



**School of  
Foundational  
Learning**

# **BASIC MATH 1**

## **MATH0701**



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**Basic Math 1**

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**To the Learner:**

This is Book 1 in a series of three Basic Math workbooks, created for you, the learner. The intention behind this book is for you to have an affordable, Canadian, adult basic education math workbook from which to build your foundation in math.

Your life is important.

Be kind and do math!

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# Unit 1: Number Introduction

## 1.1 Whole Numbers

We use whole numbers when counting. Whole numbers are written using digits.

The **digits** are 0 1 2 3 4 5 6 7 8 and 9.

A **numeral** represents a sum or quantity.

A **number** represents an amount or quantity of something.

Throughout this book, we will use the word number to represent both words numeral and number.

The whole numbers from 1 to 100 are:

|    |    |    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|----|----|-----|
| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20  |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30  |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40  |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50  |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60  |
| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70  |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80  |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90  |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |

### **Even and odd numbers**

A number is an **even** numbers if it ends in 0, 2, 4, 6, or 8.

These numbers are even. 12 56 100 1208

A number is **odd** if it ends in 1, 3, 5, 7, or 9.

These numbers are odd. 5 77 109 5899

## Place Value

This **place value chart** may help you to remember the place values.

| Millions Group   |              |          | Thousands Group   |               |           | Ones Group |      |      |
|------------------|--------------|----------|-------------------|---------------|-----------|------------|------|------|
| Hundred Millions | Ten Millions | Millions | Hundred Thousands | Ten Thousands | Thousands | Hundreds   | Tens | Ones |
|                  |              |          |                   |               |           |            |      |      |

Notice the pattern for the three places is repeated in each **place value group**. The pattern is hundreds, tens, ones. Each **place** in a number has a **value**.

## Ones

The **ones** place tells how many ones there are.

3 means 3 ones      □ □ □

9 is the largest amount that we can express (write or say) with one digit

## Tens

The **tens** place shows how many tens there are. The ones place must have a digit in it before there can be a digit in the tens place.

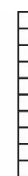
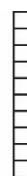
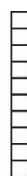
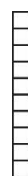
Every 10 is **ten ones**.



is



43 means 4 tens and 3 ones



## Place Value continued

The number 99 means 9 tens and 9 ones.

Ninety-nine (99) is the largest amount that we can write or say using only two digits.

## Hundreds

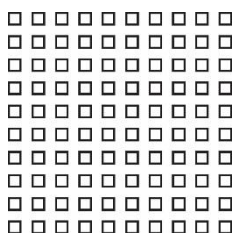
The **hundreds** place is to the left of the tens place. It shows how many hundreds there are in the number.

The ones place and the tens place must have a digit in them before there can be a digit in the hundreds place. A number written using three whole digits has a hundreds place, a tens place, and a ones place.

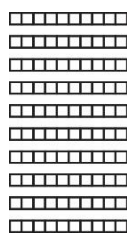
Every hundred is **10 tens**.

Every hundred is the same as **100 ones**.

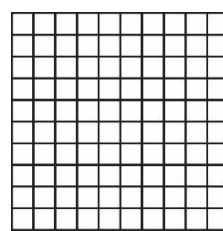
100 ones



10 tens

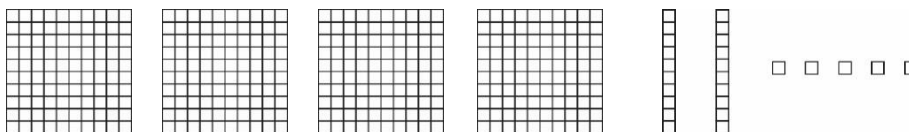


1 hundred



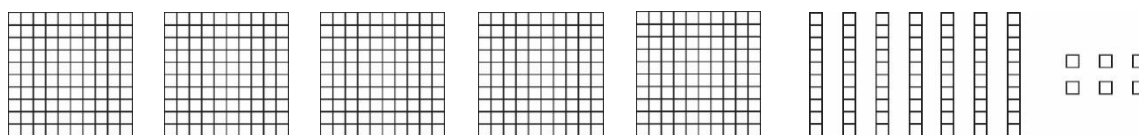
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425 means 4 hundreds, 2 tens, and 5 ones.



---

576 means 5 hundreds, 7 tens, and 6 ones.

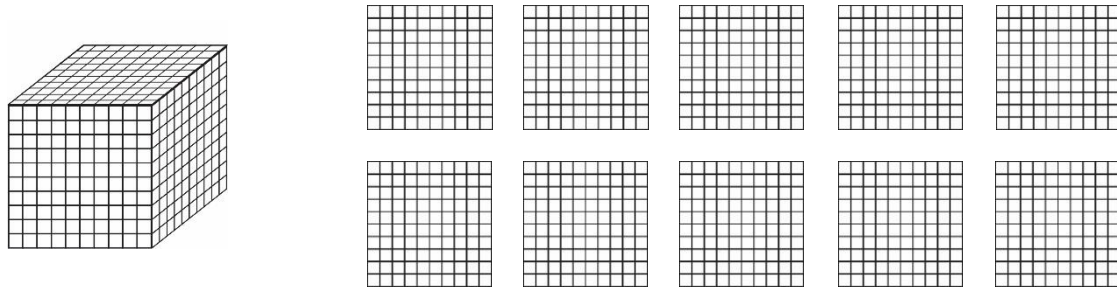


## Place Value continued

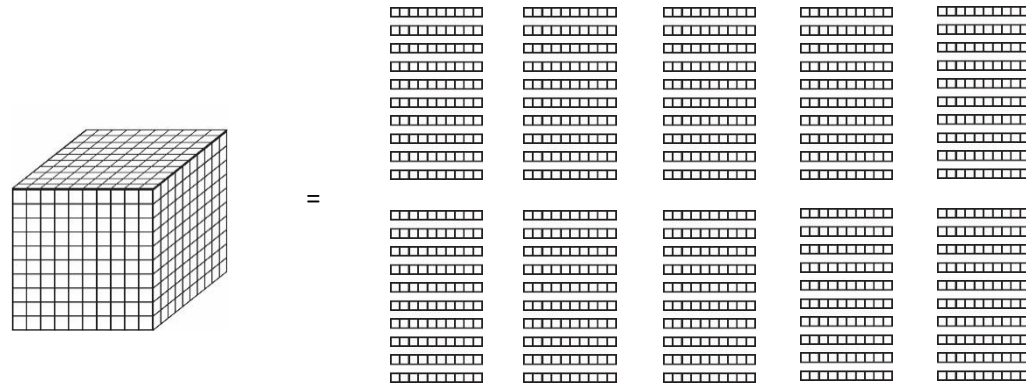
### Thousands

The place to the left of the hundreds place is the **thousands** place.

One thousand is the same as 10 hundreds.



One thousand is the same as 100 tens.



One thousand is the same as 1000 ones.  
(You will have to imagine the picture of the one thousand ones!)

## Place Value continued

### Larger Numbers

When we write numbers that are 1, 2, 3 or 4 digits in size, we write them as follows:

4      67      860      7812

When we write numbers that are 5 digits or more, a space is left between the thousands place and the hundreds place. The space makes it easier to read large numbers.

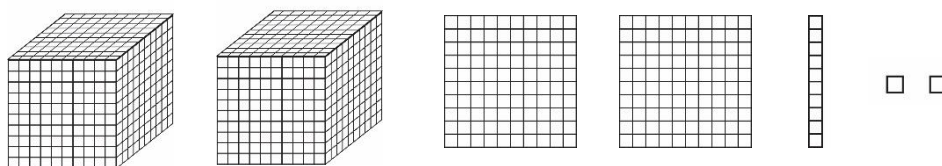
43 392      821 530      1 250 690

Large numbers may also be written with a comma (,) instead of a space.

4,392      8,253      23,693      821,530      1,250,690

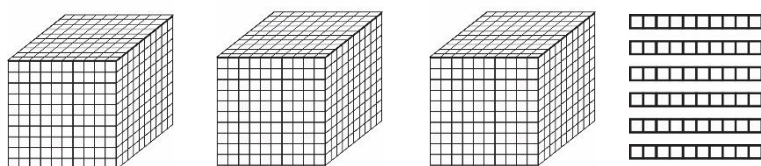
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2212 means      2 thousands, 2 hundreds, 1 ten, and 2 ones



thousands, 0 hundreds, 6 tens, and 4 ones

3064 means      3



because there are zero hundreds.

The 0 is written  
to hold the hundreds place

|                     |                 |          |                      |                  |           |          |      |      |
|---------------------|-----------------|----------|----------------------|------------------|-----------|----------|------|------|
| Hundred<br>Millions | Ten<br>Millions | Millions | Hundred<br>Thousands | Ten<br>Thousands | Thousands | Hundreds | Tens | Ones |
|                     |                 |          |                      |                  |           |          |      |      |

**Exercise 1.1a** Fill in the blanks to make each sentence true. Check your work using the answer key. The first one a) is done for you.

- a) 8261 8 thousands 2 hundreds 6 tens 1 one
- b) 4005 \_\_\_ thousands \_\_\_ hundreds \_\_\_ tens \_\_\_ ones
- c) 2931 \_\_\_ thousands \_\_\_ hundreds \_\_\_ tens \_\_\_ one
- d) 1034 \_\_\_ thousands \_\_\_ hundreds \_\_\_ tens \_\_\_ ones
- e) 2608 \_\_\_ thousands \_\_\_ hundreds \_\_\_ tens \_\_\_ ones
- f) 7543 \_\_\_ thousands \_\_\_ hundreds \_\_\_ tens \_\_\_ ones

**Answers to Exercise 1.1a**

- |                                           |                                            |
|-------------------------------------------|--------------------------------------------|
| a) 8 thousands, 2 hundreds, 6 tens, 1 one | b) 4 thousands, 0 hundreds, 0 tens, 5 ones |
| c) 2 thousands, 9 hundreds, 3 tens, 1 one | d) 1 thousand, 0 hundreds, 3 tens, 4 ones  |
| e) 2 thousands, 6 hundreds, 0 tens 8 ones | f) 7 thousands, 5 hundreds, 4 tens, 3 ones |

|                     |                 |          |                      |                  |           |          |      |      |
|---------------------|-----------------|----------|----------------------|------------------|-----------|----------|------|------|
| Hundred<br>Millions | Ten<br>Millions | Millions | Hundred<br>Thousands | Ten<br>Thousands | Thousands | Hundreds | Tens | Ones |
|                     |                 |          |                      |                  |           |          |      |      |

**Exercise 1.1b** Write the place value name for each underlined digit. Check your work using the answer key. The first one a) is done for you.

a) 23 206 thousands      b) 2468 tens

c) 622      d) 92 002

e) 92 002      f) 14 262

g) 48 076      h) 5555

i) 12 245      j) 92 002

k) 12 026      l) 6348

**Answers to Exercise 1.1b**

|              |         |                  |                  |
|--------------|---------|------------------|------------------|
| a) thousands | b) tens | c) hundreds      | d) ten thousands |
| e) hundreds  | f) tens | g) ten thousands | h) hundreds      |
| i) ones      | j) tens | k) thousands     | l) thousands     |

| Hundred<br>Millions | Ten<br>Millions | Millions | Hundred<br>Thousands | Ten<br>Thousands | Thousands | Hundreds | Tens | Ones |
|---------------------|-----------------|----------|----------------------|------------------|-----------|----------|------|------|
|                     |                 |          |                      |                  |           |          |      |      |

### Exercise 1.1c

Underline the digit for the place value named. Check your work using the answer key. The first one a) is done for you.

- |                  |                 |                      |         |
|------------------|-----------------|----------------------|---------|
| a) thousands     | 41 <u>6</u> 245 | b) hundred thousands | 206 145 |
| c) ten thousands | 36 482          | d) hundreds          | 1456    |
| e) tens          | 363 482         | f) thousands         | 63 421  |
| g) hundreds      | 74 322          | h) ones              | 685 413 |
| i) thousands     | 221 300         | j) ten thousands     | 10 000  |

#### Answers to Exercise 1.1c

- |                    |                    |                    |                    |                     |
|--------------------|--------------------|--------------------|--------------------|---------------------|
| a) 41 <u>6</u> 245 | b) <u>2</u> 06 415 | c) <u>3</u> 6 482  | d) 1 <u>4</u> 56   | e) 363 4 <u>8</u> 2 |
| f) 6 <u>3</u> 421  | g) 74 <u>3</u> 22  | h) 685 41 <u>3</u> | i) 22 <u>1</u> 300 | j) <u>1</u> 0 000   |

## 1.2 Reading and Writing Numbers

The **digits** are 0 1 2 3 4 5 6 7 8 9

Digits are arranged as numbers so we can count larger amounts than our ten fingers!

When we use **digits** we call what we write the **number**.

328 is a number with *3 digits*.

46 is a number with *2 digits*.

213 698 is a number with *6 digits*.

The numbers from 1 to 12 are written as:

|   |       |    |        |
|---|-------|----|--------|
| 0 | zero  | 7  | seven  |
| 1 | one   | 8  | eight  |
| 2 | two   | 9  | nine   |
| 3 | three | 10 | ten    |
| 4 | four  | 11 | eleven |
| 5 | five  | 12 | twelve |
| 6 | six   |    |        |

The numbers from 13 to 19 are written as:

|    |                  |
|----|------------------|
| 13 | <b>thirteen</b>  |
| 14 | <b>fourteen</b>  |
| 15 | <b>fifteen</b>   |
| 16 | <b>sixteen</b>   |
| 17 | <b>seventeen</b> |
| 18 | <b>eighteen</b>  |
| 19 | <b>nineteen</b>  |

## Reading and Writing Numbers continued

The word names for the numbers 20 to 90 are:

|    |         |
|----|---------|
| 20 | twenty  |
| 30 | thirty  |
| 40 | forty   |
| 50 | fifty   |
| 60 | sixty   |
| 70 | seventy |
| 80 | eighty  |
| 90 | ninety  |

The names for the numbers **between** groups of tens also follow a pattern. The first number tells us how many tens. The second number tells us how many ones.

|    | <b>Tens</b>          | <b>Ones</b> |    | <b>Tens</b>          | <b>Ones</b> |    | <b>Tens</b>         | <b>Ones</b> |
|----|----------------------|-------------|----|----------------------|-------------|----|---------------------|-------------|
| 20 | twenty               |             | 30 | thirty               |             | 40 | forty               |             |
| 21 | twenty- <b>one</b>   |             | 31 | thirty- <b>one</b>   |             | 41 | forty- <b>one</b>   |             |
| 22 | twenty- <b>two</b>   |             | 32 | thirty- <b>two</b>   |             | 42 | forty- <b>two</b>   |             |
| 23 | twenty- <b>three</b> |             | 33 | thirty- <b>three</b> |             | 43 | forty- <b>three</b> |             |
| 24 | twenty- <b>four</b>  |             | 34 | thirty- <b>four</b>  |             | 44 | forty- <b>four</b>  |             |
| 25 | twenty- <b>five</b>  |             | 35 | thirty- <b>five</b>  |             | 45 | forty- <b>five</b>  |             |
| 26 | twenty- <b>six</b>   |             | 36 | thirty- <b>six</b>   |             | 46 | forty- <b>six</b>   |             |
| 27 | twenty- <b>seven</b> |             | 37 | thirty- <b>seven</b> |             | 47 | forty- <b>seven</b> |             |
| 28 | twenty- <b>eight</b> |             | 38 | thirty- <b>eight</b> |             | 48 | forty- <b>eight</b> |             |
| 29 | twenty- <b>nine</b>  |             | 39 | thirty- <b>nine</b>  |             | 49 | forty- <b>nine</b>  |             |

The written names for numbers that have tens and ones are written with a hyphen ( - ) between them. This pattern continues up to ninety-nine (99).

## Writing Numbers into Words

When we write hundreds in words, we need two words. The first word tells us **how many** hundreds. The second word tells us we are **counting hundreds**.

100 one hundred

200 two hundred

300 three hundred

400 four hundred

500 five hundred

600 six hundred

700 seven hundred

800 eight hundred

900 nine hundred

1000 one thousand (this is ten hundreds but we say one thousand)

### Example A

|                         |                                  |               |               |
|-------------------------|----------------------------------|---------------|---------------|
| <b>367</b> is made of   | <b>3</b> hundreds                | <b>6</b> tens | <b>7</b> ones |
| Each is written:        | three hundred                    | sixty         | seven         |
| Put the parts together: | <b>three hundred sixty-seven</b> |               |               |

### Remember

Put a hyphen (-) between the tens and the ones.

There is no 's' on the hundred.

There is no 'and' between hundreds place and tens place.

### Example B

|                         |                          |               |               |
|-------------------------|--------------------------|---------------|---------------|
| <b>504</b> is made of   | <b>5</b> hundreds        | <b>0</b> tens | <b>4</b> ones |
| Each is written:        | five hundred             |               | four          |
| Put the parts together: | <b>five hundred four</b> |               |               |

## Writing Numbers into Words continued

### Example C

|                        |                             |               |               |
|------------------------|-----------------------------|---------------|---------------|
| <b>890</b> is made of  | <b>8</b> hundreds           | <b>9</b> tens | <b>0</b> ones |
| Each is written:       | eight hundred               | ninety        |               |
| Put the parts together | <b>eight hundred ninety</b> |               |               |

### Example D

|                        | hundred thousands                                           | ten thousands | thousands | hundreds      | tens   | ones |
|------------------------|-------------------------------------------------------------|---------------|-----------|---------------|--------|------|
| <b>423 796</b><br>is   | 4                                                           | 2             | 3         | 7             | 9      | 6    |
| Each is written        | four hundred twenty-three <b>thousand</b>                   |               |           | seven hundred | ninety | six  |
| Put the parts together | four hundred twenty-three thousand seven hundred ninety-six |               |           |               |        |      |

423 796 is four hundred twenty-three **thousand** seven hundred ninety-six

### Example E

|                        | hundred thousands                   | ten thousands | thousands | hundreds    | tens | ones |
|------------------------|-------------------------------------|---------------|-----------|-------------|------|------|
| <b>26 201</b><br>is    |                                     | 2             | 6         | 2           | 0    | 1    |
| Each is written        | twenty-six <b>thousand</b>          |               |           | two hundred |      | one  |
| Put the parts together | twenty-six thousand two hundred one |               |           |             |      |      |

26 201 is twenty-six **thousand** two hundred one

## Writing Numbers into Words continued

### Example F

|                           | hundred<br>thousands         | ten<br>thousands | thousands | hundreds | tens | ones |
|---------------------------|------------------------------|------------------|-----------|----------|------|------|
| <b>400 000</b><br>is      | 4                            | 0                | 0         | 0        | 0    | 0    |
| Each is<br>written        | four hundred <b>thousand</b> |                  |           |          |      |      |
| Put the parts<br>together | four hundred thousand        |                  |           |          |      |      |

### Exercise 1.2a

Write the word names for the numbers. Check your work by using the answer key at the end of the exercise.

|                           |                      |                  |           |          |      |      |
|---------------------------|----------------------|------------------|-----------|----------|------|------|
| a)                        | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
| <b>91 200</b><br>is       |                      |                  |           |          |      |      |
| Each is<br>written        |                      |                  |           |          |      |      |
| Put the parts<br>together |                      |                  |           |          |      |      |

|                           |                      |                  |           |          |      |      |
|---------------------------|----------------------|------------------|-----------|----------|------|------|
| b)                        | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
| <b>19 631</b><br>is       |                      |                  |           |          |      |      |
| Each is<br>written        |                      |                  |           |          |      |      |
| Put the parts<br>together |                      |                  |           |          |      |      |

**Exercise 1.2a continued** Write the word names for the numbers. Check your work by using the answer key at the end of the exercise.

| c)                        | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|---------------------------|----------------------|------------------|-----------|----------|------|------|
| <b>34 212</b><br>is       |                      |                  |           |          |      |      |
| Each is<br>written        |                      |                  |           |          |      |      |
| Put the parts<br>together |                      |                  |           |          |      |      |

| d)                        | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|---------------------------|----------------------|------------------|-----------|----------|------|------|
| <b>3426</b><br>is         |                      |                  |           |          |      |      |
| Each is<br>written        |                      |                  |           |          |      |      |
| Put the parts<br>together |                      |                  |           |          |      |      |

| e)                        | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|---------------------------|----------------------|------------------|-----------|----------|------|------|
| <b>218 000</b><br>is      |                      |                  |           |          |      |      |
| Each is<br>written        |                      |                  |           |          |      |      |
| Put the parts<br>together |                      |                  |           |          |      |      |

| f)                        | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|---------------------------|----------------------|------------------|-----------|----------|------|------|
| <b>623 009</b><br>is      |                      |                  |           |          |      |      |
| Each is<br>written        |                      |                  |           |          |      |      |
| Put the parts<br>together |                      |                  |           |          |      |      |

**Exercise 1.2a continued**

Write the word names for the numbers without the place value chart.

g) 5456

h) 9099

i) 25 876

j) 923 001

**Answers to Exercise 1.2a**

a) ninety-one thousand two hundred

b) nineteen thousand six hundred thirty-one

c) thirty-four thousand two hundred twelve

d) three thousand four hundred twenty-six

e) two hundred eighteen thousand

f) six hundred twenty-three thousand nine

g) five thousand four hundred fifty-six

h) nine thousand ninety-nine

i) twenty-five thousand eight hundred seventy-six j) nine hundred twenty-three thousand one

## Writing Larger Numbers in Words

Look at these very large numbers. The group to the left of the thousands group is the millions group.

|                        | millions                                                                          | hundred thousands                       | ten thousands | thousands | hundreds    | tens   | ones |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------|---------------|-----------|-------------|--------|------|
| <b>2 643 182</b><br>is | 2                                                                                 | 6                                       | 4             | 3         | 1           | 8      | 2    |
| Each is written        | two <b>million</b>                                                                | six hundred forty-three <b>thousand</b> |               |           | one hundred | eighty | two  |
| Put the parts together | two <b>million</b> six hundred forty-three <b>thousand</b> one hundred eighty-two |                                         |               |           |             |        |      |

### Exercise 1.2b

Write the word names for the large numbers. Check your work by using the answer key at the end of the exercise.

| a)                     | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|------------------------|----------|-------------------|---------------|-----------|----------|------|------|
| <b>6 510 231</b><br>is |          |                   |               |           |          |      |      |
| Each is written        |          |                   |               |           |          |      |      |
| Put the parts together |          |                   |               |           |          |      |      |

| b)                     | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|------------------------|----------|-------------------|---------------|-----------|----------|------|------|
| <b>2 851 234</b><br>is |          |                   |               |           |          |      |      |
| Each is written        |          |                   |               |           |          |      |      |
| Put the parts together |          |                   |               |           |          |      |      |

#### Answers to Exercise 1.2b

a) six million five hundred ten thousand two hundred thirty-one

b) two million eight hundred fifty-one thousand two hundred thirty-four

## Writing Words into Numbers

Work on reading these numbers aloud by yourself or with someone else.

|         |           |
|---------|-----------|
| 107     | 450       |
| 7800    | 45 409    |
| 4231    | 4342      |
| 13 000  | 410 623   |
| 12 050  | 24 900    |
| 227 695 | 1 105 576 |

### Exercise 1.2c

Write numbers from the words. Check your work by using the answer key at the end of the exercise. The first one a) is done for you.

a) forty-one is 41.

|          |                   |               |           |                  |      |      |
|----------|-------------------|---------------|-----------|------------------|------|------|
|          |                   |               |           | <i>forty-one</i> |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds         | tens | ones |
|          |                   |               |           |                  | 4    | 1    |

b) five hundred sixty-seven is \_\_\_\_\_

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

### Exercise 1.2c continued

c) sixty-eight is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

d) three hundred twenty-five is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

e) two hundred thirty-two is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

f) four hundred is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

### Exercise 1.2c continued

g) five hundred four is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

h) three thousand two hundred fifteen is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

i) six thousand, three hundred is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

j) twenty-six thousand five hundred eighteen is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

### Exercise 1.2c continued

k) nineteen thousand three hundred forty-five is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

l) seventy thousand two hundred is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

m) forty-eight thousand three hundred two is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

n) five hundred eighty-two thousand sixty-five is \_\_\_\_\_.

|          |                   |               |           |          |      |      |
|----------|-------------------|---------------|-----------|----------|------|------|
|          |                   |               |           |          |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|          |                   |               |           |          |      |      |

### Answers to Exercise 1.2c

a) forty-one is 41

b) five hundred sixty-seven is 567

|          |                   |               |           |                          |      |      |
|----------|-------------------|---------------|-----------|--------------------------|------|------|
|          |                   |               |           | five hundred sixty-seven |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds                 | tens | ones |
|          |                   |               |           | 5                        | 6    | 7    |

c) sixty-eight is 68

|          |                   |               |           |               |      |      |
|----------|-------------------|---------------|-----------|---------------|------|------|
|          |                   |               |           | sixty - eight |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds      | tens | ones |
|          |                   |               |           |               | 6    | 8    |

d) three hundred twenty-five is 325

|          |                   |               |           |                           |      |      |
|----------|-------------------|---------------|-----------|---------------------------|------|------|
|          |                   |               |           | three hundred twenty-five |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds                  | tens | ones |
|          |                   |               |           | 3                         | 2    | 5    |

e) two hundred thirty-two is 232

|          |                   |               |           |                        |      |      |
|----------|-------------------|---------------|-----------|------------------------|------|------|
|          |                   |               |           | two hundred thirty-two |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds               | tens | ones |
|          |                   |               |           | 2                      | 3    | 2    |

f) four hundred is 400

|          |                   |               |           |              |      |      |
|----------|-------------------|---------------|-----------|--------------|------|------|
|          |                   |               |           | four hundred |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds     | tens | ones |
|          |                   |               |           | 4            | 0    | 0    |

g) five hundred four is 504

|          |                   |               |           |                   |      |      |
|----------|-------------------|---------------|-----------|-------------------|------|------|
|          |                   |               |           | five hundred four |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds          | tens | ones |
|          |                   |               |           | 5                 | 0    | 4    |

h) three thousand two hundred fifteen is 3215

|          |                   |               |                |                     |      |      |
|----------|-------------------|---------------|----------------|---------------------|------|------|
|          |                   |               | three thousand | two hundred fifteen |      |      |
| millions | hundred thousands | ten thousands | thousands      | hundreds            | tens | ones |
|          |                   |               | 3              | 2                   | 1    | 5    |

## Answers to Exercise 1.2c continued

- i) six thousand three hundred is 6300

|          |                   |               |           |               |      |      |
|----------|-------------------|---------------|-----------|---------------|------|------|
|          | six thousand      |               |           | three hundred |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds      | tens | ones |
|          |                   |               | 6         | 3             | 0    | 0    |

- j) twenty-six thousand five hundred eighteen is 26 518

|          |                     |               |           |                       |      |      |
|----------|---------------------|---------------|-----------|-----------------------|------|------|
|          | twenty-six thousand |               |           | five hundred eighteen |      |      |
| millions | hundred thousands   | ten thousands | thousands | hundreds              | tens | ones |
|          |                     | 2             | 6         | 5                     | 1    | 8    |

- k) nineteen thousand three hundred forty-five is 19 345

|          |                   |               |           |                          |      |      |
|----------|-------------------|---------------|-----------|--------------------------|------|------|
|          | nineteen thousand |               |           | three hundred forty-five |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds                 | tens | ones |
|          |                   | 1             | 9         | 3                        | 4    | 5    |

- l) seventy thousand two hundred is 70 200

|          |                   |               |           |             |      |      |
|----------|-------------------|---------------|-----------|-------------|------|------|
|          | seventy thousand  |               |           | two hundred |      |      |
| millions | hundred thousands | ten thousands | thousands | hundreds    | tens | ones |
|          |                   | 7             | 0         | 2           | 0    | 0    |

- m) forty-eight thousand three hundred two is 48 302

|          |                      |               |           |                   |      |      |
|----------|----------------------|---------------|-----------|-------------------|------|------|
|          | forty-eight thousand |               |           | three hundred two |      |      |
| millions | hundred thousands    | ten thousands | thousands | hundreds          | tens | ones |
|          |                      | 4             | 8         | 3                 | 0    | 2    |

- n) five hundred eighty-two thousand sixty five is 582 065

|          |                                  |               |           |            |      |      |
|----------|----------------------------------|---------------|-----------|------------|------|------|
|          | five hundred eighty-two thousand |               |           | sixty-five |      |      |
| millions | hundred thousands                | ten thousands | thousands | hundreds   | tens | ones |
|          | 5                                | 8             | 2         | 0          | 6    | 5    |

## Exercise 1.2d

Write the number in each of the word problems. You do not have to write a word sentence for your final answer. Check your work by using the answer key at the end of the exercise.

- a) The Nile River in Africa is the longest river in the world. Its length is **two thousand five hundred sixty-nine** kilometers. Write the number using digits.
- b) Canada shares a border with the United States. The border's length is **eight thousand eight hundred ninety-three** kilometers. Write the number using digits.
- c) The distance around the Earth is **forty thousand seventy-six** kilometers. Write the number using digits.
- d) The population of Alberta in 2014 was **three million seven hundred thirty-two thousand six hundred**. Write the number using digits. (*Statistics Canada*)
- e) The population of Canada in 2014 was **thirty-four million, five thousand, three hundred**. Write the number using digits. (*Statistics Canada*)

### Answers to Exercise 1.2d

- a) 2569 kilometres   b) 8893 kilometres   c) 40 076 kilometres  
d) 3 732 600 people   e) 34 005 300 people

## Telling Time

There are two types of clocks – digital and analog. Digital clocks display the time as numbers. Analog clocks are clocks with hands. The shorter hand tells the hour and the longer hand tells the minutes.

In an analog clock, the minute hand travels faster than the hour hand as it has to cover 60 minutes. The hour hand only needs to travel between the numerals in the same time it takes the minute hand to cover 60 minutes.

To tell what time it is, look at the shorter hand to figure out what hour it is. Next, look at the minute hand to figure out the minutes. Each numeral of the clock represents a certain number of minutes. Look at the chart.

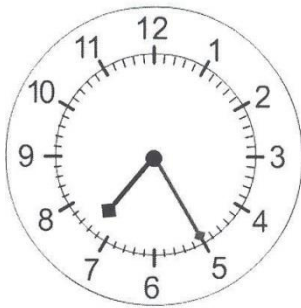
### AM and PM

The time from midnight to 11:59 (just before noon) is AM.

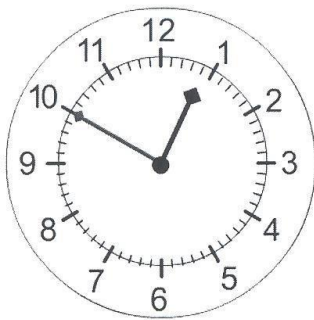
The time from 12:00 noon to 11:59 (at night) is PM.

| <b>Numeral</b> | <b>Minutes</b> |
|----------------|----------------|
| 1              | 5              |
| 2              | 10             |
| 3              | 15             |
| 4              | 20             |
| 5              | 25             |
| 6              | 30             |
| 7              | 35             |
| 8              | 40             |
| 9              | 45             |
| 10             | 50             |
| 11             | 55             |
| 12             | o'clock        |

## Example A



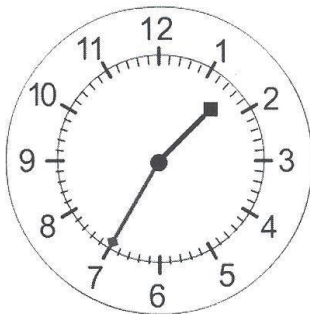
The shorter hand is closer to the 7. This means that the hour is 7. The longer hand is pointing to the 5. This means 25 minutes (check the chart on the page before). The time would be written as 7:25.



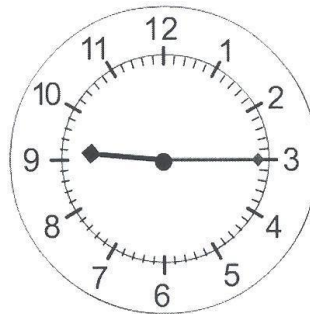
Look at the shorter hand. It is after the 12 and not yet to the 1, so this means that the hour is 12. The longer hand is pointing at the 10. This means 50 minutes (check the chart on the page before). The time would be written as 12:50.

**Exercise One** Write the time shown on each clock. Check the answers using the answer key.

a)

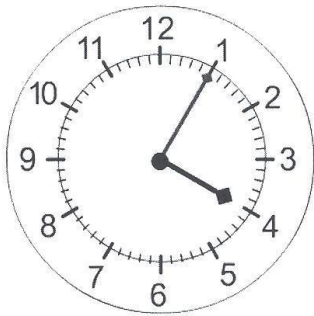


b)

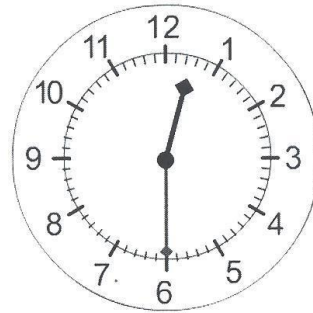


### Exercise Telling Time continued

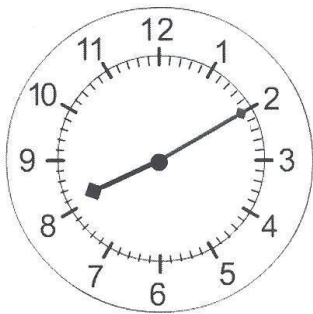
c)



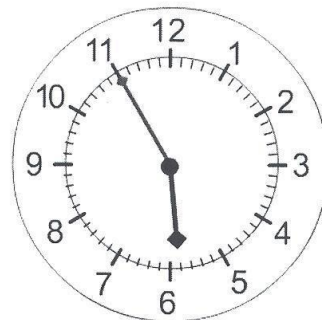
d)



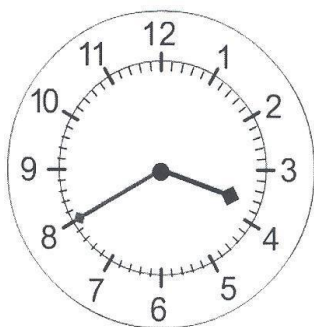
e)



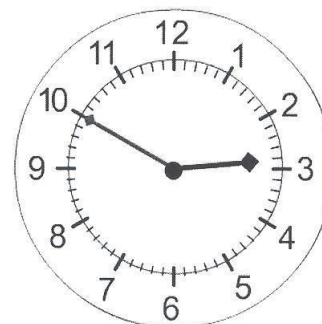
f)



g)

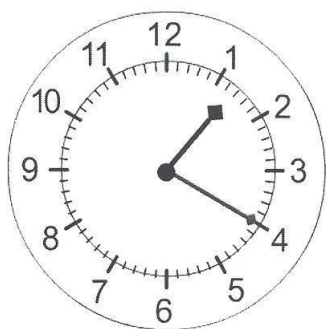


h)

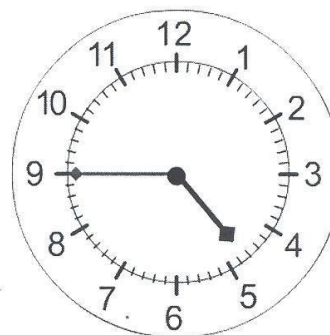


## Exercise Telling Time continued

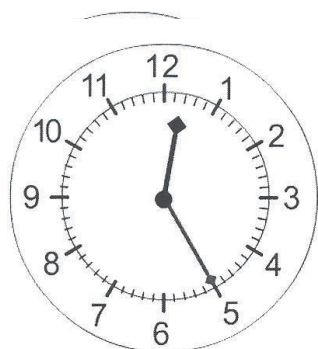
i)



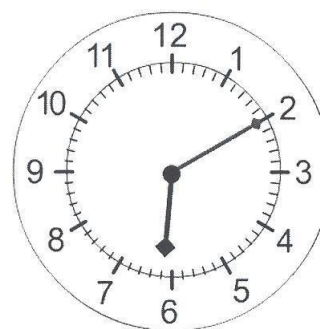
j)



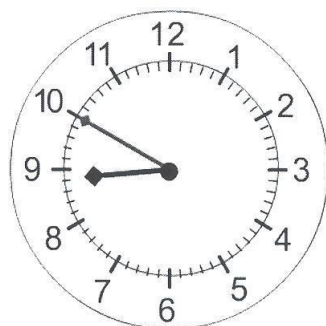
k)



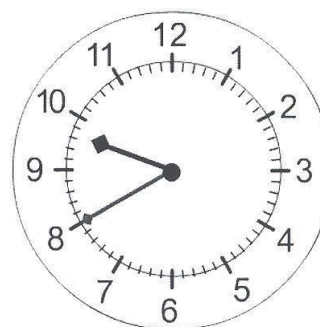
l)



m)



n)



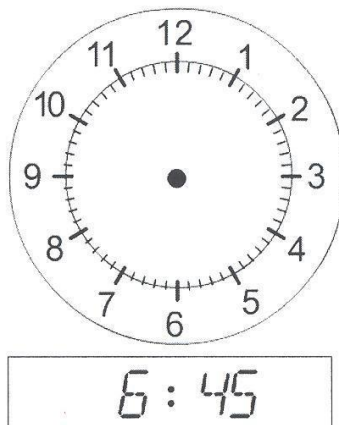
### Answers to Exercise One

- |         |         |          |          |
|---------|---------|----------|----------|
| a) 1:35 | b) 9:15 | c) 4:05  | d) 12:30 |
| e) 8:10 | f) 5:55 | g) 3:40  | h) 2:50  |
| i) 1:20 | j) 4:45 | k) 12:25 | l) 6:10  |
| m) 8:50 | n) 9:40 |          |          |

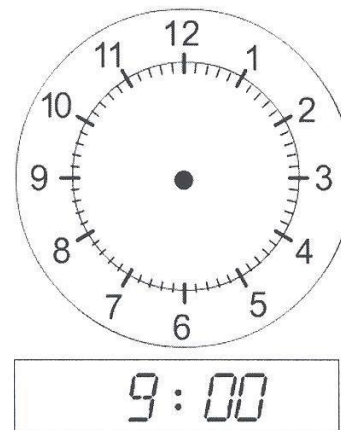
## Exercise Four

Under each clock is a time on a digital clock. Draw the hands on the analog clock to show the digital time. Check your work using the answer key at the end of the exercise.

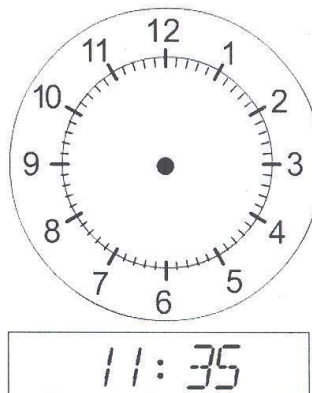
a)



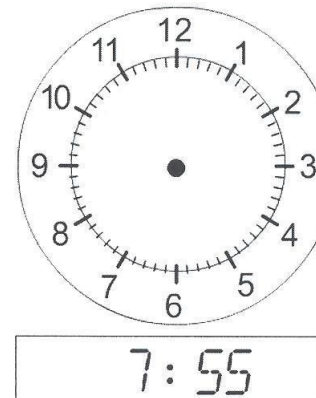
b)



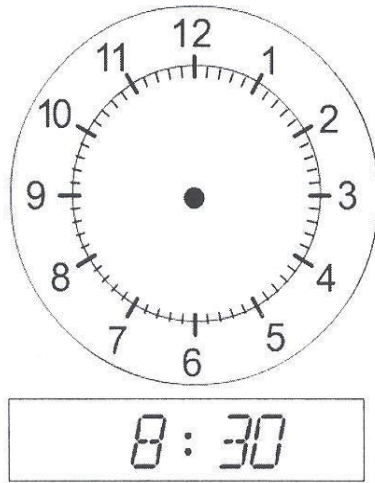
c)



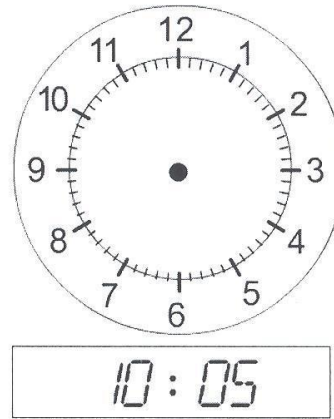
d)



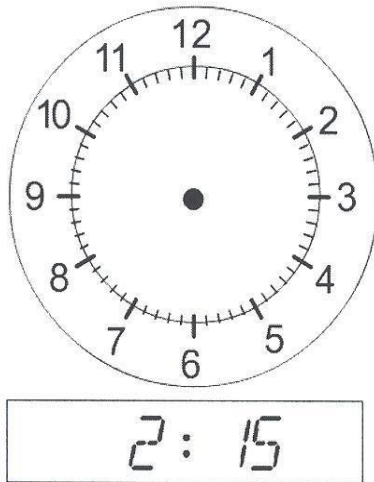
e)



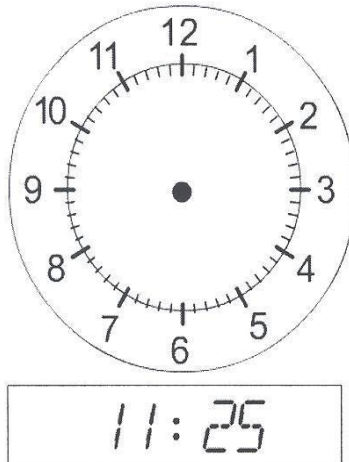
f)



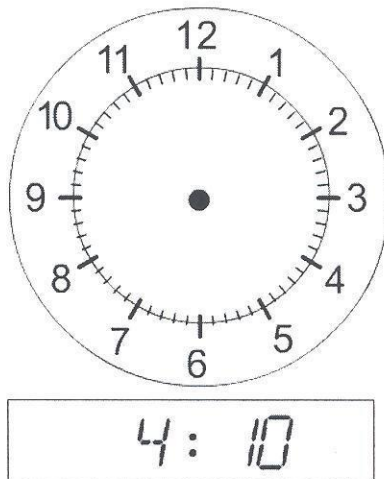
g)



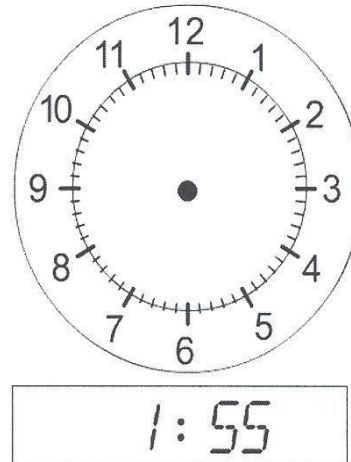
h)



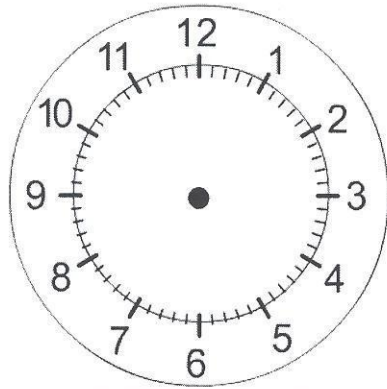
i)



j)

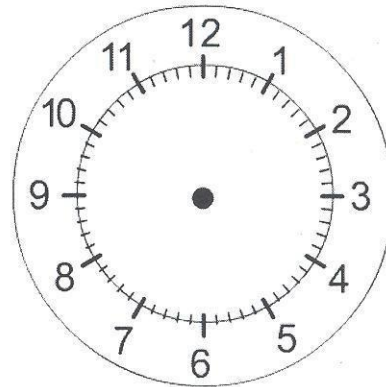


k)



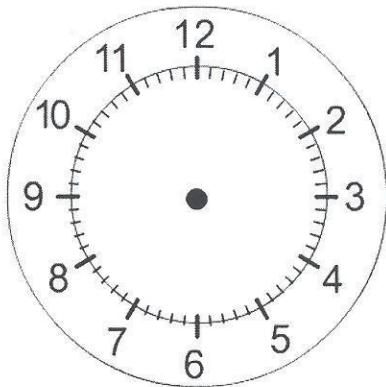
5:05

l)



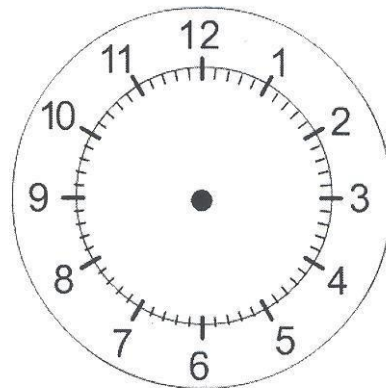
9:50

m)



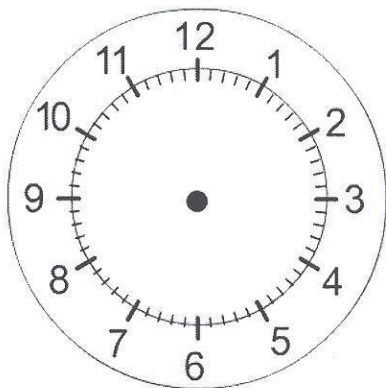
12:15

n)



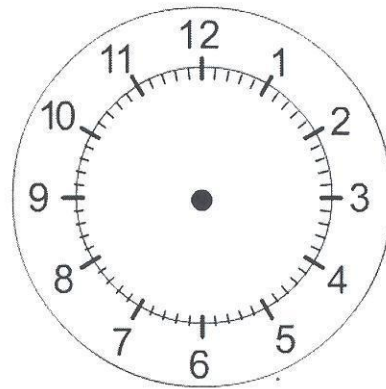
3:55

o)



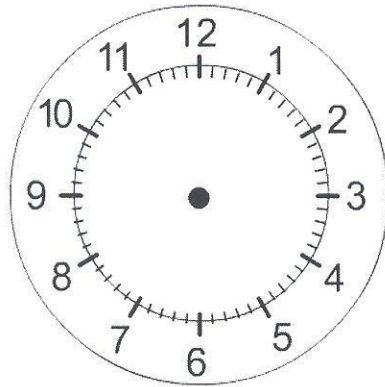
8:40

p)



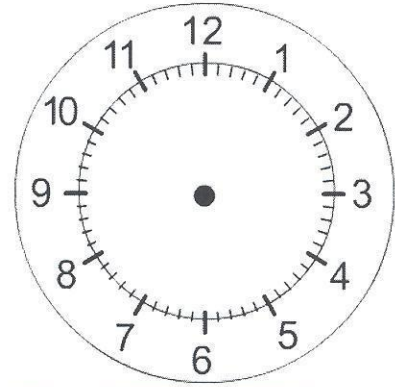
6:00

q)



10:45

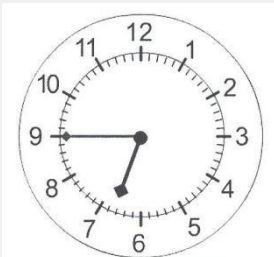
r)



7:20

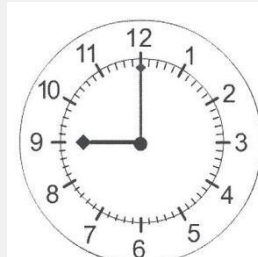
#### Answers to Exercise Four

a)



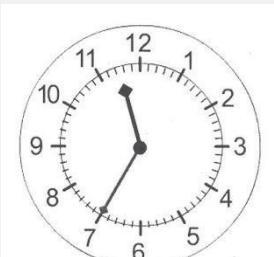
6:45

b)



9:00

c)



11:35

d)



7:55

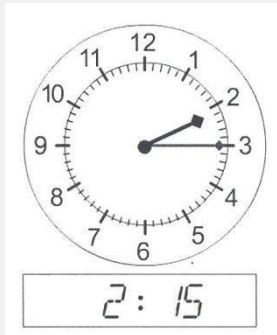
e)



f)



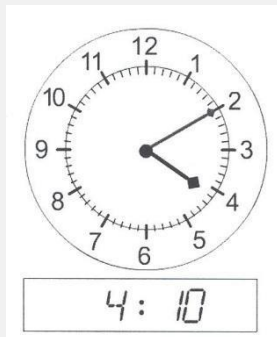
g)



h)



i)



j)



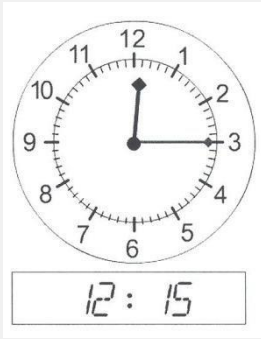
k)



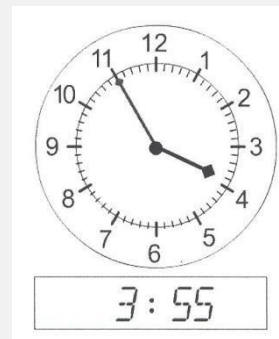
l)



m)



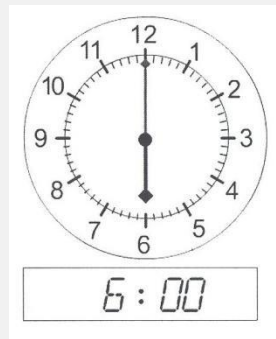
n)



o)



p)



q)



r)



## **Review: Place Value/Reading & Writing Numbers**

**A. Write the place value for the underlined digit.**

a) 8 765 \_\_\_\_\_ b) 930 \_\_\_\_\_

c) 47 932 \_\_\_\_\_ d) 85 421 \_\_\_\_\_

e) 279 673 \_\_\_\_\_ f) 397 \_\_\_\_\_

**B. Write the word names for these numbers.**

a) 59 \_\_\_\_\_

b) 942  
\_\_\_\_\_

c) 7378  
\_\_\_\_\_

d) 8200  
\_\_\_\_\_

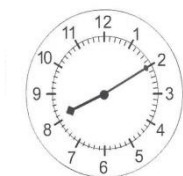
e) 4005  
\_\_\_\_\_

f) 58 310  
\_\_\_\_\_

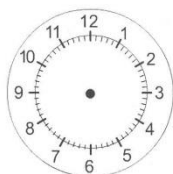
**C. Write the numbers in digits for these number words.**

- a) eight hundred forty-seven \_\_\_\_\_
- b) four thousand three hundred eighty \_\_\_\_\_
- c) two hundred seventy-five thousand eighty-seven \_\_\_\_\_
- d) sixty thousand four hundred sixteen \_\_\_\_\_
- e) fifteen thousand twenty \_\_\_\_\_

**D. a) Write the time shown on the clock.**



**b) Using the digital time below the clock, draw the hands on the analog clock**



11:35

**Answers to Review Place Value – Reading & Writing Numbers**

**A.**

- a) tens                      b) ones                      c) ten thousands
- d) thousands              e) hundred thousands      f) hundreds

**B.**

- a) fifty-nine                      b) nine hundred forty-two
- c) seven thousand three hundred seventy-eight                      d) eight thousand two hundred
- e) four thousand five                      f) fifty-eight thousand three hundred ten

**C.**

- a) 847                      b) 4380                      c) 275 087                      d) 60 416                      e) 15 020

**D. a) 8:10**

**b)**



11:35

## 1.3 Expanded and Standard Form

### Expanded Form (Expanded Notation)

When we write a number in **expanded form (or expanded notation)**, each digit is written with the **value of the place** it holds.

#### **Example A** five hundred ninety-eight

|                 | millions            | hundred thousands | ten thousands | thousands | hundreds | tens     | ones     |
|-----------------|---------------------|-------------------|---------------|-----------|----------|----------|----------|
| <b>598</b> is   |                     |                   |               |           | <b>5</b> | <b>9</b> | <b>8</b> |
| Each is written |                     |                   |               |           | 500      | 90       | 8        |
| Expanded form   | <b>500 + 90 + 8</b> |                   |               |           |          |          |          |

In this example, the 5 is in the hundreds place and has a value of 500;  
the 9 is in the tens place and has a value of 90;  
and, the 8 is in the ones place and has a value of 8.

The total value of five hundred ninety-eight is  $500 + 90 + 8 = 598$ .

#### **Example B** one thousand sixty-five

|                 | millions             | hundred thousands | ten thousands | thousands | hundreds | tens     | ones     |
|-----------------|----------------------|-------------------|---------------|-----------|----------|----------|----------|
| <b>1 065</b> is |                      |                   |               | <b>1</b>  | <b>0</b> | <b>6</b> | <b>5</b> |
| Each is written |                      |                   |               | 1000      |          | 60       | 5        |
| Expanded form   | <b>1000 + 60 + 5</b> |                   |               |           |          |          |          |

In this example, the 1 is in the thousands place and has a value of 1 000;  
there are zero hundreds, which has a value of 0;  
the 6 is in the tens place and has a value of 60;  
and, the 5 is in the ones place and has a value of 5.

The total value of one thousand sixty five is  $1000 + 0 + 60 + 5 = 1065$ .

You do not need to include the 0.  $1000 + 60 + 5 = 1065$ .

## Expanded Form continued

### Example C forty-three thousand six hundred ninety

|                     | millions                        | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|---------------------|---------------------------------|-------------------|---------------|-----------|----------|------|------|
| <b>43 690</b><br>is |                                 |                   | 4             | 3         | 6        | 9    | 0    |
| Each is written     |                                 |                   | 40 000        | 3000      | 600      | 90   | 0    |
| Expanded form       | <b>40 000 + 3000 + 600 + 90</b> |                   |               |           |          |      |      |

### Exercise 1.3a

Write each number in expanded form. Check your work using the answer key at the end of the exercise. The first one a) is done for you.

a) 329

|                  | millions            | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|------------------|---------------------|-------------------|---------------|-----------|----------|------|------|
| <b>329</b><br>is |                     |                   |               |           | 3        | 2    | 9    |
| Each is written  |                     |                   |               |           | 300      | 20   | 9    |
| Expanded form    | <i>300 + 20 + 9</i> |                   |               |           |          |      |      |

b) 762

|                  | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|------------------|----------|-------------------|---------------|-----------|----------|------|------|
| <b>762</b><br>is |          |                   |               |           |          |      |      |
| Each is written  |          |                   |               |           |          |      |      |
| Expanded form    |          |                   |               |           |          |      |      |

### Exercise 1.3a continued

c) 1847

|                   | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|-------------------|----------|-------------------|---------------|-----------|----------|------|------|
| <b>1847</b><br>is |          |                   |               |           |          |      |      |
| Each is written   |          |                   |               |           |          |      |      |
| Expanded form     |          |                   |               |           |          |      |      |

d) 6301

|                   | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|-------------------|----------|-------------------|---------------|-----------|----------|------|------|
| <b>6301</b><br>is |          |                   |               |           |          |      |      |
| Each is written   |          |                   |               |           |          |      |      |
| Expanded form     |          |                   |               |           |          |      |      |

e) 16 492

|                     | millions | hundred thousands | ten thousands | thousands | hundreds | tens | ones |
|---------------------|----------|-------------------|---------------|-----------|----------|------|------|
| <b>16 492</b><br>is |          |                   |               |           |          |      |      |
| Each is written     |          |                   |               |           |          |      |      |
| Expanded form       |          |                   |               |           |          |      |      |

### Exercise 1.3a continued

f) 74 296

|                     | millions | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|---------------------|----------|----------------------|------------------|-----------|----------|------|------|
| <b>74 296</b><br>is |          |                      |                  |           |          |      |      |
| Each is<br>written  |          |                      |                  |           |          |      |      |
| Expanded<br>form    |          |                      |                  |           |          |      |      |

g) 378 403

|                      | millions | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|----------------------|----------|----------------------|------------------|-----------|----------|------|------|
| <b>378 403</b><br>is |          |                      |                  |           |          |      |      |
| Each is<br>written   |          |                      |                  |           |          |      |      |
| Expanded<br>form     |          |                      |                  |           |          |      |      |

h) 721 834

|                      | millions | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|----------------------|----------|----------------------|------------------|-----------|----------|------|------|
| <b>721 834</b><br>is |          |                      |                  |           |          |      |      |
| Each is<br>written   |          |                      |                  |           |          |      |      |
| Expanded<br>form     |          |                      |                  |           |          |      |      |

### Exercise 1.3a continued

i) 3 816 450

|                        | millions | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|------------------------|----------|----------------------|------------------|-----------|----------|------|------|
| <b>3 816 450</b><br>is |          |                      |                  |           |          |      |      |
| Each is<br>written     |          |                      |                  |           |          |      |      |
| Expanded<br>form       |          |                      |                  |           |          |      |      |

j) 2 941 678

|                        | millions | hundred<br>thousands | ten<br>thousands | thousands | hundreds | tens | ones |
|------------------------|----------|----------------------|------------------|-----------|----------|------|------|
| <b>2 941 678</b><br>is |          |                      |                  |           |          |      |      |
| Each is<br>written     |          |                      |                  |           |          |      |      |
| Expanded<br>form       |          |                      |                  |           |          |      |      |

#### Answers to Exercise 1.3a

- a)  $300 + 20 + 9$
- b)  $700 + 60 + 2$
- c)  $1000 + 800 + 40 + 7$
- d)  $6000 + 300 + 1$
- e)  $10\,000 + 6000 + 400 + 90 + 2$
- f)  $70\,000 + 4000 + 200 + 90 + 6$
- g)  $300\,000 + 70\,000 + 8000 + 400 + 3$
- h)  $700\,000 + 20\,000 + 1000 + 800 + 30 + 4$
- i)  $3\,000\,000 + 800\,000 + 10\,000 + 6000 + 400 + 50$
- j)  $2\,000\,000 + 900\,000 + 40\,000 + 1000 + 600 + 70 + 8$

### Standard Form (Standard Notation)

Standard form uses the expanded form to create the number.

**Example A**  $600 + 30 + 7 =$  **637**  
Expanded form      Standard form

To change from expanded form to standard form, count how many place values the largest number holds. In  $600 + 30 + 7$ , the 600 is the largest number and has three places, so write down three underscores.

\_\_\_ \_ \_ Fill in the underscores with each applicable digit.

6                With 600, the 6 goes in the hundreds place.

6 3 \_\_\_\_ With 30, the 3 goes in the tens place.

6   3   7   With 7, the 7 goes in the ones place.

**Example B**

|                  |   |                                                                             |   |               |
|------------------|---|-----------------------------------------------------------------------------|---|---------------|
| $7000 + 500 + 1$ | = | $\underline{7} \quad \underline{5} \quad \underline{0} \quad \underline{1}$ | = | 7501          |
| Expanded form    |   |                                                                             |   | Standard form |

The 7000 has 4 digits, write out four underscores.  
Fill in the underscores with each applicable digit.  
There are zero tens so put a zero in the tens place.

**Example C**

|                                                         |               |
|---------------------------------------------------------|---------------|
| $4\ 000\ 000 + 600\ 000 + 70\ 000 + 8\ 000 + 900 + 3 =$ | $4\ 678\ 903$ |
| Expanded form                                           | Standard form |

4   6   7   8   9   0   3

The 4 000 000 has 7 digits, write out seven underscores.  
Fill in the underscores with each applicable digit.  
There are zero tens so put a zero in the tens place.

**Exercise 1.3b**

Write each number in standard form. Check your work using the answer key at the end of the exercise. The first one a) is done.

a)  $400 + 10 + 6 = \underline{4} \ \underline{1} \ \underline{6} = 416$

b)  $500 + 40 + 2 =$

c)  $5000 + 600 + 10 + 8 =$

d)  $4000 + 100 + 40 + 5 =$

e)  $20\ 000 + 1000 + 800 + 10 + 2 =$

f)  $40\ 000 + 200 + 5 =$

g)  $200\ 000 + 50\ 000 + 3000 + 400 + 80 + 3 =$

h)  $300\ 000 + 50\ 000 + 700 + 10 + 9 =$

i)  $1\ 000\ 000 + 400\ 000 + 20\ 000 + 3000 + 600 + 50 =$

**Answers to Exercise 1.3b**

a) 416

b) 542

c) 5618

d) 4145

e) 21 812

f) 40 205

g) 253 483

h) 350 719

i) 1 423 650

## **Review: Expanded and Standard Form**

**A. Write each number in expanded form.**

a) 643

b) 759

c) 4821

d) 94 205

e) 367 542

f) 1 850 643

**B. Write each number in standard form.**

a)  $300 + 60 + 9 =$

b)  $700 + 5 =$

c)  $1000 + 400 + 90 + 1 =$

d)  $20\,000 + 1000 + 500 + 80 + 4 =$

e)  $500\,000 + 40\,000 + 2000 + 700 + 30 + 9 =$

f)  $3\,000\,000 + 900\,000 + 60\,000 + 8000 + 400 + 30 + 1 =$

**Answers to Review: Expanded and Standard Form**

A.a)  $600 + 40 + 3$

b)  $700 + 50 + 9$

c)  $4000 + 800 + 20 + 1$

d)  $90\,000 + 4000 + 200 + 5$

e)  $300\,000 + 60\,000 + 7000 + 500 + 40 + 2$

f)  $1\,000\,000 + 800\,000 + 50\,000 + 600 + 40 + 3$

**B.** a) 369    b) 705    c) 1491    d) 21 584    e) 542 739    f) 3 968 431

## 1.4 Comparing Whole Numbers

To compare whole numbers, **start comparing digits from the left or look at the place with the largest value.** The smaller number will be closer to zero.

### **Example A**

Compare 72 and 78.      Start by comparing the tens.  
tens are the same      **72** has 7 tens  
                                 **78** has 7 tens

ones are different      **72** has 2 ones  
                                 **78** has 8 ones

2 ones is less than 8 ones

72 is less than 78      or      78 is greater than 72

---

### **Example B**

Compare 1628 and 1599.      Start by comparing the thousands.  
thousands are the same      **1628** has 1 thousand  
                                 **1599** has 1 thousand

hundreds are different      **1628** has 6 hundreds  
                                 **1599** has 5 hundreds

6 hundreds is more than 5 hundreds

1628 is greater than 1599      or      1599 is less than 1628

---

### **Example C**

Compare 13 618 and 13 662      Compare the ten thousands

ten thousands are the same      both have 1 ten thousand  
thousands are the same      both have 3 thousands  
hundreds are the same      both have 6 hundreds

tens are different      **13 618** has 1 ten  
                                 **13 662** has 6 tens

1 ten is less than 6 tens

13 618 is less than 13 662      or      13 662 is greater than 13 618

## Comparing Whole Numbers continued

### Example D

Compare 675 234 and 673 423  
hundred thousands are the same  
ten thousands are the same  
thousands are different

675 234 has 5 thousands  
673 423 has 3 thousands

5 thousands is greater than 3 thousands

675 234 is greater than 673 423    or    673 423 is less than 675 234

**Note:** Numbers with one digit are always less than numbers with two digits.  
Numbers with two digits are always less than numbers with three digits, and so on.

9    is less than    15  
87   is less than    107  
999   is less than    1001

---

### Exercise 1.4a

Draw a circle around the **larger** number in each pair. The first one a) is done for you.

a) 31    84

b) 15    51

c) 67    68

d) 274    315

e) 932    895

f) 792    810

#### Answers to Exercise 1.4a

a) 84

b) 51

c) 68

d) 315

e) 932

f) 810

### Exercise 1.4b

Draw a circle around the **smaller** number in each pair. The first one a) is done for you.

a) 1016 1316

b) 1229 1329

c) 5230 5210

d) 2151 2159

e) 83 476 93 475

f) 31 276 31 576

g) 46 821 46 801

h) 343 3740

i) 8325 8 236

j) 11 278 1325

k) 4289 4230

l) 13 471 13 422

#### Answers to Exercise 1.4b

|           |         |         |         |           |           |
|-----------|---------|---------|---------|-----------|-----------|
| a) 1016   | b) 1229 | c) 5210 | d) 2151 | e) 83 476 | f) 31 276 |
| g) 46 801 | h) 343  | i) 8236 | j) 1325 | k) 4230   | l) 13 422 |

## Arranging Numbers in Order

Now use the same ideas to arrange more than two numbers in order.

**Example A**    6      1      616      66      61      and 16

Arrange the above numbers in order from **smallest** to **largest**.

First sort the numbers with the same number of digits into groups.

| one digit | two digits | three digits |
|-----------|------------|--------------|
| 6, 1,     | 66, 16, 61 | 616          |

The one-digit numbers 6 and 1 can be arranged with 1 being the smallest.

The group of two-digit numbers contains 66 61 and 16.  
Arrange these beginning with the smallest. 16, 61, 66

Finally, notice that the three digit number 616 is the largest.

The order from smallest to largest is:

1, 6, 16, 61, 66, 616.

### Exercise 1.4c

Arrange these numbers in order from **smallest to largest**.  
Check your work using the answer key at the end of the exercise. The first one a) is done for you.

a) 35      352      23      253

23    35    253    352

b) 259      759      279      592

\_\_\_\_\_

**Exercise 1.4c continued**

c) 3050          3940          3053          3502

---

d) 56 719          65 981          46 423          64 082

---

e) 12 546          5781          423          172 901

---

f) 1444          444          14          114 444          44

---

g) 777          17          71          7177          717          77 177

---

**Answers to Exercise 1.4c**

a) 23, 35, 253, 352

b) 259, 279, 592, 759

c) 3050, 3053, 3502, 3940

d) 46 423, 56 719, 64 082, 65 981

e) 423, 5781, 12 546, 172 901

f) 14, 44, 444, 1444, 114 444

g) 17, 71, 717, 777, 7177, 77 177

## Greater Than, Less Than, Equal

The sign  $<$  means **less than** (smaller than).

$$\begin{array}{ccc} \text{less} & < & \text{more} \\ 5 & < & 12 \end{array}$$

The sign  $>$  means **greater than** (larger than).

$$\begin{array}{ccc} \text{more} & > & \text{less} \\ 6 & > & 3 \end{array}$$

The sign  $=$  means **equals** and is used when two amounts are the same.

The sign  $\neq$  means **not equal to** and is used when two amounts are **not** the same.

### Exercise 1.4d

Write  $<$ ,  $>$ , or  $=$  in each blank as needed. Check your work using the answer key at the end of the exercise. The first one a) is done for you.

- |                       |                         |
|-----------------------|-------------------------|
| a) 376 > 354          | b) 81      62           |
| c) 520      530       | d) 821      821         |
| e) 3674      3296     | f) 6214      6251       |
| g) 14 879      14 900 | h) 78 492      78 429   |
| i) 45 823      54 781 | j) 732 591      732 950 |

#### Answers to Exercise 1.4d

a)  $>$     b)  $>$     c)  $<$     d)  $=$     e)  $>$     f)  $<$     g)  $<$     h)  $>$     i)  $<$     j)  $<$

## **Review: Comparing Whole Numbers**

**A. Circle the larger number in each pair.**

- a) 9784      7892      b) 56 663      56 566  
c) 13 204      14 420      d) 721 011      721 101  
e) 461 300      416 003      f) 2 879 921      2 987 721

**B. Arrange these numbers in order from smallest to largest.**

- a) 75    754    475    5747    5774    77 575
- \_\_\_\_\_

- b) 18    23 070    429    7824    37    994    1120
- \_\_\_\_\_

**C. Write >, < or = in each blank to make a true statement.**

- a) 3678      3768      b) 14 002      14 000  
c) 38 463      38 436      d) 10 010      10 010

### **Answers to Review – Comparing Whole Numbers**

A a) 9784    b) 56 663    c) 14 420    d) 721 101    e) 461 300    f) 2 987 721

B a) 75, 475, 754, 5747, 5774, 77 575    b) 18, 37, 429, 994, 1120, 7824, 23 070

C a) <    b) >    c) >    d) =

## 1.5 Rounding Numbers

We use numbers every day in our lives. We use numbers to identify dates, time and places. We use numbers to count and measure. List some of the ways you use numbers.

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You may have written using money, shopping, time, and counting as part of your answer.

Think about time. Let's say it takes eight minutes to walk to the bus. If someone asks you how long it takes, you will probably say, "about ten minutes."

If you buy a sweater that cost \$29, you may say, "Oh, it was around thirty dollars."

How far is it from Vancouver to Calgary? The map says 970 km, but we would probably say, "about 1000 kilometres."

These are examples of **rounding numbers**.

We round numbers for many reasons. We may not know the exact number. The exact number may not be important for what we are doing. We may need a **quick estimate**.

When you are rounding numbers, use zeros to hold the places at the end of the number. Work through the following examples and exercises carefully. **Rounding is an important skill.**

## Rules for Rounding Whole Numbers

**Step 1:** Locate the place value in the number to which the number is to be rounded.  
Draw a line under that place.

**Step 2(i):** Look only at the next digit to the right of the number underlined.  
If it is **5 or more**, increase the underlined digit by 1.

**Step 2(ii):** Look only at the next digit to the right of the number underlined.  
If the next digit to the right is **4 or less**,  
do not change the digit in the underlined place.

**Step 3:** Change all the digits to the right of the underlined place to zeros

---

### Rounding to the tens place

Round 342 to the nearest ten.

342 Underline the digit in the tens place.  
The digit to the right of the tens place is a 2 (it is less than 4)  
Do not change the digit that is underlined.

340 Replace all digits to the right of the tens place with zeros.  
So 342 is closer to 340 than 350.

Round 675 to the nearest ten.

675 Underline the digit in the tens place.  
The digit to the right of the tens place is a 5  
So, round up the 7 to an 8 in the tens place.

680 Replace all digits to the right of the tens place with zeros.  
So 678 is closer to 680 than 670.

## Rounding to the hundreds place

Round 349 to the nearest hundred.

- 349     Underline the hundreds place.  
The digit to the right of the hundreds place is a 4 so do not change the digit that is underlined.
- 300     Replace all digits to the right of the underlined digit with zeros.  
So 349 is rounded to 300.  
349 is closer to 300 than 400.
- 

### Exercise 1.5a

Round each number to the nearest tens place and to the nearest hundreds place. Check your work using the answer key at the end of the exercise. The first one a) is done for you.

|        | Round to tens             | Round to hundreds         |
|--------|---------------------------|---------------------------|
| a) 426 | <u>42</u> 6 rounds to 430 | <u>4</u> 26 rounds to 400 |
| b) 684 |                           |                           |
| c) 834 |                           |                           |
| d) 97  |                           |                           |
| e) 344 |                           |                           |
| f) 502 |                           |                           |

#### Answers to Exercise 1.5a

- |                                  |                                  |
|----------------------------------|----------------------------------|
| a) 426   tens 430   hundreds 400 | b) 684   tens 680   hundreds 700 |
| c) 834   tens 830   hundreds 800 | d) 97   tens 100   hundreds 100  |
| e) 344   tens 340   hundreds 300 | f) 502   tens 500   hundreds 500 |

## Rounding to other place values

**Step 1:** Locate the place value in the number to which the number is to be rounded.  
Draw a line under that place.

**Step 2(i):** Look only at the next digit to the right of the number underlined.  
If it is **5 or more**, increase the underlined digit by 1.

**Step 2(ii):** Look only at the next digit to the right of the number underlined.  
If the next digit to the right is **4 or less**,  
do not change the digit in the underlined place.

**Step 3:** Change all the digits to the right of the underlined place to zeros

---

Round 3148 to the nearest thousand.

3148 Underline the thousands place.  
The digit to the right of the thousands place is a 1 so do not  
change the digit that is underlined.

3000 Replace all digits to the right of the underlined digit with zeros.  
So 3148 is rounded to 3000.  
3148 is closer to 3000 than 4000.

---

Round 68 210 to the nearest ten thousand.

68 210 Underline the ten thousands place.  
The digit to the right of the ten thousands place is an 8 so round up the digit  
that is underlined.

70 000 Replace all digits to the right of the underlined digit with zeros.  
So 68 210 is rounded to 70 000.  
68 210 is closer to 70 000 than 60 000.

## Rounding to other place values continued

Round 706 599 to the nearest hundred thousand.

706 599     Underline the hundred thousands place.  
The digit to the right of the hundred thousands place is a zero, so do not change the digit that is underlined.

700 000     Replace all digits to the right of the underlined digit with zeros.  
So 706 599 is rounded to 700 000.  
706 599 is closer to 700 000 than 800 000.

---

Round 9 501 100 to the nearest millions.

9 501 100     Underline the millions place.  
The digit to the right of the millions is a 5 so round up the digit that is underlined. (The 9 rounds up to a 10.)

10 000 000     Replace all digits to the right of the underlined digit with zeros.  
So 9 501 100 is rounded to 10 000 000.  
9 501 100 is closer to 10 000 000 than 9 000 000.

---

The chart below shows how rounding with 9s works.

|                | <b>Round to<br/>nearest tens</b> | <b>Round to<br/>nearest<br/>hundreds</b> | <b>Round to<br/>nearest<br/>thousands</b> | <b>Round to<br/>nearest<br/>ten<br/>thousands</b> |
|----------------|----------------------------------|------------------------------------------|-------------------------------------------|---------------------------------------------------|
| <b>9</b>       | 10                               | 0                                        | 0                                         | 0                                                 |
| <b>99</b>      | 100                              | 100                                      | 0                                         | 0                                                 |
| <b>999</b>     | 1000                             | 1000                                     | 1000                                      | 0                                                 |
| <b>9999</b>    | 10 000                           | 10 000                                   | 10 000                                    | 10 000                                            |
| <b>99 999</b>  | 100 000                          | 100 000                                  | 100 000                                   | 100 000                                           |
| <b>999 999</b> | 1 000 000                        | 1 000 000                                | 1 000 000                                 | 1 000 000                                         |

## Exercise 1.5b

For each problem, round to the number asked. Check your work using the answer key at the end of the exercise.

### Example

Juan had 1094 baseball cards. Adamo has 2106 baseball cards. Alex has 1589 baseball cards. Round each number to the nearest ten.

| Name  | Number | Rounded Number |
|-------|--------|----------------|
| Juan  | 1094   | 1090           |
| Adamo | 2106   | 2110           |
| Alex  | 1589   | 1590           |

- a) Mount Logan in the Yukon is the highest mountain in Canada. It is 5959 meters. Mount Waddington is the highest mountain in British Columbia. It is 4016 meters. Mount Columbia is the highest mountain in Alberta. It is 3747 meters. Round each number to the nearest thousands.  
(Statistics Canada)

| Mountain         | Number | Rounded Number |
|------------------|--------|----------------|
| Mount Logan      |        |                |
| Mount Waddington |        |                |
| Mount Columbia   |        |                |

### Exercise 1.5b continued

- b) The Connaught Tunnel is 8082 meters long, The Mount MacDonald Tunnel is 14 700 meters long. The Deas Island Tunnel is 629 meters long. Round each number to the nearest hundred.

| <b>Tunnel</b>      | <b>Number</b> | <b>Rounded Number</b> |
|--------------------|---------------|-----------------------|
| Connaught Tunnel   |               |                       |
| Mount MacDonald    |               |                       |
| Deas Island Tunnel |               |                       |

- c) The area of British Columbia is 944 735 square kilometers. The area of Alberta is 661 848 square kilometers. The area of Saskatchewan is 651 036 square kilometers. Round each number to the nearest ten thousand. (*Statistics Canada*)

| <b>Province</b>  | <b>Number</b> | <b>Rounded Number</b> |
|------------------|---------------|-----------------------|
| British Columbia |               |                       |
| Alberta          |               |                       |
| Saskatchewan     |               |                       |

**Exercise 1.5b Answer Key**

| <b>Mountain</b>  | <b>Number</b> | <b>Rounded Number</b> |
|------------------|---------------|-----------------------|
| Mount Logan      | 5959 meters   | 6000 meters           |
| Mount Waddington | 4016 meters   | 4000 meters           |
| Mount Columbia   | 3747 meters   | 4000 meters           |

| <b>Tunnel</b>          | <b>Number</b> | <b>Rounded Number</b> |
|------------------------|---------------|-----------------------|
| Connaught Tunnel       | 8082 meters   | 8100 meters           |
| Mount MacDonald Tunnel | 14 700 meters | 14 700 meters         |
| Deas Island Tunnel     | 629 meters    | 600 meters            |

| <b>Province</b>  | <b>Number</b>         | <b>Rounded Number</b> |
|------------------|-----------------------|-----------------------|
| British Columbia | 944 735 square meters | 940 000 square meters |
| Alberta          | 661 848 square meters | 660 000 square meters |
| Saskatchewan     | 651 035 square meters | 650 000 square meters |

## **Review: Rounding**

### **A. Round your answer to the nearest hundred.**

- a) 329
- b) 2481
- c) 8065
- d) 3916

### **B. Round your answer to the nearest thousand.**

- a) 5521
- b) 221 813
- c) 46 499
- d) 34 860

### **C. Round your answer to the nearest ten thousand**

- a) 15 521
- b) 36 318
- c) 176 994
- d) 864 860

### **D. Round your answer to the nearest hundred thousand.**

- a) 523 521
- b) 821 932
- c) 761 949
- d) 464 051

### **E. Round your answer to the nearest million.**

- a) 7 312 908
- b) 6 009 280
- c) 9 152 801
- d) 576 679

**F. For each problem, round to the number asked.**

- a) The longest river in North America is the Mississippi River which is 6275 kilometers long. The longest river in Canada is the Mackenzie River which is 4242 kilometers long. The Yukon River is 3701 kilometers long. Round each number to the nearest hundred.

| River             | Number | Rounded Number |
|-------------------|--------|----------------|
| Mississippi River |        |                |
| Mackenzie River   |        |                |
| Yukon River       |        |                |

- b) In 2009, the population of Shanghai, China was 13 831 900. The population of Moscow, Russia was 10 508 971. The population of New York City, U.S. was 8 363 710. Round each number to the nearest hundred thousand.

| City               | Number | Rounded Number |
|--------------------|--------|----------------|
| Shanghai, China    |        |                |
| Moscow, Russia     |        |                |
| New York City, USA |        |                |

| Answers to Review - Rounding |                   |                    |              |
|------------------------------|-------------------|--------------------|--------------|
| A a) 300                     | b) 2500           | c) 8100            | d) 3900      |
| B a) 6000                    | b) 222 000        | c) 46 000          | d) 35 000    |
| C a) 20 000                  | b) 40 000         | c) 180 000         | d) 860 000   |
| D a) 500 000                 | b) 800 000        | c) 800 000         | d) 500 000   |
| E a) 7 000 000               | b) 6 000 000      | c) 9 000 000       | d) 1 000 000 |
| F a) Mississippi 6300 km     | Mackenzie 4200 km | Yukon 3700 km      |              |
| b) Shanghai 13 800 000       | Moscow 10 500 000 | New York 8 400 000 |              |

# **Unit 1 Review – Number Introduction**

Use this review to practice all the skills you have learned in Unit 1 - Number Introduction. Check your answers using the answer key at the end of the review.

**A. Write the place value names (ones, tens hundreds, thousands, ten thousands, hundred thousands, millions) for each underlined digit.**

a) 4392 \_\_\_\_\_ b) 765 \_\_\_\_\_

c) 18 293 \_\_\_\_\_ d) 56 428 \_\_\_\_\_

e) 4258 \_\_\_\_\_ f) 426 153 \_\_\_\_\_

g) 8 429 576 \_\_\_\_\_ h) 3 641 758 \_\_\_\_\_

**B. Using the number 9 285 106, write the digit that is in each of the following place values.**

a) millions \_\_\_\_\_ b) ones \_\_\_\_\_

c) ten thousands \_\_\_\_\_ d) thousands \_\_\_\_\_

e) hundreds \_\_\_\_\_ f) hundred thousands \_\_\_\_\_

g) tens \_\_\_\_\_

**C. Underline the digit for the place value named.**

a) hundreds      5321      b) tens      8703

c) ten thousands      34 891      d) hundred thousands      891 402

e) thousands      72 491      f) millions      4 201 856

**D. Write the numbers in words.**

a) 818

b) 1678

c) 29 764

d) 1 984 152

e) 226 917

**E. Write the words in numbers.**

a) twenty-five thousand one hundred thirty-two

b) one thousand two hundred seven

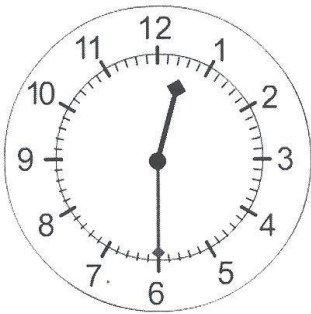
c) two hundred fifteen thousand twenty-four

d) one million six hundred ninety-five thousand four hundred twenty

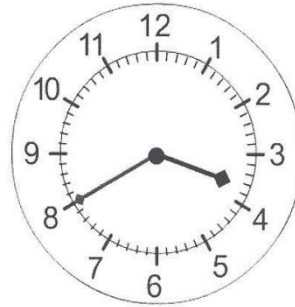
**F. Answer the questions below about Telling Time.**

Write the time shown on each clock.

a)

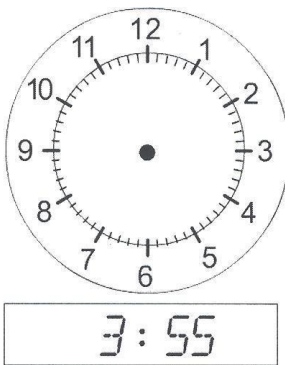


b)

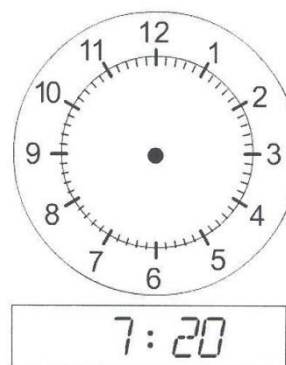


Put the hands on the analog clock to show the digital time.

c)



d)



**G. Expanded and Standard Form**

Write each number in expanded form.

a) 184

b) 3908

c) 61 281

d) 1 539 587

e) 366 524

**H. Write each number in standard form.**

a)  $50\,000 + 6000 + 600 + 90 + 8$

b)  $200\,000 + 70\,000 + 8000 + 200 + 60 + 1$

c)  $3000 + 800 + 80 + 5$

d)  $1\,000\,000 + 400\,000 + 70\,000 + 6000 + 100 + 50 + 3$

**I. Arrange these numbers in order from smallest to largest.**

a)        18            34 937        727        1487        147 832

---

b)        769            6790        697        76 976        76 796

---

**J. Write < or > or = in each blank as needed.**

a) 9698            6899                            b) 7542            7452

c) 34 682            39 421                            d) 124 693        124 693

e) 738 423            783 423                            f) 45 832        54 123

**K. Round each number to the nearest hundred.**

a) 774 rounds to \_\_\_\_\_                            b) 2581 rounds to \_\_\_\_\_

c) 21 204 rounds to \_\_\_\_\_                            d) 479 rounds to \_\_\_\_\_

e) 572 098 rounds to \_\_\_\_\_                            f) 7 652 931 rounds to \_\_\_\_\_

**L. Round each number to the nearest thousand.**

- a) 1948 rounds to \_\_\_\_\_ b) 75 767 rounds to \_\_\_\_\_  
c) 288 869 rounds to \_\_\_\_\_ d) 999 rounds to \_\_\_\_\_  
e) 3976 rounds to \_\_\_\_\_ f) 5012 rounds to \_\_\_\_\_

**M. Round each number to the nearest ten thousand.**

- a) 14 028 rounds to \_\_\_\_\_ b) 226 917 rounds to \_\_\_\_\_  
c) 126 804 rounds to \_\_\_\_\_ d) 9 794 487 rounds to \_\_\_\_\_  
e) 87 805 rounds to \_\_\_\_\_ f) 5912 rounds to \_\_\_\_\_

**N. Round each number to the nearest hundred thousand.**

- a) 687 029 rounds to \_\_\_\_\_ b) 2 801 052 rounds to \_\_\_\_\_  
c) 523 715 rounds to \_\_\_\_\_ d) 9 778 656 rounds to \_\_\_\_\_  
e) 8 182 390 rounds to \_\_\_\_\_ f) 3 102 975 rounds to \_\_\_\_\_

**O. Round each number to the nearest million.**

- a) 1 009 627 rounds to \_\_\_\_\_ b) 28 101 052 rounds to \_\_\_\_\_  
c) 894 063 rounds to \_\_\_\_\_ d) 9 778 656 rounds to \_\_\_\_\_  
e) 80 379 591 rounds to \_\_\_\_\_ f) 3 102 975 rounds to \_\_\_\_\_

### Answers to Unit 1 Review – Number Introduction

**A** a) tens                      b) ones                      c) thousands    d) hundreds  
e) thousands                f) ten thousands        g) millions        h) hundred thousands

**B** a) 9                      b) 6                      c) 8                      d) 5                      e) 1                      f) 2                      g) 0

**C** a) 5321                      b) 8703                      c) 34 891                      d) 891 402  
e) 72 491                      f) 4 201 856

**D** a) eight hundred eighteen  
b) one thousand six hundred seventy-eight  
c) twenty-nine thousand seven hundred sixty-four  
d) one million nine hundred eighty-four thousand one hundred fifty-two  
e) two hundred twenty-six thousand nine hundred seventeen

**E** a) 25 132                      b) 1207                      c) 215 024                      d) 1 695 420

**F** a) 12:30                      b) 3:40

c)



d)



**Answers to Unit 1 Review – Number Introduction continued**

- G** a)  $100 + 80 + 4$                       b)  $3000 + 900 + 8$   
c)  $60\,000 + 1000 + 200 + 80 + 1$   
d)  $1\,000\,000 + 500\,000 + 30\,000 + 9000 + 500 + 80 + 7$   
e)  $300\,000 + 60\,000 + 6000 + 500 + 20 + 4$

- H** a) 56 698                      b) 278 261                      c) 3885                      d) 1 476 153

- I** a) 18, 727, 1487, 34 937, 147 832  
b) 697, 769, 6790, 76 796, 76 976

- J** a) >                      b) > c) < d) = e) < f) <

- K** a) 800                      b) 2600                      c) 21 200                      d) 500  
e) 572 100                      f) 7 652 900

- L** a) 2000                      b) 76 000                      c) 289 000                      d) 1000  
e) 4000                      f) 5000

- M** a) 10 000                      b) 230 000                      c) 130 000                      d) 9 790 000  
e) 90 000                      f) 10 000

- N** a) 700 000                      b) 2 800 000                      c) 500 000                      d) 9 800 000  
e) 8 200 000                      f) 3 100 000

- O.** a) 1 000 000                      b) 28 000 000                      c) 1 000 000  
d) 10 000 000                      e) 80 000 000                      f) 3 000 000



# Unit 2: Addition

## 2.1 Addition

**Addition** puts amounts together.

The numbers being added are called **addends**.

The answer of addition is called the **sum** or the **total**.

The **plus sign** **+** means to add.

★ ★ ★ + ★ ★ = 5 stars

3 + 2 = 5      says **three plus two equals five**  
or **three and two is five**

The **sum** is 5.

### Basic Addition Facts

| + | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
|---|---|----|----|----|----|----|----|----|----|----|
| 0 | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
| 1 | 1 | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| 2 | 2 | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 |
| 3 | 3 | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
| 4 | 4 | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 |
| 5 | 5 | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 |
| 6 | 6 | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 |
| 7 | 7 | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 8 | 8 | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 9 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

## Exercise 2.1a

Find the sums. The highest **total** for these number facts is 20.  
Check your work using the answer key.  
The first one a) is done for you.

$$\begin{array}{r} \text{a) } 6 \\ + 7 \\ \hline 13 \end{array}$$

$$\begin{array}{r} \text{b) } 8 \\ + 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c) } 4 \\ + 2 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d) } 8 \\ + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e) } 1 \\ + 2 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f) } 6 \\ + 4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g) } 5 \\ + 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h) } 2 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i) } 7 \\ + 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j) } 0 \\ + 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k) } 9 \\ + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{l) } 7 \\ + 2 \\ \hline \end{array}$$

For adding more than two numbers, regroup the numbers if there is a grouping that works better. For example in exercise m)  $9 + 6 + 1$  can be regrouped as  $9 + 1 + 6$  because the  $9 + 1 = 10$  and then add the 6 to the 10 to get 16. This is called the **Associative Property of Addition**.

$$\begin{array}{r} \text{m) } 9 \\ 6 \\ + 1 \\ \hline 16 \end{array}$$

$$\begin{array}{r} \text{n) } 3 \\ 4 \\ + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o) } 0 \\ 2 \\ + 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{p) } 4 \\ 2 \\ 6 \\ + 3 \\ \hline \end{array}$$

### Answers to Exercise 2.1a

|       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|
| a) 13 | b) 11 | c) 6  | d) 15 | e) 3  | f) 10 | g) 13 | h) 7  |
| i) 13 | j) 3  | k) 16 | l) 9  | m) 16 | n) 14 | o) 11 | p) 15 |

## Addition of Larger Numbers

When adding larger number, line up the corresponding place values.

**Step 1:** Add the ones to the ones.

**Step 2:** Add the tens to the tens.

**Step 3:** Add the hundreds to the hundreds.

**Step 4:** Add the thousands to the thousands.

**Step 5:** Add the ten thousands to the ten thousands.

### Example A

$$23 + 56 =$$

Line up the place values.

**Step 1:** Add the ones to the ones. 3 ones + 6 ones = 9 ones

$$\begin{array}{r} 23 \\ + 56 \\ \hline 9 \end{array}$$

Write the answer in line with the ones place.

**Step 2:** Add the tens. 2 tens + 5 tens = 7 tens

$$\begin{array}{r} 23 \\ + 56 \\ \hline 79 \end{array}$$

Write the answer in line with the tens place.

The sum of  $23 + 56 = 79$

## Exercise 2.1b

Find the sums. Check your work using the answer key.  
The first one a) is done for you.

$$\begin{array}{r} \text{a) } 37 \\ + 2 \\ \hline 39 \end{array}$$

$$\begin{array}{r} \text{b) } 55 \\ + 2 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c) } 70 \\ + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d) } 26 \\ + 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e) } 87 \\ + 12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f) } 33 \\ + 64 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g) } 44 \\ + 50 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h) } 34 \\ + 11 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i) } 351 \\ + 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j) } 212 \\ + 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k) } 417 \\ + 21 \\ \hline \end{array}$$

$$\begin{array}{r} \text{l) } 370 \\ + 28 \\ \hline \end{array}$$

$$\begin{array}{r} \text{m) } 154 \\ + 123 \\ \hline \end{array}$$

$$\begin{array}{r} \text{n) } 362 \\ + 214 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o) } 715 \\ + 214 \\ \hline \end{array}$$

$$\begin{array}{r} \text{p) } 445 \\ + 200 \\ \hline \end{array}$$

**Exercise 2.1b continued**

Find the sums. Check your work using the answer key.

$$\begin{array}{r} \text{q) } 2013 \\ + \quad 64 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r) } 3453 \\ + \quad 142 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s) } 3460 \\ + \quad 423 \\ \hline \end{array}$$

$$\begin{array}{r} \text{t) } 6749 \\ + \quad 210 \\ \hline \end{array}$$

$$\begin{array}{r} \text{u) } 75\,124 \\ + \quad 1\,135 \\ \hline \end{array}$$

$$\begin{array}{r} \text{v) } 58\,460 \\ + \quad 1\,512 \\ \hline \end{array}$$

$$\begin{array}{r} \text{w) } 41\,355 \\ + \quad 27\,043 \\ \hline \end{array}$$

$$\begin{array}{r} \text{x) } 240\,456 \\ + \quad 139\,443 \\ \hline \end{array}$$

**Answers to Exercise 2.1b**

|         |         |           |           |           |            |
|---------|---------|-----------|-----------|-----------|------------|
| a) 39   | b) 57   | c) 77     | d) 29     | e) 99     | f) 97      |
| g) 94   | h) 45   | i) 354    | j) 218    | k) 438    | l) 398     |
| m) 277  | n) 576  | o) 929    | p) 645    | q) 2077   | r) 3595    |
| s) 3883 | t) 6959 | u) 76 259 | v) 59 972 | w) 68 398 | x) 379 899 |

## **2.2 Estimating Answers in Addition**

You have learned how to round numbers. Now you can use that skill to quickly find an **approximate** sum by estimating using front-end rounding. Estimating is used to find a quick answer.

In front-end rounding, the number is rounded to the highest place (or the place value most left) and all the digits to the right of that place become zeros.

In these examples, the exact numbers have been front-end rounded and then the sums for the exact and estimates are provided.

### **Example A**

$$\begin{array}{r} 22 \\ + 67 \\ \hline 89 \end{array}$$

$$\begin{array}{r} \text{rounds to} \quad 20 \\ \text{rounds to} \quad + 70 \\ \hline 90 \end{array}$$

### **Example B**

$$\begin{array}{r} 345 \\ + 451 \\ \hline 796 \end{array}$$

$$\begin{array}{r} \text{rounds to} \quad 300 \\ \text{rounds to} \quad + 500 \\ \hline 800 \end{array}$$

### **Example C**

$$\begin{array}{r} 1\,725 \\ + 28\,260 \\ \hline 29\,985 \end{array}$$

$$\begin{array}{r} \text{rounds to} \quad 2\,000 \\ \text{rounds to} \quad + 30\,000 \\ \hline 32\,000 \end{array}$$

## Estimating Answers in Addition continued

### Example D

What would a quick estimate be for these vacation costs?

The plane ticket costs \$525, the hotel costs \$195, meals cost \$175 and spending money will be \$100.

Quickly round up the values given.

\$525 becomes \$500,

\$195 becomes \$200,

\$175 becomes \$200

and \$100 stays \$100.

The vacation will be approximately  $500 + 200 + 200 + 100 = \$1000$

### Exercise 2.2

Round these numbers by using front-end rounding. Check your work using the answer key. The first one a) is done for you.

a) 58 rounds to 60

b) 148 rounds to \_\_\_\_\_

c) 399 rounds to \_\_\_\_\_

d) 3487 rounds to \_\_\_\_\_

e) 999 rounds to \_\_\_\_\_

f) 5600 rounds to \_\_\_\_\_

g) 24 987 rounds to \_\_\_\_\_

h) 58 998 rounds to \_\_\_\_\_

#### Answers to Exercise 2.2

a) 60

b) 100

c) 400

d) 3000

e) 1000

f) 6000

g) 20 000

h) 60 000

## **2.3 Addition of More Than Two Numbers**

When adding larger numbers, line up the place values beginning with the ones place.

**Example**             $1124 + 352 + 13 =$

**Step 1:** Line up the place values beginning at the right or the ones place  
Add the ones. 4 ones + 2 ones + 3 ones = 9 ones

$$\begin{array}{r} 1124 \\ 352 \\ + \underline{13} \\ 9 \end{array}$$

**Step 2:** Add the tens. 2 tens + 5 tens + 1 ten = 8 tens

$$\begin{array}{r} 1124 \\ 352 \\ + \underline{13} \\ 89 \end{array}$$

**Step 3:** Add the hundreds. 1 hundred + 3 hundreds = 4 hundreds

$$\begin{array}{r} 1124 \\ 352 \\ + \underline{13} \\ 489 \end{array}$$

**Step 4:** Add the thousands. 1 thousand = 1 thousand

$$\begin{array}{r} 1124 \\ 352 \\ + \underline{13} \\ 1489 \end{array}$$

## Exercise 2.3

Find the exact answer and the estimate. Check your work using the answer key. The first one a) is done for you.

|                                                                   |                                                                         |                                                                            |          |
|-------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------|----------|
| a) $\begin{array}{r} 21 \\ 34 \\ + 4 \\ \hline 59 \end{array}$    | Estimate<br>$\begin{array}{r} 20 \\ 30 \\ + 0 \\ \hline 50 \end{array}$ | b) $\begin{array}{r} 12 \\ 35 \\ + 1 \\ \hline \end{array}$                | Estimate |
| c) $\begin{array}{r} 213 \\ 142 \\ + 30 \\ \hline \end{array}$    | Estimate                                                                | d) $\begin{array}{r} 371 \\ 520 \\ + 6 \\ \hline \end{array}$              | Estimate |
| e) $\begin{array}{r} 1155 \\ 4622 \\ + 212 \\ \hline \end{array}$ | Estimate                                                                | f) $\begin{array}{r} 10\,195 \\ 4\,702 \\ + 3\,101 \\ \hline \end{array}$  | Estimate |
| g) $\begin{array}{r} 1011 \\ 2622 \\ + 363 \\ \hline \end{array}$ | Estimate                                                                | h) $\begin{array}{r} 15\,000 \\ 81\,601 \\ + 2\,396 \\ \hline \end{array}$ | Estimate |

### Answers to Exercise 2.3

a) 59;  $20 + 30 + 0 = 50$

b) 48;  $10 + 40 + 0 = 50$

c) 385;  $200 + 100 + 30 = 330$

d) 897;  $400 + 500 + 10 = 910$

e) 5989;  $1000 + 5000 + 200 = 6200$

f) 17 998;  $10\,000 + 5000 + 3000 = 18\,000$

g) 3996;  $1000 + 3000 + 400 = 4400$

h) 98 997;  $20\,000 + 80\,000 + 2000 = 102\,000$

## **2.1 – 2.3 Review – Addition**

**A. Find the sums. Be sure to check your answers.**

**Rewrite the question if required to line up the place values.**

$$\begin{array}{r} \text{a)} \quad 63 \\ + 25 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b)} \quad 15 \\ + 72 \\ \hline \end{array}$$

$$\text{c)} \quad 43 + 54 =$$

$$\begin{array}{r} \text{d)} \quad 42 \\ \quad 33 \\ + 14 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \quad 33 \\ \quad 22 \\ + 52 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \quad 21 \\ \quad 46 \\ + 72 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \quad 421 \\ + 354 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h)} \quad 832 \\ + 162 \\ \hline \end{array}$$

$$\text{i)} \quad 956 + 730 =$$

$$\begin{array}{r} \text{j)} \quad 154 \\ + 923 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \quad 362 \\ + 914 \\ \hline \end{array}$$

$$\text{l)} \quad 10\,715 + 23\,213 =$$

**B. Add these numbers. Find the exact answers and the estimates.**

a)  $45 + 21 + 32 =$   
Exact                      Estimate

b)  $242 + 325 + 112 =$   
Exact                      Estimate

c)  $8013 + 1246 + 5430 =$   
Exact                      Estimate

d)  $5214 + 40\,230 + 2345$   
Exact                      Estimate

**Answers to 2.1 – 2.3 Review - Addition**

A a) 88              b) 87              c) 97              d) 89              e) 107              f) 139  
g) 775              h) 994              i) 1686              j) 1077              k) 1276              l) 33 928

B a) 98; estimate  $50 + 20 + 30 = 100$   
b) 679; estimate  $200 + 300 + 100 = 600$   
c) 14 689; estimate  $8000 + 1000 + 5000 = 14\,000$   
d) 47 789; estimate  $5000 + 40\,000 + 2\,000 = 47\,000$

## 2.4 Addition with Carrying

When the digits of one column add up to a two digit number (10 or more), you must **carry** a digit to the next place value column.

### Example A

|             | Step 1                                                     | Step 2                                                      |
|-------------|------------------------------------------------------------|-------------------------------------------------------------|
| $27 + 55 =$ | $\begin{array}{r} 1 \\ 27 \\ + 55 \\ \hline 2 \end{array}$ | $\begin{array}{r} 1 \\ 27 \\ + 55 \\ \hline 82 \end{array}$ |

**Step 1:** Add the ones. 7 ones + 5 ones = 12 ones

Rename 12 ones as **1** ten and **2** ones. Write the **2** ones under the ones column and **carry** the **1** ten (carry the 1) to the tens column.

**Step 2:** Add the tens. 1 ten + 2 tens + 5 tens = 8 tens

### Example B

|             | Step 1                                                     | Step 2                                                       |
|-------------|------------------------------------------------------------|--------------------------------------------------------------|
| $58 + 76 =$ | $\begin{array}{r} 1 \\ 58 \\ + 76 \\ \hline 4 \end{array}$ | $\begin{array}{r} 1 \\ 58 \\ + 76 \\ \hline 134 \end{array}$ |

**Step 1:** Add the ones. 8 ones + 6 ones = 14 ones

Rename the 14 ones as **1** ten and **4** ones. Write the **4** ones under the ones column and **carry** the **1** ten (carry the 1) to the tens column.

**Step 2:** Add the tens. 1 ten + 5 tens + 7 tens = 13 tens

The **1** hundred can be written in the sum because there are no other hundreds to add it to.

## Addition with Carrying continued

### Example C

|                  | Step 1                                                           | Step 2                                                             |
|------------------|------------------------------------------------------------------|--------------------------------------------------------------------|
| $45 + 37 + 69 =$ | $\begin{array}{r} 2 \\ 45 \\ 37 \\ + 69 \\ \hline 1 \end{array}$ | $\begin{array}{r} 2 \\ 45 \\ 37 \\ + 69 \\ \hline 151 \end{array}$ |

**Step 1:** Add the ones. 5 ones + 7 ones + 9 ones = 21 ones

Rename 21 ones as **2** tens and **1** one. Write the **1** one in the sum under the ones column and carry the **2** tens to the tens column.

**Step 2:** Add the tens. 2 tens + 4 tens + 3 tens + 6 tens = 15 tens  
15 tens is 1 hundred and 5 tens.

The **1** hundred can be written in the sum because there are no other hundreds to add it to.

### Exercise 2.4a

Find the sums. Check your work using the answer key. Rewrite the question to line up the place values if required. The first one a) has been done.

a) 
$$\begin{array}{r} 1 \\ 62 \\ + 18 \\ \hline 80 \end{array}$$

b) 
$$\begin{array}{r} 46 \\ + 37 \\ \hline \end{array}$$

c)  $49 + 42 =$

d)  $44 + 26 =$

e) 
$$\begin{array}{r} 17 \\ + 79 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 23 \\ + 82 \\ \hline \end{array}$$

### Exercise 2.4a continued

Find the sums.

g)  $28 + 91 =$       h)  $54 + 58 =$       i)  $68 + 49 =$

j)  $66 + 35 =$       k)  $99 + 88 =$       l)  $89 + 74 =$

m) 
$$\begin{array}{r} 37 \\ 15 \\ + 72 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 55 \\ 27 \\ + 50 \\ \hline \end{array}$$

#### Answers to Exercise 2.4a

|        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|
| a) 80  | b) 83  | c) 91  | d) 70  | e) 96  | f) 105 | g) 119 |
| h) 112 | i) 117 | j) 101 | k) 187 | l) 163 | m) 124 | n) 132 |

## Addition with Carrying (Large Numbers)

Use the same method for carrying when you add the large numbers. Line up the place values and add the columns of ones, tens, hundreds, thousands, ten thousands, and so on. Look at these examples:

### Example A

$$374 + 458 =$$

$$\begin{array}{r} 1 \\ 374 \\ + 458 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 11 \\ 374 \\ + 458 \\ \hline 32 \end{array}$$

$$\begin{array}{r} 11 \\ 374 \\ + 458 \\ \hline 832 \end{array}$$

**Step 1:** Add the ones.

4 ones + 8 ones = **12 ones** = 1 ten and 2 ones

Write the **2** ones in the sum. Carry the 1 ten to the tens column.

**Step 2:** Add the tens.

1 + 7 + 5 = **13 tens** = 1 hundred and 3 tens. Write the **3** in the tens place. Carry the 1 hundred to the hundreds column.

**Step 3:** Add the hundreds.

1 + 3 + 4 hundred = **8 hundreds**. Write 8 in the hundreds place.

## Addition with Carrying (large numbers) continued

### Example B

$$4974 + 2485 + 6890 =$$

$$\begin{array}{r} 4974 \\ 2485 \\ + 6890 \\ \hline \end{array}$$

$$\begin{array}{r} \phantom{1} \phantom{2} \phantom{2} \\ 4974 \\ 2485 \\ + 6890 \\ \hline 14\,349 \end{array}$$

**Step 1:** Add the ones.

$$4 + 5 + 0 = \mathbf{9 \text{ ones}}$$

Write 9 in the ones place. There is nothing to carry.

**Step 2:** Add the tens.

$$7 + 8 + 9 = \mathbf{24 \text{ tens}} = 2 \text{ hundreds} + 4 \text{ tens}$$

Write **4 in the tens place** and carry the 2 hundreds to the hundreds column.

**Step 3:** Add the hundreds.

$$2 + 9 + 4 + 8 = 23 \text{ hundreds.}$$

Write **3 in the hundreds place** and carry the 2 (2 thousands) to the thousands column.

**Step 4:** Add the thousands.  $2 + 4 + 2 + 6 = 14$  thousands

Write a 4 in the thousands and carry the 1 (10 thousand) to the ten thousands column.

**Step 5:** Add the ten thousands. There is only the 1.

Write a 1 in the ten thousands column.

If the numbers were larger, this process would continue until all the digits in each of the place values have been added.

## Exercise 2.4b

Find the estimate and the exact sum or answer. Check your work using the answer key. The first one a) is done.

| Exact                                                        | Estimate                                                  |
|--------------------------------------------------------------|-----------------------------------------------------------|
| a) $\begin{array}{r} 235 \\ + 459 \\ \hline 694 \end{array}$ | $\begin{array}{r} 200 \\ + 500 \\ \hline 700 \end{array}$ |

| Exact                                                   | Estimate |
|---------------------------------------------------------|----------|
| b) $\begin{array}{r} 306 \\ + 83 \\ \hline \end{array}$ |          |

| Exact                                                     | Estimate |
|-----------------------------------------------------------|----------|
| c) $\begin{array}{r} 5237 \\ + 549 \\ \hline \end{array}$ |          |

| Exact                                                      | Estimate |
|------------------------------------------------------------|----------|
| d) $\begin{array}{r} 2846 \\ + 1437 \\ \hline \end{array}$ |          |

| Exact                                                           | Estimate |
|-----------------------------------------------------------------|----------|
| e) $\begin{array}{r} 24\ 642 \\ + 9\ 261 \\ \hline \end{array}$ |          |

| Exact                                                           | Estimate |
|-----------------------------------------------------------------|----------|
| f) $\begin{array}{r} 53\ 196 \\ + 8\ 366 \\ \hline \end{array}$ |          |

| Exact                                                             | Estimate |
|-------------------------------------------------------------------|----------|
| g) $\begin{array}{r} 4624 \\ 892 \\ + 5923 \\ \hline \end{array}$ |          |

| Exact                                                                                   | Estimate |
|-----------------------------------------------------------------------------------------|----------|
| h) $\begin{array}{r} 1\ 403 \\ 179\ 561 \\ 6\ 349 \\ + \quad 914 \\ \hline \end{array}$ |          |

**Exercise 2.4b continued** Find the estimate and the exact sum or answer. Rewrite the question to line up the place values if required. Check your work using the answer key.

i)  $223 + 848 =$   
           Exact               Estimate

j)  $1453 + 748 =$   
           Exact               Estimate

k)  $4180 + 1264 + 341 =$   
           Exact               Estimate

l)  $31\,453 + 51\,262 + 6999 =$   
           Exact               Estimate

m)  $6795 + 97\,215 + 446 + 20 =$   
           Exact               Estimate

n)  $99\,999 + 999 + 9999 =$   
           Exact               Estimate

**Answers to Exercise 2.4b**

(est means estimate)

a) 694; est  $200 + 500 = 700$

b) 389; est  $300 + 80 = 380$

c) 5786; est  $5000 + 500 = 5500$

d) 4 283; est  $3000 + 1000 = 4000$

e) 33 903; est  $20\,000 + 9000 = 29000$

f) 61 562; est  $50\,000 + 8000 = 58\,000$

g) 11 439; est  $5000 + 900 + 6000 = 11\,900$

h) 188 227; est  $1000 + 200\,000 + 6000 + 900 = 207\,900$

i) 1071; est  $200 + 800 = 1000$

j) 2201; est  $1000 + 700 = 1700$

k) 5785; est  $4000 + 1000 + 300 = 5300$

l) 89 714; est  $30\,000 + 50\,000 + 7000 = 87\,000$

m) 104 476; est  $7000 + 100\,000 + 400 + 20 = 107\,420$

n) 110 997; est  $100\,000 + 1000 + 10\,000 = 111\,000$

## **2.4 Review - Addition with Carrying**

A. Find the sums. Be sure to check your answers.

$$\begin{array}{r} \text{A a)} \quad 85 \\ + \quad 57 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b)} \quad 94 \\ + \quad 26 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \quad 982 \\ + \quad 743 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d)} \quad 829 \\ + \quad 303 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \quad 7834 \\ + \quad 2169 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \quad 5976 \\ + \quad 2081 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \quad 46\,940 \\ + \quad 86\,502 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h)} \quad 41\,801 \\ + \quad 39\,199 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i)} \quad 3742 \\ \quad 4108 \\ + \quad 7336 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j)} \quad 12\,350 \\ \quad 17\,629 \\ + \quad 23\,244 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \quad 352\,641 \\ \quad 432\,629 \\ + \quad 720\,250 \\ \hline \end{array}$$

$$\begin{array}{r} \text{l)} \quad 18\,060 \\ \quad 62\,549 \\ \quad 1\,375 \\ + \quad 399 \\ \hline \end{array}$$

**B. Rewrite the question to line up the place values if required. Then estimate and find the exact sum of these numbers.**

a)  $74 + 32 + 67 + 85 =$                       Exact                      Estimate

b)  $721 + 78\,462 + 968 + 99 =$                       Exact                      Estimate

c)  $389 + 82\,517 + 2 =$                       Exact                      Estimate

**Answers to 2.4 Review - Addition with Carrying**

A a) 142              b) 120              c) 1725              d) 1132              e) 10 003

f) 8057              g) 133 442              h) 81 000              i) 15 186              j) 53 223

k) 1 505 520              l) 82 383

B a) 258; est  $70 + 30 + 70 + 90 = 260$

b) 80 250; est  $700 + 80\,000 + 1000 + 100 = 81\,800$

c) 82 908; est  $400 + 80\,000 + 0 = 80\,400$

## **2.5 Word Problems - Addition**

The problem solving skills we learn in math can be very useful to help us solve problems we have in our day-to-day lives. To solve a problem, it is a good idea to have a plan. Consider the steps below for solving word problems.

Watch for **key words** when you are solving addition word problems.

**sum** - the answer in an addition problem  
**total** - the whole amount  
**all together** – everything is included in total  
**how much** - adding amounts together  
**combine** – to bring together in a group  
**join** - to add or attach together  
**accumulate** – to gather or collect  
**how many** – to add numbers together

### **Problem Solving Steps**

- Step 1:** Read the problem.
- Step 2:** List the information you found.
- Step 3:** Use key words to decide what you have to find out.
- Step 4:** Solve the problem.
- Step 5:** Does your answer make sense?
- Step 6:** Write your answer in a sentence.

## Word Problems continued

### Example A

David purchased three items at a store which cost \$134, \$16 and \$7. How much did David pay for the three items all together?

The key word is **all together** which means to add.

$$\begin{array}{r} \$134 + \$16 + \$7 = \\ 134 \\ 16 \\ + 7 \\ \hline \end{array}$$

*David paid \$157 all together for the three items.*

### Example B

The football team travelled 155 kilometres to their first game and 35 kilometres to their second game. How many kilometres did the football team travel in total?

The key words **how many** and **in total** means to add.

$$\begin{array}{r} 155 \text{ km} + 35 \text{ km} = \\ 155 \\ + 35 \\ \hline \end{array}$$

*The football team travelled 190 kilometres in total.*

## Writing the answer in a sentence

To write the answer in a sentence, go back to the word problem and read the question again. Start writing your answer with words from the question. There is more than one way to write the answer in the sentence.

In Example A, the question asks:

**How much did David pay for the three items all together?**

David paid \$157 all together for the three items.

Example B, the question asks:

**How many kilometres did the football team travel in total?**

The football team travelled 190 kilometres in total.

## Exercise 2.5

Solve each word problem. Give your answer in a sentence.  
Check your work using the answer key. The sentence you write  
may be a little different than the sentence in the answer key.

a) Attendance at the community picnic was 78 adults and 127 children. What was the combined number of people attending the picnic?

b) Andrea collects books for her bookstore. In January, she gathered 210. In February, she collected 165, and in March she added 137. How many books did she accumulate in those three months?

c) The floor space of an office is 126 square metres at the entrance and 1865 square metres in the work area. How many square metres is the whole office?

d) The population of Calgary at the end of 2012 was 1 120 225. In 2013, the population increased by 29 327 people. What was the population of Calgary by the end of 2013?  
(*City of Calgary census*)

**Exercise 2.5 continued**

Solve each word problem. Give your answer in a sentence. Check your work using the answer key.

e) In July, Robert earned \$1987 over Stampede week. For the remainder of the month, he earned another \$865. How much money in total did Robert earn in July?

f) The table below shows the average annual of precipitation (rain and snow) for the locations in Alberta. What is the total for Calgary, Red Deer and Edmonton combined? (*Currentresults.com*)

| Place        | Millimetres |
|--------------|-------------|
| Banff        | 470         |
| Calgary      | 419         |
| Edmonton     | 456         |
| Jasper       | 393         |
| Lloydminster | 409         |
| Red Deer     | 486         |

g) Linda studied for three hours on Monday, four hours on Tuesday, seven hours on Saturday and 10 hours on Sunday. How many hours did Linda study on those four days?

### Exercise 2.5 continued

h) The daily sales for the week at Acme Printing Company are shown in the table below. What were the total sales for the days shown?

|                  | <i>Sales</i>   |
|------------------|----------------|
| <i>Monday</i>    | <i>\$ 1204</i> |
| <i>Tuesday</i>   | <i>\$ 582</i>  |
| <i>Wednesday</i> | <i>\$ 2987</i> |
| <i>Thursday</i>  | <i>\$ 127</i>  |
| <i>Friday</i>    | <i>\$ 1098</i> |

#### Answers to Exercise 2.5– Word Problems

a)  $78 + 127 = 205$  Two hundred five (205) people attended the picnic.

b)  $210 + 165 + 137 = 512$  Andrea collected 512 books.

c)  $126 + 1865 = 1991$  The office is 1991 square metres.

d)  $1\,120\,225 + 29\,327 = 1\,149\,552$   
The population of Calgary at the end of 2013 was 1 149 552.

e)  $1987 + 865 = 2852$  Robert earned \$2 852 in July.

f)  $419 + 456 + 486 = 1361$  The combined total is 1361 millimetres of precipitation.

g)  $3 + 4 + 7 + 10 = 24$  Linda studied for 24 hours over four days.

h)  $1204 + 582 + 2987 + 127 + 1098 = 5998$   
The total sales for the days shown is \$ 5998.

**The Unit 2 Review for Addition is at the end of Unit 3 Subtraction.**

# Unit 3: Subtraction

## 3.1 Subtraction

**Subtraction takes away** an amount from another amount.  
The answer or result of subtraction is called the **difference**.

The **minus sign**  $-$  means to subtract.

$$\begin{array}{c} \star \star \star \\ \star \star \star - \star \star \star = 6 \text{ stars} \\ \star \star \star \end{array}$$

$$9 - 3 = 6 \text{ stars}$$

says **nine minus three equals six**  
or **nine take away three is six**

Subtraction is the opposite of addition. Look at these examples:

$$9 - 4 = 5 \qquad 5 + 4 = 9$$

$$9 - 5 = 4 \qquad 4 + 5 = 9$$

$$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array} \qquad \begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array} \qquad \begin{array}{r} 3 \\ + 8 \\ \hline 11 \end{array}$$

### Exercise 3.1a

Find the difference. Check your work using the answer key.  
The first one a) is done for you.

$$\begin{array}{r} \text{a)} \quad 5 \\ - 2 \\ \hline 3 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 9 \\ - 1 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \quad 12 \\ - 4 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d)} \quad 4 \\ - 2 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \quad 17 \\ - 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \quad 2 \\ - 1 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \quad 11 \\ - 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h)} \quad 7 \\ - 7 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i)} \quad 14 \\ - 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j)} \quad 16 \\ - 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \quad 9 \\ - 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{l)} \quad 8 \\ - 1 \\ \hline \end{array}$$

$$\begin{array}{r} \text{m)} \quad 9 \\ - 0 \\ \hline \end{array}$$

$$\begin{array}{r} \text{n)} \quad 14 \\ - 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o)} \quad 10 \\ - 5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{p)} \quad 15 \\ - 8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{q)} \quad 12 \\ - 9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r)} \quad 13 \\ - 5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s)} \quad 6 \\ - 5 \\ \hline \end{array}$$

$$\begin{array}{r} \text{t)} \quad 5 \\ - 0 \\ \hline \end{array}$$

#### Answers to Exercise 3.1a

|      |      |      |      |       |      |      |      |
|------|------|------|------|-------|------|------|------|
| a) 3 | b) 8 | c) 8 | d) 2 | e) 10 | f) 1 | g) 2 | h) 0 |
| i) 8 | j) 7 | k) 6 | l) 7 | m) 9  | n) 6 | o) 5 | p) 7 |
| q) 3 | r) 8 | s) 1 | t) 5 |       |      |      |      |

## Subtraction of Larger Numbers

When finding the difference between larger numbers, line up the corresponding place values. Subtract the number after the minus sign from the first number.

**Step 1:** Subtract the ones from the ones.

**Step 2:** Subtract the tens from the tens.

**Step 3:** Subtract the hundreds from the hundreds.

**Step 4:** Subtract the thousands from the thousands.

**Step 5:** Subtract the ten thousands from the ten thousands and so on.

**Example A**       $257 - 26 =$

Line up the place values beginning at the right.

**Step 1:** Subtract the ones from the ones.  $7 \text{ ones} - 6 \text{ ones} = \mathbf{1 \text{ one}}$

$$\begin{array}{r} 257 \\ - 26 \\ \hline 1 \end{array}$$

Write the answer 1 in line with the ones place.

**Step 2:** Subtract the tens.  $5 \text{ tens} - 2 \text{ tens} = \mathbf{3 \text{ tens}}$

$$\begin{array}{r} 257 \\ - 26 \\ \hline 31 \end{array}$$

Write the answer 3 in line with the tens place.

**Step 3:** Subtract the hundreds.  $2 \text{ hundreds} - 0 \text{ hundreds} = 2 \text{ hundreds}$

$$\begin{array}{r} 257 \\ - 26 \\ \hline 231 \end{array}$$

Write the answer 2 in line with the hundreds place.

The difference between 257 and 26 is 31.

**Exercise 3.1b**

Find the differences. Check your work using the answer key.  
Rewrite the question to line up the place values if required.  
The first one a) is done for you.

$$\begin{array}{r} \text{a)} \quad 36 \\ - 4 \\ \hline 32 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 72 \\ - 2 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \quad 48 \\ - 22 \\ \hline \end{array}$$

$$\text{d)} \quad 55 - 3 =$$

$$\begin{array}{r} \text{e)} \quad 73 \\ - 40 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \quad 76 \\ - 71 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \quad 195 \\ - 62 \\ \hline \end{array}$$

$$\text{h)} \quad 39 - 25 =$$

$$\begin{array}{r} \text{i)} \quad 464 \\ - 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j)} \quad 285 \\ - 64 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \quad 698 \\ - 173 \\ \hline \end{array}$$

$$\text{l)} \quad 176 - 64 =$$

$$\begin{array}{r} \text{m)} \quad 86 \\ - 50 \\ \hline \end{array}$$

$$\begin{array}{r} \text{n)} \quad 95 \\ - 35 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o)} \quad 28 \\ - 17 \\ \hline \end{array}$$

$$\text{p)} \quad 468 - 5 =$$

### Exercise 3.1b continued

$$\begin{array}{r} \text{q)} \quad 840 \\ - 40 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r)} \quad 766 \\ - 500 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s)} \quad 8628 \\ - 8513 \\ \hline \end{array}$$

$$\text{t)} \quad 8954 - 531 =$$

$$\begin{array}{r} \text{u)} \quad 48\,739 \\ - 616 \\ \hline \end{array}$$

$$\begin{array}{r} \text{v)} \quad 98\,562 \\ - 3\,001 \\ \hline \end{array}$$

$$\begin{array}{r} \text{w)} \quad 89\,528 \\ - 61\,017 \\ \hline \end{array}$$

$$\text{x)} \quad 19\,806 - 7101 =$$

#### Answers to Exercise 3.1b

a) 32

b) 70

c) 26

d) 52

e) 33

f) 5

g) 133

h) 14

i) 461

j) 221

k) 525

l) 112

m) 36

n) 60

o) 11

p) 463

q) 800

r) 266

s) 115

t) 8423

u) 48 123

v) 95 561

w) 28 511

x) 12 705

## **3.2 Checking Subtraction**

You can check your subtraction using addition. Add the answer (the **difference**) to the number you took away (the second number). If your subtracting was correct, the result of addition will be the number you started with (the top number) in the subtraction question.

### **Example A**

$$\begin{array}{r} 8 \\ - 6 \\ \hline 2 \end{array} \quad 2 \text{ is the difference}$$

To check using addition, add 2 to 6 to ensure you get back to 8.

$$\begin{array}{r} 2 \\ + 6 \\ \hline 8 \end{array}$$

---

### **Example B**

$$\begin{array}{r} 975 \\ - 21 \\ \hline 954 \end{array} \quad 954 \text{ is the difference}$$

To check using addition, add 954 to 21 to get back to 975

$$\begin{array}{r} 954 \\ + 21 \\ \hline 975 \end{array}$$

### Exercise 3.2

Find the difference. Then use addition to ensure your answer is correct. The first one a) is done for you.

Check

$$\begin{array}{r} \text{a)} \quad 25 \\ - 13 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 12 \\ + 13 \\ \hline 25 \end{array}$$

Check

$$\begin{array}{r} \text{b)} \quad 84 \\ - 30 \\ \hline \end{array}$$

Check

$$\begin{array}{r} \text{c)} \quad 975 \\ - 21 \\ \hline \end{array}$$

Check

$$\begin{array}{r} \text{d)} \quad 863 \\ - 701 \\ \hline \end{array}$$

Check

$$\begin{array}{r} \text{e)} \quad 5973 \\ - 832 \\ \hline \end{array}$$

Check

$$\begin{array}{r} \text{f)} \quad 85\,374 \\ - 2\,312 \\ \hline \end{array}$$

#### Answers to Exercise 3.2

$$\text{a) } 12 \quad 12 + 13 = 25$$

$$\text{b) } 54 \quad 54 + 30 = 84$$

$$\text{c) } 954 \quad 954 + 21 = 975$$

$$\text{d) } 162 \quad 162 + 701 = 863$$

$$\text{e) } 5141 \quad 5141 + 832 = 5973$$

$$\text{f) } 83\,062 \quad 83\,062 + 2312 = 85\,374$$

## **3.1 – 3.2 Review: Subtraction**

**A. Find the differences. Be sure to check your answers.**

a) 
$$\begin{array}{r} 39 \\ - 18 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 58 \\ - 24 \\ \hline \end{array}$$

c)  $72 - 60 =$

d) 
$$\begin{array}{r} 49 \\ - 23 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 64 \\ - 10 \\ \hline \end{array}$$

f)  $85 - 4 =$

**B. Find the differences. Be sure to check your answers.**

a) 
$$\begin{array}{r} 896 \\ - 385 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 698 \\ - 461 \\ \hline \end{array}$$

c)  $399 - 22 =$

d) 
$$\begin{array}{r} 467 \\ - 124 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 752 \\ - 231 \\ \hline \end{array}$$

f)  $497 - 34 =$

**C. Find the differences. Be sure to check your answers.**

a) 
$$\begin{array}{r} 8627 \\ - 323 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 9875 \\ - 9251 \\ \hline \end{array}$$

c)  $9751 - 340 =$

d) 
$$\begin{array}{r} 34\,859 \\ - 1\,336 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 37\,698 \\ - 12\,540 \\ \hline \end{array}$$

f)  $96\,723 - 403 =$

**Answers to 3.1 – 3.2 Review – Subtraction**

A a) 21

b) 34

c) 12

d) 26

e) 54

f) 81

Ba) 511

b) 237

c) 377

d) 343

e) 521

f) 463

Ca) 8304

b) 624

c) 9411

d) 33 523

e) 25 158

f) 96 320

### 3.3 Subtraction with Borrowing

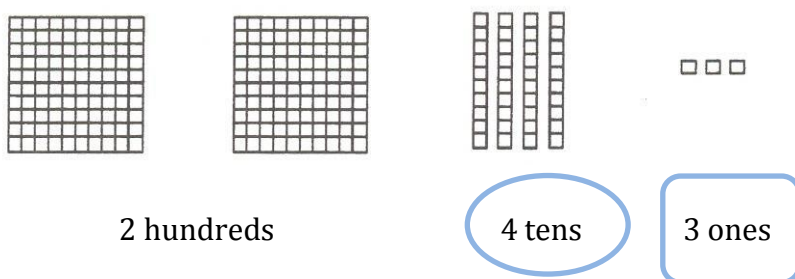
When you subtract, you may have to borrow from another place value to ensure you have enough. The number you are taking away may be larger than the top digit in that same column. So, you must **borrow** from the column on the left.

**Example A**

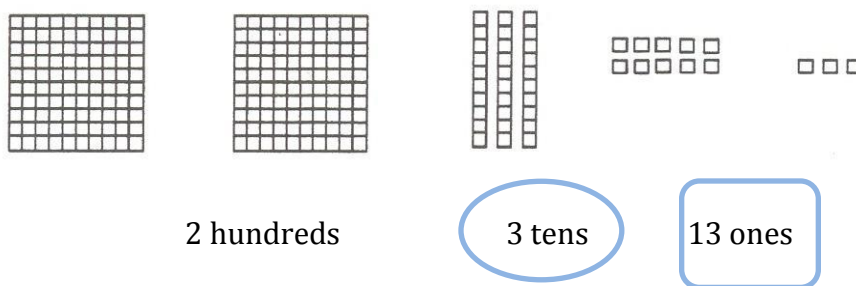
$$\begin{array}{r} 243 \\ - 128 \\ \hline \end{array}$$

$$\begin{array}{r} \phantom{3}^3 \phantom{13} \\ 2\cancel{4}3 \\ - 128 \\ \hline 115 \end{array}$$

**Step 1:** 3 ones minus 8 ones cannot be done



Borrow one ten and rename it as ten ones. Add the ten ones to the three ones.



Now you can subtract: 13 ones – 8 ones = **5 ones**

**Step 2:** Subtract the tens. 3 tens – 2 tens = **1 ten**

**Step 3:** Subtract the hundreds. 2 hundreds – 1 hundred = **1 hundred**

$$243 - 128 = 115$$

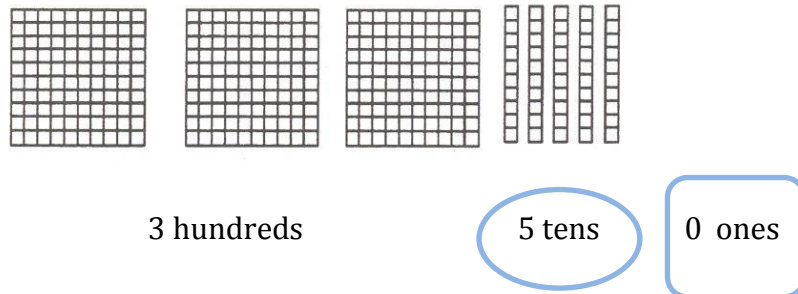
## Subtraction with Borrowing continued

### Example B

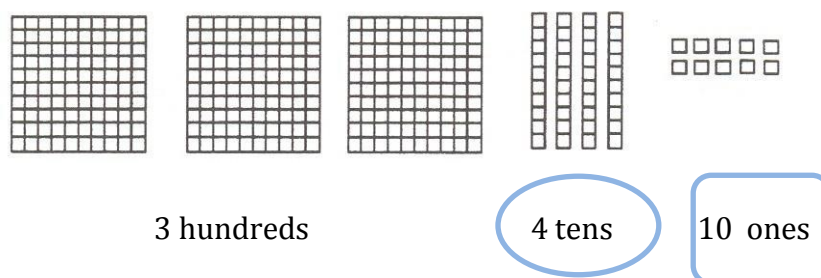
$$\begin{array}{r} 350 \\ - 124 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \quad 10 \\ 3\cancel{5}0 \\ - 124 \\ \hline 226 \end{array}$$

**Step 1:** 0 ones minus 4 ones cannot be done



Borrow one ten and rename it as ten ones.



Now you can subtract 10 ones – 4 ones = **6 ones**

**Step 2:** Subtract the tens. 4 tens – 2 tens = **2 tens**

**Step 3:** Subtract the hundreds. 3 hundreds – 1 hundred = **2 hundreds**

$$350 - 124 = 226$$

## Subtraction with Borrowing continued

Use this same method of borrowing when you subtract the hundreds, thousands, ten thousands and so on.

### Example C

$$\begin{array}{r} 3624 \\ - 815 \\ \hline \end{array}$$

$$\begin{array}{r} 2 \quad 16 \quad 1 \quad 14 \\ \cancel{3} \cancel{6} \cancel{2} \cancel{4} \\ - 815 \\ \hline 2809 \end{array}$$

**Step 1:** Subtract the ones.

4 ones minus 5 ones cannot be done

Borrow 1 ten from the 2 tens

Now you can subtract 14 ones – 5 ones = **9 ones**

**Step 2** Subtract the tens. You used to have 2 tens but now only have 1 ten.

1 ten – 1 ten = **0 tens**

**Step 3:** Subtract the hundreds.

6 hundreds – 8 hundreds cannot be done

Borrow 1 thousand from the 3 thousands

Now you can subtract 16 hundreds – 8 hundreds = **8 hundreds**

**Step 4:** Subtract the thousands. You used to have 3 but now only have 2.

2 thousands – 0 thousands = **2 thousands**

$$3624 - 815 = 2809$$

### Example D

with zeros

$$\begin{array}{r} 2000 \\ - 815 \\ \hline \end{array}$$

$$\begin{array}{r} 9 \quad 9 \\ 1 \quad \cancel{10} \quad \cancel{10} \quad \cancel{10} \\ \cancel{2} \quad \cancel{0} \quad \cancel{0} \quad \cancel{0} \\ - 815 \\ \hline 1185 \end{array}$$

When there are as many zeros as there are in 2000, before you begin to subtract you have to borrow from the 2 thousands and then work your way back to the ones place.

Borrow from the 2 thousands (which becomes 1 thousand), hundreds become 10, then borrow from the 10 hundreds (which becomes 9 hundreds). You then have 10 tens. Borrow from the 10 tens (which becomes 9 tens) and you are left with 10 ones.

You will have enough ones, tens, and hundred from which to subtract 815.

### Exercise 3.3

Find the difference. You may need to borrow. Check your work using the answer key. The first one a) is done for you.

a) 
$$\begin{array}{r} 2 \ 13 \\ 33 \\ - 7 \\ \hline 26 \end{array}$$

b) 
$$\begin{array}{r} 82 \\ - 45 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 37 \\ - 9 \\ \hline \end{array}$$

d)  $28 - 9 =$

e) 
$$\begin{array}{r} 63 \\ - 7 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 54 \\ - 5 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 25 \\ - 7 \\ \hline \end{array}$$

h)  $84 - 6 =$

i) 
$$\begin{array}{r} 45 \\ - 17 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 40 \\ - 28 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 45 \\ - 29 \\ \hline \end{array}$$

l)  $60 - 22 =$

m) 
$$\begin{array}{r} 445 \\ - 26 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 200 \\ - 34 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 736 \\ - 47 \\ \hline \end{array}$$

p)  $744 - 179 =$

**Exercise 3.3 continued**

Find the difference. Then use addition to ensure your answer is correct. The first one a) is done for you.

q) 
$$\begin{array}{r} \phantom{0}^3 \phantom{0}^{17} \\ 747 \\ - 109 \\ \hline 638 \end{array}$$

Check  
1

$$+ \begin{array}{r} 109 \\ \hline 747 \end{array}$$

Check

r)  $4000 - 215 =$

s) 
$$\begin{array}{r} 2640 \\ - 834 \\ \hline \end{array}$$

Check

Check

t)  $6753 - 1942 =$

u) 
$$\begin{array}{r} 44\,610 \\ - 13\,071 \\ \hline \end{array}$$

Check

Check

v)  $28\,243 - 9578 =$

**Answers to Exercise 3.3**

|           |                               |        |           |                              |       |
|-----------|-------------------------------|--------|-----------|------------------------------|-------|
| a) 26     | b) 37                         | c) 28  | d) 19     | e) 56                        | f) 49 |
| g) 18     | h) 78                         | i) 28  | j) 12     | k) 16                        | l) 38 |
| m) 419    | n) 166                        | o) 689 | p) 565    |                              |       |
| q) 638    | $638 + 109 = 747$             |        | r) 3785   | $3785 + 215 = 4000$          |       |
| s) 1806   | $1806 + 834 = 2640$           |        | t) 4811   | $4811 + 1942 = 6753$         |       |
| u) 31 539 | $31\,539 + 13\,071 = 44\,610$ |        | v) 18 665 | $18\,665 + 9\,578 = 28\,243$ |       |

## 3.4 Estimating Answers in Subtraction

You have learned how to round numbers. Now you can use that skill in rounding numbers to find an **approximate** difference by estimating using front-end rounding. Estimating is used to come up with a quick answer.

In front-end rounding, the number is rounded to the highest place (or the place value most left) and all the digits to the right of that place become zeros.

In these examples, the exact numbers have been front-end rounded and then the difference for the estimates are provided.

|                  |                                                     |           |                                                        |
|------------------|-----------------------------------------------------|-----------|--------------------------------------------------------|
| <b>Example A</b> | $\begin{array}{r} 47 \\ - 26 \\ \hline \end{array}$ | rounds to | $\begin{array}{r} 50 \\ - 30 \\ \hline 20 \end{array}$ |
|------------------|-----------------------------------------------------|-----------|--------------------------------------------------------|

|                  |                                                       |           |                                                           |
|------------------|-------------------------------------------------------|-----------|-----------------------------------------------------------|
| <b>Example B</b> | $\begin{array}{r} 870 \\ - 342 \\ \hline \end{array}$ | rounds to | $\begin{array}{r} 900 \\ - 300 \\ \hline 600 \end{array}$ |
|------------------|-------------------------------------------------------|-----------|-----------------------------------------------------------|

|                  |                                                              |           |                                                                      |
|------------------|--------------------------------------------------------------|-----------|----------------------------------------------------------------------|
| <b>Example C</b> | $\begin{array}{r} 24\,397 \\ - 6\,148 \\ \hline \end{array}$ | rounds to | $\begin{array}{r} 20\,000 \\ - 6\,000 \\ \hline 14\,000 \end{array}$ |
|------------------|--------------------------------------------------------------|-----------|----------------------------------------------------------------------|

### **Example D**

What would a quick estimate be of your closing bank balance if your opening balance was \$1125 and you spent \$89 and \$767.

|                            |                 |         |
|----------------------------|-----------------|---------|
| Round up the values given. | \$ 1125 becomes | \$ 1000 |
|                            | \$ 89 becomes   | \$ 90   |
|                            | \$ 767 becomes  | \$ 800  |

Your bank balance would be approximately \$100.

$$1000 - (100 + 800) = \$100$$

$$1000 - 900 = \$100$$

### Exercise 3.4

Find the exact answer and the estimated answer. Check your work using the answer key. The first one is a) is done for you.

- |                                                                                                   |                                                                                                                    |
|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <p>a) <math display="block">\begin{array}{r} 687 \\ - 48 \\ \hline 639 \end{array}</math></p>     | <p>Estimate</p> <p>b) <math display="block">\begin{array}{r} 654 \\ - 236 \\ \hline \end{array}</math></p>         |
| <p>c) <math display="block">\begin{array}{r} 8000 \\ - 1876 \\ \hline \end{array}</math></p>      | <p>Estimate</p> <p>d) <math display="block">\begin{array}{r} 92\ 163 \\ - 48\ 517 \\ \hline \end{array}</math></p> |
| <p>e) <math display="block">\begin{array}{r} 54\ 751 \\ - 7\ 696 \\ \hline \end{array}</math></p> | <p>Estimate</p> <p>f) <math display="block">\begin{array}{r} 102\ 085 \\ - 5\ 000 \\ \hline \end{array}</math></p> |

#### Answers to Exercise 3.4 (est means estimate)

- |                                           |                                             |
|-------------------------------------------|---------------------------------------------|
| a) 639      est 700 – 50 = 650            | b) 418      est 700 – 200 = 500             |
| c) 6124      est 8000 – 2000 = 6000       | d) 43 646      est 90 000 – 50 000 = 40 000 |
| e) 47 055      est 50 000 – 8000 = 42 000 | f) 97 085      est 100 000 – 5000 = 95 000  |

## **3.5 Word Problems - Subtraction**

The problem solving skills we learn in math can be very useful to help us solve problems we have in our day-to-day lives. To solve a problem, it is a good idea to have a plan. Consider the steps below for solving word problems.

Watch for **key words** when you are solving subtraction word problems.

|                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>difference</b> - the answer in a subtraction problem</p> <p><b>how much more</b></p> <p><b>how many more</b></p> <p><b>how many fewer</b></p> <p><b>find the increase</b></p> <p><b>find the decrease</b></p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### **Problem Solving Steps**

- Step 1:** Read the problem.
- Step 2:** List the information you found.
- Step 3:** Use key words to decide what you have to find out.
- Step 4:** Solve the problem.
- Step 5:** Does your answer make sense?
- Step 6:** Write your answer in a sentence.

## Word Problems continued

### Example A

On Tuesday, a coffee shop had sales of \$8526. On Wednesday, the same coffee shop had sales of \$6312. What was the difference between Tuesday's sales and Wednesday's sales?

The key word is **difference** which means to subtract.

$$\begin{array}{r} \$8526 - \$6312 = \quad 8526 \\ \quad \quad \quad - \underline{6312} \end{array}$$

*The difference between Tuesday's and Wednesday's sales was \$2214.*

### Example B

The football team travelled 155 kilometres to their first game and 35 kilometres to their second game. How many more kilometres did the football team travel to their first game than their second?

The key word is **how many more** which means to subtract.

$$\begin{array}{r} 155 \text{ km} - 35 \text{ km} = \quad 155 \\ \quad \quad \quad - \underline{35} \end{array}$$

*The football team travelled 120 more kilometres to their first game than their second game.*

## Writing the answer in a sentence

To write the answer in a sentence, go back to the word problem and read the question again. Start writing your answer with words from the question. There is more than one way to write the answer in the sentence.

In Example A, the question asks:

**What was the difference between Tuesday's sales and Wednesday's sales?**

The difference between Tuesday's and Wednesday's sales was \$2214.

In Example B, the question asks:

**How many more kilometres did the football team travel to their first game than to their second game?**

The football team travelled 120 kilometres more to their first game than their second game.

### Exercise 3.5

Solve each word problem. Give your answer in a sentence.

Check your work using the answer key. The sentence you write may be a little different than the sentence in the answer key.

a) Attendance at the community picnic was 78 adults and 127 children. What was the difference between the number of adults attending and the number of children attending?

b) Andrea collects books for her bookstore. In January, she gathered 210. In February, she collected 165. How many more books did she gather in January than in February?

c) The floor space of an office is 1991 square metres in total. If the entrance is 126 square metres, how much area remains for the work area?

d) The population of Calgary at the end of 2012 was 1 120 225. In 2013, the population was 1 149 552. By how much did the population increase between 2012 and 2013?  
(*City of Calgary census*)

**Exercise 3.5 continued**

Solve each word problem. Give your answer in a sentence. Check your work using the answer key.

e) In July, Robert earned \$2852. He had to pay \$485 in deductions (taken off). How much money did Robert earn after deductions in July?

f) The table below shows the average annual of precipitation (rain and snow) for the locations in Alberta. How many fewer millimetres of precipitation occur in Jasper than in Banff? (*Currentresults.com*)

| Place        | Millimetres |
|--------------|-------------|
| Banff        | 470         |
| Calgary      | 419         |
| Edmonton     | 456         |
| Jasper       | 393         |
| Lloydminster | 409         |
| Red Deer     | 486         |

g) Linda has purchased a computer for \$836. She has paid \$250 so far. How much money does she still have to pay on the computer?

### Exercise 3.5 continued

h) The daily sales for the week at Acme Printing Company are shown in the table below. What is the difference between the day with the greatest sales and the day with the least sales?

|                  | <i>Sales</i>   |
|------------------|----------------|
| <i>Monday</i>    | <i>\$ 1204</i> |
| <i>Tuesday</i>   | <i>\$ 582</i>  |
| <i>Wednesday</i> | <i>\$ 2987</i> |
| <i>Thursday</i>  | <i>\$ 127</i>  |
| <i>Friday</i>    | <i>\$ 1098</i> |

#### Answers to Exercise 3.5 – Word Problems

- a)  $127 - 78 = 49$  There were 49 more children than adults at the picnic.
- b)  $210 - 165 = 45$  Andrea collected 45 more books in January.
- c)  $1991 - 126 = 1865$  There is 1865 square metres remaining for the work space.
- d)  $1\,149\,552 - 1\,120\,225 = 29\,327$   
The population of Calgary increased by 29 327 between 2012 and 2013.
- e)  $2852 - 485 = 2367$  After deductions, Robert earned \$2367 in July.
- f) Banff (470) less Jasper (393)  $470 - 393 = 77$   
Jasper has 77 millimetres less precipitation than Banff.
- g)  $836 - 250 = 586$  Linda owes \$586 on the computer.
- h) Greatest sales Wednesday \$2987 Least sales Thursday \$127  $2987 - 127 = 2860$   
The difference in sales between the greatest and least sales days is \$2860.

## Unit 2 and Unit 3 Review – Addition & Subtraction

**A. Find the sums. Check your work using the answer key at the end of the review.**

$$\begin{array}{r} \text{a)} \quad 23 \\ + 35 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b)} \quad 147 \\ + 74 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \quad 62 \\ + 56 \\ \hline \end{array}$$

$$\begin{array}{r} \text{d)} \quad 823 \\ 237 \\ + 42 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \quad 345 \\ 735 \\ + 70 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \quad 416 \\ 588 \\ + 204 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \quad 2548 \\ + 470 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h)} \quad 10\,457 \\ + 3\,166 \\ \hline \end{array}$$

$$\begin{array}{r} \text{i)} \quad 18\,862 \\ + 56\,149 \\ \hline \end{array}$$

**B. Find the exact answer and the estimates.**

**Rewrite the addition problems in a column for solving.**

a)  $45 + 104 =$   
Exact                  Estimate

b)  $523 + 364 =$   
Exact                  Estimate

c)  $5231 + 346 =$   
Exact                  Estimate

d)  $4661 + 2138 =$   
Exact                  Estimate

e)  $42 + 707 + 350 =$   
Exact                  Estimate

f)  $63\,613 + 45\,165 =$   
Exact                  Estimate

g)  $22\,714 + 43\,267 + 1102 =$   
Exact                  Estimate

h)  $72\,510 + 4127 + 13\,041 =$   
Exact                  Estimate

**C. Use the problem solving steps to estimate the following answers and then solve for the exact answer. Give your exact answer in a sentence.**

a) The Plumbers' Union has 456 members. The Carpenters' Union has 875 members. The Electricians' Union has 1394 members. How many members do these three unions have all together?

b) Last year Sam shipped 42 169 orders from his warehouse. So far this year, Sam has shipped 5837 orders. What was the total number of orders shipped last year and this year?

c) Amy has driven 22 576 kilometres, 38 342 kilometres and 14 208 kilometres in the last three years. In total, how many kilometres has Amy driven in the last three years?

## Answers to Unit 2 Review - Addition (est means estimate)

A a) 58      b) 221      c) 118      d) 1102      e) 1150

f) 1208      g) 3018      h) 13 623      i) 75 011

**B** a) 149 est  $50 + 100 = 150$       b) 887 est  $500 + 400 = 900$   
c) 5577 est  $5000 + 300 = 5300$       d) 6799 est  $5000 + 2000 = 7000$   
e) 1099 est  $40 + 700 + 400 = 1140$       f) 108 778 est  $60\,000 + 50\,000 = 110\,000$   
g) 67 083 est  $20\,000 + 40\,000 + 1000 = 61\,000$       h) 89 678 est  $70\,000 + 4000 + 10\,000 = 84\,000$

**C a)**  $456 + 875 + 1394 = 2725$       est  $500 + 900 + 1000 = 2400$   
The three unions have 2725 members in total.

b)  $42\,169 + 5837 = 48\,006$     est  $40\,000 + 6000 = 46\,000$   
Sam shipped 48 006 orders in total last year and this year.

c)  $22\,576 + 38\,342 + 14\,208 = 75\,126$       est  $20\,000 + 40\,000 + 10\,000 = 70\,000$   
Amy drove 75 126 kilometres in the last three years.

## Unit 3 Review - Subtraction

**D. Find the difference. Check your work using the answer key at the end of the review.**

$$\begin{array}{r} \text{a)} \quad 76 \\ - 35 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b)} \quad 686 \\ - 271 \\ \hline \end{array}$$

$$\text{c)} \quad 5546 - 432 =$$

$$\begin{array}{r} \text{d)} \quad 823 \\ - 42 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \quad 345 \\ - 70 \\ \hline \end{array}$$

$$\text{f)} \quad 416 - 204 =$$

$$\begin{array}{r} \text{g)} \quad 1000 \\ - 436 \\ \hline \end{array}$$

$$\begin{array}{r} \text{h)} \quad 345\,398 \\ - 26\,737 \\ \hline \end{array}$$

$$\text{i)} \quad 134\,529 - 3894 =$$

**E. Find the exact answer and check your answer through addition.  
Rewrite the subtraction problems in a column for solving.**

a)  $45 - 19 =$   
Exact                      Check

b)  $523 - 364 =$   
Exact                      Check

c)  $5231 - 346 =$   
Exact                      Check

d)  $54\,661 - 25\,138 =$   
Exact                      Check

**Find the exact answer and the estimates.  
Rewrite the subtraction problems in a column for solving.**

e)  $707 - 350 =$   
Exact                      Estimate

f)  $63\,613 - 45\,165 =$   
Exact                      Estimate

g)  $40\,000 - 1102 =$   
Exact                      Estimate

h)  $672\,510 - 94\,127 =$   
Exact                      Estimate

**F. Use the problem solving steps to estimate the following answers and then solve for the exact answer. Give your exact answer in a sentence.**

a) The Carpenters' Union has 875 members. The Electricians' Union has 1394 members. How many more members are there in the Electricians' Union than the Carpenters' Union?

b) Last year Sam shipped 42 169 orders from his warehouse. So far this year, Sam has shipped 5837 orders. What was the difference between last year's shipments and this year's shipments to date?

c) Amy has driven 22 576 kilometres in 2013 and 38 342 kilometres in 2014. In which year did she drive more and by how many kilometres?

**The problems below require the use of either addition or subtraction or may require the use of both addition and subtraction. Apply the skills you have learned in Units 2 and 3 to solve each question.**

d) Last Friday, 1259 children and 339 parents went to the hockey game. How many children and parents were at the game?

e) The Laerdal Tunnel in Norway is the longest road tunnel in the world. It is 24 510 metres long. The Zhongnanshan Tunnel in China is the second longest road tunnel in the world. It is 18 040 metres long. How much longer is the Laerdal Tunnel?

f) Lin bought school clothes for her children. She spent \$46 at the department store, \$40 at the shoe store and \$78 at the discount store. How much did Lin spend altogether?

- g) A truck weighed 4267 kilograms when loaded with dirt. When the truck is empty it weighed 2189 kilograms. How much did the dirt weigh?

**These questions have both addition and subtraction in them.  
Find the answer for each question.**

h)  $776 + 634 - 478 =$

i)  $3714 - 819 + 496 =$

j)  $7413 - 249 + 382 =$

k)  $6415 + 5829 - 1756 =$

**These word problems have both addition and subtraction in them.  
They require more than one step. Find the answer for each question.**

l) Two weeks ago, Van opened a new bank account and deposited \$295. He paid \$146 for his gas bill from his account. Van then deposited \$1632 in his account. How much money is in his account?

m) Michael has 1532 metres of fencing. He wants to fence his garden which measures 253 metres long on both sides and 187 metres wide on both sides. Does he have enough fencing? How much fencing will be left over?



**Answers to Unit 3 Review – Subtraction** (est means estimate)

- D** a) 41              b) 415              c) 5114              d) 781              e) 275  
f) 212              g) 564              h) 318 661              i) 130 635

- E** a) 26    check  $19 + 26 = 45$                                       b) 159    check  $159 + 364 = 523$   
c) 4885    check  $4885 + 346 = 5231$                               d) 29 523    check  $29\,523 + 25\,138 = 54\,661$   
e) 357    est  $700 - 400 = 300$                                       f) 18 448    est  $60\,000 - 50\,000 = 10\,000$   
g) 38 898    est  $40\,000 - 1000 = 39\,000$                               h) 578 383    est  $700\,000 - 90\,000 = 610\,000$

- F** a)  $1394 - 875 = 519$               est  $1000 - 900 = 100$   
The Electricians' Union has 519 more members than the Carpenters' Union.  
b)  $42\,169 - 5837 = 36\,332$               est  $40\,000 - 6000 = 34\,000$   
The difference between last year's shipments and this year's shipments to date is 36 332.  
c)  $38\,342 - 22\,576 = 15\,766$               est  $40\,000 - 20\,000 = 20\,000$   
Amy drove more in 2014. She drove 15 766 kilometres more in 2014 than in 2013.

**Answers to Addition and Subtraction**

- d)  $1259 + 339 = 1598$     There were 1598 children and parents at the game.  
e)  $24510 - 18\,040 = 6470$     The Laerdal Tunnel is 6470 metres longer than the Zhongnanshan Tunnel.  
f)  $46 + 40 + 78 = 164$               Lin spent \$164.  
g)  $4267 - 2189 = 2078$     The dirt weighed kilograms.  
h) 932              i) 3391              j) 7546              k) 10 488  
l)  $295 - 146 + 1632 = 1781$     Van has \$1781 in his account.  
m) length  $253 \times 2 = 506$  width  $287 \times 2 = 374$     Fencing required for entire garden is  $506 + 374 = 880$ .  
Michael has 1532 metres of fencing and needs 880 metres. So, yes he has enough fencing.  
 $1532 - 880 = 652$     He will have 652 metres left over.

# Unit 4: Multiplication

## 4.1 Multiplication Facts

Multiplication is repeated addition. It is a fast way to add up groups of the same number.

The **times sign**  $\times$  means to multiply.

  
 $3 + 3 + 3 + 3 = 12$  stars

How many groups are there? 4

4 groups of 3 stars is 12

This can be written as a multiplication equation.

$$4 \times 3 = 12 \text{ stars}$$

Reads **four times three equals twelve**  
or **four groups of three is twelve**

---

  
 $2 + 2 + 2 + 2 + 2 = 10$  stars

How many groups are there? 5

5 groups of 2 stars is 10

This can be written as a multiplication equation.

$$5 \times 2 = 10 \text{ stars}$$

Reads **five times two equals ten**  
or **five groups of two is ten**

## Multiplication Facts continued

The answer in multiplication is called the **product**.

The numbers that are multiplied together are called **factors**.

A multiplication problem can be written side by side or in a column.

$$4 \times 3 = 12$$
$$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$$

The product is 12.  
The factors are 4 and 3.

---

$$5 \times 2 = 10$$
$$\begin{array}{r} 5 \\ \times 2 \\ \hline 10 \end{array}$$

The product is 10.  
The factors are 5 and 2.

---

Try writing this multiplication fact in a column.

$$7 \times 6 = 42$$
$$\begin{array}{r} \square \\ \times \square \\ \hline \square \end{array}$$

The product is \_\_\_\_\_.

The factors are \_\_\_\_ and \_\_\_\_.

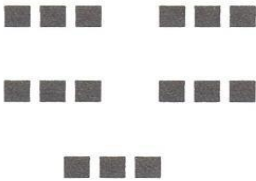
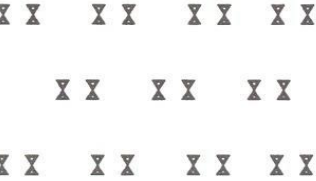
### Answer to above example

$$7 \times 6 = 42$$
$$\begin{array}{r} 7 \\ \times 6 \\ \hline 42 \end{array}$$

The product is 42.      The factors are 7 and 6.

## Exercise 4.1a

For each drawing, write the addition equation and find the total. Then write the multiplication equation for same drawing and find the product. Check your work using the answer key.

|    | Drawing                                                                             | Addition Equation | Multiplication Equation |
|----|-------------------------------------------------------------------------------------|-------------------|-------------------------|
| a) |    | $4 + 4 + 4 = 12$  | $3 \times 4 = 12$       |
| b) |    |                   |                         |
| c) |    |                   |                         |
| d) |    |                   |                         |
| e) |  |                   |                         |
| f) |  |                   |                         |
| g) |  |                   |                         |

### Answers to Exercise 4.1a

- |                                                     |                    |                         |                   |
|-----------------------------------------------------|--------------------|-------------------------|-------------------|
| a) $4 + 4 + 4 = 12$                                 | $3 \times 4 = 12$  | b) $6 + 6 = 12$         | $2 \times 6 = 12$ |
| c) $3 + 3 + 3 + 3 + 3 = 15$                         | $5 \times 3 = 15$  | d) $5 + 5 + 5 + 5 = 20$ | $4 \times 5 = 20$ |
| e) $8 + 8 + 8 + 8 = 32$                             | $4 \times 8 = 32$  | f) $3 + 3 + 3 = 9$      | $3 \times 3 = 9$  |
| g) $2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = 22$ | $11 \times 2 = 22$ |                         |                   |

## Multiplication Facts continued

### 0 times tables

$$0 \times \text{any number} = 0$$

zero times any number will always equal zero

$$0 \times 0 = 0$$

$$1 \times 0 = 0$$

$$2 \times 0 = 0$$

$$3 \times 0 = 0$$

$$4 \times 0 = 0$$

$$5 \times 0 = 0$$

$$6 \times 0 = 0$$

$$7 \times 0 = 0$$

$$8 \times 0 = 0$$

$$9 \times 0 = 0$$

$$10 \times 0 = 0$$

Memorize the multiplication facts.

## Multiplication Facts continued

### 1 times tables

1 x any number = that number

one times any number will always equal that number

$$1 \times 0 = 0$$

$$1 \times 1 = 1$$

$$1 \times 2 = 2$$

$$1 \times 3 = 3$$

$$1 \times 4 = 4$$

$$1 \times 5 = 5$$

$$1 \times 6 = 6$$

$$1 \times 7 = 7$$

$$1 \times 8 = 8$$

$$1 \times 9 = 9$$

$$1 \times 10 = 10$$

Memorize the multiplication facts.

## Multiplication Facts continued

### 2 times tables

The answer of any number times 2 will be even.

$$2 \times 0 = 0$$

$$2 \times 1 = 2$$

$$2 \times 2 = 4$$

$$2 \times 3 = 6$$

$$2 \times 4 = 8$$

$$2 \times 5 = 10$$

$$2 \times 6 = 12$$

$$2 \times 7 = 14$$

$$2 \times 8 = 16$$

$$2 \times 9 = 18$$

$$2 \times 10 = 20$$

Practice counting by 2s

0      2      4      6      8      10      12      14      16      18      20

Memorize the multiplication facts.

## Multiplication Facts continued

### 3 times tables

$$3 \times 0 = 0$$

$$3 \times 1 = 3$$

$$3 \times 2 = 6$$

$$3 \times 3 = 9$$

$$3 \times 4 = 12$$

$$3 \times 5 = 15$$

$$3 \times 6 = 18$$

$$3 \times 7 = 21$$

$$3 \times 8 = 24$$

$$3 \times 9 = 27$$

$$3 \times 10 = 30$$

Practice counting by 3s

0      3      6      9      12      15      18      21      24      27      30

Memorize the multiplication facts.

## Exercise 4.1b

Find the product. This exercise includes the zero to three times tables. Check your work using the answer key at the end of the exercise.

a)  $\begin{array}{r} 2 \\ \times 2 \\ \hline \end{array}$

b)  $\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$

c)  $\begin{array}{r} 1 \\ \times 4 \\ \hline \end{array}$

d)  $\begin{array}{r} 0 \\ \times 1 \\ \hline \end{array}$

e)  $\begin{array}{r} 1 \\ \times 7 \\ \hline \end{array}$

f)  $\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$

g)  $\begin{array}{r} 0 \\ \times 4 \\ \hline \end{array}$

h)  $\begin{array}{r} 3 \\ \times 1 \\ \hline \end{array}$

i)  $\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$

j)  $\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$

k)  $\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$

l)  $\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$

m)  $\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$

n)  $\begin{array}{r} 0 \\ \times 7 \\ \hline \end{array}$

o)  $\begin{array}{r} 2 \\ \times 4 \\ \hline \end{array}$

p)  $\begin{array}{r} 1 \\ \times 9 \\ \hline \end{array}$

q)  $\begin{array}{r} 1 \\ \times 1 \\ \hline \end{array}$

r)  $\begin{array}{r} 2 \\ \times 1 \\ \hline \end{array}$

s)  $\begin{array}{r} 0 \\ \times 3 \\ \hline \end{array}$

t)  $\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$

u)  $\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$

v)  $\begin{array}{r} 1 \\ \times 10 \\ \hline \end{array}$

w)  $\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array}$

x)  $\begin{array}{r} 3 \\ \times 7 \\ \hline \end{array}$

### Answers to Exercise 4.1b

|       |       |       |       |
|-------|-------|-------|-------|
| a) 4  | b) 9  | c) 4  | d) 0  |
| e) 7  | f) 6  | g) 0  | h) 3  |
| i) 12 | j) 8  | k) 12 | l) 10 |
| m) 15 | n) 0  | o) 8  | p) 9  |
| q) 1  | r) 2  | s) 0  | t) 6  |
| u) 27 | v) 10 | w) 16 | x) 21 |

## Multiplication Facts continued

|                |
|----------------|
| 4 times tables |
|----------------|

|                    |
|--------------------|
| $4 \times 0 = 0$   |
| $4 \times 1 = 4$   |
| $4 \times 2 = 8$   |
| $4 \times 3 = 12$  |
| $4 \times 4 = 16$  |
| $4 \times 5 = 20$  |
| $4 \times 6 = 24$  |
| $4 \times 7 = 28$  |
| $4 \times 8 = 32$  |
| $4 \times 9 = 36$  |
| $4 \times 10 = 40$ |

Practice counting by 4s

0      4      8      12      16      20      24      28      32      36      40

Memorize the multiplication facts.

## Multiplication Facts continued

### 5 times tables

Any number times 5 will end in a 5 or 0.

|                    |
|--------------------|
| $5 \times 0 = 0$   |
| $5 \times 1 = 5$   |
| $5 \times 2 = 10$  |
| $5 \times 3 = 15$  |
| $5 \times 4 = 20$  |
| $5 \times 5 = 25$  |
| $5 \times 6 = 30$  |
| $5 \times 7 = 35$  |
| $5 \times 8 = 40$  |
| $5 \times 9 = 45$  |
| $5 \times 10 = 50$ |

Practice counting by 5s

0      5      10    15    20    25    30    35    40    45    50

Memorize the multiplication facts.

The answers (products) for 5 times an odd number will end in a 5.

$5 \times 1 = 5$        $5 \times 3 = 15$        $5 \times 5 = 25$        $5 \times 7 = 35$        $5 \times 9 = 45$

The answers (products) for 5 times an even number will end in a 0.

$5 \times 0 = 0$      $5 \times 2 = 10$      $5 \times 4 = 20$      $5 \times 6 = 30$      $5 \times 8 = 40$      $5 \times 10 = 50$

## Multiplication Facts continued

|                |
|----------------|
| 6 times tables |
|----------------|

|                    |
|--------------------|
| $6 \times 0 = 0$   |
| $6 \times 1 = 6$   |
| $6 \times 2 = 12$  |
| $6 \times 3 = 18$  |
| $6 \times 4 = 24$  |
| $6 \times 5 = 30$  |
| $6 \times 6 = 36$  |
| $6 \times 7 = 42$  |
| $6 \times 8 = 48$  |
| $6 \times 9 = 54$  |
| $6 \times 10 = 60$ |

Practice counting by 6s

0      6      12      18      24      30      36      42      48      54      60

Memorize the multiplication facts.

### Exercise 4.1c

Find the product. This exercise includes the four to six times tables. Check your work using the answer key.

a)  $\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$

b)  $\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$

c)  $\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$

d)  $\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$

e)  $\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$

f)  $\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$

g)  $\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$

h)  $\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$

i)  $\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$

j)  $\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$

k)  $\begin{array}{r} 6 \\ \times 3 \\ \hline \end{array}$

l)  $\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$

m)  $\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$

n)  $\begin{array}{r} 6 \\ \times 0 \\ \hline \end{array}$

o)  $\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$

p)  $\begin{array}{r} 5 \\ \times 0 \\ \hline \end{array}$

q)  $\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$

r)  $\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$

s)  $\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$

t)  $\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$

u)  $\begin{array}{r} 6 \\ \times 4 \\ \hline \end{array}$

v)  $\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$

w)  $\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$

x)  $\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$

#### Answers to Exercise 4.1c

|       |       |       |       |
|-------|-------|-------|-------|
| a) 15 | b) 42 | c) 8  | d) 25 |
| e) 12 | f) 12 | g) 5  | h) 36 |
| i) 16 | j) 20 | k) 18 | l) 20 |
| m) 40 | n) 0  | o) 24 | p) 0  |
| q) 36 | r) 10 | s) 48 | t) 36 |
| u) 24 | v) 32 | w) 45 | x) 54 |

## Multiplication Facts continued

|                |
|----------------|
| 7 times tables |
|----------------|

|                    |
|--------------------|
| $7 \times 0 = 0$   |
| $7 \times 1 = 7$   |
| $7 \times 2 = 14$  |
| $7 \times 3 = 21$  |
| $7 \times 4 = 28$  |
| $7 \times 5 = 35$  |
| $7 \times 6 = 42$  |
| $7 \times 7 = 49$  |
| $7 \times 8 = 56$  |
| $7 \times 9 = 63$  |
| $7 \times 10 = 70$ |

Practice counting by 7s

0      7      14      21      28      35      42      49      56      63      70

Memorize the multiplication facts.

## Multiplication Facts continued

|                |
|----------------|
| 8 times tables |
|----------------|

|                    |
|--------------------|
| $8 \times 0 = 0$   |
| $8 \times 1 = 8$   |
| $8 \times 2 = 16$  |
| $8 \times 3 = 24$  |
| $8 \times 4 = 32$  |
| $8 \times 5 = 40$  |
| $8 \times 6 = 48$  |
| $8 \times 7 = 56$  |
| $8 \times 8 = 64$  |
| $8 \times 9 = 72$  |
| $8 \times 10 = 80$ |

Practice counting by 8s

0      8      16      24      32      40      48      56      64      72      80

Memorize the multiplication facts.

## Multiplication Facts continued

|                |
|----------------|
| 9 times tables |
|----------------|

|                    |
|--------------------|
| $9 \times 0 = 0$   |
| $9 \times 1 = 9$   |
| $9 \times 2 = 18$  |
| $9 \times 3 = 27$  |
| $9 \times 4 = 36$  |
| $9 \times 5 = 45$  |
| $9 \times 6 = 54$  |
| $9 \times 7 = 63$  |
| $9 \times 8 = 72$  |
| $9 \times 9 = 81$  |
| $9 \times 10 = 90$ |

Practice counting by 9s

0      9      18    27    36    45    54    63    72    81    90

Memorize the multiplication facts.

## Exercise 4.1d

Find the product. This exercise includes the seven to nine times tables. Check your work using the answer key.

a)  $\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$

b)  $\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$

c)  $\begin{array}{r} 9 \\ \times 0 \\ \hline \end{array}$

d)  $\begin{array}{r} 7 \\ \times 2 \\ \hline \end{array}$

e)  $\begin{array}{r} 9 \\ \times 6 \\ \hline \end{array}$

f)  $\begin{array}{r} 7 \\ \times 0 \\ \hline \end{array}$

g)  $\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$

h)  $\begin{array}{r} 9 \\ \times 1 \\ \hline \end{array}$

i)  $\begin{array}{r} 8 \\ \times 6 \\ \hline \end{array}$

j)  $\begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$

k)  $\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$

l)  $\begin{array}{r} 8 \\ \times 0 \\ \hline \end{array}$

m)  $\begin{array}{r} 9 \\ \times 4 \\ \hline \end{array}$

n)  $\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$

o)  $\begin{array}{r} 8 \\ \times 1 \\ \hline \end{array}$

p)  $\begin{array}{r} 9 \\ \times 10 \\ \hline \end{array}$

q)  $\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$

r)  $\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$

s)  $\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$

t)  $\begin{array}{r} 7 \\ \times 10 \\ \hline \end{array}$

u)  $\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$

v)  $\begin{array}{r} 9 \\ \times 5 \\ \hline \end{array}$

w)  $\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$

x)  $\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$

### Answers to Exercise 4.1d

|       |       |       |       |
|-------|-------|-------|-------|
| a) 28 | b) 24 | c) 0  | d) 14 |
| e) 54 | f) 0  | g) 64 | h) 9  |
| i) 48 | j) 18 | k) 63 | l) 0  |
| m) 36 | n) 49 | o) 8  | p) 90 |
| q) 35 | r) 32 | s) 27 | t) 70 |
| u) 64 | v) 45 | w) 7  | x) 16 |

## Times Table Chart

Use this times table chart to learn the multiplication facts.

Follow the steps to find an answer (product).

**Example**  $5 \times 7 = 35$

Locate the 5 down the side.

Locate the 7 across the top

Follow the lines of the numbers until they intersect or come together.

The product is 35.

## Times Table Chart

|    | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
|----|---|----|----|----|----|----|----|----|----|----|-----|
| 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   |
| 1  | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
| 2  | 0 | 2  | 4  | 6  | 8  | 10 | 12 | 14 | 16 | 18 | 20  |
| 3  | 0 | 3  | 6  | 9  | 12 | 15 | 18 | 21 | 24 | 27 | 30  |
| 4  | 0 | 4  | 8  | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40  |
| 5  | 0 | 5  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50  |
| 6  | 0 | 6  | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60  |
| 7  | 0 | 7  | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70  |
| 8  | 0 | 8  | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80  |
| 9  | 0 | 9  | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90  |
| 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

# Times Tables Chart

|    | 1                  | 2                  | 3                   | 4                    | 5                    | 6                    |
|----|--------------------|--------------------|---------------------|----------------------|----------------------|----------------------|
| 1  | $1 \times 1 = 1$   | $2 \times 1 = 2$   | $3 \times 1 = 3$    | $4 \times 1 = 4$     | $5 \times 1 = 5$     | $6 \times 1 = 6$     |
| 2  | $1 \times 2 = 2$   | $2 \times 2 = 4$   | $3 \times 2 = 6$    | $4 \times 2 = 8$     | $5 \times 2 = 10$    | $6 \times 2 = 12$    |
| 3  | $1 \times 3 = 3$   | $2 \times 3 = 6$   | $3 \times 3 = 9$    | $4 \times 3 = 12$    | $5 \times 3 = 15$    | $6 \times 3 = 18$    |
| 4  | $1 \times 4 = 4$   | $2 \times 4 = 8$   | $3 \times 4 = 12$   | $4 \times 4 = 16$    | $5 \times 4 = 20$    | $6 \times 4 = 24$    |
| 5  | $1 \times 5 = 5$   | $2 \times 5 = 10$  | $3 \times 5 = 15$   | $4 \times 5 = 20$    | $5 \times 5 = 25$    | $6 \times 5 = 30$    |
| 6  | $1 \times 6 = 6$   | $2 \times 6 = 12$  | $3 \times 6 = 18$   | $4 \times 6 = 24$    | $5 \times 6 = 30$    | $6 \times 6 = 36$    |
| 7  | $1 \times 7 = 7$   | $2 \times 7 = 14$  | $3 \times 7 = 21$   | $4 \times 7 = 28$    | $5 \times 7 = 35$    | $6 \times 7 = 42$    |
| 8  | $1 \times 8 = 8$   | $2 \times 8 = 16$  | $3 \times 8 = 24$   | $4 \times 8 = 32$    | $5 \times 8 = 40$    | $6 \times 8 = 48$    |
| 9  | $1 \times 9 = 9$   | $2 \times 9 = 18$  | $3 \times 9 = 27$   | $4 \times 9 = 36$    | $5 \times 9 = 45$    | $6 \times 9 = 54$    |
| 10 | $1 \times 10 = 10$ | $2 \times 10 = 20$ | $3 \times 10 = 30$  | $4 \times 10 = 40$   | $5 \times 10 = 50$   | $6 \times 10 = 60$   |
| 11 | $1 \times 11 = 11$ | $2 \times 11 = 22$ | $3 \times 11 = 33$  | $4 \times 11 = 44$   | $5 \times 11 = 55$   | $6 \times 11 = 66$   |
| 12 | $1 \times 12 = 12$ | $2 \times 12 = 24$ | $3 \times 12 = 36$  | $4 \times 12 = 48$   | $5 \times 12 = 60$   | $6 \times 12 = 72$   |
|    | 7                  | 8                  | 9                   | 10                   | 11                   | 12                   |
| 1  | $7 \times 1 = 7$   | $8 \times 1 = 8$   | $9 \times 1 = 9$    | $10 \times 1 = 10$   | $11 \times 1 = 11$   | $12 \times 1 = 12$   |
| 2  | $7 \times 2 = 14$  | $8 \times 2 = 16$  | $9 \times 2 = 18$   | $10 \times 2 = 20$   | $11 \times 2 = 22$   | $12 \times 2 = 24$   |
| 3  | $7 \times 3 = 21$  | $8 \times 3 = 24$  | $9 \times 3 = 27$   | $10 \times 3 = 30$   | $11 \times 3 = 33$   | $12 \times 3 = 36$   |
| 4  | $7 \times 4 = 28$  | $8 \times 4 = 32$  | $9 \times 4 = 36$   | $10 \times 4 = 40$   | $11 \times 4 = 44$   | $12 \times 4 = 48$   |
| 5  | $7 \times 5 = 35$  | $8 \times 5 = 40$  | $9 \times 5 = 45$   | $10 \times 5 = 50$   | $11 \times 5 = 55$   | $12 \times 5 = 60$   |
| 6  | $7 \times 6 = 42$  | $8 \times 6 = 48$  | $9 \times 6 = 54$   | $10 \times 6 = 60$   | $11 \times 6 = 66$   | $12 \times 6 = 72$   |
| 7  | $7 \times 7 = 49$  | $8 \times 7 = 56$  | $9 \times 7 = 63$   | $10 \times 7 = 70$   | $11 \times 7 = 77$   | $12 \times 7 = 84$   |
| 8  | $7 \times 8 = 56$  | $8 \times 8 = 64$  | $9 \times 8 = 72$   | $10 \times 8 = 80$   | $11 \times 8 = 88$   | $12 \times 8 = 96$   |
| 9  | $7 \times 9 = 63$  | $8 \times 9 = 72$  | $9 \times 9 = 81$   | $10 \times 9 = 90$   | $11 \times 9 = 99$   | $12 \times 9 = 108$  |
| 10 | $7 \times 10 = 70$ | $8 \times 10 = 80$ | $9 \times 10 = 90$  | $10 \times 10 = 100$ | $11 \times 10 = 110$ | $12 \times 10 = 120$ |
| 11 | $7 \times 11 = 77$ | $8 \times 11 = 88$ | $9 \times 11 = 99$  | $10 \times 11 = 110$ | $11 \times 11 = 121$ | $12 \times 11 = 132$ |
| 12 | $7 \times 12 = 84$ | $8 \times 12 = 96$ | $9 \times 12 = 108$ | $10 \times 12 = 120$ | $11 \times 12 = 132$ | $12 \times 12 = 144$ |

## **4.1 Review: Multiplication Facts**

**A. Find the products. Be sure to check your answers.**

a) 
$$\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$$

d) 
$$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 2 \\ \times 0 \\ \hline \end{array}$$

h) 
$$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$$

i) 
$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 9 \\ \times 6 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 9 \\ \times 9 \\ \hline \end{array}$$

m) 
$$\begin{array}{r} 1 \\ \times 7 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 0 \\ \times 6 \\ \hline \end{array}$$

q) 
$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

r) 
$$\begin{array}{r} 2 \\ \times 1 \\ \hline \end{array}$$

s) 
$$\begin{array}{r} 1 \\ \times 5 \\ \hline \end{array}$$

t) 
$$\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$$

u) 
$$\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$$

v) 
$$\begin{array}{r} 0 \\ \times 2 \\ \hline \end{array}$$

w) 
$$\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$$

x) 
$$\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$$

**B. Find the products. Be sure to check your answers.**

a)  $2 \times 6 =$

b)  $5 \times 4 =$

c)  $7 \times 3 =$

d)  $3 \times 6 =$

e)  $8 \times 5 =$

f)  $4 \times 7 =$

g)  $9 \times 2 =$

h)  $6 \times 5 =$

i)  $5 \times 3 =$

j)  $3 \times 8 =$

k)  $7 \times 7 =$

l)  $2 \times 9 =$

m)  $4 \times 6 =$

n)  $6 \times 9 =$

o)  $8 \times 8 =$

p)  $9 \times 4 =$

q)  $3 \times 9 =$

r)  $4 \times 4 =$

**Answers to Mid-Unit Review - Multiplication Facts**

Aa) 2

b) 9

c) 36

d) 20

e) 49

f) 64

g) 0

h) 4

i) 25

j) 54

k) 12

l) 81

m) 7

n) 54

o) 15

p) 0

q) 8

r) 2

s) 5

t) 63

u) 32

v) 0

w) 5

x) 72

Ba) 12

b) 20

c) 21

d) 18

e) 40

f) 28

g) 18

h) 30

i) 15

j) 24

k) 49

l) 18

m) 24

n) 54

o) 64

p) 36

q) 27

r) 16

## 4.2 Multiplying Larger Numbers

When multiplying larger numbers line up the place values in a column.

**Step 1:** Multiply the ones digit in the large number by the one digit multiplier.

**Step 2:** Multiply the tens digit in the large number by the multiplier.

**Step 3:** Multiply the hundreds digit in the large number by the multiplier and so on.

**Example A**  $62 \times 4 =$

$$\begin{array}{r} 62 \\ \times 4 \\ \hline 8 \end{array}$$

← multiplier  
← product

**Step 1:** 4 ones times 2 ones = 8 ones      Write an 8 in the ones place.

$$\begin{array}{r} 62 \\ \times 4 \\ \hline 248 \end{array}$$

**Step 2:** 4 ones  $\times$  6 tens = 24 tens = 2 hundreds and 4 tens  
Write the 4 in the tens place and the 2 in the hundreds place

The product of  $62 \times 4 = 248$

### **Commutative Property**

In multiplication, the order of the factors can be changed and the answer will remain the same. This is called the Commutative Property.

$3 \times 5 = 15$       and       $5 \times 3 = 15$       You will get the same product.

$4 \times 6 = 24$       and       $6 \times 4 = 24$

$62 \times 4 = 248$       and       $4 \times 62 = 248$

## Multiplying larger numbers with carrying

**Example B**  $517 \times 3 =$

$$\begin{array}{r} 2 \\ 517 \\ \times 3 \\ \hline 1 \end{array}$$

**Step 1:** 3 ones times 7 ones = 21 ones  
Write a 1 in the ones place and carry the 2 to the tens place.

$$\begin{array}{r} 2 \\ 517 \\ \times 3 \\ \hline 51 \end{array}$$

**Step 2:** 3 ones times 1 ten = 3 and add the 2 that was carried  
So  $3 \times 1 = 3$  and  $3 + 2 = 5$  tens.  
Write a 5 in the tens place. There is nothing to carry.

$$\begin{array}{r} 2 \\ 517 \\ \times 3 \\ \hline 1551 \end{array}$$

**Step 3:** 3 ones times 5 hundreds = 15 hundreds  
Write a 5 in the hundreds place and a 1 in the thousands place.

The product of  $517 \times 3 = 1551$

## Multiplying larger numbers with carrying continued

### Example C

$$64\ 083 \times 5 =$$

$$\begin{array}{r} 1 \\ \nearrow \\ 64\ 083 \\ \times \quad 5 \\ \hline 5 \end{array}$$

- Step 1:** 5 ones times 3 ones = 15 ones  
Write a 5 in the ones place and carry the 1 to the tens place.

$$\begin{array}{r} 4\ 1 \\ \nearrow \\ 64\ 083 \\ \times \quad 5 \\ \hline 15 \end{array}$$

- Step 2:** 5 ones times 8 tens = 40 tens and add the 1 = 41 tens  
So  $5 \times 8 = 40$  and  $40 + 1 = 41$  tens.  
Write a 1 in the tens place and carry the 4 to the hundreds place.

$$\begin{array}{r} 4\ 1 \\ \nearrow \\ 64\ 083 \\ \times \quad 5 \\ \hline 415 \end{array}$$

- Step 3:** 5 ones times 0 hundreds = 0 hundreds and add the 4 = 4 hundreds  
So  $5 \times 0 = 0$  and  $0 + 4 = 4$   
Write a 4 in the hundreds place and there is nothing to carry.

$$\begin{array}{r} 2\ 4\ 1 \\ \nearrow \\ 64\ 083 \\ \times \quad 5 \\ \hline 0\ 415 \end{array}$$

- Step 4:** 5 ones times 4 thousands = 20 thousands  
Write a 0 in the thousands place and carry the 2.

$$\begin{array}{r} 2\ 4\ 1 \\ \nearrow \\ 64\ 083 \\ \times \quad 5 \\ \hline 0\ 415 \end{array}$$

- Step 5:** 5 ones times 6 ten thousands = 30 ten thousands and add the 2  
So  $5 \times 6 = 30$  and  $30 + 2 = 32$   
Write a 2 in the ten thousands place and a 3 in the hundred thousands place.

The product of  $64\ 083 \times 5 = 320\ 415$

### Exercise 4.2a

Find the products. Check your work using the answer key.  
Rewrite the question to line up the place values if required.  
The first one a) is done for you.

a) 
$$\begin{array}{r} 71 \\ \times 6 \\ \hline 426 \end{array}$$

b) 
$$\begin{array}{r} 82 \\ \times 2 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 37 \\ \times 3 \\ \hline \end{array}$$

d)  $92 \times 4 =$

e) 
$$\begin{array}{r} 60 \\ \times 7 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 54 \\ \times 5 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 25 \\ \times 8 \\ \hline \end{array}$$

h)  $84 \times 0 =$

i) 
$$\begin{array}{r} 43 \\ \times 3 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 54 \\ \times 8 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 25 \\ \times 9 \\ \hline \end{array}$$

l)  $76 \times 2 =$

m) 
$$\begin{array}{r} 42 \\ \times 2 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 12 \\ \times 8 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 74 \\ \times 5 \\ \hline \end{array}$$

p)  $60 \times 4 =$

#### Answers to Exercise 4.2a

a) 426

b) 164

c) 111

d) 368

e) 420

f) 270

g) 200

h) 0

i) 129

j) 432

k) 225

l) 152

m) 84

n) 96

o) 370

p) 240

**Exercise 4.2b** Find the products. Check your work using the answer key. Rewrite the question to line up the place values if required.

a) 
$$\begin{array}{r} 714 \\ \times 2 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 815 \\ \times 5 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 605 \\ \times 8 \\ \hline \end{array}$$

d)  $581 \times 1 =$

e) 
$$\begin{array}{r} 172 \\ \times 2 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 654 \\ \times 5 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 100 \\ \times 9 \\ \hline \end{array}$$

h)  $760 \times 4 =$

i) 
$$\begin{array}{r} 942 \\ \times 8 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 704 \\ \times 0 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 529 \\ \times 9 \\ \hline \end{array}$$

l)  $398 \times 3 =$

m) 
$$\begin{array}{r} 904 \\ \times 4 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 673 \\ \times 8 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 961 \\ \times 6 \\ \hline \end{array}$$

p)  $400 \times 4 =$

**Answers to Exercise 4.2b**

a) 1428

b) 4075

c) 4840

d) 581

e) 344

f) 3270

g) 900

h) 3040

i) 7536

j) 0

k) 4761

l) 1194

m) 3616

n) 5384

o) 5766

p) 1600

### Exercise 4.2c

Find the products. Check your work using the answer key.  
Rewrite the question to line up the place values if required.

a) 
$$\begin{array}{r} 2704 \\ \times \quad 2 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 9852 \\ \times \quad 5 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 2100 \\ \times \quad 8 \\ \hline \end{array}$$

d)  $7086 \times 7 =$

e) 
$$\begin{array}{r} 7651 \\ \times \quad 2 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 2654 \\ \times \quad 5 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 1122 \\ \times \quad 9 \\ \hline \end{array}$$

h)  $6209 \times 6 =$

i) 
$$\begin{array}{r} 9076 \\ \times \quad 3 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 6754 \\ \times \quad 1 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 5242 \\ \times \quad 9 \\ \hline \end{array}$$

l)  $9001 \times 3 =$

m) 
$$\begin{array}{r} 5242 \\ \times \quad 0 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 4615 \\ \times \quad 8 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 3951 \\ \times \quad 5 \\ \hline \end{array}$$

p)  $6785 \times 4 =$

#### Answers to Exercise 4.2c

|           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|
| a) 5408   | b) 49 260 | c) 16 800 | d) 49 602 | e) 15 302 | f) 13 270 |
| g) 10 098 | h) 37 254 | i) 27 228 | j) 6754   | k) 47 178 | l) 27 003 |
| m) 0      | n) 36 920 | o) 19 755 | p) 27 140 |           |           |

**Exercise 4.2d**

Find the products. Check your work using the answer key.  
Rewrite the question to line up the place values if required.

a) 
$$\begin{array}{r} 21\,654 \\ \times \quad 2 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 67\,098 \\ \times \quad 5 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 11\,124 \\ \times \quad 0 \\ \hline \end{array}$$

d)  $44\,711 \times 1 =$

e) 
$$\begin{array}{r} 56\,418 \\ \times \quad 3 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 98\,654 \\ \times \quad 6 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 11\,111 \\ \times \quad 9 \\ \hline \end{array}$$

h)  $23\,691 \times 4 =$

i) 
$$\begin{array}{r} 90\,602 \\ \times \quad 7 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 15\,565 \\ \times \quad 8 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 76\,567 \\ \times \quad 2 \\ \hline \end{array}$$

l)  $90\,176 \times 3 =$

m) 
$$\begin{array}{r} 359\,076 \\ \times \quad 4 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 312\,145 \\ \times \quad 8 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 765\,409 \\ \times \quad 5 \\ \hline \end{array}$$

p)  $79\,021 \times 4$

**Answers to Exercise 4.2d**

|              |              |              |            |            |            |
|--------------|--------------|--------------|------------|------------|------------|
| a) 43 308    | b) 335 490   | c) 0         | d) 44 711  | e) 169 254 | f) 591 924 |
| g) 99 999    | h) 94 764    | i) 634 214   | j) 124 520 | k) 153 134 | l) 270 528 |
| m) 1 436 304 | n) 2 497 160 | o) 3 827 045 | p) 316 084 |            |            |

## 4.3 Two Digit Multipliers

|                 |
|-----------------|
| 11 times tables |
|-----------------|

|                   |
|-------------------|
| $11 \times 0 = 0$ |
|-------------------|

|                    |
|--------------------|
| $11 \times 1 = 11$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 2 = 22$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 3 = 33$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 4 = 44$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 5 = 55$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 6 = 66$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 7 = 77$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 8 = 88$ |
|--------------------|

|                    |
|--------------------|
| $11 \times 9 = 99$ |
|--------------------|

|                      |
|----------------------|
| $11 \times 10 = 110$ |
|----------------------|

|                      |
|----------------------|
| $11 \times 11 = 121$ |
|----------------------|

|                      |
|----------------------|
| $11 \times 12 = 132$ |
|----------------------|

Practice counting by 11s

0    11    22    33    44    55    66    77    88    99    110    121    132

Memorize the multiplication facts.

## Two Digit Multipliers continued

|                      |
|----------------------|
| 12 times tables      |
| $12 \times 0 = 0$    |
| $12 \times 1 = 12$   |
| $12 \times 2 = 24$   |
| $12 \times 3 = 36$   |
| $12 \times 4 = 48$   |
| $12 \times 5 = 60$   |
| $12 \times 6 = 72$   |
| $12 \times 7 = 84$   |
| $12 \times 8 = 96$   |
| $12 \times 9 = 108$  |
| $12 \times 10 = 120$ |
| $12 \times 11 = 132$ |
| $12 \times 12 = 144$ |

Practice counting by 12s

0    12    24    36    48    60    72    84    96    108    120    132    144

Memorize the multiplication facts.

## Two Digit Multipliers continued

When the multiplier is more than one digit, use the same process to get partial products. Repeat the steps until you have multiplied each digit and then add the partial products together.

### Example A

$$62 \times 14 =$$

$$\begin{array}{r} 62 \\ \times 14 \\ \hline 8 \end{array} \quad \leftarrow \text{two digit multiplier}$$

**Step 1:** 4 ones times 2 ones = 8 ones. Write an 8 in the ones place.

$$\begin{array}{r} 62 \\ \times 14 \\ \hline 248 \end{array}$$

**Step 2:** 4 ones times 6 tens = 24 tens.  
Write a 4 in the tens place and a 2 in the hundreds place.

$$\begin{array}{r} 62 \\ \times 14 \\ \hline 248 \\ 0 \end{array} \quad \begin{array}{l} \text{start multiplying from the tens place} \\ \text{placeholder zero} \end{array}$$

**Step 3:** Put a placeholder zero in the ones place of the second line of the product to begin multiplying from the tens place.

$$\begin{array}{r} 62 \\ \times 14 \\ \hline 248 \\ 20 \end{array}$$

**Step 4:** Multiply 1 ten by 2 ones. = 2 tens  
Write a 2 in the tens place.

$$\begin{array}{r} 62 \\ \times 14 \\ \hline 248 \\ 620 \end{array}$$

**Step 5:** Multiply 1 ten by 6 tens. = 6 hundreds  
Write a 6 in the hundreds place

**Two digit multipliers**  
**Example A continued**

$$\begin{array}{r}
 62 \\
 \times 14 \\
 \hline
 248 \\
 + 620 \\
 \hline
 868
 \end{array}$$

$\leftarrow$  partial product  
 $\leftarrow$  partial product

**Step 6:** To find the total product add the two partial products together.  
 Add the ones.  $8 + 0 = 8$  ones Write an 8 in the ones place.  
 Add the tens.  $4 + 2 = 6$  tens Write a 6 in the tens place.  
 Add the hundreds.  $2 + 6 = 8$  hundreds Write an 8 in the hundreds place.

$$62 \times 14 = 868$$

**Example B**

$$425 \times 36 =$$

$$\begin{array}{r}
 3 \\
 425 \\
 \times 36 \\
 \hline
 0
 \end{array}$$

**Step 1:** 6 ones times 5 ones = 30 ones.  
 Write a 0 in the ones place and carry the 3.

$$\begin{array}{r}
 1\ 3 \\
 425 \\
 \times 36 \\
 \hline
 50
 \end{array}$$

**Step 2:** 6 ones times 2 tens = 12 tens and add the 3.  $12 + 3 = 15$  tens  
 Write a 5 in the tens place and carry the 1.

$$\begin{array}{r}
 1\ 3 \\
 425 \\
 \times 36 \\
 \hline
 2550
 \end{array}$$

**Step 3:** 6 ones times 4 hundreds = 24 hundreds and add the 1.  
 $24 + 1 = 25$  Write a 5 in the hundreds and a 2 in the thousands.

**Two digit multipliers**  
**Example B continued**

$$\begin{array}{r}
 13 \\
 425 \\
 \times \underline{36} \\
 2550 \\
 0
 \end{array}$$

start multiplying from the tens place

put a placeholder zero

**Step 4:** Put a placeholder zero in the ones place of the second line of the product to begin multiplying from the tens place.

$$\begin{array}{r}
 1 \\
 13 \\
 425 \\
 \times \underline{36} \\
 2550 \\
 50
 \end{array}$$

**Step 5:** Multiply 3 tens by 5 ones = 15 tens  
 Write a 5 in the hundreds and carry the 1.

$$\begin{array}{r}
 1 \\
 13 \\
 425 \\
 \times \underline{36} \\
 2550 \\
 750
 \end{array}$$

**Step 6:** Multiply 3 tens by 2 tens = 6 tens and add the 1 = 7 tens  
 Write a 7 in the hundreds.

$$\begin{array}{r}
 1 \\
 13 \\
 425 \\
 \times \underline{36} \\
 2550 \\
 12750
 \end{array}$$

**Step 7:** Multiply 3 tens by 4 hundreds = 12 hundreds  
 Write a 2 in the thousands and a 1 in the ten thousands.

**Two digit multipliers**  
**Example B continued**

$$\begin{array}{r}
 1 \\
 13 \\
 \swarrow \\
 425 \\
 \times \quad 36 \\
 \hline
 11 \\
 2550 \\
 + \quad 12750 \\
 \hline
 15300
 \end{array}$$

← partial product  
 ← partial product

**Step 8:** To find the total product add the two partial products together.

Add the ones.  $0 + 0 = 0$  ones      Write an 0 in the ones place.

Add the tens.  $5 + 5 = 10$  tens  
 Write a 0 in the tens place and carry the 1.

Add the hundreds.  $1 + 5 + 7 = 13$  hundreds  
 Write a 3 in the hundreds place and carry the 1.

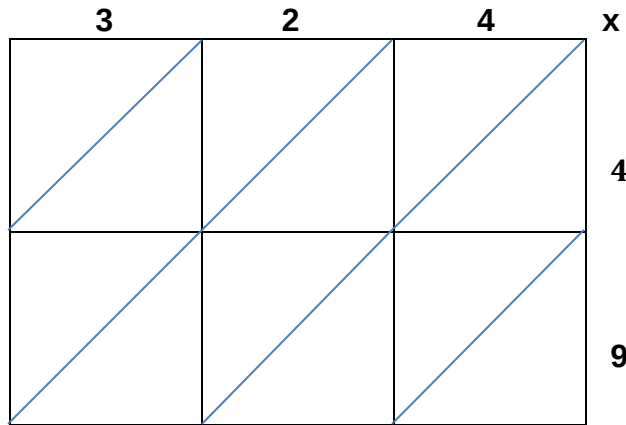
Add the thousands.  $1 + 2 + 2 = 5$  thousands.  
 Write a 5 in the thousands place.

Add the ten thousands. There is only 1.  
 Write a 1 in the ten thousands place.

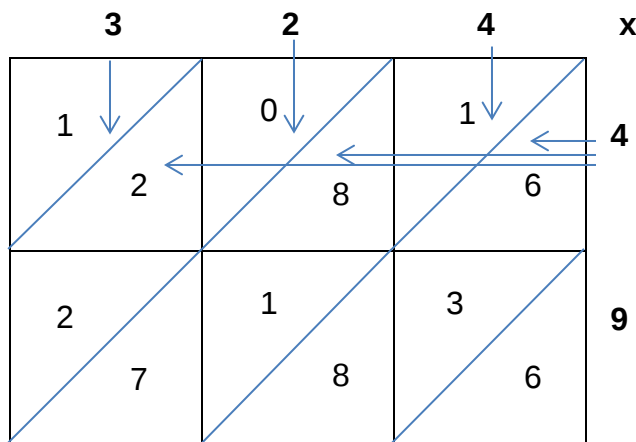
$$425 \times 36 = 15\,300$$

# Lattice Multiplication (This is another method to try.)

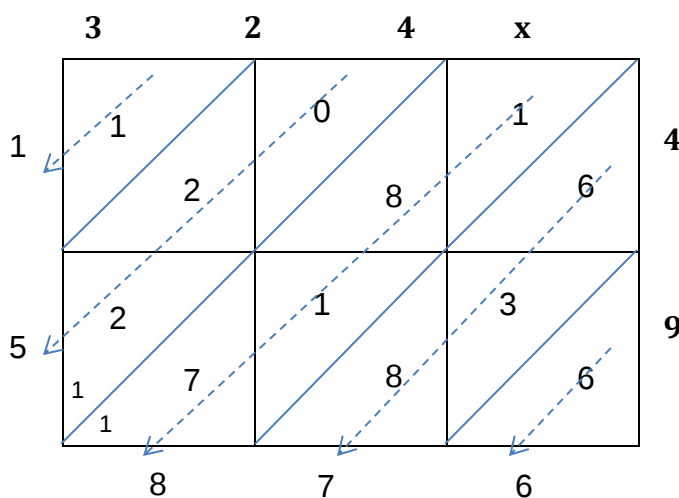
Example       $324 \times 49$



Step 1) Set-up the lattice as shown, with the number of rows and columns based on the number of digits involved. Here is shown 2 rows and 3 columns but we could also set this problem up as 3 rows and 2 columns; it makes no difference.



Step 2) Complete all the multiples, such as  $4 \times 4 = 16$ , as shown.



Step 3) The final step is to add up the diagonals, where the first one on the right is the ones, then tens, hundreds, thousands. Notice that when adding up the tens ( $6+3+8$ ), this makes 17 so the 1 from the 17 tens has been carried over to the hundreds column.

The product of  $324 \times 49$  is given around the outside as 15 876.

### Exercise 4.3a

Find the products. Check your work using the answer key.  
Rewrite the question to line up the place values if required.  
The first one a) is done for you.

$$\begin{array}{r} \text{a)} \quad 84 \\ \times 12 \\ \hline 168 \\ + 840 \\ \hline 1008 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 91 \\ \times 53 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \quad 55 \\ \times 73 \\ \hline \end{array}$$

$$\text{d)} \quad 26 \times 65 =$$

$$\begin{array}{r} \text{e)} \quad 60 \\ \times 37 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \quad 87 \\ \times 41 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \quad 97 \\ \times 20 \\ \hline \end{array}$$

$$\text{h)} \quad 16 \times 78 =$$

$$\begin{array}{r} \text{i)} \quad 68 \\ \times 13 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j)} \quad 12 \\ \times 41 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \quad 93 \\ \times 22 \\ \hline \end{array}$$

$$\text{l)} \quad 85 \times 57 =$$

$$\begin{array}{r} \text{m)} \quad 24 \\ \times 98 \\ \hline \end{array}$$

$$\begin{array}{r} \text{n)} \quad 33 \\ \times 41 \\ \hline \end{array}$$

$$\begin{array}{r} \text{o)} \quad 74 \\ \times 25 \\ \hline \end{array}$$

$$\text{p)} \quad 61 \times 44 =$$

### Exercise 4.3a continued

$$\begin{array}{r} \text{q)} \quad 22 \\ \times 34 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r)} \quad 63 \\ \times 15 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s)} \quad 52 \\ \times 47 \\ \hline \end{array}$$

$$\text{t)} \quad 58 \times 11 =$$

$$\begin{array}{r} \text{u)} \quad 172 \\ \times 32 \\ \hline \end{array}$$

$$\begin{array}{r} \text{v)} \quad 540 \\ \times 35 \\ \hline \end{array}$$

$$\begin{array}{r} \text{w)} \quad 487 \\ \times 14 \\ \hline \end{array}$$

$$\text{x)} \quad 269 \times 94 =$$

$$\begin{array}{r} \text{y)} \quad 520 \\ \times 30 \\ \hline \end{array}$$

$$\begin{array}{r} \text{z)} \quad 752 \\ \times 63 \\ \hline \end{array}$$

$$\begin{array}{r} \text{aa)} \quad 152 \\ \times 79 \\ \hline \end{array}$$

$$\text{bb)} \quad 613 \times 91 =$$

#### Answers to Exercise 4.3a

|           |           |            |            |         |           |
|-----------|-----------|------------|------------|---------|-----------|
| a) 1008   | b) 4823   | c) 4015    | d) 1690    | e) 2220 | f) 3567   |
| g) 1940   | h) 1248   | i) 884     | j) 492     | k) 2046 | l) 4845   |
| m) 2352   | n) 1353   | o) 1850    | p) 2684    | q) 748  | r) 945    |
| s) 2444   | t) 638    | u) 5504    | v) 18 900  | w) 6818 | x) 25 286 |
| y) 15 600 | z) 47 376 | aa) 12 008 | bb) 55 783 |         |           |

**Exercise 4.3b** Find the products. Check your work using the answer key. Rewrite the question to line up the place values if required. The first one a) is done for you.

$$\begin{array}{r} \text{a)} \quad \begin{array}{r} \phantom{0}^4 \phantom{0}^2 \\ 284 \\ \times 51 \\ \hline 284 \\ + 14200 \\ \hline 14484 \end{array} \end{array}$$

$$\text{b)} \quad \begin{array}{r} 943 \\ \times 70 \\ \hline \end{array}$$

$$\text{c)} \quad \begin{array}{r} 863 \\ \times 24 \\ \hline \end{array}$$

$$\text{d)} \quad 426 \times 65$$

$$\text{e)} \quad \begin{array}{r} 206 \\ \times 86 \\ \hline \end{array}$$

$$\text{f)} \quad \begin{array}{r} 752 \\ \times 93 \\ \hline \end{array}$$

$$\text{g)} \quad \begin{array}{r} 613 \\ \times 12 \\ \hline \end{array}$$

$$\text{h)} \quad 752 \times 78$$

$$\text{i)} \quad \begin{array}{r} 968 \\ \times 51 \\ \hline \end{array}$$

$$\text{j)} \quad \begin{array}{r} 854 \\ \times 84 \\ \hline \end{array}$$

$$\text{k)} \quad \begin{array}{r} 697 \\ \times 54 \\ \hline \end{array}$$

$$\text{l)} \quad 253 \times 17 =$$

$$\text{m)} \quad \begin{array}{r} 3527 \\ \times 82 \\ \hline \end{array}$$

$$\text{n)} \quad \begin{array}{r} 6003 \\ \times 40 \\ \hline \end{array}$$

$$\text{o)} \quad \begin{array}{r} 9264 \\ \times 12 \\ \hline \end{array}$$

$$\text{p)} \quad 7610 \times 73 =$$

### Exercise 4.3b continued

$$\begin{array}{r} \text{q)} \quad 55\,222 \\ \times \quad 34 \\ \hline \end{array}$$

$$\begin{array}{r} \text{r)} \quad 77\,613 \\ \times \quad 15 \\ \hline \end{array}$$

$$\begin{array}{r} \text{s)} \quad 19\,052 \\ \times \quad 47 \\ \hline \end{array}$$

$$\text{t)} \quad 3581 \times 55$$

$$\begin{array}{r} \text{u)} \quad 41\,317 \\ \times \quad 32 \\ \hline \end{array}$$

$$\begin{array}{r} \text{v)} \quad 34\,540 \\ \times \quad 39 \\ \hline \end{array}$$

$$\begin{array}{r} \text{w)} \quad 562\,187 \\ \times \quad 14 \\ \hline \end{array}$$

$$\text{x)} \quad 112\,069 \times 94$$

$$\begin{array}{r} \text{y)} \quad 50\,520 \\ \times \quad 73 \\ \hline \end{array}$$

$$\begin{array}{r} \text{z)} \quad 43\,113 \\ \times \quad 68 \\ \hline \end{array}$$

$$\begin{array}{r} \text{aa)} \quad 19\,101 \\ \times \quad 79 \\ \hline \end{array}$$

$$\text{bb)} \quad 135\,613 \times 91$$

#### Answers to Exercise 4.3b

|              |              |               |                |              |               |
|--------------|--------------|---------------|----------------|--------------|---------------|
| a) 14 484    | b) 66 010    | c) 20 712     | d) 27 690      | e) 17 716    | f) 69 936     |
| g) 7356      | h) 58 656    | i) 49 368     | j) 71 736      | k) 37 638    | l) 4301       |
| m) 289 214   | n) 240 120   | o) 111 168    | p) 555 530     | q) 1 877 548 | r) 1 164 195  |
| s) 895 444   | t) 196 955   | u) 1 322 144  | v) 1 347 060   | w) 7 870 618 | x) 10 534 486 |
| y) 3 687 960 | z) 2 931 684 | aa) 1 508 979 | bb) 12 340 783 |              |               |

## 4.4 Three Digit Multipliers

When the multiplier is more than two digits, use the same process to get partial products. Remember to increase the placeholder zeros as the place value changes.

### **Example A**

$$234 \times 212 =$$

$$\begin{array}{r} 234 \\ \times \underline{212} \\ 468 \end{array} \quad \begin{array}{l} \leftarrow \text{three digit multiplier} \\ 2 \times 234 = 468 \end{array}$$

$$\begin{array}{r} 234 \\ \times \underline{212} \\ 468 \\ 0 \end{array} \quad \begin{array}{l} \leftarrow \text{Placeholder zero} \end{array}$$

Put the placeholder zero in and then multiply by the digit in the tens place.

$$\begin{array}{r} 234 \\ \times \underline{212} \\ 468 \\ 2340 \end{array} \quad 10 \times 234 = 2340$$

$$\begin{array}{r} 234 \\ \times \underline{212} \\ 468 \\ 2340 \\ 00 \end{array} \quad \begin{array}{l} \text{put 2 placeholder zeros in for hundreds place} \end{array}$$

$$\begin{array}{r} 234 \\ \times \underline{212} \\ 468 \\ 2340 \\ \underline{46800} \\ 49608 \end{array} \quad \begin{array}{l} 200 \times 234 = 46800 \\ \text{Add the partial products.} \end{array}$$

### Exercise 4.4

Find the products. Check your work using the answer key.  
Rewrite the question to line up the place values if required.  
The first one a) is done for you.

$$\begin{array}{r} \phantom{0000}^1 \\ \phantom{000}^4 \phantom{00}^1 \\ \text{a)} \quad 416 \\ \times 213 \\ \hline 1248 \\ 4160 \\ + 83200 \\ \hline 88608 \end{array}$$

$$\begin{array}{r} \text{b)} \quad 375 \\ \times 291 \\ \hline \end{array}$$

$$\begin{array}{r} \text{c)} \quad 361 \\ \times 475 \\ \hline \end{array}$$

$$\text{d)} \quad 275 \times 165$$

$$\begin{array}{r} \text{e)} \quad 970 \\ \times 702 \\ \hline \end{array}$$

$$\begin{array}{r} \text{f)} \quad 274 \\ \times 145 \\ \hline \end{array}$$

$$\begin{array}{r} \text{g)} \quad 613 \\ \times 112 \\ \hline \end{array}$$

$$\text{h)} \quad 725 \times 697$$

$$\begin{array}{r} \text{i)} \quad 3658 \\ \times 451 \\ \hline \end{array}$$

$$\begin{array}{r} \text{j)} \quad 1209 \\ \times 257 \\ \hline \end{array}$$

$$\begin{array}{r} \text{k)} \quad 983 \\ \times 357 \\ \hline \end{array}$$

$$\text{l)} \quad 1835 \times 386$$

#### Answers to Exercise 4.4

|           |            |              |            |            |            |
|-----------|------------|--------------|------------|------------|------------|
| a) 88 608 | b) 109 125 | c) 171 475   | d) 45 375  | e) 680 940 | f) 39 730  |
| g) 68 656 | h) 505 325 | i) 1 649 758 | j) 310 713 | k) 350 931 | l) 708 310 |

## 4.5 Multiplying by 10, 100, and 1000

When multiplying by multiples of tens, such as 10, 100, 1 000, 10 000 and so on, place as many zeros to the right of the number as there are zeros in the 10, 100, 1000, 10 000 and so on.

**To multiply by 10**, put one zero after the number.

$$4 \times 10 = 40$$

$$82 \times 10 = 820$$

**To multiply by 100**, put two zeros after the number.

$$4 \times 100 = 400$$

$$82 \times 100 = 8200$$

**To multiply by 1000**, put three zeros after the number.

$$4 \times 1000 = 4000$$

$$82 \times 1000 = 82\,000$$

### Exercise 4.5

Do the following questions and see if you can find the pattern.  
Check your work using the answer key.

a)  $9 \times 10 =$

b)  $9 \times 100 =$

c)  $9 \times 1000 =$

d)  $10 \times 6 =$

e)  $100 \times 6 =$

f)  $1000 \times 6 =$

g)  $73 \times 100 =$

h)  $73 \times 1000 =$

i)  $73 \times 10\,000 =$

j)  $125 \times 10 =$

k)  $405 \times 100 =$

l)  $1000 \times 399 =$

#### Answers to Exercise 4.5

a) 90

b) 900

c) 9000

d) 60

e) 600

f) 6000

g) 7300

h) 73 000

i) 730 000

j) 1250

k) 40 500

l) 399 000

## **4.6 Estimating Products**

Before you practice estimating products, look at the easy multiplication that can be done when the factors end in zeros. Count all the zeros at the **end** of the numbers in both factors. Write down that many zeros. Multiply the other digits in the usual way and put them before the zeros. Write your answer in groupings of three digits starting from the right side.

**Example A**     $30 \times 500 =$

How many zeros at the end of the factors?    **3**

Write them down.    **000**

Multiply the other digits ( $3 \times 5 = 15$ ) and put that answer before the zeros.

$$30 \times 500 = \quad \mathbf{15\ 000}$$

**Example B**     $400 \times 6000 =$

How many zeros at the end of the factors?    **5**

Write them down.    **00 000**

Multiply the other digits ( $4 \times 6 = 24$ ) and put that answer before the zeros.

$$400 \times 6000 = \quad \mathbf{2\ 400\ 000}$$

**Example C**     $84\ 028 \times 174 =$

To find an estimate of a multiplication problem, front-end round each of the numbers.

|                                                      |           |                                                      |
|------------------------------------------------------|-----------|------------------------------------------------------|
| $\begin{array}{r} 84\ 028 \\ \times 174 \end{array}$ | rounds to | $\begin{array}{r} 80\ 000 \\ \times 200 \end{array}$ |
|                                                      | rounds to |                                                      |

How many zeros at the end of the factors?    **6**

Write them down.    **000 000**

Multiply the other digits ( $8 \times 2 = 16$ ) and put that answer before the zeros.

$$80\ 000 \times 200 = \quad \mathbf{16\ 000\ 000}$$

## Exercise 4.6

Find an **estimated** product. Check your work using the answer key. Do not solve for the actual answer.

Estimate

a) 
$$\begin{array}{r} 85 \\ \times 60 \\ \hline \end{array}$$

Do not solve

Do estimate only for each.

Estimate

b) 
$$\begin{array}{r} 7803 \\ \times 272 \\ \hline \end{array}$$

Estimate

c) 
$$\begin{array}{r} 46\,982 \\ \times 540 \\ \hline \end{array}$$

Estimate

d) 
$$\begin{array}{r} 1\,795 \\ \times 349 \\ \hline \end{array}$$

Estimate

e) 
$$\begin{array}{r} 12\,883 \\ \times 6 \\ \hline \end{array}$$

Estimate

f) 
$$\begin{array}{r} 5\,000 \\ \times 42 \\ \hline \end{array}$$

Estimate

g) 
$$\begin{array}{r} 356\,002 \\ \times 99 \\ \hline \end{array}$$

Estimate

h) 
$$\begin{array}{r} 999 \\ \times 78 \\ \hline \end{array}$$

### Answers to Exercise 4.6

a) 2 zeros  $90 \times 60 = 5400$

b) 5 zeros  $8000 \times 300 = 2\,400\,000$

c) 6 zeros  $50\,000 \times 500 = 25\,000\,000$

d) 5 zeros  $2000 \times 300 = 600\,000$

e) 5 zeros  $10\,000 \times 10 = 100\,000$

f) 4 zeros  $5000 \times 40 = 200\,000$   
( $5 \times 4 = 20$ )

g) 7 zeros  $400\,000 \times 100 = 40\,000\,000$

h) 4 zeros  $1000 \times 80 = 80\,000$

## **4.7 Word Problems – Multiplication**

The problem solving skills we learn in math can be very useful to help us solve problems we have in our day-to-day lives. To solve a problem, it is a good idea to have a plan. Consider the steps below for solving word problems.

Watch for **key words** when you are solving multiplication word problems.

**product** - the answer in a multiplication problem

**times** - multiply the numbers

**twice** – two times the number

The words **how many** and **how much** are used in multiplication word programs and are also used in addition. So be careful how you read the word problem.

### **Problem Solving Steps**

**Step 1:** Read the problem.

**Step 2:** List the information you found.

**Step 3:** Use key words to decide what you have to find out.

**Step 4:** Solve the problem.

**Step 5:** Does your answer make sense?

**Step 6:** Write your answer in a sentence.

## Word Problems continued

### Example A

John buys 74 litres of gas a month. In 6 months, how many litres of gas does John buy?

The key word is **how many** which means to multiply.

6 months worth of gas would be  $74+74+74+74+74+74 =$   
or  $74 \times 6 =$

$$\begin{array}{r} 74 \\ \times 6 \\ \hline 444 \end{array}$$

*John buys 444 litres of gas in 6 months.*

### Example B

Maria spent \$99 each month on a bus pass for a year. How much did it cost her to ride the bus to school for the whole year? (year = 12 months)

The key word is **how much** which means to multiply.

$$\begin{array}{r} \$99 \times 12 \text{ months} = \\ \begin{array}{r} 99 \\ \times 12 \\ \hline 198 \\ + 990 \\ \hline 1188 \end{array} \end{array}$$

*It cost Maria \$ 1188 to ride the bus for one year.*

## Writing the answer in a sentence

In Example A, the question asks:

**In 6 months, how many litres of gas does John buy?**

John buys 444 litres of gas in 6 months.

Example B, the question asks:

**How much did it cost her to ride the bus to school for the whole year?**

It cost Mary \$1188 to ride the bus for one year.

### **Exercise 4.7**

Solve each word problem. Give your answer in a sentence.

Check your work using the answer key. The sentence you write may be a little different than the sentence in the answer key.

a) Fred travels 121 km a day on his delivery route. How far does he travel in 5 working days?

b) An apartment building has 16 apartments, each rented for \$870 a month. What is the total monthly rental income from this building?

c) Frank bought a car and paid for it over 36 months. He made 36 monthly payments of \$325 each. How much did he pay for the car?

d) A freight train has 70 cars. Each car can hold 22 680 kilograms of cargo. How much cargo can the train hold in all? (Use the zero shortcut.)

#### Exercise 4.7 continued

- e) Bill is painting all of the 50 apartments in a building. Each apartment uses 4 litres of paint. The paint costs \$8 per litres.

How much paint will he need to paint all the apartments?

How much will it cost in total?

- f) Sound travels 320 metres per second. How far does it travel in 1 minute?  
(1 minutes = 60 seconds) (Use the zero shortcut.)

- g) Bob likes to exercise by running 10 km each day, rain, shine and holidays!  
How many kilometres does he run in one year? ( 1 year = 365 days)

#### **Exercise 4.7 continued**

h) Sami is paid \$15 per hour. If she work 39 hours last week and 24 hours this week, how much did she earn for the two weeks in total?

i) A florist sells flowers for \$15 a bunch. There are 3 types of flowers in each bunch. She sells 24 bunches at the market. How much money does she make at the market from selling flowers?

j) The highway distance between Calgary and Edmonton is approximately 300 kilometres. What is the distance on a round trip (to and from) Calgary to Edmonton?

k) If John travels to Edmonton and back from Calgary 6 times each year, how much will he pay over the year if the Red Arrow bus is \$76 each direction? (Hint: how much will 1 round (to and from) trip cost?)

### Exercise 4.7 continued

l) A theatre seats 1250 people. The musical performance will run for 5 nights and is a sold out show. How many people will be seated over the 5 nights if the theatre is full each night?

#### Answers to Exercise 4.7 – Word Problems

- a)  $121 \times 5 = 605$  Fred travels 605 kilometres in 5 working days.
- b)  $16 \times \$870 = \$13\,920$  The total monthly income from this building is \$13 920.
- c)  $36 \times \$325 = \$11\,700$  Frank paid \$11 700 for the car.
- d)  $22\,680 \times 70 = 1\,587\,600$  The train can hold 1 587 600 kilograms of cargo.
- e) There are two steps to solve this question.  $50 \times 4 = 200$  Bill needs 200 litres of paint  
It will cost  $\$8 \times 200 = \$1600$  It will cost \$1600 to paint the 50 apartments.
- f)  $320 \times 60 = 19\,200$  metres Sound travels 19 200 metres in one minute.
- g)  $10 \times 365 = 3650$  Bob runs 3 650 kilometres in a year.
- h)  $39 \times \$15 = \$585$  and  $24 \times \$15 = \$360$  Total  $585 + 360 = \$945$  Sami earned \$945 in two weeks.
- i)  $\$15 \times 24 = \$360$  The florist will make \$360.
- j)  $300 \times 2 = 600$  The distance on a return trip from Calgary to Edmonton is 600 kilometres.
- k) One trip is  $\$76 \times 2 = \$152$   $\$152 \times 6 = \$912$   
John pays \$912 per year to travel to Edmonton from Calgary.
- l)  $1250 \times 5 = 6250$  The theatre will seat 6250 people over 5 nights.

**The review for Unit 4 Multiplication is at the end of Unit 5 Division.**

# Unit 5: Division

## 5.1 Division Facts

Division is the repeated subtraction of the same number from another number.

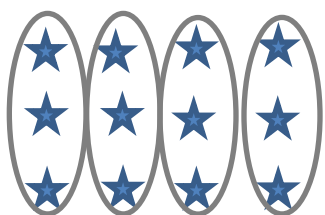
For example  $12 \div 3$  is the same as having 12 items and taking 3 items away each time until there is nothing left.  $12 - 3 = 9$      $9 - 3 = 6$      $6 - 3 = 3$      $3 - 3 = 0$

In this example we could take 3 away from 12 four times.

So  $12 \div 3 = 4$

Division takes the total and separates that amount into groups of equal size.

Take the 12 stars below and divide them into groups that have 3 stars each.



There will be 4 groups, each with 3 stars in the group.

There are three ways to show division.

$$12 \div 3 = 4$$

$$\begin{array}{r} 4 \\ 3 \overline{) 12} \end{array}$$

$$\frac{12}{3} = 4$$

The **dividend** is the number you are dividing.

12 is what we are dividing (dividend)

The **divisor** is the number you are dividing by.

3 is what we are dividing by (divisor)

The answer in division is called the **quotient**. (“kw o shent”)

4 is the answer (quotient)

$$\text{dividend} \div \text{divisor} = \text{quotient}$$

$$\begin{array}{r} \text{quotient} \\ \text{divisor} \overline{) \text{dividend}} \end{array}$$

$$\frac{\text{dividend}}{\text{divisor}}$$

Division is also the opposite of multiplication.

Multiplication takes equal-sized groups and puts the groups together to find the total.



$$4 \text{ groups of } 3 \text{ stars each} = 12 \text{ stars}$$

$$4 \times 3 = 12$$

## Division Facts continued

Use the times table to learn division.

**Example** if  $4 \times 7 = 28$  then  $28 \div 7 = 4$  and  $28 \div 4 = 7$

if  $9 \times 5 = 45$  then  $45 \div 5 = 9$  and  $45 \div 9 = 5$

|    | 1                  | 2                  | 3                                       | 4                                       | 5                    | 6                    |
|----|--------------------|--------------------|-----------------------------------------|-----------------------------------------|----------------------|----------------------|
| 1  | $1 \times 1 = 1$   | $2 \times 1 = 2$   | $3 \times 1 = 3$                        | $4 \times 1 = 4$                        | $5 \times 1 = 5$     | $6 \times 1 = 6$     |
| 2  | $1 \times 2 = 2$   | $2 \times 2 = 4$   | $3 \times 2 = 6$                        | $4 \times 2 = 8$                        | $5 \times 2 = 10$    | $6 \times 2 = 12$    |
| 3  | $1 \times 3 = 3$   | $2 \times 3 = 6$   | $3 \times 3 = 9$                        | $4 \times 3 = 12$                       | $5 \times 3 = 15$    | $6 \times 3 = 18$    |
| 4  | $1 \times 4 = 4$   | $2 \times 4 = 8$   | $3 \times 4 = 12$                       | $4 \times 4 = 16$                       | $5 \times 4 = 20$    | $6 \times 4 = 24$    |
| 5  | $1 \times 5 = 5$   | $2 \times 5 = 10$  | $3 \times 5 = 15$                       | $4 \times 5 = 20$                       | $5 \times 5 = 25$    | $6 \times 5 = 30$    |
| 6  | $1 \times 6 = 6$   | $2 \times 6 = 12$  | $3 \times 6 = 18$                       | <del><math>4 \times 6 = 24</math></del> | $5 \times 6 = 30$    | $6 \times 6 = 36$    |
| 7  | $1 \times 7 = 7$   | $2 \times 7 = 14$  | $3 \times 7 = 21$                       | $4 \times 7 = 28$                       | $5 \times 7 = 35$    | $6 \times 7 = 42$    |
| 8  | $1 \times 8 = 8$   | $2 \times 8 = 16$  | $3 \times 8 = 24$                       | $4 \times 8 = 32$                       | $5 \times 8 = 40$    | $6 \times 8 = 48$    |
| 9  | $1 \times 9 = 9$   | $2 \times 9 = 18$  | $3 \times 9 = 27$                       | $4 \times 9 = 36$                       | $5 \times 9 = 45$    | $6 \times 9 = 54$    |
| 10 | $1 \times 10 = 10$ | $2 \times 10 = 20$ | $3 \times 10 = 30$                      | $4 \times 10 = 40$                      | $5 \times 10 = 50$   | $6 \times 10 = 60$   |
| 11 | $1 \times 11 = 11$ | $2 \times 11 = 22$ | $3 \times 11 = 33$                      | $4 \times 11 = 44$                      | $5 \times 11 = 55$   | $6 \times 11 = 66$   |
| 12 | $1 \times 12 = 12$ | $2 \times 12 = 24$ | $3 \times 12 = 36$                      | $4 \times 12 = 48$                      | $5 \times 12 = 60$   | $6 \times 12 = 72$   |
|    | 7                  | 8                  | 9                                       | 10                                      | 11                   | 12                   |
| 1  | $7 \times 1 = 7$   | $8 \times 1 = 8$   | $9 \times 1 = 9$                        | $10 \times 1 = 10$                      | $11 \times 1 = 11$   | $12 \times 1 = 12$   |
| 2  | $7 \times 2 = 14$  | $8 \times 2 = 16$  | $9 \times 2 = 18$                       | $10 \times 2 = 20$                      | $11 \times 2 = 22$   | $12 \times 2 = 24$   |
| 3  | $7 \times 3 = 21$  | $8 \times 3 = 24$  | $9 \times 3 = 27$                       | $10 \times 3 = 30$                      | $11 \times 3 = 33$   | $12 \times 3 = 36$   |
| 4  | $7 \times 4 = 28$  | $8 \times 4 = 32$  | <del><math>9 \times 4 = 36</math></del> | $10 \times 4 = 40$                      | $11 \times 4 = 44$   | $12 \times 4 = 48$   |
| 5  | $7 \times 5 = 35$  | $8 \times 5 = 40$  | $9 \times 5 = 45$                       | $10 \times 5 = 50$                      | $11 \times 5 = 55$   | $12 \times 5 = 60$   |
| 6  | $7 \times 6 = 42$  | $8 \times 6 = 48$  | $9 \times 6 = 54$                       | $10 \times 6 = 60$                      | $11 \times 6 = 66$   | $12 \times 6 = 72$   |
| 7  | $7 \times 7 = 49$  | $8 \times 7 = 56$  | $9 \times 7 = 63$                       | $10 \times 7 = 70$                      | $11 \times 7 = 77$   | $12 \times 7 = 84$   |
| 8  | $7 \times 8 = 56$  | $8 \times 8 = 64$  | $9 \times 8 = 72$                       | $10 \times 8 = 80$                      | $11 \times 8 = 88$   | $12 \times 8 = 96$   |
| 9  | $7 \times 9 = 63$  | $8 \times 9 = 72$  | $9 \times 9 = 81$                       | $10 \times 9 = 90$                      | $11 \times 9 = 99$   | $12 \times 9 = 108$  |
| 10 | $7 \times 10 = 70$ | $8 \times 10 = 80$ | $9 \times 10 = 90$                      | $10 \times 10 = 100$                    | $11 \times 10 = 110$ | $12 \times 10 = 120$ |
| 11 | $7 \times 11 = 77$ | $8 \times 11 = 88$ | $9 \times 11 = 99$                      | $10 \times 11 = 110$                    | $11 \times 11 = 121$ | $12 \times 11 = 132$ |
| 12 | $7 \times 12 = 84$ | $8 \times 12 = 96$ | $9 \times 12 = 108$                     | $10 \times 12 = 120$                    | $11 \times 12 = 132$ | $12 \times 12 = 144$ |

**Exercise 5.1a**

Find the division equations. Check your work using the answer key. The first one a) is done for you.

a) if  $3 \times 8 = 24$  then  $\underline{24} \div \underline{8} = \underline{3}$  and  $\underline{24} \div \underline{3} = \underline{8}$

b) if  $2 \times 6 = 12$  then  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$  and  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$

c) if  $5 \times 10 = 50$  then  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$  and  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$

d) if  $1 \times 12 = 12$  then  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$  and  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$

e) if  $11 \times 4 = 44$  then  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$  and  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$

f) if  $7 \times 9 = 63$  then  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$  and  $\underline{\quad} \div \underline{\quad} = \underline{\quad}$

**Answers to Exercise 5.1a**

a) if  $3 \times 8 = 24$  then  $24 \div 8 = 3$  and  $12 \div 3 = 8$

b) if  $2 \times 6 = 12$  then  $12 \div 6 = 2$  and  $12 \div 2 = 6$

c) if  $5 \times 10 = 50$  then  $50 \div 10 = 5$  and  $50 \div 5 = 10$

d) if  $1 \times 12 = 12$  then  $12 \div 12 = 1$  and  $12 \div 1 = 12$

e) if  $11 \times 4 = 44$  then  $44 \div 4 = 11$  and  $44 \div 11 = 4$

f) if  $7 \times 9 = 63$  then  $63 \div 9 = 7$  and  $63 \div 7 = 9$

## Division Facts continued

### Dividing a number by itself

Any number divided by itself will always equal 1.

**Example A**      $4 \div 4 = 1$

There are 4 candies to share among 4 children.  
Each child will get 1 candy.

---

### Dividing a number by 1

**Example B**      $9 \div 1 = 9$

If there are 9 apples to put in 1 bag, the bag will hold all 9 apples.

---

### Dividing a number by 0

**Example C**      $8 \div 0 = \text{undefined}$

If there are 8 oranges and I want to divide them into 0.....  
I can't. I can't make the oranges disappear.  
I can't divide the oranges into nothing.  
We call this undefined. We cannot define it.  
It is impossible.

---

### Dividing 0 by a number

**Example D**      $0 \div 5 = 0$

There are 0 pencils and I want to divide them into 5 groups.  
Each group will get 0.  
There is nothing to divide.

### Exercise 5.1b

Find the quotient. Check your work using the answer key.  
Use the times table if required. The first one a) is done for you.

a)  $2 \div 1 = \underline{2}$

b)  $10 \div 2 = \underline{\quad}$

c)  $15 \div 5 = \underline{\quad}$

d)  $24 \div 6 = \underline{\quad}$

e)  $32 \div 4 = \underline{\quad}$

f)  $18 \div 2 = \underline{\quad}$

g)  $42 \div 7 = \underline{\quad}$

h)  $21 \div 3 = \underline{\quad}$

i)  $36 \div 9 = \underline{\quad}$

j)  $25 \div 5 = \underline{\quad}$

k)  $48 \div 8 = \underline{\quad}$

l)  $56 \div 7 = \underline{\quad}$

m)  $72 \div 9 = \underline{\quad}$

n)  $12 \div 1 = \underline{\quad}$

o)  $24 \div 8 = \underline{\quad}$

p)  $6 \div 6 = \underline{\quad}$

q)  $8 \div 4 = \underline{\quad}$

r)  $14 \div 2 = \underline{\quad}$

#### Answers to Exercise 5.1b

a) 2

b) 5

c) 3

d) 4

e) 8

f) 9

g) 6

h) 7

i) 4

j) 5

k) 6

l) 8

m) 8

n) 12

o) 3

p) 1

q) 2

r) 7

**Exercise 5.1c**

Find the quotient. Use the times table if required. Check your work using the answer key. The first one a) is done for you.

$$\begin{array}{r} 2 \\ 1 \overline{)2} \end{array}$$

$$b) 10 \overline{)100}$$

$$c) 9 \overline{)18}$$

$$d) 5 \overline{)5}$$

$$e) 1 \overline{)12}$$

$$f) 4 \overline{)44}$$

$$g) 7 \overline{)63}$$

$$h) 5 \overline{)35}$$

$$i) 7 \overline{)42}$$

$$j) 12 \overline{)96}$$

$$k) 3 \overline{)15}$$

$$l) 10 \overline{)10}$$

$$m) 11 \overline{)77}$$

$$n) 8 \overline{)16}$$

$$o) 3 \overline{)27}$$

$$p) 1 \overline{)8}$$

$$q) 9 \overline{)9}$$

$$r) 2 \overline{)14}$$

**Answers to Exercise 5.1c**

|      |       |      |      |       |       |
|------|-------|------|------|-------|-------|
| a) 2 | b) 10 | c) 2 | d) 1 | e) 12 | f) 11 |
| g) 9 | h) 7  | i) 6 | j) 8 | k) 5  | l) 1  |
| m) 7 | n) 2  | o) 9 | p) 8 | q) 1  | r) 7  |

### Exercise 5.1d

Find the quotient. Use the times table if required. Rewrite the question if you need to. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } \frac{12}{3} = 12 \div 3 = 4$$

$$\text{b) } \frac{4}{2} =$$

$$\text{c) } \frac{16}{4} =$$

$$\text{d) } \frac{20}{4} =$$

$$\text{e) } \frac{24}{8} =$$

$$\text{f) } \frac{30}{5} =$$

$$\text{g) } \frac{36}{4} =$$

$$\text{h) } \frac{45}{9} =$$

$$\text{i) } \frac{9}{9} =$$

$$\text{j) } \frac{10}{2} =$$

$$\text{k) } \frac{14}{2} =$$

$$\text{l) } \frac{16}{2} =$$

$$\text{m) } \frac{35}{5} =$$

$$\text{n) } \frac{18}{6} =$$

$$\text{o) } \frac{56}{8} =$$

$$\text{p) } \frac{60}{6} =$$

$$\text{q) } \frac{45}{9} =$$

$$\text{r) } \frac{27}{9} =$$

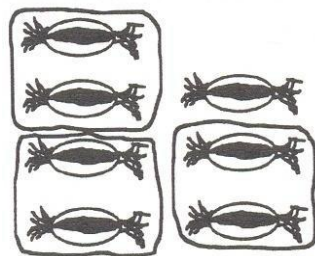
#### Answers to Exercise 5.1d

|      |      |      |       |      |      |
|------|------|------|-------|------|------|
| a) 4 | b) 2 | c) 4 | d) 5  | e) 3 | f) 6 |
| g) 9 | h) 5 | i) 1 | j) 5  | k) 7 | l) 8 |
| m) 7 | n) 3 | o) 7 | p) 10 | q) 5 | r) 3 |

## 5.2 Remainders

You have been practicing division facts that always work out evenly – nothing is left over. Sometimes in division, there will be a remainder.

**Example A** There are 7 candies to share among 3 children.  
Circle groups of 2. How many would each child receive?



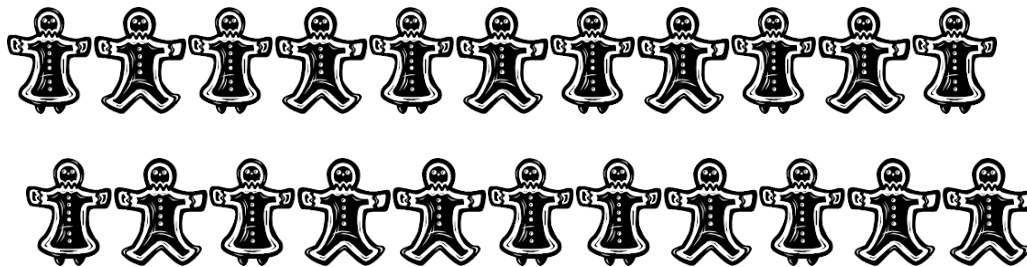
Each child would get 2 candies,  
and there would be 1 left over.

We call the left-over the **remainder**. For now, write **R** and the left over number after your quotient.

$$7 \div 3 = 2 \text{ R}1$$

|       |                                      |
|-------|--------------------------------------|
| 2 R1  |                                      |
| 3 ) 7 | How many times does 3 go into 7? 2   |
| - 6   | $3 \times 2 = 6$ (Subtract 6 from 7) |
| 1     | $7 - 6 = 1$ is the remainder R1      |

**Example B** There are 22 cookies. Circle groups of 5. How many groups of 5 in 22?



You should have 4 groups with 2 left over.

$$22 \div 5 = 4 \text{ R}2$$

|        |                                         |
|--------|-----------------------------------------|
| 4 R2   |                                         |
| 5 ) 22 | How many times does 5 go into 22? 4     |
| - 20   | $5 \times 4 = 20$ (Subtract 20 from 22) |
| 2      | $22 - 20 = 2$ are remaining R2          |

## Remainders continued

The remainder must be smaller than the divisor. If it is the same size or bigger, it means another group could be made. In the previous example:

### Example C

$$22 \div 5 =$$

If we would have only chosen 3 groups of 5 then:

$$\begin{array}{r} 3 \text{ R}7 \\ 5 \overline{) 22} \\ \underline{-15} \phantom{0} \\ 7 \end{array}$$

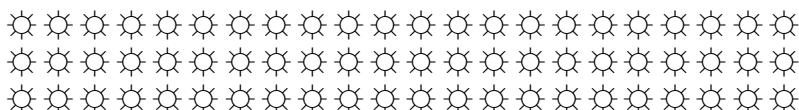
There is too much left over.  
5 can go into 7 again.

We should have chosen 4 groups of 5 as in the previous example.

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### Example D

Here are 66 suns. Make groups of 9. How many groups?



$$66 \div 9 = 7 \text{ R}3$$

$$\begin{array}{r} 7 \text{ R}3 \\ 9 \overline{) 66} \\ \underline{-63} \phantom{0} \\ 3 \end{array}$$

How many times does 9 go into 22? 7  
 $9 \times 7 = 63$  (Subtract 63 from 66)  
 $66 - 63 = 3$  are remaining

You should have 7 groups with 3 left over.

Notice in the examples how the numbers in the answer are lined up based on place value. For example, note how the 7 in the answer is placed in the ones place because we are dividing 9 into 66, so we begin writing the answer from the ones place.

## Exercise 5.2

Find the quotients and remainders. Check your work using the answer key. The first one a) is done for you.

$$\begin{array}{r} 4 \text{ R} 1 \\ 2 \overline{) 9} \\ \underline{- 8} \\ 1 \end{array}$$

$$b) \quad 5 \overline{) 29}$$

$$c) \quad 4 \overline{) 38}$$

$$d) \quad 5 \overline{) 43}$$

$$e) \quad 3 \overline{) 19}$$

$$f) \quad 4 \overline{) 14}$$

$$g) \quad 7 \overline{) 47}$$

$$h) \quad 6 \overline{) 56}$$

$$i) \quad 8 \overline{) 67}$$

$$j) \quad 9 \overline{) 74}$$

$$k) \quad 8 \overline{) 35}$$

$$l) \quad 7 \overline{) 57}$$

### Answers to Exercise 5.2

a) 4 R1

b) 5 R4

c) 9 R2

d) 8 R3

e) 6 R1

f) 3 R2

g) 6 R5

h) 9 R2

i) 8 R3

j) 8 R2

k) 4 R3

l) 8 R1

## 5.3 Divisibility Tests for 2, 3 and 5

There are some tricks you can use to test whether a number is divisible by another without a remainder. These divisibility tests will be useful in the next unit when simplifying fractions.

### Divisibility by 2

A number is divisible by 2 if it is an even number and ends in 0, 2, 4, 6 or 8.

**Example** 48 540 256 12 154 are all divisible by 2 because each number is even and ends in a 0, 2, 4, 6 or 8.

35 193 849 347 101 are not divisible by 2 because each number is odd and does not end in a 0, 2, 4, 6 or 8.

### Exercise 5.3a

Write *yes* beside the numbers that are divisible by 2.

Write *no* beside the numbers that are not divisible by 2.

Check your work using the answer key. The first one a) is done for you.

a) 22 *yes*

b) 35

c) 17

d) 10

e) 274

f) 345

g) 639

h) 456

i) 2437

j) 7548

k) 6754

l) 5543

#### Answers to Exercise 5.3a

a) yes

b) no

c) no

d) yes

e) yes

f) no

g) no

h) yes

i) no

j) yes

k) yes

l) no

## Divisibility Tests continued

### Divisibility by 3

A number is divisible by 3 if the sum (total) of the digits is divisible by 3.

#### Example

Let's look at the number 63. 6 and 3 are the digits.  
Add them together.  $6 + 3 = 9$   
9 is divisible by 3, so that means 63 will be divisible by 3.

Let's look at the number 148. 1, 4 and 8 are the digits.  
Add them together.  $1 + 4 + 8 = 13$   
You could add the digits again.  $1 + 3 = 4$ .  
Neither 4 nor 13 is divisible by 3 so that means 148 will not be divisible by 3.

Let's look at the number 5892. 5, 8, 9 and 2 are the digits.  
Add them together.  $5 + 8 + 9 + 2 = 24$   
You could add the digits again.  $2 + 4 = 6$ .  
6 and 24 are divisible by 3 so that means 5892 will be divisible by 3.

#### Exercise 5.3b

Write yes beside the numbers that are divisible by 3.  
Write no beside the numbers that are not divisible by 3.  
Check your work. The first one a) is done for you.

- |                       |         |         |
|-----------------------|---------|---------|
| a) 27 $2 + 7 = 9$ yes | b) 35   | c) 81   |
| d) 94                 | e) 274  | f) 581  |
| g) 564                | h) 316  | i) 3175 |
| j) 1458               | k) 1890 | l) 3934 |

#### Answers to Exercise 5.3b

- |        |       |        |        |        |       |
|--------|-------|--------|--------|--------|-------|
| a) yes | b) no | c) yes | d) no  | e) no  | f) no |
| g) yes | h) no | i) no  | j) yes | k) yes | l) no |

## Divisibility Tests continued

### Divisibility by 5

A number is divisible by 5 if the number ends in 0 or 5.

**Example**      **290** is divisible by 5 because it ends in 0.

**615** is divisible by 5 because it ends in 5.

**132 is not** divisible by 5 because it does not end in 0 or 5.

**Exercise 5.3c**      Write **yes** beside the numbers that are divisible by 5.  
Write **no** beside the numbers that are not divisible by 5.  
Check your work. The first one a) is done for you.

- a)    45    *ends in a 5 - yes*    b)    84    c)    72
- d)    90    e)    800    f)    753
- g)    672    h)    355    i)    6009
- j)    6375    k)    7020    l)    1704

#### Answers to Exercise 5.3c

|        |        |       |        |        |       |
|--------|--------|-------|--------|--------|-------|
| a) yes | b) no  | c) no | d) yes | e) yes | f) no |
| g) no  | h) yes | i) no | j) yes | k) yes | l) no |

### Exercise 5.3d

Put a check mark for each number that divides evenly.  
Check your work using the answer key.

|          | Number | 2 | 3 | 5 |
|----------|--------|---|---|---|
| <b>a</b> | 84     |   |   |   |
| <b>b</b> | 75     |   |   |   |
| <b>c</b> | 412    |   |   |   |
| <b>d</b> | 865    |   |   |   |
| <b>e</b> | 300    |   |   |   |
| <b>f</b> | 831    |   |   |   |
| <b>g</b> | 525    |   |   |   |
| <b>h</b> | 350    |   |   |   |
| <b>i</b> | 710    |   |   |   |
| <b>j</b> | 429    |   |   |   |
| <b>k</b> | 3906   |   |   |   |
| <b>l</b> | 2634   |   |   |   |
| <b>m</b> | 4430   |   |   |   |
| <b>n</b> | 12 275 |   |   |   |

### Answers to Exercise 5.3d

|          | Number | 2 | 3 | 5 |
|----------|--------|---|---|---|
| <b>a</b> | 84     | √ | √ |   |
| <b>b</b> | 75     |   | √ | √ |
| <b>c</b> | 412    | √ |   |   |
| <b>d</b> | 865    |   |   | √ |
| <b>e</b> | 300    | √ | √ | √ |
| <b>f</b> | 831    |   | √ |   |
| <b>g</b> | 525    |   | √ | √ |
| <b>h</b> | 350    | √ |   | √ |
| <b>i</b> | 710    | √ |   | √ |
| <b>j</b> | 429    |   | √ |   |
| <b>k</b> | 3906   | √ | √ |   |
| <b>l</b> | 2634   | √ | √ |   |
| <b>m</b> | 4430   | √ |   | √ |
| <b>n</b> | 12 275 |   |   | √ |

## 5.4 Dividing Larger Numbers by One Digit Divisors

Several methods are used to divide larger numbers. This book will only teach one method. If you have learned a different method for dividing, ask your instructor to review it with you. You can use the practice exercises in this workbook using whichever method you prefer.

Division has four steps which are repeated until the dividend is completely divided. Work through the three examples which show these steps.

**Step 1:** Divide

**Step 2:** Multiply

**Step 3:** Subtract and compare the remainder to the divisor

**Step 4:** Bring down the next digit in the dividend and repeat.

**Example**       $294 \div 7 =$

$$\begin{array}{r} 4 \\ 7 \overline{) 294} \\ \underline{-28} \end{array}$$

*Does 7 go into 2? No*

*Does 7 go into 29? Yes? How many times? 4*

$$7 \times 4 = 28$$

*Write a 4 above the 9 in the answer.*

$$\begin{array}{r} 4 \\ 7 \overline{) 294} \\ \underline{-28} \downarrow \\ 14 \end{array}$$

$$29 - 28 = 1 \text{ Write a 1 below the 8.}$$

*7 does not go into 1 so bring down the 4.*

## Dividing Larger Numbers by One Digit Divisors continued

$$\begin{array}{r}
 42 \\
 7 \overline{) 294} \\
 \underline{-28} \downarrow \\
 14 \\
 \underline{-14} \\
 0
 \end{array}$$

*Does 7 go into 14? Yes. How many times? 2*

*Write a 2 in the answer.  $7 \times 2 = 14$*

*$14 - 14 = 0$  There is nothing left to divide.*

$$294 \div 7 = 42$$

Check your answer with multiplication.

$$294 \div 7 = 42$$

$$42 \times 7 =$$

$$\begin{array}{r}
 1 \\
 42 \\
 \times 7 \\
 \hline
 294
 \end{array}$$

The answer is correct.

### Exercise 5.4

Find the quotient. Check your work using the answer key.  
The first one a) is done for you.

$$\begin{array}{r}
 91 \\
 a) \quad 4 \overline{) 364} \\
 \underline{-36} \downarrow \\
 04 \\
 \underline{-4} \\
 0
 \end{array}$$

$$b) \quad 2 \overline{) 144}$$

$$c) \quad 5 \overline{) 455}$$

**Exercise 5.4 continued**

d)  $7 \overline{)651}$

e)  $8 \overline{)176}$

f)  $2 \overline{)166}$

g)  $7 \overline{)588}$

h)  $2 \overline{)196}$

i)  $5 \overline{)630}$

j)  $8 \overline{)592}$

k)  $9 \overline{)387}$

l)  $4 \overline{)248}$

**Answers to Exercise 5.4**

a) 91

b) 72

c) 91

d) 93

e) 22

f) 83

g) 84

h) 98

i) 126

j) 74

k) 43

l) 62

## 5.5 Zero as a Placeholder in Division

**Example**  $856 \div 8 =$

$$\begin{array}{r} 1 \\ 8 \overline{) 856} \\ \underline{-8} \\ 0 \end{array}$$

*Does 8 go into 8? Yes How many times? 1*

*Write a 1 above the 8 in the answer.*

$$8 \times 1 = 8$$

$$8 - 8 = 0 \text{ Write a zero.}$$

$$\begin{array}{r} 10 \\ 8 \overline{) 856} \\ \underline{-8} \downarrow \\ 05 \end{array}$$

*Bring down the 5.*

*8 does not go into 5 so place a 0 in the answer above the 5.*

$$\begin{array}{r} 107 \\ 8 \overline{) 856} \\ \underline{-8} \downarrow \\ 056 \\ \underline{56} \\ 0 \end{array}$$

*Bring down the 6.*

*Does 8 go into 56? Yes How many times? 7*

*Write a 7 above the 6 in the answer.*

$$8 \times 7 = 56$$

$$56 - 56 = 0$$

$$856 \div 8 = 107$$

Check your answer with multiplication.

$$856 \div 8 = 107$$

$$107 \times 8 =$$

$$\begin{array}{r} 5 \\ 107 \\ \times 8 \\ \hline 856 \end{array}$$

The answer is correct.

### Exercise 5.5

Find the quotients. Check your work using the answer key.  
The first one a) is done for you.

$$\begin{array}{r} 104 \\ 6 \overline{) 624} \\ \underline{- 6} \phantom{00} \phantom{0} \\ 024 \\ \underline{- 24} \\ 0 \end{array}$$

$$b) \quad 4 \overline{) 832}$$

$$c) \quad 864 \div 8 =$$

$$d) \quad 2 \overline{) 608}$$

$$e) \quad 5 \overline{) 545}$$

$$f) \quad 749 \div 7 =$$

$$g) \quad 9 \overline{) 918}$$

$$h) \quad 3 \overline{) 303}$$

$$i) \quad 840 \div 8 =$$

**Exercise 5.5 continued**

j)  $4 \overline{)412}$

k)  $6 \overline{)630}$

l)  $963 \div 9 =$

m)  $3 \overline{)6252}$

n)  $5 \overline{)5545}$

o)  $1236 \div 6 =$

**Answers to Exercise 5.5**

a) 104

b) 208

c) 108

d) 304

e) 109

f) 107

g) 102

h) 101

i) 105

j) 103

k) 105

l) 107

m) 2084

n) 1109

o) 206

## 5.6 One Digit Divisors with Remainders

Do the division exactly the same way that you have been learning. Often there is a remainder after the last subtraction. Write it with the quotient as you already know how to do.

**Example**  $259 \div 8 =$

$$\begin{array}{r} 3 \\ 8 \overline{) 259} \\ \underline{- 24} \phantom{0} \\ 19 \end{array}$$

*How many times does 8 go into 25? 3.*

$8 \times 3 = 24$  Write a 3 in the answer.

$$25 - 24 = 1$$

*Write a 1. Bring down 9.*

$$\begin{array}{r} 32 \text{ R}3 \\ 8 \overline{) 259} \\ \underline{- 24} \phantom{0} \\ 19 \\ \underline{- 16} \\ 3 \end{array}$$

*How many times does 8 go into 19? 2*

*Write a 2 in the answer.  $8 \times 2 = 16$*

$$19 - 16 = 3$$

*There is nothing left to bring down.*

*8 does not go into 3 evenly, so 3 is the remainder.*

*Write R3 in the answer*

$$259 \div 8 = 32 \text{ R}3$$

Check your answer with multiplication and adding.

$$259 \div 8 = 32 \text{ R}3$$

$$32 \times 8 = 256 \quad (\text{quotient} \times \text{divisor})$$

$$\text{Then add the remainder. } 256 + 3 = 259$$

## Exercise 5.6

Divide and show any remainders. Check your work using the answer key. Also, check your work using multiplication and addition. The first one a) is done for you.

$$\begin{array}{r} 46 \text{ R}1 \\ 2 \overline{) 93} \\ \underline{-8} \phantom{0} \\ 13 \\ \underline{-12} \\ 1 \end{array}$$

*Check*

$$\begin{array}{r} 1 \\ 46 \\ \times 2 \\ \hline 92 \end{array} \quad \text{and} \quad 92 + 1 = 93$$

$$\text{b) } 3 \overline{) 52}$$

$$\text{c) } 94 \div 5 =$$

$$\text{d) } 7 \overline{) 74}$$

$$\text{e) } 4 \overline{) 95}$$

$$\text{f) } 79 \div 6 =$$

*Check*

### Exercise 5.6 continued

g)  $5 \overline{)538}$

h)  $8 \overline{)301}$

i)  $320 \div 7 =$

*Check*

j)  $3 \overline{)416}$

k)  $7 \overline{)657}$

l)  $8993 \div 9 =$

*Check*

#### Answers to Exercise 5.6

a) 46 R1 check  $46 \times 2 = 92$   $92 + 1 = 93$

b) 17 R1 check  $17 \times 3 = 51$   $51 + 1 = 52$

c) 18 R4 check  $18 \times 5 = 90$   $90 + 4 = 94$

d) 10 R4 check  $10 \times 7 = 70$   $70 + 4 = 74$

e) 23 R3 check  $23 \times 4 = 92$   $92 + 3 = 95$

f) 13 R1 check  $13 \times 6 = 78$   $78 + 1 = 79$

g) 107 R3 check  $107 \times 5 = 535$   $535 + 3 = 538$

h) 37 R5 check  $37 \times 8 = 296$   $296 + 5 = 301$

i) 45 R5 check  $45 \times 7 = 315$   $315 + 5 = 320$

j) 138 R2 check  $138 \times 3 = 414$   $414 + 2 = 416$

k) 93 R6 check  $93 \times 7 = 651$   $651 + 6 = 657$

l) 999 R2 check  $999 \times 9 = 8991$   $8991 + 2 = 8993$

## **5.1 – 5.6 Review: Division**

**A. Find the quotient.**

a)  $12 \div 6 = \underline{\quad}$       b)  $21 \div 7 = \underline{\quad}$       c)  $45 \div 5 = \underline{\quad}$

d)  $27 \div 9 = \underline{\quad}$       e)  $32 \div 8 = \underline{\quad}$       f)  $14 \div 2 = \underline{\quad}$

g)  $56 \div 7 = \underline{\quad}$       h)  $36 \div 6 = \underline{\quad}$       i)  $42 \div 6 = \underline{\quad}$

j)  $20 \div 5 = \underline{\quad}$       k)  $24 \div 4 = \underline{\quad}$       l)  $24 \div 3 = \underline{\quad}$

**B. Divide. No remainders**

a)  $6 \overline{)96}$

b)  $8 \overline{)736}$

c)  $576 \div 9 =$

d)  $5 \overline{)295}$

e)  $3 \overline{)486}$

f)  $3196 \div 2 =$

**C. Dividing with remainders. Also, check your answer using  $\times$  and  $+$ .**

a)  $9 \overline{)705}$

b)  $4 \overline{)257}$

c)  $899 \div 7 =$

*check*

d)  $5 \overline{)538}$

e)  $8 \overline{)876}$

f)  $4628 \div 6 =$

*check*

**Answers to 5.1 - 5.6 Review - Division**

A a) 2 b) 3 c) 9 d) 3 e) 4 f) 7 g) 8 h) 6 i) 7 j) 4 k) 6 l) 8

B a) 16 b) 92 c) 64 d) 59 e) 162 f) 1 598

C a) 78 R3 check  $78 \times 9 = 702$   $702 + 3 = 705$  b) 64 R1 check  $64 \times 4 = 256$   $256 + 1 = 257$

c) 128 R3 check  $128 \times 7 = 896$   $896 + 3 = 899$  d) 107 R3 check  $107 \times 5 = 535$   $535 + 3 = 538$

e) 109 R4 check  $109 \times 8 = 872$   $872 + 4 = 876$

f) 771 R2 check  $771 \times 6 = 4626$   $4626 + 2 = 4628$

## 5.7 Dividing by Two Digit Divisors

There are no short cuts to dividing by 2 or 3 digit divisors. It is hard work.  
There are a few different methods to help you through the process.

**Example A**       $630 \div 15 =$

### **Method 1**

**Using multiples.**      The first method is to write out a few of the multiples of the divisor.  
In this question,  $630 \div 15 =$  , the divisor is 15.  
Write a few of the multiples of 15.

$$15 \times 1 = 15$$

$$15 \times 2 = 30$$

$$15 \times 3 = 45$$

$$15 \times 4 = 60$$

$$15 \times 5 = 75$$

Notice if any of the multiples will be reasonable for the division.

$$\begin{array}{r} 4 \\ 15 \overline{)630} \\ \underline{-60} \phantom{0} \\ 30 \end{array}$$

*Does 15 go into 6? No .*

*Does 15 go into 63? Yes. How many times? 4*

*Write a 4 above the 3 in the answer.*

$$15 \times 4 = 60 \quad 63 - 60 = 3$$

*Write down the 3 and bring down the 0.*

$$\begin{array}{r} 42 \\ 15 \overline{)630} \\ \underline{-60} \phantom{0} \\ 30 \\ \underline{-30} \\ 0 \end{array}$$

*Does 15 go into 30? Yes. How many times? 2*

*Write a 2 above the 0 in the answer.*

$$15 \times 2 = 30 \quad 30 - 30 = 0$$

*There is nothing left to bring down and no remainder.*

$$630 \div 15 = 42$$

## Dividing by Two Digit Divisors continued

**Example B**  $2709 \div 63 =$

### Method 2

**Estimating using the first digit of the divisor.** In the second method, estimate by using the first digit of the divisor. This method is not always accurate because it is an estimate.

$$63 \overline{)2709}$$

Instead of asking: Does 63 go into 2? No.

Does 63 go into 27? No.

Does 63 go into 270? Yes. How many times? (This is too much work!)

$$63 \overline{)2709}$$

Look at the first digit of the divisor. It is a 6.

Ask this instead. Does 6 go into 2? No.

Does 6 go into 27? Yes. How many times? 4

Now go back to the original divisor of 63 and multiply  $63 \times 4$  to see if this is a reasonable amount.

$$\begin{array}{r} 4 \\ 63 \overline{)2709} \\ - 252 \\ \hline 18 \end{array}$$

$$63 \times 4 = 252$$

$$270 - 252 = 18 \quad \text{So 4 was a reasonable estimate.}$$

*Write a 4 above the 0 in the answer.*

$$\begin{array}{r} 43 \\ 63 \overline{)2709} \\ - 252 \\ \hline 189 \\ - 189 \\ \hline 0 \end{array}$$

*Bring down the 9 and follow the same estimating process. Does 6 go into 1? No.*

*Does 6 go into 18? Yes. How many times? 3*

$$63 \times 3 = 189 \quad \text{Write a 3 above the 9.}$$

*$189 - 189 = 0$  There is nothing left to bring down and no remainder.*

$$2709 \div 63 = 43$$

## Dividing by Two Digit Divisors continued

**Example C**       $630 \div 15 =$

Method 2 (not accurate)

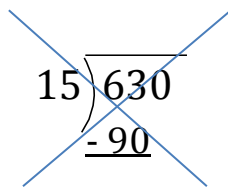
**Estimating using the first digit of the divisor.** Sometimes this method will not be useful.

Let's look at the question from Example A.       $630 \div 15 =$

Instead of asking: Does 15 go into 630 and so on?

Ask this instead. Does 1 go into 6? Yes. How many times? 6

Now multiply  $15 \times 6$  to see if this is a reasonable amount.



The image shows a long division problem: 15 is the divisor, 630 is the dividend. A bracket is drawn over 63, and 90 is subtracted from it. The entire problem is crossed out with a large blue 'X'.

*$15 \times 6 = 90$ . 90 is too much.*

*$63 - 90$  does not work.*

So in this case it would be best to follow method 1 and find the multiples of 15 as was done in Example A.

### Exercise 5.7

Divide. You can either find multiples of the divisor or use the estimation method. Check your work using the answer key. The first one a) is done for you.

$$\begin{array}{r} 45 R5 \\ 21 \overline{) 950} \\ \underline{- 84} \phantom{0} \\ 110 \\ \underline{- 105} \\ 5 \end{array}$$

$$\text{b) } 732 \div 12 =$$

*Estimate*

*2 goes in to 9 about 4 times*

*So,  $21 \times 4 = 84$  is reasonable.*

*Estimate*

*2 goes into 11, 5 times*

*So,  $21 \times 5 = 105$*

*The remainder 5 is less than 21*

*and there is nothing left to bring down.*

*45 R5 is the answer.*

$$\text{c) } 32 \overline{) 3527}$$

$$\text{d) } 6768 \div 42 =$$

**Exercise 5.7 continued**

e)  $25 \overline{)300}$

f)  $518 \div 14 =$

g)  $61 \overline{)859}$

h)  $24\,882 \div 78 =$

**Exercise 5.7 continued**

i)  $31 \overline{)899}$

j)  $1180 \div 28 =$

k)  $19 \overline{)1653}$

l)  $20\,183 \div 96 =$

**Exercise 5.7 continued**

m)  $57 \overline{) 9144}$

n)  $416 \div 29 =$

o)  $62 \overline{) 3810}$

p)  $8445 \div 42 =$

**Answers to Exercise 5.7**

a) 45 R5

b) 61

c) 110 R7

d) 161 R6

e) 12

f) 37

g) 14 R5

h) 319

i) 29

j) 42 R4

k) 87

l) 210 R23

m) 160 R24

n) 14 R10

o) 61 R28

p) 201 R3

## 5.8 Dividing by Three Digit Divisors

There are no short cuts to dividing by 3 digit divisors. It is hard work.

Just as with 2 digit divisors, you can use multiples or estimation to help you through the process.

**Example A**       $17\,902 \div 381 =$

### **Method 1**

**Using multiples.**      The first method is to write out a few of the multiples of the divisor.  
In this question,  $630 \div 15 =$  , the divisor is 15.  
Write a few of the multiples of 15.

$$381 \times 1 = 381$$

$$381 \times 2 = 762$$

$$381 \times 3 = 1143$$

$$381 \times 4 = 1524$$

$$381 \times 5 = 1905$$

$$381 \times 6 = 2286$$

Notice if any of the multiples will be reasonable for the division.

$$\begin{array}{r} 4 \\ 381 \overline{) 17902} \\ - 1524 \phantom{0} \\ \hline 266 \end{array}$$

*Begin with, does 381 go into 179? No*

*Does 381 go into 1790? Yes.*

*How many times?      4 times*

*Write a 4 above the 0 in the answer.*

$$381 \times 4 = 1524 \quad 1790 - 1524 = 266$$

*Write down 266. Bring down the 2.*

$$\begin{array}{r} 46 \\ 381 \overline{) 17902} \\ - 1524 \phantom{0} \\ \hline 2662 \\ - 2286 \phantom{0} \\ \hline 376 \end{array}$$

*Does 381 go into 2662? Yes. How many times? 6*

*Write a 6 above the 2 in the answer.*

$$381 \times 6 = 2286 \quad 2662 - 2286 = 376$$

*376 is less than 381, so 376 is the remainder.*

$$17\,902 \div 381 = 46 \text{ R } 376$$

## Exercise 5.8

Divide. You can either find multiples of the divisor or use the estimation method. Check your work using the answer key. The first one a) is done for you.

$$\begin{array}{r} 75 \text{ R}57 \\ 115 \overline{)8682} \\ \underline{-805} \phantom{2} \downarrow \\ 632 \\ \underline{-575} \\ 57 \end{array}$$

$$\text{b) } 2384 \div 205 =$$

*Estimate*

*11 goes in to 86 about 7 times*

*So,  $115 \times 7 = 805$  is reasonable.*

*Estimate*

*11 goes into 63, 5 times*

*So,  $115 \times 5 = 575$*

*The remainder is 57 which is less than 115.*

*So the answer is 75 R57.*

$$\text{c) } 325 \overline{)66321}$$

$$\text{d) } 13284 \div 241 =$$

### Answers to Exercise 5.8

a) 75 R57

b) 11 R129

c) 204 R21

d) 55 R29

## 5.9 Dividing by Multiples of 10

### Dividing by 10

#### Exercise 5.9a

Find the quotients. Look for the pattern. Check your work using the answer key. The first one a) is done for you.

$$\begin{array}{r} 46 \text{ R}4 \\ 10 \overline{) 464} \\ \underline{- 40} \phantom{4} \\ 64 \\ \underline{- 60} \\ 4 \end{array}$$

$$\text{b) } 10 \overline{) 75}$$

$$\text{c) } 136 \div 10 =$$

$$\text{d) } 10 \overline{) 832}$$

$$\text{e) } 10 \overline{) 2457}$$

$$\text{f) } 3685 \div 10 =$$

The pattern when dividing by 10s is that the digit in the ones place becomes the remainder. The other numbers in the dividend stay the same but each digit is one place value less.

That is, the hundreds become tens, the tens become ones and the ones become the remainder.  $464 \div 10 = 46 \text{ R}4$   $75 \div 10 = 7 \text{ R}5$

#### Answers to Exercise 5.9a

$$\text{a) } 464 \div 10 = 46 \text{ R}4$$

$$\text{b) } 75 \div 10 = 7 \text{ R}5$$

$$\text{c) } 136 \div 10 = 13 \text{ R}6$$

$$\text{d) } 832 \div 10 = 83 \text{ R}2$$

$$\text{e) } 2457 \div 10 = 245 \text{ R}7$$

$$\text{f) } 3685 \div 10 = 368 \text{ R}5$$

## Dividing by 100

### Exercise 5.9b

Find the quotients. Look for the pattern. Check your work using the answer key.

$$\begin{array}{r} 29 \text{ R}48 \\ 100 \overline{)2948} \\ \underline{-200} \phantom{00} \\ 948 \\ \underline{-900} \\ 48 \end{array}$$

$$b) 100 \overline{)269}$$

$$c) 4671 \div 100 =$$

$$d) 100 \overline{)9932}$$

$$e) 100 \overline{)92\,829}$$

$$f) 43\,821 \div 100 =$$

The pattern when dividing by 100s is that the digits in the ones and tens places become the remainder. The other numbers in the dividend stay the same but each digit is two place values less.

That is, the thousands become tens, the hundreds become ones and the ones and tens become the remainder.  $2948 \div 100 = 29 \text{ R}48$        $269 \div 100 = 2 \text{ R}69$

#### Answers to Exercise 5.9b

$$a) 2948 \div 100 = 29 \text{ R}48 \quad b) 269 \div 100 = 2 \text{ R}69 \quad c) 4671 \div 100 = 46 \text{ R}71$$

$$d) 9932 \div 100 = 99 \text{ R}32 \quad e) 92\,829 \div 100 = 928 \text{ R}29 \quad f) 43\,821 \div 100 = 438 \text{ R}21$$

## **5.10 Word Problems - Division**

The problem solving skills we learn in math can be very useful to help us solve problems we have in our day-to-day lives. To solve a problem, it is a good idea to have a plan. Consider the steps below for solving word problems.

Watch for **key words** when you are solving division word problems.

**quotient** - the answer in a division problem  
**shared** – each person gets the same amount  
**split** – separate into groups of equal numbers

**Find the average.**  
**Find the unit price.**  
**Find the \_\_\_\_ per \_\_\_\_.**

### **Problem Solving Steps**

- Step 1:** Read the problem.
- Step 2:** List the information you found.
- Step 3:** Use key words to decide what you have to find out.
- Step 4:** Solve the problem.
- Step 5:** Does your answer make sense?
- Step 6:** Write your answer in a word sentence.

## Word Problems Division continued

The most common type of division problem gives a total amount for **several** things and asks you to **find** what the amount would be for **one**.

| Problems may tell you...              | and ask you to find...           |
|---------------------------------------|----------------------------------|
| kilometres driven in 8 hours (hr)     | km driven in one hour (km/hr)    |
| cost for 15 kilograms                 | cost for one kg (\$/kg)          |
| \$ pay for 40 hours                   | \$ pay for one hour (\$/hr)      |
| rent for one year (12 months)         | rent for one month (rent/month)  |
| work done in eight hours              | work done in one hour (work/hr)  |
| kilometres driven on 55 Litres of gas | km driven on one L of gas (km/L) |

The word *per* is a Latin word meaning “for each”.

For example, when asked to find the kilometres *per* hour, it means to find the kilometres driven in *one* hour.

A slash (/) also means per. kilometres/hour or km/h.

### Example A

John buys 444 litres of gas in 6 months. How much gas per month does John buy if he buys the same amount each month?

The key words are **per month** which means to find the amount per one month which is dividing.

Dividend: What are you dividing? 444 litres of gas

Divisor: What are you dividing it into? 6 months

$$444 \div 6 =$$

$$\begin{array}{r} 74 \\ 6 \overline{) 444} \\ \underline{- 42} \phantom{0} \\ 24 \\ \underline{- 24} \\ 0 \end{array}$$

*John buys 74 litres of gas each month.*

## Word Problems Division continued

Finding the average is another way of asking to find the amount for one unit. To find the average, divide the total amount by the number of items that make up the total. You may first have to add the different items together to find the total and then divide.

$$\text{Average} = \text{total} \div \text{amount of items}$$

### Example B

Joan and Rick have been keeping track of their household costs. They want to plan a monthly budget. Their grocery bills for five months were \$605, \$397, \$530, \$590 and \$474. What is their average monthly grocery cost?

The key words are **average monthly** which means to find the total of the amounts. Then, divide by the number of amounts.

The total amount is  $\$605 + 397 + 530 + 590 + 474 =$

$$\begin{array}{r} 21 \\ 605 \\ 397 \\ 530 \\ 590 \\ + 473 \\ \hline 2595 \end{array}$$

Dividend: What are you dividing? \$2595

Divisor: What are you dividing it by 5 months

$$2595 \div 5 =$$

$$\begin{array}{r} 519 \\ 5 \overline{) 2595} \\ \underline{- 25} \phantom{0} \\ 09 \phantom{0} \\ \underline{- 5} \phantom{0} \\ 45 \phantom{0} \\ \underline{- 45} \\ 0 \end{array}$$

*Joan and Rick spend \$519 on average each month.*

**Exercise 5.10a**

Solve these division word problems. Check your work using the answer key.

a) A machine shop can stamp out 360 car parts in an 8 hour working day. How many parts is that per hour?

b) Ivan paid \$560 for 4 tires. How much did each tire cost?

c) The total cost of the car Lisa bought is \$14 880 including tax and interest. She will pay for it in 24 equal payments. How much will each payment be?

d) Jessica cycled 14 km, 10 km, 18 km, 22 km in each of four hours. What was her average speed in kilometres per hour? (km/hr)

### Exercise 5.10a continued

e) Mandy spent \$124, \$187, \$164, \$205 and \$220 on her heating bill over 5 months. What was the average cost per month for her heating?

f) Dan worked 8 hours a day for five days and earned \$560. How much was he paid per hour?

Hint: How many hours did he work in total over the five days?

What did he earn per hour?

#### Answers to Exercise 5.10a – Word Problems

a)  $360 \div 8 = 45$  The machine makes 45 parts per hour.

b)  $\$560 \div 4 = \$140$  Each tire cost \$140.

c)  $\$14\,880 \div 24 = \$620$  Lisa will pay \$620 per month for her car.

d) First find the total.  $14 + 10 + 18 + 22 = 64$  Next, find the average  $64 \div 4 = 16$   
Jessica cycled 16 km per hour.

e) First find the total.  $124 + 187 + 164 + 205 + \$220 = \$900$   
Next, find the average.  $\$900 \div 5 = 180$   
On average, Mandy paid \$180 per month for heating.

f)  $8 \times 5 = 40$  hours over five days.  
 $\$560 \div 40 = 14$  Dan earned \$14 per hour.

## Word Problems Division continued

### Divide to find the number of groups

Another type of division problem gives the total amount and the size of each group. The question asks you to find the number of groups. Both numbers will have the same units. The answer to the problem will give another type of unit.

#### Example A

One necklace uses 25 beads. How many necklaces can Susan make for the craft fair if she has 525 beads?

Find how many groups of 25 beads there are in 525 beads.

$$525 \div 25 = 21 \quad \text{Susan can make 21 necklaces.}$$

#### Example B

If you drive an average speed of 80 km an hour, how many hours will it take you to drive 560 km?

Find how many groups of 80 km there are in 560 km.

$$560 \div 80 = 7 \quad \text{It will take 7 hours to drive 560 km.}$$

#### Exercise 5.10b

Solve these division word problems. Check your work using the answer key.

- a) A train travels 90 km per hour. How many hours will it take the train to go 540 km?

**Exercise 5.10b continued**

b) A car gets 16 km per litre of gasoline. How many litres of gasoline will the car need to go 128 km?

c) About 8 metres is needed for one parking space. How many parking spaces can be made along a street that is 232 metres long?

d) If you spend an average of 8 minutes on one math problem, how many problems can you finish in one hour?

Will you have any time left? How much?

### Exercise 5.10b continued

e) The Football Club members decided to sell home-made candy to raise money. The boxes they bought will hold 45 pieces of candy. If everyone makes a double batch of fudge they will have 2590 pieces of fudge. How many boxes can they fill?

How many pieces of fudge are left-over for them to eat?

f) A group of 334 students is going to Victoria by bus. Each bus holds 32 passengers. How many buses do they need? Will there be any empty seats? (Be careful with this one!)

#### Answers to Exercise 5.10b– Word Problems

a)  $540 \div 90 = 6$  It will take 6 hours for the train to travel 540 km.

b)  $128 \div 16 = 8$  The car will require 8 litres of gas to travel 128 km.

c)  $232 \div 8 = 29$  Along the street they can make 29 parking spaces.

d) Convert 1 hour to minutes. 1 hour = 60 minutes.  $60 \div 8 = 7 \text{ R}4$   
I can do 7 math problems in one hour. I will have 4 minutes left over.

e)  $2590 \div 45 = 57 \text{ R}25$  They can fill 57 boxes. There will be 25 pieces of fudge left over.

f)  $334 \div 32 = 10 \text{ R}14$  They will require 11 buses. On the 11<sup>th</sup> bus, there will be 18 empty seats. ( $32 - 14 = 18$ )

## **Unit 5 Review - Division**

You will now practice all the skills you learned in Unit 5. Check your work using the answer key at the end of the review.

### **A. Find the quotient.**

a)  $21 \div 3 = \underline{\quad}$       b)  $45 \div 9 = \underline{\quad}$       c)  $64 \div 8 = \underline{\quad}$

d)  $24 \div 8 = \underline{\quad}$       e)  $30 \div 6 = \underline{\quad}$       f)  $12 \div 1 = \underline{\quad}$

g)  $2 \overline{)12}$

h)  $4 \overline{)36}$

i)  $54 \div 9 =$

j)  $9 \overline{)27}$

k)  $4 \overline{)8}$

l)  $8 \div 8 =$

### **B. Divide. No remainders**

a)  $3 \overline{)81}$

b)  $5 \overline{)735}$

c)  $837 \div 9 =$

d)  $2 \overline{)314}$

e)  $8 \overline{)336}$

f)  $576 \div 4 =$

**C. Dividing with remainders. Also, check your answer using x and +.**  
**(1 mark for question, 1 mark for check)**

a)  $7 \overline{)615}$

b)  $2 \overline{)647}$

c)  $781 \div 3 =$

*check*

d)  $5 \overline{)659}$

e)  $4 \overline{)342}$

f)  $175 \div 9 =$

*check*

**D. Put a check mark for each number that divides evenly.**

|          | <b>Number</b> | <b>2</b> | <b>3</b> | <b>5</b> |
|----------|---------------|----------|----------|----------|
| <b>a</b> | 135           |          |          |          |
| <b>b</b> | 384           |          |          |          |
| <b>c</b> | 4614          |          |          |          |
| <b>d</b> | 495           |          |          |          |
| <b>e</b> | 648           |          |          |          |
| <b>f</b> | 745           |          |          |          |

**E. Find the quotients.**

a)  $42 \overline{) 8956}$

b)  $832 \div 34 =$

c)  $10 \overline{) 4923}$

d)  $24\,882 \div 100 =$

e)  $12 \overline{)3721}$

f)  $5364 \div 51 =$

g)  $10 \overline{)768}$

h)  $5360 \div 100 =$

**F. Word Problems.**

a) At the Car Factory, 4325 cars were put together in 5 days. Each day the same number of cars were built. How many cars were built each day?

b) The Basketball Company needs to make 6912 basketballs. Mr. Bounce, the foreman, says that their machines can make the balls in 12 hours. How many balls would be made in one hour?

c) The new stadium has 15 960 seats divided evenly into 76 sections. How many seats are in each section?

d) Kate achieved 84%, 92%, 73%, 86%, and 80% on her first five tests. What was her average grade on the tests?

e) The distance between Calgary and Edmonton is approximately 300 kilometres. If a person drives 100 kilometres per hour, how many hours will the drive take?

f) John collects sports cards. In 4 months, January through April, he collected 123, 287, 45, and 106 cards respectively. On average, how many sports cards did he collect per month? Were there any cards remaining?

### Answers to Unit 5 Review - Division

**A** a) 7 b) 5 c) 8 d) 3 e) 5 f) 12 g) 6 h) 9 i) 6 j) 3 k) 2 l) 1

**B** a) 27 b) 147 c) 93 d) 157 e) 42 f) 144

**C** a) 87 R6 check  $87 \times 7 = 609$   $609 + 6 = 615$  b) 323 R1 check  $323 \times 2 = 646$   $646 + 1 = 647$

c) 260 R1 check  $260 \times 3 = 780$   $780 + 1 = 781$  d) 131 R4 check  $131 \times 5 = 655$   $655 + 4 = 659$

e) 85 R2 check  $85 \times 4 = 340$   $340 + 2 = 342$  f) 19 R4 check  $19 \times 9 = 171$   $171 + 4 = 175$

| <b>D</b> | <b>Number</b> | <b>2</b> | <b>3</b> | <b>5</b> |
|----------|---------------|----------|----------|----------|
| <b>a</b> | 135           |          | ✓        | ✓        |
| <b>b</b> | 384           | ✓        | ✓        |          |
| <b>c</b> | 4614          | ✓        | ✓        |          |
| <b>d</b> | 495           |          | ✓        | ✓        |
| <b>e</b> | 648           | ✓        | ✓        |          |
| <b>f</b> | 745           |          |          | ✓        |

**E** a) 213 R10 b) 24 R 16 c) 492 R3 d) 248 R 82 e) 310 R1 f) 105 R9 g) 76 R8 h) 53 R60

**F.** a)  $4325 \div 5 = 865$  The factory builds 865 cars per day.

b)  $6912 \div 12 = 576$  The machine makes 576 basketballs in 1 hour.

c)  $15\,960 \div 76 = 210$  Each section has 210 seats.

d) First find the total.  $84 + 92 + 73 + 86 + 80 = 415$  Next, find the average  $415 \div 5 = 83$   
Kate achieved an 83% on average.

e)  $300 \div 100 = 3$  It takes about 3 hours to drive to Edmonton from Calgary.

f) First find the total.  $123 + 287 + 45 + 106 = 561$  Next, find the average  $561 \div 4 = 140$  R1  
John collects on average 140 sports cards each month. There was 1 sports card remaining.

## Unit 4 & Unit 5 Review – Multiplication & Division

Let's review the skills you learned in Unit 4 Multiplication. Check your work using the answer key at the end of the review. The review for Unit 5 Division follows the review of multiplication.

### **A. Solve these multiplication facts.**

a) 
$$\begin{array}{r} 8 \\ \times 5 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 9 \\ \times 5 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 0 \\ \times 1 \\ \hline \end{array}$$

d) 
$$\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$$

h) 
$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

i) 
$$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 0 \\ \times 0 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$$

m) 
$$\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

q)  $2 \times 6 =$

r)  $5 \times 4 =$

s)  $7 \times 1 =$

t)  $0 \times 6 =$

u)  $8 \times 5 =$

v)  $2 \times 7 =$

w)  $9 \times 7 =$

x)  $6 \times 5 =$

y)  $5 \times 4 =$

z)  $3 \times 9 =$

**B. Find the products.**

a) 
$$\begin{array}{r} 81 \\ \times 5 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 441 \\ \times 2 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 5649 \\ \times 3 \\ \hline \end{array}$$

d)  $67 \times 19 =$

e) 
$$\begin{array}{r} 581 \\ \times 34 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 87 \\ \times 41 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 97 \\ \times 20 \\ \hline \end{array}$$

h)  $16 \times 78 =$

i) 
$$\begin{array}{r} 2805 \\ \times 46 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 7310 \\ \times 82 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 6143 \\ \times 51 \\ \hline \end{array}$$

l)  $85 \times 57 =$

**C. Find the products. Use the zero shortcut.**

a) 
$$\begin{array}{r} 285 \\ \times 10 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 731 \\ \times 100 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 9693 \\ \times 1000 \\ \hline \end{array}$$

d)  $10 \times 850 =$

e)  $1000 \times 629 =$

f)  $10\,000 \times 2735 =$

g)  $19 \times 100 =$

**D. Find the estimated product only.**

Estimate

$$\begin{array}{r} 285 \\ \times 6 \\ \hline \end{array}$$

Do not solve

Do estimate only for each.

Estimate

b) 
$$\begin{array}{r} 593 \\ \times 74 \\ \hline \end{array}$$

Estimate

c) 
$$\begin{array}{r} 6999 \\ \times 507 \\ \hline \end{array}$$

Estimate

d) 
$$\begin{array}{r} 21\,395 \\ \times 599 \\ \hline \end{array}$$

**E. Solve each word problem. Give your answer in a sentence. Check your work using the answer key. The sentence you write may be a little different than the sentence in the answer key.**

a) The theatre at Bow Valley College has 12 rows of seating. Each row has 18 seats. How many seats are there in total at the theatre?

b) Lisa pays \$650 for daycare each month. How much will Lisa pay for daycare for one year? How much will Lisa pay for daycare for two years?

c) The college cafeteria hopes to serve 95 people each day. How many meals will be served if the cafeteria is open 175 days. Find the estimate and the actual product.

d) Helen spends \$2 on coffee each day at work. She works five days a week. How much does she spend in one week on coffee? How much does she spend if she works 45 weeks each year?

e) A store keeper bought 25 ipads. He bought them for \$200 each. He sold them for \$300 each. How much did he pay for all of the ipads in total?

How much money did he make when he sold all of the ipads?

What is the difference between what he paid and what he made (profit)?

| Answers to Unit 4 Review - Multiplication                                                       |  |  |  |           |  | (est means estimate) |  |              |  |  |  |            |  |                                                                             |  |            |  |  |  |               |  |  |  |         |  |  |  |
|-------------------------------------------------------------------------------------------------|--|--|--|-----------|--|----------------------|--|--------------|--|--|--|------------|--|-----------------------------------------------------------------------------|--|------------|--|--|--|---------------|--|--|--|---------|--|--|--|
| A a) 40 b)45 c) 0 d) 24 e) 14 f) 6 g) 63 h) 8 i) 14 j) 4 k) 0 l) 6 m) 35                        |  |  |  |           |  |                      |  |              |  |  |  |            |  |                                                                             |  |            |  |  |  |               |  |  |  |         |  |  |  |
| n) 16 o) 12 p) 49 q) 12 r) 20 s) 7 t) 0 u) 40 v) 14 w) 63 x) 30 y) 20 z) 27                     |  |  |  |           |  |                      |  |              |  |  |  |            |  |                                                                             |  |            |  |  |  |               |  |  |  |         |  |  |  |
| B a)405                                                                                         |  |  |  | b) 882    |  |                      |  | c) 16 947    |  |  |  | d) 1273    |  |                                                                             |  | e) 19 754  |  |  |  | f) 3567       |  |  |  |         |  |  |  |
| g) 1940                                                                                         |  |  |  | h) 1248   |  |                      |  | i) 129 030   |  |  |  | j) 599 420 |  |                                                                             |  | k) 313 293 |  |  |  | l) 4845       |  |  |  |         |  |  |  |
| C a) 2850                                                                                       |  |  |  | b) 73 100 |  |                      |  | c) 9 693 000 |  |  |  | d) 8500    |  |                                                                             |  | e) 629 000 |  |  |  | f) 27 350 000 |  |  |  | g) 1900 |  |  |  |
| D a)3 zeros est $300 \times 10 = 3000$                                                          |  |  |  |           |  |                      |  |              |  |  |  |            |  | b) 3 zeros est $600 \times 70 = 42\,000$                                    |  |            |  |  |  |               |  |  |  |         |  |  |  |
| c) 5 zeros est $7000 \times 500 = 3\,500\,000$                                                  |  |  |  |           |  |                      |  |              |  |  |  |            |  | d) 6 zeros est $20\,000 \times 600 = 12\,000\,000$                          |  |            |  |  |  |               |  |  |  |         |  |  |  |
| E a) 12 rows times 18 seats. $12 \times 18 = 216$                                               |  |  |  |           |  |                      |  |              |  |  |  |            |  | There are 216 seats in the theatre.                                         |  |            |  |  |  |               |  |  |  |         |  |  |  |
| b) \$650 for 12 months $650 \times 12 = \$7\,800$ Lisa will pay \$7800 for daycare for 1 year.  |  |  |  |           |  |                      |  |              |  |  |  |            |  | \$7800 x 2 years = \$15 600 Lisa will pay \$15 600 for daycare for 2 years. |  |            |  |  |  |               |  |  |  |         |  |  |  |
| c) 95 people x 175 days = 16 625 people estimate $100 \times 200 = 20\,000$                     |  |  |  |           |  |                      |  |              |  |  |  |            |  | The cafeteria will serve 16 625 people. The estimate is 20 000 people.      |  |            |  |  |  |               |  |  |  |         |  |  |  |
| d) $\$2 \times 5 \text{ days} = \$10 \text{ per week}$ . $\$10 \times 45 \text{ weeks} = \$450$ |  |  |  |           |  |                      |  |              |  |  |  |            |  | Helen spends \$10 on coffee each week and \$450 on coffee each year.        |  |            |  |  |  |               |  |  |  |         |  |  |  |
| e) 25 ipads x \$200 = \$5000                                                                    |  |  |  |           |  |                      |  |              |  |  |  |            |  | The iPads cost \$5000 in total.                                             |  |            |  |  |  |               |  |  |  |         |  |  |  |
| 25 x \$300 = \$7500                                                                             |  |  |  |           |  |                      |  |              |  |  |  |            |  | He sold the iPads for \$7500 in total.                                      |  |            |  |  |  |               |  |  |  |         |  |  |  |



## **5.11 Order of Operations**

The order in which math problems are solved is important. This is the Order of Operations. There are 4 steps to solving a math equation.

### **Order of Operations**

- 1) Solve inside grouping brackets or parentheses.
- 2) Solve exponents and square roots.
- 3) Solve multiplication and/or division  
in the order it appears starting from left to right.
- 4) Solve addition and/or subtraction  
in the order it appears starting from left to right.

You may remember the Order of Operations as BEDMAS or PEDMAS.

It is important to learn that multiplication and division are equal, as are addition and subtraction. We solve them in the order they appear with division and multiplication being done first before addition and subtraction.

We will not be covering exponents at this time so will only be using steps 1, 3 & 4 from the Order of Operations.

## Order of Operations continued

### Order of Operations

- 1) Solve inside grouping brackets or parentheses.
- 2) Solve exponents and square roots.  
(We are not using this step.)
- 3) Solve multiplication and/or division  
in the order it appears starting from left to right.
- 4) Solve addition and/or subtraction  
in the order it appears starting from left to right.

### Example A Solve using the Order of Operations.

Read the question.

There are no grouping brackets.

Solve  $\times$  and  $\div$  in the order it appears  
starting from left to right.  $5 \times 6 = 30$

$$\underline{5 \times 6} + 18 \div 3 =$$

30

Bring down the rest of the question.

$$30 + \underline{18 \div 3}$$

6

Solve  $\div$   $18 \div 3 = 6$

Bring down the rest of the question.

$$\underline{30 + 6}$$

Solve  $+$  and  $-$  in the order it appears  
starting from left to right.

36

$30 + 6 = 36$

## Order of Operations continued

### Example B Solve using the Order of Operations.

Read the question.

$$3 \times \underline{(8 - 1)} + 10 \div 2 - 2 =$$

Solve grouping brackets. ( $8 - 1 = 7$ )

$$7$$

Bring down the rest of the question.

$$\underline{3 \times 7} + \underline{10 \div 2} - 2$$

Solve  $\times$  and  $\div$  in the order it appears starting from left to right.

$$21$$

$$5$$

Bring down the rest of the question.

$$\underline{21 \quad + \quad 5} - 2$$

Solve  $+$  and  $-$  in the order it appears starting from left to right.

$$26$$

Bring down the rest of the question.

$$\underline{26 - 2}$$

Solve for the answer.

$$24$$

## Order of Operations continued

**Example C** Solve using the Order of Operations.

$$\underline{(6)} \underline{(4)} - (15 + 5) \div 2 + 16 =$$

(6) (4) means multiplication

Rewrite the question as such.

$$6 \times 4 - \underline{(15 + 5)} \div 2 + 16$$

Solve grouping brackets. ( $15 + 5 = 20$ )

$$20$$

Bring down the rest of the question.

$$\underline{6 \times 4} - \underline{20} \div 2 + 16$$

Solve  $\times$  and  $\div$  in the order it appears starting from left to right.

$$24$$

$$10$$

Bring down the rest of the question.

$$\underline{24} \quad - \quad 10 \quad + \quad 16$$

Solve  $+$  and  $-$  in the order it appears starting from left to right.

$$14$$

Bring down the rest of the question.

$$\underline{14 \quad + \quad 16}$$

Solve for the answer

$$30$$

**Exercise 5.11**

Solve using the Order of Operations. Check your work using the answer key. Use the previous examples to guide your work.

a)  $9 \times 7 - 11 =$

b)  $5 \times 9 + 15 =$

c)  $4 \times 8 - 10 \div 2 =$

d)  $6 \times 6 - 28 \div 4 =$

e)  $6 + 4 \times (8 + 3) =$

f)  $(40 \div 8) + 9 \times 5 - 18 =$

**Exercise 5.11 continued**

g)  $33 \div 3 \times (5 - 1) + 7 =$

h)  $75 - 3 \times (5) (2) + 15 =$

i)  $16 - (2) (4) \div 2 + 36 =$

j)  $21 \times 3 + 5 - (28 - 21) \times 5 =$

k)  $17 + (18 \div 6) + 3 \times 12 =$

l)  $(4) (5) \times (2 + 5) - (35 - 14) =$

**Answers to Exercise 5.11**

a) 52 ( $63 - 11 = 52$ )

b) 60 ( $45 + 15 = 60$ )

c) 27 ( $32 - 5 = 27$ )

d) 29 ( $36 - 7 = 29$ )

e) 50 ( $6 + 44 = 50$ )

f) 32 ( $5 + 45 - 18 = 32$ )

g) 51 ( $11 \times 4 + 7 = 44 + 7 = 51$ )

h) 60 ( $75 - 30 + 15 = 60$ )

i) 48 ( $16 - 4 + 36 = 48$ )

j) 33 ( $63 + 5 - 35 = 33$ )

k) 56 ( $17 + 3 + 36 = 56$ )

l) 119 ( $20 \times 7 - 21 = 119$ )

# **Unit 1 - 5 Review**

Practice all the skills you learned in Units 1 - 5. Check your work using the answer key at the end of the review.

**A. Write the place value names (ones, tens hundreds, thousands, ten thousands, hundred thousands, millions) for each underlined digit.**

a) 34 921 \_\_\_\_\_ b) 5498 \_\_\_\_\_

c) 418 \_\_\_\_\_ d) 57 128 \_\_\_\_\_

**Using the number 41 276, write the digit that is in each of the following place values.**

e) thousands \_\_\_\_\_ f) ones \_\_\_\_\_

g) hundreds \_\_\_\_\_ h) tens \_\_\_\_\_

**Underline the digit for the place value named.**

i) hundreds      25 026      j) tens      3754

k) ten thousands      137 192      l) hundred thousands      1 291 569

**Write the numbers in words.**

m) 725

n) 3607

o) 60 710

p) 3 088 179

**Write the words in numbers.**

q) six thousand three hundred thirty-seven

r) ten thousand four hundred seventeen

s) two hundred four

t) one hundred ninety-five thousand four hundred thirty

**Write each number in expanded form.**

u) 925

v) 31 365

w) 98 008

x) 1 562 321

**Write each number in standard form.**

y) 60 000 + 9000 + 400 + 20 + 6

z) 90 000 + 300 + 40 + 3

aa) 1000 + 900 + 60 + 5

bb) 4 000 000 + 500 000 + 90 000 + 3000 + 200 + 40 + 2

**Arrange these numbers in order from smallest to largest.**

cc)      418      4018      18      487      4832

---

dd)      76      79      67      70      72

---

**Write < or > or = in each blank as needed.**

ee) 498              458              ff) 3200      3300

gg) 35 781              35 807              hh) 12 468      12 493

**B. Round each number as indicated.**

a) Round 1653 to nearest tens \_\_\_\_\_ to nearest thousands \_\_\_\_\_

b) Round 12 581 to nearest hundreds \_\_\_\_\_ to nearest ten thousands \_\_\_\_\_

c) Round 43 999 to nearest hundreds \_\_\_\_\_ to nearest tens \_\_\_\_\_

d) Round 572 098 to nearest thousands \_\_\_\_\_

## Adding, Subtraction, Multiplying or Dividing

Solve.

$$\begin{array}{r} \text{a)} \quad 368 \\ + 31 \\ \hline \end{array}$$

$$\begin{array}{r} \text{b)} \quad 2147 \\ + 690 \\ \hline \end{array}$$

$$\text{c)} \quad 62 + 947 + 8 =$$

$$\begin{array}{r} \text{d)} \quad 2376 \\ - 254 \\ \hline \end{array}$$

$$\begin{array}{r} \text{e)} \quad 16\,043 \\ - 9\,672 \\ \hline \end{array}$$

$$\text{f)} \quad 6000 - 625 =$$

Find the exact answer and the estimates.

Rewrite the addition problems in a column for solving.

$$\begin{array}{ll} \text{g)} \quad 12\,653 + 7098 = & \\ \text{Exact} & \text{Estimate} \end{array}$$

$$\begin{array}{ll} \text{h)} \quad 9909 + 582 = & \\ \text{Exact} & \text{Estimate} \end{array}$$

Find the exact answer and estimate.

$$\begin{array}{ll} \text{i)} \quad 10\,545 - 1433 = & \\ \text{Exact} & \text{Estimate} \end{array}$$

$$\begin{array}{ll} \text{j)} \quad 165\,912 - 58\,102 = & \\ \text{Exact} & \text{Estimate} \end{array}$$

**Find the product for each question.**

k) 
$$\begin{array}{r} 2805 \\ \times 46 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 7310 \\ \times 82 \\ \hline \end{array}$$

m)  $85 \times 57 =$

**Find the products. Use the zero shortcut method.**

n) 
$$\begin{array}{r} 285 \\ \times 10 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 731 \\ \times 100 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 9693 \\ \times 1000 \\ \hline \end{array}$$

**Use front-end rounding to find the estimated product for each question.**

q) 
$$\begin{array}{r} 2285 \\ \times 56 \\ \hline \end{array}$$
  
Do not solve

Estimate

r) 
$$\begin{array}{r} 25\,491 \\ \times 99 \\ \hline \end{array}$$

Estimate

Do estimate only for each.

**Dividing with remainders. Also, check your answer using x and +. (Check the answers of questions s), t), and u) by multiplying the quotient with the divisor and adding back in the remainder.)**

s)  $6 \overline{)4575}$

t)  $2 \overline{)8125}$

u)  $832 \div 7 =$

*check*

v)  $23 \overline{)8837}$

w)  $51 \overline{)10447}$

x)  $8500 \div 85 =$

**Put a check mark for each number that divides evenly.**

|          | <b>Number</b> | <b>2</b> | <b>3</b> | <b>5</b> |
|----------|---------------|----------|----------|----------|
| <b>a</b> | 4132          |          |          |          |
| <b>b</b> | 33 084        |          |          |          |
| <b>c</b> | 615           |          |          |          |
| <b>d</b> | 900           |          |          |          |

**C. Word Problems** Solve each word problem. The word problems could be addition, multiplication, subtraction and/or division. Give your answer in a sentence. Check your work using the answer key. The sentence you write may be a little different than the sentence in the answer key.

a) If Sal drives 120 kilometres per hour for 5 hours, how far does he drive?

b) Ten workers contribute \$5 each per week to buy lottery tickets. How much do they contribute in total each week? How much do they contribute in one year? ( 1 year = 52 weeks)

c) The population of Calgary in 2014 was 1 195 194. The population of Calgary in 2009 was 1 065 455. What is the difference in the population between 2014 and 2009. (Calgary.ca)

d) Last year Sam earned \$39 425. He paid \$6702 in taxes. How much money did Sam have left after paying his taxes?

e) The Glenmore Reservoir provides more than half of Calgary's drinking water. It was completed in the year 1933. If it is the year 2015, how many years has the reservoir been collecting drinking water?  
([www.sunsite.ualberta.ca/Projects/Alberta-Lakes](http://www.sunsite.ualberta.ca/Projects/Alberta-Lakes))

f) Sandy has saved \$151, \$96, \$15, \$225, \$39 and \$146 in the first 6 months of the year. How much money has she saved in total? What was the average amount she saved each month?

g) How long would it take a person driving at a speed of 80 kilometres per hour to travel a distance of 1440 kilometres?

h) The Student Association is putting together welcome packages for new students. They plan on putting 10 items in 1250 bags. How many items do they have in total?

i) Beth achieved 64%, 83%, 65%, 72%, and 76% on five assignments. What was her average grade on the assignments?

j) The distance between Calgary and Vancouver is approximately 975 kilometres. If a person drives 100 kilometres per hour, how many hours will the drive take? Round up to the nearest hour if you have a remainder.

**Answers to Unit 1 - 5 Review**

a) hundreds    b) thousands    c) ones    d) tens

e) 1    f) 6    g) 2    h) 7    i) 0    j) 5    k) 3    l) 2

m) seven hundred twenty-five    n) three thousand six hundred seven

o) sixty thousand seven hundred ten    p) three million eighty-eight thousand one hundred seventy-nine

q) 6337    r) 10 417    s) 204    t) 195 430

u)  $900 + 20 + 5 = 925$     v)  $30\,000 + 1000 + 300 + 60 + 5 = 31\,365$

w)  $90\,000 + 8000 + 8 = 98\,008$

x)  $1\,000\,000 + 500\,000 + 60\,000 + 2000 + 300 + 20 + 1 = 1\,562\,321$

y) 69 426    z) 90 343    aa) 1965    bb) 4 593 242

cc) 18    418    487    4018    4832    dd) 67    70    72    72    76    79

ee)  $498 > 458$     ff)  $3200 < 3300$     gg)  $35\,781 < 35\,807$     hh)  $12\,468 < 12\,493$

**B. Rounding**

a) tens 1650    thousands 2000    b) hundreds 12 600    ten thousands 10 000

c) hundreds 44 000    tens 44 000    d) thousands 572 000

**Adding, Subtracting, Multiplying and/or Dividing**

a) 399    b) 2837    c) 1017    d) 2122    e) 6371    f) 5375

g) exact = 19 751    est =  $10\,000 + 7000 = 17\,000$     h) exact = 10 491    est  $10\,000 + 600 = 10\,600$

i) exact = 9112    estimate  $10\,000 - 1000 = 9000$     j) exact = 107 810    est  $200\,000 - 60\,000 = 140\,000$

### Answers to Unit 1 - 5 Review (est means estimate)

#### Adding, Subtracting, Multiplying and/or Dividing continued

- k) 129 030      l) 599 420      m) 4845      n) 2850      o) 73 100      p) 9 693 000
- q) est  $2000 \times 60 = 120\,000$       r)  $30\,000 \times 100 = 3\,000\,000$
- s) 762 R3 check  $762 \times 6 = 4572$      $4572 + 3 = 4575$     t) 4062 R1 check  $4062 \times 2 = 8124$      $8124 + 1 = 8125$
- u) 118 R6 check  $118 \times 7 = 826$      $826 + 6 = 832$     v) 384 R5      w) 204 R43      x) 100

|   | Number | 2 | 3 | 5 |
|---|--------|---|---|---|
| a | 4132   | ✓ |   |   |
| b | 33 084 | ✓ | ✓ |   |
| c | 615    |   | ✓ | ✓ |
| d | 900    | ✓ | ✓ | ✓ |

#### C. Word Problems

- a)  $120 \times 5 = 600$     Sal drive 600 kilometres.
- b)  $10 \times 5 = 50$      $50 \times 52 = 2600$   
The workers contribute \$50 each week. The workers contribute \$2600 each year.
- c)  $1\,195\,194 - 1\,065\,455 = 129\,739$   
The difference in the population between 2014 and 2009 is 129 739.
- d)  $39\,425 - 6702 = 32\,723$   
The difference between what Sam earned and what he paid in taxes is \$32 723.
- e)  $2015 - 1933 = 82$  The reservoir has been collecting drinking water for 82 years.
- f) Add numbers to find the total.  $151 + 96 + 15 + 225 + 39 + 146 = \$672$   
Next, find the average  $\$672 \div 6 = \$112$  Sandy saves on average \$112 each month
- g)  $1\,440 \div 80 = 18$   
It would take 18 hours for a person to drive 1 440 kilometres at a speed of 80 kilometres.
- h)  $1250 \times 10 = 12\,500$     The Student Association has 12 500 items in total.
- i) First find the total.  $64 + 83 + 65 + 72 + 39 + 76 = 360$     Next, find the average  $360 \div 5 = 72$   
Beth's average grade on the assignments is 72%.
- j)  $975 \div 100 = 9\text{ R}75$     Round to 10 hours. It would take 10 hours to drive to Vancouver.

## **Extra Review for Whole Numbers Units 1 - 5**

### **1) Write the words in numbers**

Two hundred thirty\_\_\_\_\_

Six thousand three hundred two\_\_\_\_\_

One hundred fifteen thousand eight hundred forty-seven\_\_\_\_\_

### **2) Write the following numbers in words:**

5002 \_\_\_\_\_

4237 \_\_\_\_\_

55 171 \_\_\_\_\_

108 438 \_\_\_\_\_

13 362 013 \_\_\_\_\_

\_\_\_\_\_

### **3) Write the following numbers in standard form (as numbers):**

eight hundred twelve \_\_\_\_\_

six thousand twenty-two\_\_\_\_\_

nine hundred thousand\_\_\_\_\_

eighty thousand, five hundred \_\_\_\_\_

one million, one hundred eleven thousand, three\_\_\_\_\_

4) Write the following number 45 221 in expanded notation.

5) Write the place value of the 5 in each number given below:

1 036 925 \_\_\_\_\_

452 \_\_\_\_\_

579 \_\_\_\_\_

15 211 \_\_\_\_\_

6) Look at the number below and answer the following questions

**87 240 691**

The **8** is in the \_\_\_\_\_ place

The **0** is in the \_\_\_\_\_ place

The **2** is in the \_\_\_\_\_ place

The **7** is in the \_\_\_\_\_ place

The **9** is in the \_\_\_\_\_ place

7) Round 452 to the tens place.

\_\_\_\_\_

Round 63 476 to the hundreds place.

\_\_\_\_\_

Round 543 788 to the thousands place.

\_\_\_\_\_

Round 98 776 452 to the ten thousands place.

\_\_\_\_\_

**8) Arrange the numbers below in columns and add:**

a)  $9759 + 4136 + 3821 =$

b)  $301 + 5012 + 18\,000 + 14 =$

**9) Estimate the answer using front-end rounding. (SHOW YOUR WORK!)**

a)  $9821 + 4131 + 2096 =$

b)  $5981 + 4121 + 816 =$

10) Kate went on a bus trip. She travelled 296 km on Monday, 716 km on Tuesday, and 308 km on Wednesday. How far did she travel altogether?

11) Last week William earned \$592. This week he earned \$612. How much did he earn in all? How much more money did he earn this week?

12) Find the difference for each of the following questions:

$$843 - 641 =$$

13) Last week Pirate's Cove fish plant processed 338 000 kg of fish. This week they processed 231 209 kg. How many fewer kilograms of fish did they process this week?

14) Cindy and Fiona collect old books. Cindy had 195 books and purchased 7 more during the summer. Fiona had 172 books and purchased 15 more during the summer. What are the new totals of their collection of books? How many more books does Cindy have than Fiona at the end of summer?

15) Solve.

a)  $23 \times 0 =$

b)  $145 \times 1 =$

c)  $12 \div 0 =$

d)  $0 \div 15 =$

16) Solve:

a)  $824 \times 8 =$

b)  $1260 \times 15 =$

17) Estimate the answer by using front-end rounding.  
Do not solve for the exact answer.

$458\,411 \times 45 =$

Estimate

18) A car manufacturer can produce 1329 cars in a week. How many cars can be produced in 52 weeks?

19) Tom wants to buy a used vehicle for his son. Tom will pay \$1500 down payment and then \$50 a month for 60 months. How much will Tom pay for his son's car in total?

20) Solve:

a)  $496 \div 62$

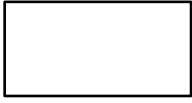
b)  $15\,627 \div 11$

21) Dan earned \$30 000 last year. How much did he earn each month?  
(There are 12 months in a year.)

22) Solve.  
 $47\,259 \div 450 =$

23) There were 12 960 cars travelling on Deerfoot Trail in 8 hours one day. On average, how many cars travelled on Deerfoot Trail per hour?

- 24) Dylan wants to build a fence around the perimeter of his new property. The length of his property is 25 meters and the width is 15 meters. How many meters of fence does he have to build?



- 25) Solve:

a)  $5 \times 8 \div (12 - 7) =$

b)  $56 - 28 \div 7 \times 5 =$

### Answers to Extra Review for the Whole Number Review

1) 230 6302 115 847

2) 5002 five thousand two 4237 four thousand two hundred thirty seven

55 171 fifty five thousand one hundred seventy-one

108 438 one hundred eight thousand four hundred thirty eight

13 362 013 thirteen million three hundred sixty two thousand thirteen

3) 812 6022 900 000 80 500 1 111 003

4)  $45\,221 - 40\,000 + 5000 + 200 + 20 + 1$

5) 1 036 925 ones 452 tens 579 hundreds 15 211 thousands

6) 8 is in the ten millions place. 0 is in the thousands place 2 is in the hundred thousands place.

7 is in the millions place. 9 is in the tens place

7) 450 63 500 544 000 98 780 000

8) a) 17 716 b) 23 327

9a)  $10\,000 + 4000 + 2000 = 16\,000$  b)  $6000 + 4000 + 800 = 10\,800$

10) add She travelled 1320 kilometres.

11) add He earned \$1204 in total. subtract This week he earned \$20 more than last week.

12) 202 13) subtract They processed 106 791 kilograms fewer this week.

14) Cindy has 202 books.  $195 + 7 = 202$  Fiona has 187 books.  $172 + 15 = 187$   $202 - 187 = 15$

Cindy has 15 more books than Fiona.

15) a) 0 b) 145 c) undefined d) 0 16) a) 6592 b) 18 900

17)  $500\,000 \times 50 = 250\,000\,000$  18) multiply  $52 \times 1329 = 69\,108$  cars can be produced.

19)  $50 \times 60 = 3000$   $3000 + 1500 = \$4500$  Tom will pay \$4500 for the car.

20) a) 8 b) 1420 R7 21) divide He eared \$2500 per month.

22) 105 R9 23) divide On average 1620 cars travelled on Deerfoot Trail per hour.

24)  $25 + 15 + 25 + 15 = 80$  Dylan has to build 80 metres of fence.

25) a)  $40 \div 5 = 8$  b)  $56 - 4 \times 5 = 56 - 20 = 36$



# Unit 6 Fraction Introduction

## 6.1 Introducing Fractions

A fraction is a part of a whole number.

$$\begin{array}{c} \boxed{\text{numerator}} \rightarrow 4 \\ \hline 5 \leftarrow \boxed{\text{denominator}} \end{array}$$

The **denominator** is the bottom number. It tells how many equal parts are in the whole. The **numerator** is the top number. It tells how many **equal** parts of the whole we are dealing with.

### Examples



The whole is the bunch of bananas.

The whole has 5 equal parts (5 bananas).

The denominator is 5.

How many bananas have been eaten? 1

What fraction of the bananas have been eaten?

$\frac{1}{5}$  of the bananas (one-fifth)

$$\frac{1}{5} = \frac{\text{numerator}}{\text{denominator}}$$

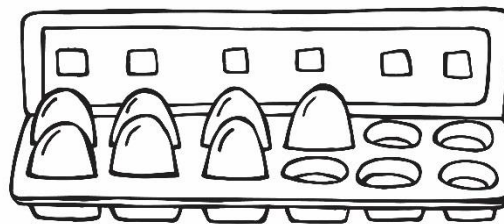
The whole is a carton of one dozen eggs.

One dozen has 12 equal parts.

How many eggs are still in the carton? 7

What fraction of the eggs are left?

$\frac{7}{12}$  of the eggs (seven-twelfths)



A fraction is always looking at parts of a whole.

In the example of the eggs above, the **whole** is 12 eggs.

The **part** is the 7 eggs that are left. 7 is part of the whole of 12.

## Introducing Fractions continued

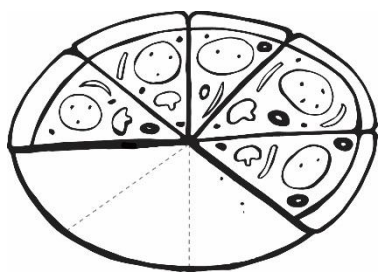
### Example A

This pizza is **one whole** pizza.

The pizza is cut into 8 pieces. This means the whole is 8 parts.

Five (5) parts are left. (The pieces that are shaded are the ones left.)

The fraction of how many pieces of pizza are left is  $\frac{5}{8}$



$$\frac{5}{8} \quad \frac{\text{numerator}}{\text{denominator}} \quad \frac{5 \text{ pieces left over}}{\text{pizza is cut into 8 pieces}}$$

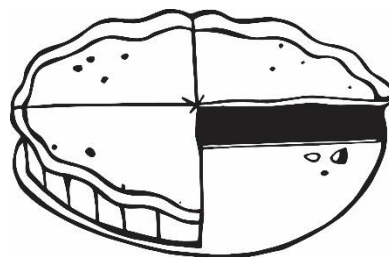
### Example B

Sue made a pie.

The pie was cut into 4 equal parts. The whole is 4 parts.

She ate 1 piece. How many pieces were left? 3  
(The pieces that are shaded are the ones left.)

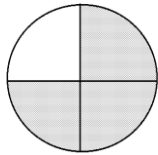
The fraction of how many pieces of pie are left is  $\frac{3}{4}$



$$\frac{3}{4} \quad \frac{\text{numerator}}{\text{denominator}} \quad \frac{3 \text{ pieces left over}}{\text{pie is cut into 4 pieces}}$$

### Exercise 6.1a

Each shape drawn here is a whole. The shapes have been divided into equal parts. Answer the questions below. The first one a) is done for you.



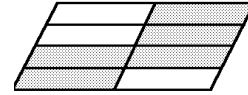
a) i) How many parts make up the whole?

4

ii) How many parts are shaded?

3

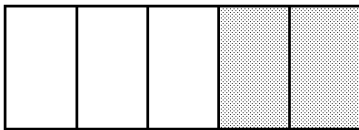
iii) Write the fraction.  $\frac{3}{4}$



b) i) How many parts make up the whole?

ii) How many parts are shaded?

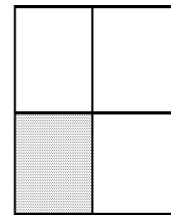
iii) Write the fraction.



c) i) How many parts make up the whole?

ii) How many parts are shaded?

iii) Write the fraction.

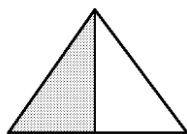


d) i) How many parts make up the whole?

ii) How many parts are shaded?

iii) Write the fraction.

**Exercise 6.1a continued** Answer the questions below.



e) i) How many parts make the whole?

ii) How many parts are shaded?

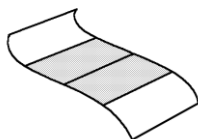
iii) Write the fraction.



f) i) How many parts make the whole?

ii) How many parts are shaded?

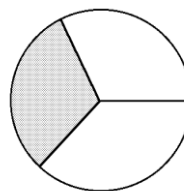
iii) Write the fraction.



g) i) How many parts make the whole?

ii) How many parts are shaded?

iii) Write the fraction.



h) i) How many parts make the whole?

ii) How many parts are shaded?

iii) Write the fraction.

**Answers to Exercise 6.1a**

a i) 4 ii) 3 iii)  $\frac{3}{4}$

b i) 8 ii) 5 iii)  $\frac{5}{8}$

c i) 5 ii) 2 iii)  $\frac{2}{5}$

d i) 4 ii) 1 iii)  $\frac{1}{4}$

e i) 2 ii) 1 iii)  $\frac{1}{2}$

f i) 13 ii) 5 iii)  $\frac{5}{13}$

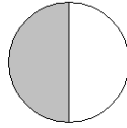
g i) 4 ii) 2 iii)  $\frac{2}{4}$

h i) 3 ii) 1 iii)  $\frac{1}{3}$

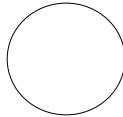
## Exercise 6.1b

Shade in the numerator (top number) to draw fractions.  
Check your work using the answer key.

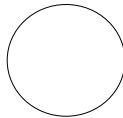
**Example** Draw  $\frac{1}{2}$  in a circle.



a) Draw  $\frac{1}{4}$  in a circle.



b) Draw  $\frac{1}{3}$  in a circle.



Here is a  
hint.



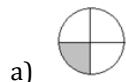
c) Draw  $\frac{1}{2}$  in the rectangle.



d) Draw  $\frac{2}{4}$  in the rectangle.



### Answers to Exercise 6.1b



## 6.2 Reading Fractions

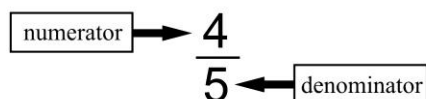
Fractions can be read in a few different ways.

$\frac{1}{2}$  can be called one over two or one out of two or one-half

$\frac{1}{4}$  can be called one over four or one out of four or one-fourth or one-quarter

$\frac{1}{3}$  can be called one over three or one out of three or one-third

**Remember:**



The numerator is read as a number.

The denominator is read as an ordinal number as follows:

| If the denominator is ... | Read ...                |
|---------------------------|-------------------------|
| 2                         | half                    |
| 3                         | Third(s)                |
| 4                         | fourth(s) or quarter(s) |
| 5                         | fifth(s)                |
| 6                         | sixth(s)                |
| 7                         | seventh(s)              |
| 8                         | eighth(s)               |
| 9                         | ninth(s)                |
| 10                        | tenth(s)                |
| 22                        | twenty-second(s)        |

## Exercise 6.2a

Write the names for these fractions. Check your work using the answer key. The first one a) is done for you.

a)  $\frac{7}{8}$  is *seven over eight* or *seven out of eight* or *seven - eighths*

b)  $\frac{2}{5}$  is

c)  $\frac{1}{4}$  is

d)  $\frac{2}{3}$  is

e)  $\frac{1}{2}$  is

f)  $\frac{4}{9}$  is

g)  $\frac{5}{6}$  is

h)  $\frac{9}{10}$  is

### Answers to Exercise 6.2a

|                     |    |                    |    |               |
|---------------------|----|--------------------|----|---------------|
| a) seven over eight | or | seven out of eight | or | seven-eighths |
| b) two over five    | or | two out of five    | or | two-fifths    |
| c) one over four    | or | one-fourth         | or | one-quarter   |
| d) two over three   | or | two out of three   | or | two-thirds    |
| e) one over two     | or | one out of two     | or | one-half      |
| f) four over nine   | or | four out of nine   | or | four-ninths   |
| g) five over six    | or | five out of six    | or | five-sixths   |
| h) nine over ten    | or | nine out of ten    | or | nine-tenths   |

## Using Fractions

We use fractions in our daily lives.

**Example** We add  $\frac{1}{2}$  cup of sugar to a recipe.

In the carton of eggs, 3 out of 12 are broken.  $\frac{3}{12}$

On a test, Bill answered 13 questions correct out of 15 questions.  $\frac{13}{15}$

These fractions are called **proper fractions**.

**Proper fractions** - fractions where the numerator is smaller than the denominator.

**Exercise 6.2b** Answer the questions by writing a fraction. Check your work using the answer key. The first one a) is done for you.

- a) Jill walks 20 minutes of her 30 minute lunch break. What fraction did she walk?  
 $\frac{20}{30}$
- b) Kim got 18 marks out of 25 on her test. What fraction did she get correct on her test?
- c) The restaurant has 12 tables. Six of the tables are empty. What fraction are empty?
- d) In the litter of 4 kittens, 3 are female. What fraction are female?
- e) Of the 18 new students, 16 of them are taking math. What fraction are taking math?

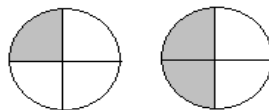
### Answers to Exercise 6.2b

a)  $\frac{20}{30}$     b)  $\frac{18}{25}$     c)  $\frac{6}{12}$     d)  $\frac{3}{4}$     e)  $\frac{16}{18}$

## 6.3 Comparing Fractions

### Example A

- a) Which circle has more shaded parts?



The one on the right has more shaded parts.

- b) Which is larger  $\frac{1}{4}$  or  $\frac{2}{4}$  ?

Answer:  $\frac{2}{4}$  is larger because it fills in more parts of the circle.

---

The sign  $<$  means **less than** (smaller than).

less  $<$  more

$$\frac{1}{4} < \frac{2}{4}$$

Reads: one-fourth is less than two-fourths

---

The sign  $>$  means **greater than** (larger than).

more  $>$  less

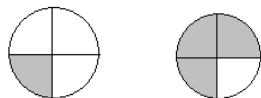
$$\frac{2}{4} > \frac{1}{4}$$

Reads: two-fourths is greater than one-fourth

---

### Example B

Write the fraction for each circle and then compare the fractions. Use the  $<$  or  $>$  sign.



$$\frac{1}{4} < \frac{3}{4}$$

Reads: one-fourth is less than three-fourths

## Comparing Fractions continued

**There is a rule you can follow to compare fractions:**

As the numerator gets larger and the denominator stays the same, the fraction gets larger.

$$\frac{3}{10} < \frac{7}{10}$$

Reads: three-tenths is less than seven-tenths

### Exercise 6.3a

Use the < or > symbols to show which fraction is larger. Check your work using the answer key. The questions a) and g) are done for you.

a)  $\frac{3}{4} > \frac{1}{4}$   
*is greater than*

b)  $\frac{9}{10}$   $\frac{1}{10}$

c)  $\frac{1}{6}$   $\frac{5}{6}$

d)  $\frac{5}{8}$   $\frac{3}{8}$

e)  $\frac{3}{5}$   $\frac{4}{5}$

f)  $\frac{1}{5}$   $\frac{4}{5}$

g) one fourth  $<$  three fourths  
*is less than*

h) five ninths two ninths

i) five sixths four sixths

j) six sevenths three sevenths

k) one eighth three eighths

l) one third two thirds

#### Answers to Exercise 6.3a

a) > greater than

b) > greater than

c) < less than

d) > greater than

e) < less than

f) < less than

g) < less than

h) > greater than

i) > greater than

j) > greater than

k) < less than

l) < less than

### Exercise 6.3b

Compare fractions with the same denominator. Put the fractions in order from smallest to largest. Check your work using the answer key. The first one a) is done for you.

a)  $\frac{3}{5}$   $\frac{1}{5}$   $\frac{4}{5}$

answer  $\frac{1}{5}$   $\frac{3}{5}$   $\frac{4}{5}$

---

b)  $\frac{4}{8}$   $\frac{3}{8}$   $\frac{7}{8}$

---

c)  $\frac{2}{7}$   $\frac{1}{7}$   $\frac{6}{7}$   $\frac{5}{7}$

---

d)  $\frac{3}{12}$   $\frac{6}{12}$   $\frac{9}{12}$   $\frac{1}{12}$   $\frac{8}{12}$

---

#### Answers to Exercise 6.3b

a)  $\frac{1}{5}$   $\frac{3}{5}$   $\frac{4}{5}$

b)  $\frac{3}{8}$   $\frac{4}{8}$   $\frac{7}{8}$

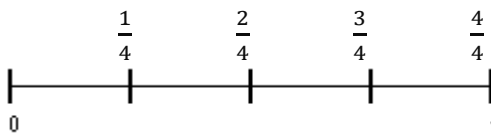
c)  $\frac{1}{7}$   $\frac{2}{7}$   $\frac{5}{7}$   $\frac{6}{7}$

d)  $\frac{1}{12}$   $\frac{3}{12}$   $\frac{6}{12}$   $\frac{8}{12}$   $\frac{9}{12}$

## Number Lines

Using a number line is another way to look at how numbers compare to each other. Fractions can also be plotted on a number line. This number line is numbered 0 to 1. The section between 0 and 1 is split into fractions.

### Example



The distance between 0 and 1 is broken into four parts (using 3 lines).

Notice how  $\frac{1}{4}$  is labeled on the number line. Notice how  $\frac{2}{4}$  is labeled on the number line.

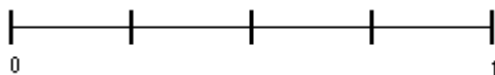
Notice how  $\frac{3}{4}$  is labeled on the number line. Notice how  $\frac{4}{4}$  is labeled on the number line.

Also, notice how the fractions are written above the number line. They could also be written below the number line.

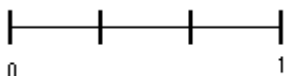
### Exercise 6.3c

Write the fractions on the number line. There is no answer key so check your answers with your instructor or a classmate.

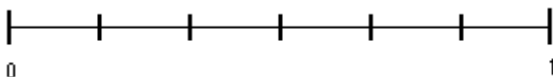
a)  $\frac{2}{4}$   $\frac{3}{4}$



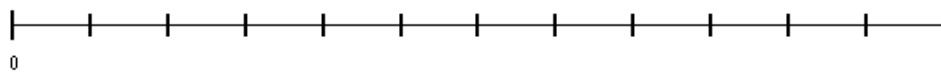
b)  $\frac{2}{3}$   $\frac{1}{3}$



c)  $\frac{5}{6}$   $\frac{1}{6}$   $\frac{2}{6}$   $\frac{4}{6}$



d)  $\frac{4}{12}$   $\frac{8}{12}$   $\frac{11}{12}$   $\frac{2}{12}$   $\frac{5}{12}$



## 6.4 Equivalent Fractions

Equivalent means equal. Equivalent fractions mean that the fractions are equal.

**Example A**       $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$



The amount is the same. All of these fractions have the value of one-half.  
The difference is how many pieces the whole was cut into.

**Example B**       $\frac{2}{3} = \frac{4}{6} = \frac{6}{9}$

To find an equivalent fraction, the rule is what you do to the numerator, you have to do to the denominator.

**Example C**

|                             |                                               |                                                                                             |
|-----------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------|
| $\frac{1}{2} = \frac{2}{4}$ | $\frac{1 \times 2}{2 \times 2} = \frac{2}{4}$ | $\frac{\text{the numerator is multiplied by 2}}{\text{the denominator is multiplied by 2}}$ |
| $\frac{1}{2} = \frac{3}{6}$ | $\frac{1 \times 3}{2 \times 3} = \frac{3}{6}$ | $\frac{\text{the numerator is multiplied by 3}}{\text{the denominator is multiplied by 3}}$ |

**Example D**      Equivalent fractions can work the other way as well.

|                             |                                           |                                                                                       |
|-----------------------------|-------------------------------------------|---------------------------------------------------------------------------------------|
| $\frac{2}{4} = \frac{1}{2}$ | $\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$ | $\frac{\text{the numerator is divided by 2}}{\text{the denominator is divided by 2}}$ |
| $\frac{3}{6} = \frac{1}{2}$ | $\frac{3 \div 3}{6 \div 3} = \frac{1}{2}$ | $\frac{\text{the numerator is divided by 3}}{\text{the denominator is divided by 3}}$ |

## Are the Fractions Equivalent?

If the denominators are the same, you can easily judge if the fractions are equivalent by comparing the numerators.

$$\frac{1}{3} \neq \frac{2}{3} \quad \text{These fractions are not equal.}$$

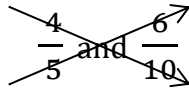
The  $\neq$  sign means not equal or not equivalent.

If the denominators are different, you can judge if the fractions are equivalent by using either cross multiplication or common denominators or both.

## Cross Multiplication

A quick method to use to determine if fractions are equal or not equal is to cross multiply.

### Example A

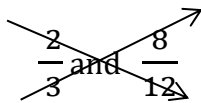

$$\frac{4}{5} \text{ and } \frac{6}{10}$$

$$\text{Multiply } 5 \times 6 = 30$$

$$\text{Multiply } 4 \times 10 = 40$$

The cross products are not equal so the fractions are not equal.

### Example B


$$\frac{2}{3} \text{ and } \frac{8}{12}$$

$$\text{Multiply } 3 \times 8 = 24$$

$$\text{Multiply } 2 \times 12 = 24$$

The cross products are equal so the fractions are equal.

## Exercise 6.4a

Use cross products to determine if the fractions are equivalent. Check your work to the answer key. If the fractions are equivalent, write *equivalent* (=). If the fractions are not equivalent, write *not equivalent* ( $\neq$ ). Questions a) and b) are done for you.

a)  $\frac{5}{6}$  and  $\frac{10}{12}$  *equivalent*  
 $5 \times 12 = 60$       =  
 $6 \times 10 = 60$

b)  $\frac{2}{3}$  and  $\frac{7}{9}$        $2 \times 9 = 18$   
 $3 \times 7 = 21$  *not equivalent*  
 $\neq$

c)  $\frac{8}{12}$  and  $\frac{2}{3}$

d)  $\frac{4}{10}$  and  $\frac{20}{50}$

e)  $\frac{1}{3}$  and  $\frac{10}{15}$

f)  $\frac{6}{7}$  and  $\frac{7}{8}$

g)  $\frac{5}{6}$  and  $\frac{15}{18}$

h)  $\frac{1}{3}$  and  $\frac{1}{2}$

### Exercise 6.4a continued

i)  $\frac{5}{4}$  and  $\frac{2}{3}$

j)  $\frac{7}{10}$  and  $\frac{20}{50}$

k)  $\frac{2}{3}$  and  $\frac{16}{24}$

l)  $\frac{5}{6}$  and  $\frac{3}{4}$

#### Answers to Exercise 6.4a

a)  $5 \times 12 = 60$  and  $6 \times 10 = 60$  equivalent

b)  $3 \times 7 = 21$  and  $2 \times 9 = 18$  not equivalent

c)  $12 \times 2 = 24$  and  $8 \times 3 = 24$  equivalent

d)  $10 \times 20 = 200$  and  $4 \times 50 = 200$  equivalent

e)  $3 \times 10 = 30$  and  $1 \times 15 = 15$  not equivalent

f)  $7 \times 7 = 49$  and  $6 \times 8 = 48$  not equivalent

g)  $6 \times 15 = 90$   $5 \times 18 = 90$  equivalent

h)  $3 \times 1 = 3$   $1 \times 2 = 2$  not equivalent

i)  $4 \times 2 = 8$   $5 \times 3 = 15$  not equivalent

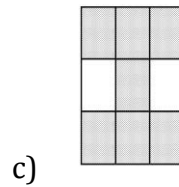
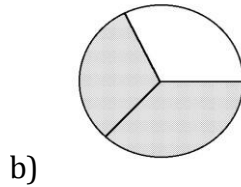
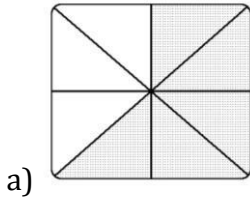
j)  $10 \times 20 = 200$   $7 \times 50 = 350$  not equivalent

k)  $3 \times 16 = 48$   $2 \times 24 = 48$  equivalent

l)  $6 \times 3 = 18$   $5 \times 4 = 20$  not equivalent

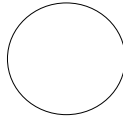
## **6.1 – 6.4 Review: Fractions Introduction**

**Write a fraction to describe the shaded part of each whole shape.**



**Draw the following fractions.**

d) Draw  $\frac{3}{4}$  in a circle.



e) Draw  $\frac{2}{5}$  in a rectangle.



**Write the word name for the following fractions.**

f)  $\frac{4}{5}$  is

g)  $\frac{1}{10}$  is

**Re-write the statements using a fraction.**

h) Jack runs 5 kilometres of his 10 kilometres exercise program.

i) Sam received 17 marks out of 20 on his assignment.

j) After lunch there were 3 out of 8 pieces of pizza remaining.

Compare the following fractions, use > or <.

k)  $\frac{5}{6}$   $\frac{1}{6}$

l)  $\frac{3}{6}$   $\frac{5}{6}$

m)  $\frac{7}{8}$   $\frac{3}{8}$

n)  $\frac{5}{10}$   $\frac{2}{10}$

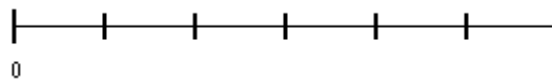
Put the fractions in order from smallest to largest.

o)  $\frac{13}{15}$   $\frac{4}{15}$   $\frac{9}{15}$

p)  $\frac{3}{8}$   $\frac{2}{8}$   $\frac{7}{8}$   $\frac{6}{8}$

Put the fractions on the number line.

q)  $\frac{3}{6}$   $\frac{1}{6}$   $\frac{4}{6}$   $\frac{6}{6}$



#### Answers to 6.1 – 6.4 Review Fractions

a)  $\frac{5}{8}$  b)  $\frac{2}{3}$  c)  $\frac{7}{9}$  d)  e) 

f) four-fifths g) one-tenth h)  $\frac{5}{10}$  i)  $\frac{17}{20}$  j)  $\frac{3}{8}$

k) > l) < m) > n) > o)  $\frac{4}{15}$   $\frac{9}{15}$   $\frac{13}{15}$

p)  $\frac{2}{8}$   $\frac{3}{8}$   $\frac{6}{8}$   $\frac{7}{8}$

q) compare the number line with your instructor or classmate

## 6.5 Types of Fractions

There are three types of fractions:

**Proper fractions** are a part of the whole thing.  $\frac{1}{2}$   $\frac{2}{3}$   $\frac{7}{9}$   $\frac{5}{12}$

In a proper fraction the numerator is smaller than the denominator.

**Improper fractions** are equal to 1 or are greater than 1.  $\frac{4}{4}$   $\frac{5}{2}$   $\frac{7}{3}$   $\frac{16}{5}$

In an improper fraction, the numerator is the same or greater than the denominator.

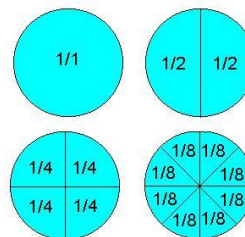
**Mixed numbers** are greater than one whole.  $1\frac{1}{2}$   $2\frac{3}{4}$   $3\frac{3}{5}$   $10\frac{7}{8}$

A mixed number has a whole number and a fraction.

---

### Example A

$\frac{1}{1}$   $\frac{2}{2}$   $\frac{4}{4}$   $\frac{8}{8}$  In these improper fractions,  
the numerator and the denominator are the same number.  
These fractions will simplify or reduce to equal 1 whole.



<http://en.wikibooks.org>

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Here are some pictures to visualize improper fractions and mixed numbers.

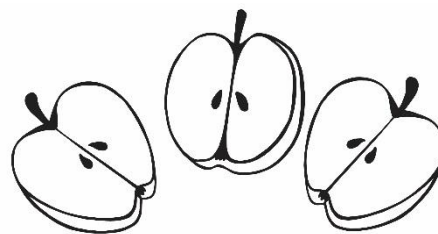
### Example B

Three half apples are shown.

Each apple was cut into 2 pieces, so the denominator is 2.

The improper fraction is  $\frac{3}{2}$ .

The mixed number is 1 whole and  $\frac{1}{2}$  or  $1\frac{1}{2}$



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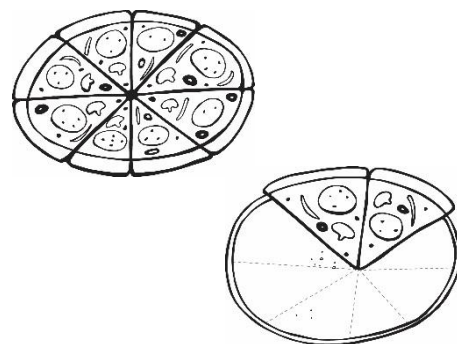
### Example C

10 pieces of pizza are shown.

Each pizza was cut into 8 pieces, so the denominator is 8.

The improper fraction is  $\frac{10}{8}$ .

The mixed number is 1 whole and  $\frac{2}{8}$  pieces or  $1\frac{2}{8}$



### Exercise 6.5a

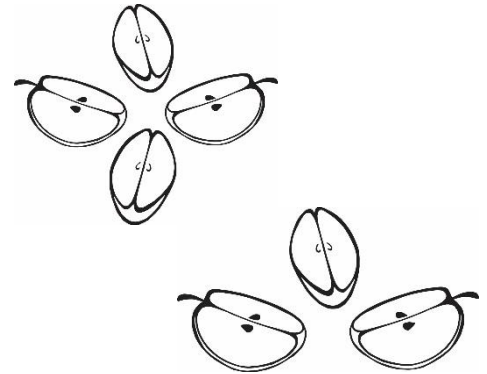
Using the above example, answer the questions below. Check your work using the answer key.

a) i) How many pieces of apple are shown?

ii) **Each** apple was cut into 4 pieces, so the denominator is \_\_\_\_

iii) Write the **improper fraction** that describes the photo.

iv) Write the **mixed number** that describes the apple.

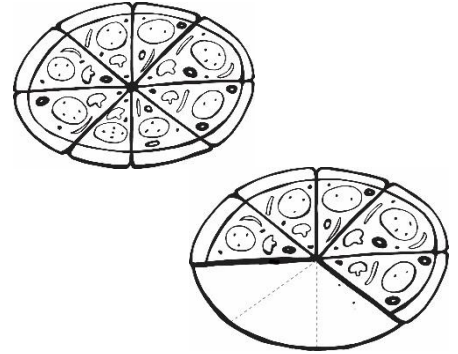


b) i) How many pieces of pizza are shown?

ii) **Each** pizza was cut into 8 pieces, so the denominator is \_\_\_\_

iii) Write the **improper fraction** that describes the photo.

iv) Write the **mixed number** that describes the pizza.

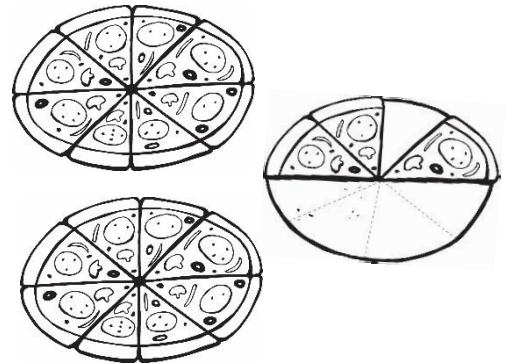


c) i) How many pieces of pizza are shown?

ii) **Each** pizza was cut into 8 pieces, so the denominator is \_\_\_\_

iii) Write the **improper fraction** that describes the photo.

iv) Write the **mixed number** that describes the pizza.

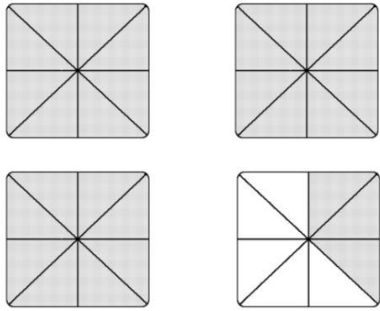
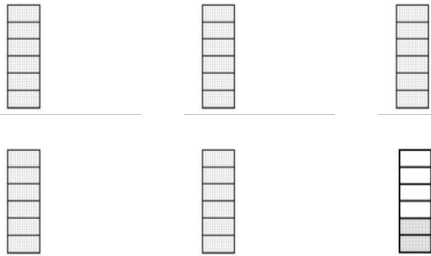
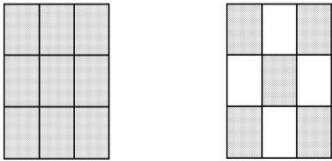
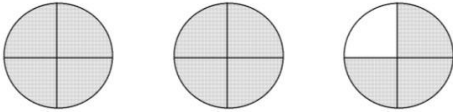


#### Answers to Exercise 6.5a

|         |       |                     |                    |
|---------|-------|---------------------|--------------------|
| a i) 7  | ii) 4 | iii) $\frac{7}{4}$  | iv) $1\frac{3}{4}$ |
| b i) 13 | ii) 8 | iii) $\frac{13}{8}$ | iv) $1\frac{5}{8}$ |
| c i) 19 | ii) 8 | iii) $\frac{19}{8}$ | iv) $2\frac{3}{8}$ |

## Exercise 6.5b

Write the improper fraction and the mixed number that describes the shaded part in each drawing. First decide on the denominator. The denominator is what the one whole shape has been divided into. The first one a) is done for you.

|    |                              |                                                                                     |
|----|------------------------------|-------------------------------------------------------------------------------------|
| a) | $\frac{3}{2} = 1\frac{1}{2}$ |   |
| b) |                              |    |
| c) |                              |   |
| d) |                              |  |
| e) |                              |  |

### Answers to Exercise 6.5b

a)  $\frac{3}{2} = 1\frac{1}{2}$

b)  $\frac{27}{8} = 3\frac{3}{8}$

c)  $\frac{32}{6} = 5\frac{2}{6}$

d)  $\frac{14}{9} = 1\frac{5}{9}$

e)  $\frac{11}{4} = 2\frac{3}{4}$

## 6.6 Writing Improper Fractions as Mixed Numbers

In the last exercise you were able to write (rename) an improper fraction as a mixed number by looking at the drawing - you could see how many whole things were represented and how many parts were left over. Without a picture, follow these steps.

Write the fraction as a division question.

$$\frac{\text{numerator}}{\text{denominator}} \quad \frac{\text{dividend}}{\text{divisor}} \quad \text{divisor} \overline{) \text{dividend}}$$

### Example A Method 1

$$\frac{7}{2} \quad \frac{\text{dividend}}{\text{divisor}} \quad \begin{array}{r} 3 \text{ whole number} \\ 2 \overline{) 7} \\ \underline{- 6} \\ 1 \text{ numerator} \end{array}$$

How many times does 2 go into 7? 3  
Put a 3 in the answer.  $2 \times 3 = 6$   
 $7 - 6 = 1$   
(2 does not go into 1 evenly, so write the mixed fraction)

$$\frac{7}{2} = 3 \frac{1}{2} \quad \text{note the denominator stays the same}$$

### Example B Method 2

$$\frac{7}{2} \quad \text{How many times does 2 go into 7? 3}$$

3 becomes the whole in the mixed number.

$$3 \times 2 = 6 \quad \text{and} \quad 7 - 6 = 1$$

1 is left over and becomes the numerator.

The denominator stays a 2.

$$\frac{7}{2} = 3 \frac{1}{2}$$

Try another.

$$\frac{8}{5}$$

How many times does 5 go into 8? 1

1 becomes the whole in the mixed number.

$$5 \times 1 = 5 \quad \text{and} \quad 8 - 5 = 3$$

3 is left over and becomes the numerator.

The denominator stays a 5.

$$\frac{8}{5} = 1 \frac{3}{5}$$

## Changing Improper Fractions to Whole Numbers

### Example C

$$\frac{2}{2} \quad \text{How many times does 2 go into 2? } 1$$

$$\frac{2}{2} = 1$$

There are no parts left over.

Try another.

$$\frac{10}{5} \quad \text{How many times does 5 go into 10? } 2$$
$$5 \times 2 = 10 \quad \text{There are no parts left over.}$$

$$\frac{10}{5} = 2$$

Try another.

$$\frac{12}{3} \quad \text{How many times does 3 go into 12? } 4$$
$$3 \times 4 = 12 \quad \text{There are no parts left over.}$$

$$\frac{12}{3} = 4$$

### Exercise 6.6a

Write each improper fraction as a mixed number or a whole number. Use method 1 or method 2 to find the answer. Check your work using the answer key. The first one a) is done for you.

a)  $\frac{9}{2} = 4\frac{1}{2}$

b)  $\frac{7}{4} =$

c)  $\frac{8}{3} =$

d)  $\frac{17}{5} =$

e)  $\frac{3}{2} =$

f)  $\frac{8}{8} =$

### Exercise 6.6a continued

g)  $\frac{11}{2} =$

h)  $\frac{5}{4} =$

i)  $\frac{5}{3} =$

j)  $\frac{9}{9} =$

k)  $\frac{15}{2} =$

l)  $\frac{12}{5} =$

m)  $\frac{8}{2} =$

n)  $\frac{23}{7} =$

o)  $\frac{4}{3} =$

p)  $\frac{15}{5} =$

#### Answers to Exercise 6.6a

a)  $\frac{9}{2} = 4 \frac{1}{2}$

b)  $\frac{7}{4} = 1 \frac{3}{4}$

c)  $\frac{8}{3} = 2 \frac{2}{3}$

d)  $\frac{17}{5} = 3 \frac{2}{5}$

e)  $\frac{3}{2} = 1 \frac{1}{2}$

f)  $\frac{8}{8} = 1$

g)  $\frac{11}{2} = 5 \frac{1}{2}$

h)  $\frac{5}{4} = 1 \frac{1}{4}$

i)  $\frac{5}{3} = 1 \frac{2}{3}$

j)  $\frac{9}{9} = 1$

k)  $\frac{15}{2} = 7 \frac{1}{2}$

l)  $\frac{12}{5} = 2 \frac{2}{5}$

m)  $\frac{8}{2} = 4$

n)  $\frac{23}{7} = 3 \frac{2}{7}$

o)  $\frac{4}{3} = 1 \frac{1}{3}$

p)  $\frac{15}{5} = 3$

## Writing Mixed Numbers as Improper Fractions

To write a mixed number as an improper fraction multiply the whole number by the denominator and then add the numerator.

**Example A** Write  $2\frac{3}{5}$  as an improper fraction.

Multiply the whole number by the denominator.  $2 \times 5 = 10$

Add the numerator.  $10 + 3 = 13$

The denominator stays the same.

$$2\frac{3}{5} = \frac{13}{5}$$

**Example B** Write  $1\frac{2}{3}$  as an improper fraction.

Multiply the whole number by the denominator.  $1 \times 3 = 3$

Add the numerator.  $3 + 2 = 5$

The denominator stays the same.

$$1\frac{2}{3} = \frac{5}{3}$$

## Changing Whole Numbers to Improper Fractions

To write a whole number as an improper fraction, put the whole number over 1.

**Example C**

$$2 = \frac{2}{1}$$

Try another.

$$10 = \frac{10}{1}$$

**Exercise 6.6b**

Write each mixed number as an improper fraction.  
Check your work using the answer key. The first one  
a) is done for you.

a)  $2\frac{4}{5} = \frac{14}{5}$        $2 \times 5 = 10$   
 $10 + 4 = 14$

b)  $8\frac{3}{4} =$

c)  $7\frac{2}{3} =$

d)  $6 =$

e)  $1\frac{8}{10} =$

f)  $4\frac{1}{5} =$

g)  $5\frac{1}{3} =$

h)  $3 =$

i)  $4\frac{3}{4} =$

j)  $12\frac{1}{4} =$

k)  $2\frac{1}{2} =$

l)  $8\frac{4}{5} =$

**Answers to Exercise 6.6b**

a)  $2\frac{4}{5} = \frac{14}{5}$

b)  $8\frac{3}{4} = \frac{35}{4}$

c)  $7\frac{2}{3} = \frac{23}{3}$

d)  $6 = \frac{6}{1}$

e)  $1\frac{8}{10} = \frac{18}{10}$

f)  $4\frac{1}{5} = \frac{21}{5}$

g)  $5\frac{1}{3} = \frac{16}{3}$

h)  $3 = \frac{3}{1}$

i)  $4\frac{3}{4} = \frac{19}{4}$

j)  $12\frac{1}{4} = \frac{49}{4}$

k)  $2\frac{1}{2} = \frac{5}{2}$

l)  $8\frac{4}{5} = \frac{44}{5}$

## 6.6 and 6.7 Review: Fractions

A. Circle the proper fractions.

a)  $\frac{4}{5}$     $\frac{3}{2}$     $\frac{6}{6}$     $\frac{3}{4}$     $\frac{7}{8}$     $\frac{5}{3}$

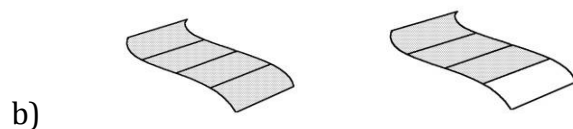
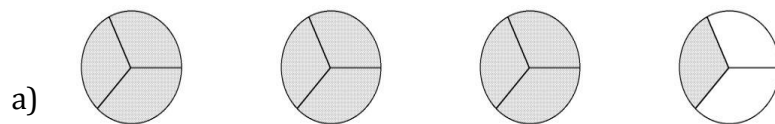
B. Circle the improper fractions.

a)  $\frac{7}{4}$     $\frac{3}{2}$     $\frac{1}{6}$     $\frac{3}{3}$     $\frac{7}{8}$     $\frac{5}{2}$

C. Circle the mixed numbers.

a)  $2\frac{4}{5}$     $\frac{3}{4}$     $7\frac{2}{3}$     $\frac{6}{5}$     $\frac{3}{1}$     $12\frac{7}{12}$

D. Write the improper fraction and the mixed number.



E. Change each improper fraction to a whole or mixed number.

a)  $\frac{11}{2} =$

b)  $\frac{12}{3} =$

**Change each improper fraction to a whole or mixed number (continued).**

c)  $\frac{18}{5} =$

d)  $\frac{9}{2} =$

e)  $\frac{10}{4} =$

f)  $\frac{8}{1} =$

**F. Change to an improper fraction.**

a)  $2\frac{1}{3} =$

b)  $4\frac{3}{5} =$

c)  $3 =$

d)  $6\frac{1}{4} =$

e)  $10\frac{2}{5} =$

f)  $1\frac{1}{2} =$

**Answers to 6.6 – 6.7 Review Fractions**

Aa)  $\frac{4}{5}$   $\frac{3}{4}$   $\frac{7}{8}$

Ba)  $\frac{7}{4}$   $\frac{3}{2}$   $\frac{3}{3}$   $\frac{5}{2}$

Ca)  $2\frac{4}{5}$   $7\frac{2}{3}$   $12\frac{7}{12}$

Da)  $\frac{10}{3}$   $3\frac{1}{3}$  b)  $\frac{7}{4}$   $1\frac{3}{4}$

Ea)  $5\frac{1}{2}$  b) 4 c)  $3\frac{3}{5}$

d)  $4\frac{1}{2}$  e)  $2\frac{2}{4}$  f) 8

Fa)  $\frac{7}{3}$  b)  $\frac{23}{5}$  c)  $\frac{3}{1}$

d)  $\frac{25}{4}$  e)  $\frac{52}{5}$  f)  $\frac{3}{2}$

Remember the times table charts from the whole numbers unit?

We can use these charts to help out in the next sections.

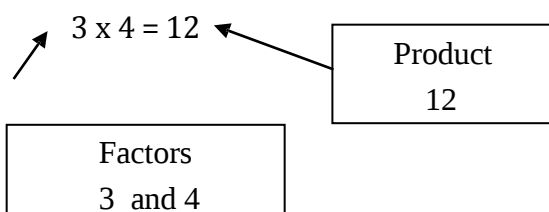
|    | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
|----|---|----|----|----|----|----|----|----|----|----|-----|
| 0  | 0 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   |
| 1  | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
| 2  | 0 | 2  | 4  | 6  | 8  | 10 | 12 | 14 | 16 | 18 | 20  |
| 3  | 0 | 3  | 6  | 9  | 12 | 15 | 18 | 21 | 24 | 27 | 30  |
| 4  | 0 | 4  | 8  | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40  |
| 5  | 0 | 5  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50  |
| 6  | 0 | 6  | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60  |
| 7  | 0 | 7  | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70  |
| 8  | 0 | 8  | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80  |
| 9  | 0 | 9  | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90  |
| 10 | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

|    | 1                  | 2                  | 3                   | 4                    | 5                    | 6                    |
|----|--------------------|--------------------|---------------------|----------------------|----------------------|----------------------|
| 1  | $1 \times 1 = 1$   | $2 \times 1 = 2$   | $3 \times 1 = 3$    | $4 \times 1 = 4$     | $5 \times 1 = 5$     | $6 \times 1 = 6$     |
| 2  | $1 \times 2 = 2$   | $2 \times 2 = 4$   | $3 \times 2 = 6$    | $4 \times 2 = 8$     | $5 \times 2 = 10$    | $6 \times 2 = 12$    |
| 3  | $1 \times 3 = 3$   | $2 \times 3 = 6$   | $3 \times 3 = 9$    | $4 \times 3 = 12$    | $5 \times 3 = 15$    | $6 \times 3 = 18$    |
| 4  | $1 \times 4 = 4$   | $2 \times 4 = 8$   | $3 \times 4 = 12$   | $4 \times 4 = 16$    | $5 \times 4 = 20$    | $6 \times 4 = 24$    |
| 5  | $1 \times 5 = 5$   | $2 \times 5 = 10$  | $3 \times 5 = 15$   | $4 \times 5 = 20$    | $5 \times 5 = 25$    | $6 \times 5 = 30$    |
| 6  | $1 \times 6 = 6$   | $2 \times 6 = 12$  | $3 \times 6 = 18$   | $4 \times 6 = 24$    | $5 \times 6 = 30$    | $6 \times 6 = 36$    |
| 7  | $1 \times 7 = 7$   | $2 \times 7 = 14$  | $3 \times 7 = 21$   | $4 \times 7 = 28$    | $5 \times 7 = 35$    | $6 \times 7 = 42$    |
| 8  | $1 \times 8 = 8$   | $2 \times 8 = 16$  | $3 \times 8 = 24$   | $4 \times 8 = 32$    | $5 \times 8 = 40$    | $6 \times 8 = 48$    |
| 9  | $1 \times 9 = 9$   | $2 \times 9 = 18$  | $3 \times 9 = 27$   | $4 \times 9 = 36$    | $5 \times 9 = 45$    | $6 \times 9 = 54$    |
| 10 | $1 \times 10 = 10$ | $2 \times 10 = 20$ | $3 \times 10 = 30$  | $4 \times 10 = 40$   | $5 \times 10 = 50$   | $6 \times 10 = 60$   |
| 11 | $1 \times 11 = 11$ | $2 \times 11 = 22$ | $3 \times 11 = 33$  | $4 \times 11 = 44$   | $5 \times 11 = 55$   | $6 \times 11 = 66$   |
| 12 | $1 \times 12 = 12$ | $2 \times 12 = 24$ | $3 \times 12 = 36$  | $4 \times 12 = 48$   | $5 \times 12 = 60$   | $6 \times 12 = 72$   |
|    | 7                  | 8                  | 9                   | 10                   | 11                   | 12                   |
| 1  | $7 \times 1 = 7$   | $8 \times 1 = 8$   | $9 \times 1 = 9$    | $10 \times 1 = 10$   | $11 \times 1 = 11$   | $12 \times 1 = 12$   |
| 2  | $7 \times 2 = 14$  | $8 \times 2 = 16$  | $9 \times 2 = 18$   | $10 \times 2 = 20$   | $11 \times 2 = 22$   | $12 \times 2 = 24$   |
| 3  | $7 \times 3 = 21$  | $8 \times 3 = 24$  | $9 \times 3 = 27$   | $10 \times 3 = 30$   | $11 \times 3 = 33$   | $12 \times 3 = 36$   |
| 4  | $7 \times 4 = 28$  | $8 \times 4 = 32$  | $9 \times 4 = 36$   | $10 \times 4 = 40$   | $11 \times 4 = 44$   | $12 \times 4 = 48$   |
| 5  | $7 \times 5 = 35$  | $8 \times 5 = 40$  | $9 \times 5 = 45$   | $10 \times 5 = 50$   | $11 \times 5 = 55$   | $12 \times 5 = 60$   |
| 6  | $7 \times 6 = 42$  | $8 \times 6 = 48$  | $9 \times 6 = 54$   | $10 \times 6 = 60$   | $11 \times 6 = 66$   | $12 \times 6 = 72$   |
| 7  | $7 \times 7 = 49$  | $8 \times 7 = 56$  | $9 \times 7 = 63$   | $10 \times 7 = 70$   | $11 \times 7 = 77$   | $12 \times 7 = 84$   |
| 8  | $7 \times 8 = 56$  | $8 \times 8 = 64$  | $9 \times 8 = 72$   | $10 \times 8 = 80$   | $11 \times 8 = 88$   | $12 \times 8 = 96$   |
| 9  | $7 \times 9 = 63$  | $8 \times 9 = 72$  | $9 \times 9 = 81$   | $10 \times 9 = 90$   | $11 \times 9 = 99$   | $12 \times 9 = 108$  |
| 10 | $7 \times 10 = 70$ | $8 \times 10 = 80$ | $9 \times 10 = 90$  | $10 \times 10 = 100$ | $11 \times 10 = 110$ | $12 \times 10 = 120$ |
| 11 | $7 \times 11 = 77$ | $8 \times 11 = 88$ | $9 \times 11 = 99$  | $10 \times 11 = 110$ | $11 \times 11 = 121$ | $12 \times 11 = 132$ |
| 12 | $7 \times 12 = 84$ | $8 \times 12 = 96$ | $9 \times 12 = 108$ | $10 \times 12 = 120$ | $11 \times 12 = 132$ | $12 \times 12 = 144$ |

## **6.8 Factors**

Factors are the **numbers which are multiplied together to make a product**. An understanding of factors is needed to express fractions in lowest terms. If needed, use the times table charts to find the factors.

### **Example A**



We say, "The factors of 12 are 3 and 4."

Does 12 have any other factors? Yes.

What other numbers can be multiplied together to equal 12?

$$\begin{array}{lll} 1 \times 12 = 12 & \text{or} & 12 \times 1 = 12 \\ 2 \times 6 = 12 & \text{or} & 6 \times 2 = 12 \\ 3 \times 4 = 12 & \text{or} & 4 \times 3 = 12 \end{array}$$

The factors of 12 are 1, 2, 3, 4, 6, 12.

### **Example B** Find the factors of 10.

$$\begin{array}{l} 1 \times 10 = 10 \\ 2 \times 5 = 10 \end{array}$$

The factors of 10 are 1, 2, 5, 10.

### **Example C** Find the factors of 9.

$$\begin{array}{l} 1 \times 9 = 9 \\ 3 \times 3 = 9 \end{array}$$

The factors of 9 are 1, 3, 9.

## Exercise 6.8a

Find all the factors for each number. Check your answer to the answer key. The first one a) is done for you.

a) The factors of 16:

*1, 2, 4, 8, 16*

*1 x 16*

*2 x 8*

*4 x 4*

b) The factors of 20:

c) The factors of 15:

d) The factors of 21:

e) The factors of 14:

f) The factors of 32:

g) The factors of 36:

h) The factors of 100:

i) The factors of 25:

### Answers to Exercise 6.8a

a) 1, 2, 4, 8, 16

b) 1, 2, 4, 5, 10, 20

c) 1, 3, 5, 15

d) 1, 3, 7, 21

e) 1, 2, 7, 14

f) 1, 2, 4, 8, 16, 32

g) 1, 2, 3, 4, 6, 9, 12, 18, 36

h) 1, 2, 4, 5, 10, 20, 25, 50, 100

i) 1, 5, 25

## Common Factors

Common factors are factors that two or more numbers have in common.

**Example A** Look at the numbers 4 and 8. What are the factors of each?

Factors of 4  
1, 2, 4

Factors of 8  
1, 2, 4, 8

Which factors do they have in common? 1, 2, 4

Which is the greatest common factor? 4

Which factor is the biggest number?

A note about the factor 1. Even though 1 is a common factor, we do not include the 1 as a common factor when listing the common factors of whole numbers.

**Example B** Look at the numbers 15 and 30. What are the factors of each?

Factors of 15  
1, 3, 5, 15

Factors of 30  
1, 2, 3, 5, 6, 10, 15, 30

Which factors do they have in common? 3, 5, 15

Which is the greatest common factor? 15

**Example C** Look at the numbers 9 and 12 and 18.

Factors of 9  
1, 3, 9

Factors of 12  
1, 2, 3, 4, 6, 12

Factors of 18  
1, 2, 3, 6, 9, 18

Which factors do they all have in common? 3

Which is the greatest common factor? 3

## Exercise 6.8b

Find the common factors. Write the greatest common factor in the last column. The first one a) is done for you.

| Numbers   | Factors                                                                                                                      | Common Factors | Greatest Common Factor |
|-----------|------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------|
| a) 10, 15 | <i>...of 10 are</i> $\textcircled{1}$ 2 $\textcircled{5}$ 10<br><i>...of 15 are</i> $\textcircled{1}$ 3 $\textcircled{5}$ 15 | 1, 5           | 5                      |
| b) 4, 16  |                                                                                                                              |                |                        |
| c) 9, 12  |                                                                                                                              |                |                        |
| d) 20, 30 |                                                                                                                              |                |                        |
| e) 18, 12 |                                                                                                                              |                |                        |
| f) 24, 32 |                                                                                                                              |                |                        |
| g) 8, 12  |                                                                                                                              |                |                        |
| h) 6, 9   |                                                                                                                              |                |                        |

| <b>Numbers</b> | <b>Factors</b> | <b>Common Factors</b> | <b>Greatest Common Factor</b> |
|----------------|----------------|-----------------------|-------------------------------|
| i) 9, 15       |                |                       |                               |
| j) 14, 28      |                |                       |                               |
| k) 8, 12, 24   |                |                       |                               |

### Answers to Exercise 6.8b

| <b>Numbers</b> | <b>Factors</b>                                                                                       | <b>Common Factors</b> | <b>Greatest Common Factor</b> |
|----------------|------------------------------------------------------------------------------------------------------|-----------------------|-------------------------------|
| a) 10, 15      | ... of 10 are 1, 2, 5, 10<br>... of 15 are 1, 3, 5, 15                                               | 1, 5                  | 5                             |
| b) 4, 16       | ... of 4 are 1, 2, 4<br>... of 16 are 1, 2, 4, 8, 16                                                 | 1, 2, 4               | 4                             |
| c) 9, 12       | ... of 9 are 1, 3, 9<br>... of 12 are 1, 2, 3, 4, 6, 12                                              | 1, 3                  | 3                             |
| d) 20, 30      | ... of 20 are 1, 2, 4, 5, 10, 20<br>... of 30 are 1, 2, 3, 5, 6, 10, 15, 30                          | 1, 2, 5, 10           | 10                            |
| e) 18, 12      | ... of 18 are 1, 2, 3, 6, 9, 18<br>... of 12 are 1, 2, 3, 4, 6, 12                                   | 1, 2, 3, 6            | 6                             |
| f) 24, 32      | ... of 24 are 1, 2, 3, 4, 6, 8, 12, 24<br>... of 32 are 1, 2, 4, 8, 16, 32                           | 1, 2, 4, 8            | 8                             |
| g) 8, 12       | ... of 8 are 1, 2, 4, 8<br>... of 12 are 1, 2, 3, 4, 6, 12                                           | 1, 2, 4               | 4                             |
| h) 6, 9        | ... of 6 are 1, 2, 3, 6<br>... of 9 are 1, 3, 9                                                      | 1, 3                  | 3                             |
| i) 9, 15       | ... of 9 are 1, 3, 9<br>... of 15 are 1, 3, 5, 15                                                    | 1, 3                  | 3                             |
| j) 14, 28      | ... of 14 are 1, 2, 7, 14<br>... of 28 are 1, 2, 7, 14, 28                                           | 1, 2, 7, 14           | 14                            |
| l) 8, 12, 24   | ... of 8 are 1, 2, 4, 8<br>... of 12 are 1, 2, 3, 4, 6, 12<br>... of 24 are 1, 2, 3, 4, 6, 8, 12, 24 | 1, 2, 4               | 4                             |

## 6.9 Simplifying Fractions

To simplify or reduce a fraction, we take it to its simplest form. The factor trees may remind you that a prime number can no longer be reduced or simplified.

These all have the same meaning. (lowest equivalent fraction)

simplify

reduce

lowest terms

simplest form

### **Example A**

#### **(Greatest common factor method)**

To express a fraction in its simplest form, we look for common factors in the numerator and denominator. Any common factor will do, but often we try to look for the greatest common factor (or the biggest number that goes into both the numerator and the denominator).

**Step 1:** Find the greatest common factor (GCF) of the numerator and denominator

$$\frac{4}{12}$$

Factors of 4

1, 2, 4

Factors of 12

1, 2, 3, 4, 6, 12

Which factors do they all have in common? 2, 4

Which is the greatest common factor? 4

**Step 2:** Divide both the numerator and the denominator by the greatest common factor.

$$\frac{4}{12} \div \frac{4}{4} = \frac{1}{3}$$

#### **Another method**

You could have also started with dividing both the numerator and the denominator by 2. Then divide each by 2 again.

$$\frac{4}{12} \div \frac{2}{2} = \frac{2}{6}$$

$$\frac{2}{6} \div \frac{2}{2} = \frac{1}{3}$$

## Simplifying fractions continued

### Divisibility test method

#### Divisibility by 2

A number is divisible by 2 if it is an even number and ends in 0, 2, 4, 6 or 8.

**Example** 48 540 256 12 154 are all divisible by 2 because each number is even and ends in a 0, 2, 4, 6 or 8.

35 193 849 347 101 are not divisible by 2 because each number is odd and does not end in a 0, 2, 4, 6 or 8.

#### Divisibility by 3

A number is divisible by 3 if the sum (total) of the digits is divisible by 3.

**Example** Look at the number 63. 6 and 3 are the digits.  
Add them together.  $6 + 3 = 9$   
9 is divisible by 3, so that means 63 will be divisible by 3.

Look at the number 148. 1, 4 and 8 are the digits.  
Add them together.  $1 + 4 + 8 = 13$   
You could add the digits again.  $1 + 3 = 4$ .  
Neither 4 nor 13 is divisible by 3 so that means 148 will not be divisible by 3.

Look at the number 5892. 5, 8, 9 and 2 are the digits.  
Add them together.  $5 + 8 + 9 + 2 = 24$   
You could add the digits again.  $2 + 4 = 6$ .  
6 and 24 are divisible by 3 so that means 5892 will be divisible by 3.

#### Divisibility by 5

A number is divisible by 5 if the number ends in 0 or 5.

**Example** 290 is divisible by 5 because it ends in 0.  
615 is divisible by 5 because it ends in 5.  
132 is not divisible by 5 because it does not end in 0 or 5.

## Simplifying fractions continued

### Divisibility by 10

A number is divisible by 10 if the number ends in 0.

**Example**                **290** is divisible by 10 because it ends in 0.

**342** is not divisible by 10 because it does not end in 0.

## Example B

**Method 1:** Find the greatest common factor (GCF) of the numerator and denominator

$$\frac{12}{30}$$

Factors of 12

1, 2, 3, 4, 6, 12

Factors of 30

1, 2, 3, 5, 6, 10, 15, 30

Which factors do they all have in common? 6

Which is the greatest common factor? 6

Divide the numerator and the denominator by the greatest common factor.

$$\frac{12}{30} \div \frac{6}{6} = \frac{2}{5} \quad \text{The greatest factor 12 and 30 have in common is a 6.}$$

**Method 2:** **Divisible by 2?** Yes, because 12 and 30 are even

**Divisible by 3?** Yes, because 12 is divisible by 3 and

When the digits in 30 (3 + 0) are added together they equal 3, which is divisible by 3.

Divide the numerator and the denominator by 2 and then by 3.

$$\frac{12}{30} \div \frac{2}{2} = \frac{6}{15} \quad \frac{6}{15} \div \frac{3}{3} = \frac{2}{5}$$

Even though 2 and 3 are not the greatest common factor, this method still works well when simplifying or reducing fractions to the simplest form.

Note:  $2 \times 3 = 6$                 6 is the greatest common factor of 12 and 30.

**Exercise 6.9a**

Reduce each fraction to its simplest form. Check your work to the answer key. The first one a) is done for you.

a)  $\frac{4}{16} \div \frac{4}{4} = \frac{1}{4}$        $1, 2, 4$       b)  $\frac{3}{9} =$   
 $1, 2, 4, 8, 16$

c)  $\frac{5}{10} =$       d)  $\frac{4}{20} =$

e)  $\frac{9}{12} =$       f)  $\frac{6}{8} =$

g)  $\frac{10}{15} =$       h)  $\frac{10}{30} =$

i)  $\frac{12}{24} =$       j)  $\frac{2}{8} =$

k)  $\frac{7}{14} =$       l)  $\frac{6}{9} =$

**Answers to Exercise 6.9a**

|                                                  |                                              |                                                |                                                  |
|--------------------------------------------------|----------------------------------------------|------------------------------------------------|--------------------------------------------------|
| a) $\frac{4 \div 4}{16 \div 4} = \frac{1}{4}$    | b) $\frac{3 \div 3}{9 \div 3} = \frac{1}{3}$ | c) $\frac{5 \div 5}{10 \div 5} = \frac{1}{2}$  | d) $\frac{4 \div 4}{20 \div 4} = \frac{1}{5}$    |
| e) $\frac{9 \div 3}{12 \div 3} = \frac{3}{4}$    | f) $\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$ | g) $\frac{10 \div 5}{15 \div 5} = \frac{2}{3}$ | h) $\frac{10 \div 10}{30 \div 10} = \frac{1}{3}$ |
| i) $\frac{12 \div 12}{24 \div 12} = \frac{1}{2}$ | j) $\frac{2 \div 2}{8 \div 2} = \frac{1}{4}$ | k) $\frac{7 \div 7}{14 \div 7} = \frac{1}{2}$  | l) $\frac{6 \div 3}{9 \div 3} = \frac{2}{3}$     |

## Factor Trees and Prime Numbers

Using a factor tree is a method to find the prime factorization of a number.

Remember that prime numbers are numbers that can be evenly divided by only 1 and itself.

The first ten prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

The number 2 is the only even prime number. All other prime numbers are odd.

### Exercise 6.9b

Circle the prime numbers in each grouping. Remember a prime number is only evenly divisible by the number 1 and itself. Check your work to the answer key

a) 3 8 9 2

b) 5 9 11 10 7

c) 6 15 8 3 13 17

d) 23 9 5 11 6 3

e) 3 14 7 5 10 12

f) 100 5 7 6 14

#### Answers to Exercise 6.9b

a) (3) 8 9 (2)

b) (5) 9 (11) 10 (7)

c) 6 15 8 (3) (13) (17)

d) (23) 9 (5) (11) 6 (3)

e) (3) 14 (7) (5) 10 12

f) 100 (5) (7) 6 14

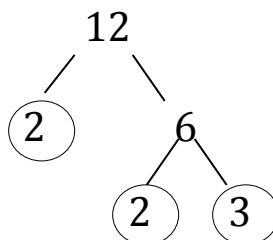
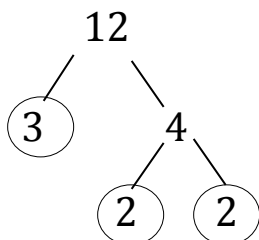
## Factor Trees

**Example A** Find the prime factors of 12. To begin, choose 2 factors that equal 12.

$$3 \times 4 = 12$$

or

$$2 \times 6 = 12$$



Circle the prime factors.

Write an equation

$$3 \times 2 \times 2 = 12$$

$$2 \times 2 \times 3 = 12$$

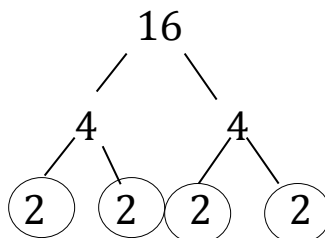
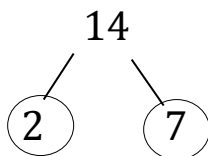
In both of these factor trees, the prime factors of 12 are  $2 \times 2 \times 3 = 12$

It did not matter which two factors you started with as you will end up with the same prime factors. Write your answer from smallest to largest number.

**Example B** Find the prime factors of 14 and 16.

$$2 \times 7 = 14$$

$$4 \times 4 = 16$$



Circle the prime factors.

Write an equation with the prime numbers.

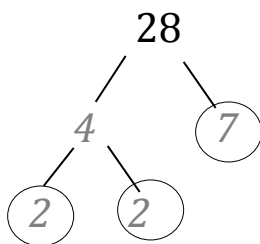
$$2 \times 7 = 14$$

$$2 \times 2 \times 2 \times 2 = 16$$

### Exercise 6.9c

Use a factor tree to find the prime factors of each number.  
Remember to circle the prime numbers and rewrite them as an equation. Check your work to the answer key. The first one a) is done for you.

a)



$$2 \times 2 \times 7 = 28$$

b) 25

c)

24

d)

49

e)

36

f)

60

#### Answers to Exercise 6.9c

a)  $2 \times 2 \times 7 = 28$

b)  $5 \times 5 = 25$

c)  $2 \times 2 \times 2 \times 3 = 24$

d)  $7 \times 7 = 49$

e)  $2 \times 2 \times 3 \times 3 = 36$

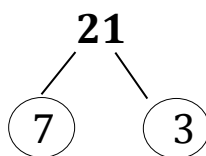
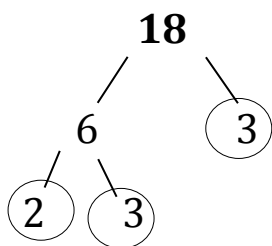
f)  $2 \times 2 \times 3 \times 5 = 60$

## Using the factor tree to reduce a fraction to simplest form

In the previous section you learned how to use a factor tree to write a number as a product of prime factors. Now use this skill to reduce a fraction to its simplest form or lowest terms. We can use this method as an alternative to finding common factors, or if the numerators and denominators are large numbers

**Example A** Reduce the fraction  $\frac{18}{21}$  to simplest form.

1) Find the prime factors using a factor tree.



2) Write the equations.  $2 \times 3 \times 3 = 18$

$3 \times 7 = 21$

3) Look for common factors.  $\frac{18}{21} = \frac{2 \times 3 \times 3}{3 \times 7}$

(Notice the 3 in the numerator and denominator.)

4) Reduce.  $\frac{18}{21} = \frac{2 \times 3 \times \overset{1}{\cancel{3}}}{\underset{1}{\cancel{3}} \times 7}$  (What you do to the numerator, you must do to the denominator.)

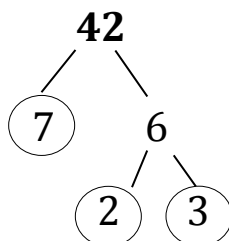
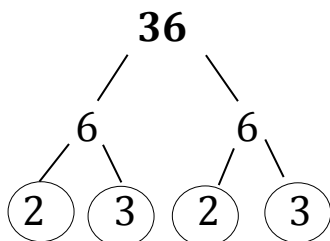
5) Simplify. You are left with  $\frac{2 \times 3 \times 1}{1 \times 7} = \frac{6}{7}$

6) Therefore,  $\frac{18}{21} = \left( \frac{6}{7} \right)$

## Factor trees continued

**Example B** Reduce the fraction  $\frac{36}{42}$  to simplest form.

1) Find the prime factors using a factor tree. Circle the prime numbers.



2) Write the equations from smallest prime number to largest prime number.

$$2 \times 2 \times 3 \times 3 = 36$$

$$2 \times 3 \times 7 = 42$$

3) Look for common factors.  $\frac{36}{42} = \frac{2 \times 2 \times 3 \times 3}{2 \times 3 \times 7}$

(Notice the 2 and 3 in the numerator and denominator.)

4) Reduce.  $\frac{36}{42} = \frac{\overset{1}{\cancel{2}} \times 2 \times \overset{1}{\cancel{3}} \times 3}{\underset{1}{\cancel{2}} \times \underset{1}{\cancel{3}} \times 7}$  (What you do to the numerator, you must do to the denominator.)

When reducing or cancelling and the result is 1, it can be left out of the equation.

5) Simplify. You are left with  $\frac{2 \times 3}{7} = \frac{6}{7}$

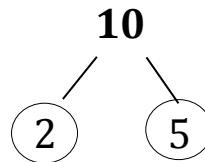
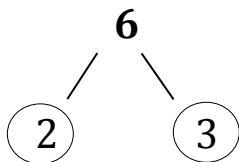
6) Therefore,  $\frac{36}{42} = \left( \frac{6}{7} \right)$

**Note:** Even though there are two 2s and two 3s in the numerator, you can only reduce by matching the number in the numerator with the number in the denominator. There is only one 2 in the denominator, so you can only reduce one 2 in the numerator. There is only one 3 in the denominator, so you can only reduce one 3 in the numerator.

### Exercise 6.9d

Reduce each fraction to its simplest form using factor trees. Check your work to the answer key. The first one a) is done for you.

a)  $\frac{6}{10} = \frac{2 \times 3}{2 \times 5} = \frac{3}{5}$



b)  $\frac{12}{28} =$

c)  $\frac{15}{45} =$

### Exercise 6.9d continued

d)  $\frac{18}{30} =$

e)  $\frac{25}{50} =$

#### Answers to Exercise 6.9d

a)  $\frac{6}{10} = \frac{2 \times 3}{2 \times 5} = \frac{3}{5}$

b)  $\frac{12}{28} = \frac{2 \times 2 \times 3}{2 \times 2 \times 7} = \frac{3}{7}$

c)  $\frac{15}{45} = \frac{3 \times 5}{3 \times 3 \times 5} = \frac{1}{3}$

d)  $\frac{18}{30} = \frac{2 \times 3 \times 3}{2 \times 3 \times 5} = \frac{3}{5}$

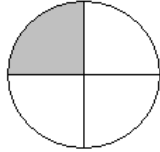
e)  $\frac{25}{50} = \frac{5 \times 5}{2 \times 5 \times 5} = \frac{1}{2}$

**Note:** There are three methods that can be used when simplifying fractions, greatest common factor, common factors and prime factors. Each of the three methods will produce the same result. So, if you are given a choice, choose the method that works best for you.

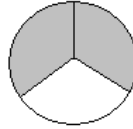
## Unit 6 Review Fraction Introduction

A. Write fractions for the shaded parts from the pictures.

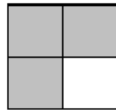
a)



b)



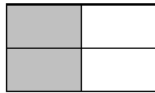
c)



d)



e)



f)



Write the following fractions in words:

g)  $\frac{1}{2}$  \_\_\_\_\_

h)  $\frac{3}{4}$  \_\_\_\_\_

i)  $\frac{2}{3}$  \_\_\_\_\_

j)  $\frac{5}{7}$  \_\_\_\_\_

Answer the questions using a fraction.

k) There are 25 questions on a Math test. Joe answered 19 questions correctly. What fraction of the questions were answered correctly?

l) Oliver planted 8 trees in September. In the May, 5 trees blossomed. What fraction of trees blossomed?

Compare the following fractions. Use < or > signs.

m)  $\frac{2}{7}$        $\frac{5}{7}$

n)  $\frac{3}{4}$        $\frac{1}{4}$

o)  $\frac{4}{5}$        $\frac{2}{5}$

p)  $\frac{5}{7}$        $\frac{6}{7}$

## B. Types of Fractions

Circle the proper fractions.

a)  $\frac{4}{7}$        $\frac{1}{2}$        $\frac{7}{2}$        $\frac{4}{4}$        $\frac{9}{3}$        $\frac{12}{15}$

Circle the improper fractions.

b)  $\frac{5}{2}$        $\frac{3}{3}$        $\frac{2}{7}$        $\frac{8}{5}$        $\frac{7}{8}$        $\frac{9}{1}$

Circle the mixed numbers.

c)  $4\frac{1}{4}$        $7\frac{3}{8}$        $\frac{2}{3}$        $12\frac{3}{4}$        $\frac{3}{2}$        $\frac{7}{12}$

Change each improper fraction to a whole or mixed number.

d)  $\frac{8}{3} =$

e)  $\frac{16}{4} =$

f)  $\frac{3}{2} =$

g)  $\frac{24}{5} =$

Change each mixed number to an improper fraction.

h)  $3\frac{1}{2} =$

i)  $5 =$

j)  $6\frac{2}{5} =$

k)  $1\frac{7}{8} =$

### C. Factors and Factorization

Find the common factors and the Greatest Common Factor (GCF).

|    | Numbers  | Factors | Common Factors | GCF |
|----|----------|---------|----------------|-----|
| a) | 12<br>18 |         |                |     |
| b) | 15<br>30 |         |                |     |
| c) | 6<br>16  |         |                |     |
| d) | 20<br>30 |         |                |     |

Use a factor tree to find the prime factors for each number.

e) 12

f) 30

g) 25

h) 36

**Reduce each fraction to its simplest form.** Choose the method that works best for you. There are three methods that can be used when simplifying fractions, greatest common factor, common factors and prime factors. Each of the three methods will produce the same result.

i)  $\frac{2}{4}$

j)  $\frac{4}{12} =$

k)  $\frac{10}{20} =$

l)  $\frac{15}{25} =$

m)  $\frac{18}{27} =$

n)  $\frac{16}{18} =$

**Use cross products to determine if the fractions are equivalent (=) or not equivalent (≠).**

o)  $\frac{2}{4}$  and  $\frac{8}{16}$

p)  $\frac{6}{9}$  and  $\frac{10}{14}$

q)  $\frac{6}{7}$  and  $\frac{9}{11}$

r)  $\frac{7}{8}$  and  $\frac{21}{24}$

### Answers to Unit 6 Review Fraction Introduction

A a)  $\frac{1}{4}$  b)  $\frac{2}{3}$  c)  $\frac{3}{4}$  d)  $\frac{1}{2}$  e)  $\frac{2}{4}$  f)  $\frac{4}{6}$  g) one-half

h) three-quarters or three out of four or three-fourths

i) two-thirds or two out of three j) five-sevenths or five out of seven

k)  $\frac{19}{25}$  l)  $\frac{5}{8}$  m) < n) > o) > p) <

B. a) proper  $\frac{4}{7}$   $\frac{1}{2}$   $\frac{12}{15}$  b) improper  $\frac{5}{2}$   $\frac{3}{3}$   $\frac{8}{5}$   $\frac{9}{1}$  c) mixed numbers  $4\frac{1}{4}$   $7\frac{3}{8}$   $12\frac{3}{4}$

d)  $2\frac{2}{3}$  e) 4 f)  $1\frac{1}{2}$  g)  $4\frac{4}{5}$  h)  $\frac{7}{2}$  i)  $\frac{5}{1}$  j)  $\frac{32}{5}$  k)  $\frac{15}{8}$

| C. Factors | Factors                                                                     | Common Factors | Greatest Common Factor |
|------------|-----------------------------------------------------------------------------|----------------|------------------------|
| a) 12, 18  | ... of 12 are 1, 2, 3, 4, 6, 12<br>... of 18 are 1, 2, 3, 6, 9, 18          | 1, 2, 3, 6     | 6                      |
| b) 15, 30  | ... of 15 are 1, 3, 5, 15<br>... of 30 are 1, 2, 3, 5, 6, 10, 15, 30        | 1, 3, 5, 15    | 15                     |
| c) 6, 16   | ... of 6 are 1, 2, 3, 6<br>... of 16 are 1, 2, 4, 8, 16                     | 1, 2           | 2                      |
| d) 20, 30  | ... of 20 are 1, 2, 4, 5, 10, 20<br>... of 30 are 1, 2, 3, 5, 6, 10, 15, 30 | 1, 2, 5, 10    | 10                     |

C e)  $2 \times 2 \times 3 = 12$  f)  $2 \times 3 \times 5 = 30$  g)  $5 \times 5 = 25$  h)  $2 \times 2 \times 3 \times 3 = 36$

i)  $\frac{1}{2}$  j)  $\frac{1}{3}$  k)  $\frac{1}{2}$  l)  $\frac{3}{5}$  m)  $\frac{2}{3}$  n)  $\frac{8}{9}$

o)  $2 \times 16 = 32$ ,  $4 \times 8 = 32$  equal p)  $6 \times 14 = 84$ ,  $9 \times 10 = 90$  not equal

q)  $6 \times 11 = 66$ ,  $7 \times 9 = 63$  not equal r)  $7 \times 24 = 168$ ,  $8 \times 21 = 168$  equal



# Unit 7: Multiplying & Dividing Fractions

## 7.1 Multiplying Fractions

When asked, “What is a fraction of a fraction?” use multiplication. To multiply fractions, multiply the numerators together and then multiply the denominators. The answer may need to be reduced to lowest terms.

**Example A**      What is  $\frac{1}{2}$  of  $\frac{1}{2}$  ?

Write the equation.       $\frac{1}{2} \times \frac{1}{2} =$

Multiply the numerators.       $1 \times 1 = 1$

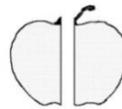
and

Multiply the denominators.       $2 \times 2 = 4$

$$\frac{1 \times 1}{2 \times 2} \times \frac{1}{4}$$

Here is a picture of  $\frac{1}{2}$  of  $\frac{1}{2}$  .

Take an apple and cut it in half.



Now cut one of the halves in half.



You get  $\frac{1}{4}$  of an apple.       $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

---

**Example B**      What is  $\frac{2}{3}$  of  $\frac{2}{5}$  ?

Write the equation.       $\frac{2}{3} \times \frac{2}{5} =$

Multiply the numerators.       $2 \times 2 = 4$

and

Multiply the denominators.       $3 \times 5 = 15$

$$\frac{2 \times 2}{3 \times 5} = \frac{4}{15}$$

## Exercise 7.1

Multiply the fraction by the fraction. Check your work using the answer key. The first one a) is done for you.

a)  $\frac{1}{5} \times \frac{2}{3} = \frac{2}{15}$

b)  $\frac{1}{3} \times \frac{5}{7} =$

c)  $\frac{3}{5} \times \frac{1}{4} =$

d)  $\frac{2}{3} \times \frac{4}{3} =$

e)  $\frac{2}{3} \times \frac{2}{3} =$

f)  $\frac{5}{7} \times \frac{3}{4} =$

g)  $\frac{5}{6} \times \frac{1}{4} =$

h)  $\frac{7}{4} \times \frac{1}{5} =$

i)  $\frac{2}{5} \times \frac{1}{3} =$

j)  $\frac{1}{8} \times \frac{3}{4} =$

k)  $\frac{4}{9} \times \frac{2}{3} =$

l)  $\frac{1}{2} \times \frac{1}{2} =$

**Exercise 7.1 continued**

m)  $\frac{2}{3} \times \frac{7}{5} =$

n)  $\frac{1}{3} \times \frac{1}{3} =$

o)  $\frac{5}{7} \times \frac{1}{2} =$

p)  $\frac{3}{4} \times \frac{3}{4} =$

q)  $\frac{1}{2} \times \frac{2}{3} =$

r)  $\frac{3}{8} \times \frac{3}{7} =$

**Answers to Exercise 7.1**

a)  $\frac{2}{15}$

b)  $\frac{5}{21}$

c)  $\frac{3}{20}$

d)  $\frac{8}{9}$

e)  $\frac{4}{9}$

f)  $\frac{15}{28}$

g)  $\frac{5}{24}$

h)  $\frac{7}{20}$

i)  $\frac{2}{15}$

j)  $\frac{3}{32}$

k)  $\frac{8}{27}$

l)  $\frac{1}{4}$

m)  $\frac{14}{15}$

n)  $\frac{1}{9}$

o)  $\frac{5}{14}$

p)  $\frac{9}{16}$

q)  $\frac{2}{6}$

r)  $\frac{9}{56}$

## 7.2 Simplify Before Multiplying Fractions

In the previous exercise, the fractions do not require simplifying before multiplying. There were no common factors in the numerator and denominator.

**Example A** Notice there is a 2 in the numerator and in the denominator.

$$\frac{1}{\textcircled{2}} \times \frac{\textcircled{2}}{3} =$$

Before multiplying the fractions, the fractions can be simplified by dividing by the numerator and denominator by a common factor of 2.

$$\frac{1}{\cancel{2}} \times \frac{\cancel{2}}{3} =$$

Divide by 2.

Rewrite the equation.

$$\frac{1}{1} \times \frac{1}{3} =$$

No more common factors.

Multiply the numerators.

$$1 \times 1 = 1$$

and

$$\frac{1 \times 1}{1 \times 3} = \frac{1}{3}$$

Multiply the denominators.

$$1 \times 3 = 3$$


---

**Example B** Look for common factors between the numerators and denominators.

$$\frac{3}{\textcircled{8}} \times \frac{\textcircled{2}}{9} =$$

Divide by 2.

$$\frac{3}{\cancel{8}} \times \frac{\cancel{2}}{9} =$$

Rewrite the equation.

$$\frac{\textcircled{3}}{4} \times \frac{1}{\textcircled{9}}$$

Notice the common factor of 3.

$$\frac{\cancel{3}}{4} \times \frac{1}{\cancel{9}} =$$

Divide by 3.

Rewrite the equation.

$$\frac{1}{4} \times \frac{1}{3} = \frac{1 \times 1}{4 \times 3} = \frac{1}{12}$$

## Simplify before multiplying fractions continued

### Example B Simplifying the equation using prime factors

Rewrite the equation using prime factors.

Find the prime factors of each number in the numerator and denominator.

Write them out. Reduce the common factors.

Multiply the numerators. Multiply the denominators.

$$\frac{3}{8} \times \frac{2}{9} = \frac{3}{2 \times 2 \times 2} \times \frac{2}{3 \times 3} = \frac{\overset{1}{\cancel{3}} \times \overset{1}{\cancel{2}}}{\underset{1}{2} \times 2 \times 2 \times \underset{1}{\cancel{3}} \times 3} = \frac{1}{12}$$

### Exercise 7.2

Simplify before multiplying the fractions. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } \frac{1}{\underset{2}{\cancel{6}}} \times \frac{\overset{3}{\cancel{9}}}{5} = \frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$$

$$\text{b) } \frac{2}{4} \times \frac{5}{6} =$$

$$\text{c) } \frac{7}{9} \times \frac{2}{7} =$$

$$\text{d) } \frac{4}{5} \times \frac{7}{8} =$$

$$\text{e) } \frac{6}{5} \times \frac{5}{8} =$$

$$\text{f) } \frac{9}{10} \times \frac{2}{3} =$$

$$\text{g) } \frac{7}{7} \times \frac{7}{14} =$$

$$\text{h) } \frac{5}{12} \times \frac{3}{10} =$$

### Exercise 7.2 continued

i)  $\frac{8}{10} \times \frac{2}{3} =$

j)  $\frac{11}{9} \times \frac{3}{5} =$

k)  $\frac{6}{12} \times \frac{1}{6} =$

l)  $\frac{2}{5} \times \frac{1}{12} =$

m)  $\frac{3}{5} \times \frac{5}{12} =$

n)  $\frac{5}{5} \times \frac{3}{10} =$

#### Answers to Exercise 7.2

a) reduce by 3 to get  $\frac{3}{10}$

b) reduce by 2 to get  $\frac{5}{12}$

c) reduce by 7 to get  $\frac{2}{9}$

d) reduce by 2/reduce by 2 again to get  $\frac{7}{10}$

or reduce by 4 to get  $\frac{7}{10}$

e) reduce by 5/reduce by 2 to get  $\frac{3}{4}$

f) reduce by 3/reduce by 2 to get  $\frac{3}{5}$

g) reduce by 7/reduce by 7 again to get  $\frac{1}{2}$

h) reduce by 3/reduce by 5 to get  $\frac{1}{8}$

i) reduce by 2 to get  $\frac{8}{15}$  (only once in numerator/once in denominator)

j) reduce by 3 to get  $\frac{11}{15}$

k) reduce by 6 to get  $\frac{1}{12}$

l) reduce by 2 to get  $\frac{1}{30}$

m) reduce by 5, reduce by 3 to get  $\frac{1}{4}$

n) reduce by 5 to get  $\frac{3}{10}$

## 7.3 Multiplying a Whole Number and a Fraction

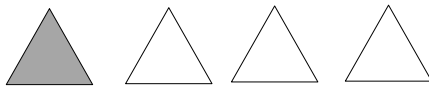
When asked, “What is a fraction of a whole number?”, use multiplication.

### **Example A**

Here are four equal shapes. What is  $\frac{1}{4}$  of 4?



If  $\frac{1}{4}$  of the 4 shapes are shaded, then 1 shape out of 4 would be shaded.



$$\frac{1}{4} \times 4 = 1 \quad \text{or} \quad 4 \times \frac{1}{4} = 1$$

---

### **Example B**

Here are five equal shapes. What is  $\frac{2}{5}$  of 5? Shade  $\frac{2}{5}$  of the shapes.



If 2 of the 5 shapes are shaded, then 2 shapes out of 5 would be shaded.



$$\frac{2}{5} \times 5 = 2 \quad \text{or} \quad 5 \times \frac{2}{5} = 2$$

---

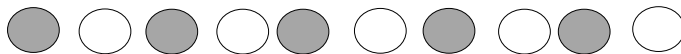
### **Example C**

Here are 10 equal shapes. What is  $\frac{1}{2}$  of 10?



Shade in  $\frac{1}{2}$  of the shapes. For every 2 shapes, shade in 1.

Five (5) shapes will be shaded.



$$\frac{1}{2} \times 10 = 5 \quad \text{or} \quad 10 \times \frac{1}{2} = 5$$

## Multiplying a whole number and a fraction continued

To multiply a fraction with a whole number without a picture, do the following:

**Example A**      What is  $\frac{1}{4}$  of 4?

Write the equation.       $\frac{1}{4} \times 4 =$

Put the whole number over 1.       $\frac{1}{4} \times \frac{4}{1} =$

Reduce the numerator  
and denominator by the  
same factor.       $\frac{1}{\cancel{4}^1} \times \frac{\cancel{4}^1}{1} =$       The common factor is 4.

Multiply the numerators.       $1 \times 1 = 1$   
and       $\frac{1}{1} \times \frac{1}{1} = \frac{1}{1} = 1$   
Multiply the denominators.       $1 \times 1 = 1$

---

**Example B**      What is  $\frac{1}{2}$  of 8?

Write the equation.       $\frac{1}{2} \times 8 =$

Put the whole number over 1.       $\frac{1}{2} \times \frac{8}{1} =$

Reduce the numerator  
and denominator by the  
same factor.       $\frac{1}{\cancel{2}^1} \times \frac{\cancel{8}^4}{1} =$       The common factor is 2.

Multiply the numerators.       $1 \times 4 = 4$   
and       $\frac{1}{1} \times \frac{4}{1} = \frac{4}{1} = 4$   
Multiply the denominators.       $1 \times 1 = 1$

---

**NOTE: Zero – any fraction multiplied by 0 will always equal 0.**       $\frac{1}{2} \times 0 = 0$

---

**Example C**      What is  $\frac{3}{5}$  of 10?

Write the equation.  $\frac{3}{5} \times 10 =$

Put the whole number over 1.  $\frac{3}{5} \times \frac{10}{1} =$

Reduce the numerator  
and denominator by the  
same factor.  $\frac{3}{\cancel{5}_1} \times \frac{\cancel{10}^2}{1} =$       The common factor is 5.

Multiply the numerators.  $3 \times 2 = 6$

and

$$\frac{3}{1} \times \frac{2}{1} = \frac{6}{1} = 6$$

Multiply the denominators.  $1 \times 1 = 1$

**Exercise 7.3a**

Multiply the whole number by the fraction. Write the equation and solve. Write your answer as a whole number. Use the above example to guide you.

a) What is  $\frac{1}{3}$  of 27?

b) What is  $\frac{3}{8}$  of 16?

c) What is  $\frac{2}{5}$  of 10?

d) What is  $\frac{2}{4}$  of 12?

**Answers to Exercise 7.3a**

a) common factor 9  $\frac{1}{3} \times \frac{27}{1} = \frac{1}{1} \times \frac{9}{1} = 9$

b) common factor 8  $\frac{3}{8} \times \frac{16}{1} = \frac{3}{1} \times \frac{2}{1} = 6$

c) common factor 5  $\frac{2}{5} \times \frac{10}{1} = \frac{2}{1} \times \frac{2}{1} = 4$

d) common factor 4  $\frac{2}{4} \times \frac{12}{1} = \frac{2}{1} \times \frac{3}{1} = 6$

### Exercise 7.3b

Here is more practice. Simplify before multiplying the fractions.  
Check your work using the answer key.

a)  $\frac{1}{4} \times \frac{6}{7} =$

b)  $6 \times \frac{5}{6} =$

c)  $8 \times \frac{3}{16} =$

d)  $\frac{10}{12} \times \frac{4}{5} =$

e)  $\frac{6}{7} \times \frac{7}{8} =$

f)  $\frac{3}{5} \times 10 =$

g)  $\frac{4}{4} \times \frac{7}{12} =$

h)  $5 \times \frac{7}{10} =$

#### Answers to Exercise 7.3b

a) reduce by 2 to get  $\frac{3}{14}$

b) reduce by 6 to get  $\frac{5}{1} = 5$

c) reduce by 8 to get  $\frac{3}{2} = 1\frac{1}{2}$

d) reduce by 4/reduce by 5 to get  $\frac{2}{3}$

e) reduce by 2/reduce by 7 to get  $\frac{3}{4}$

f) reduce by 5 to get  $\frac{6}{1} = 6$

g) reduce by 4 to get  $\frac{7}{12}$

h) reduce by 5 to get  $\frac{7}{1} = 7$

## 7.4 Multiplying Mixed Numbers

When multiplying mixed numbers, first change the mixed number to an improper fraction, then multiply.

### Example A

$$2\frac{1}{4} \times 4\frac{1}{3} =$$

$$\frac{9}{4} \times \frac{13}{3} = \quad \text{change to improper fractions}$$

$$\overset{3}{\cancel{9}} \times \frac{13}{\underset{1}{\cancel{3}}} = \quad \text{reduce or simplify (} \div 3 \text{)}$$

$$\frac{3}{4} \times \frac{13}{1} = \frac{3 \times 13}{4 \times 1} = \frac{39}{4} \quad \text{multiply}$$

$$\frac{39}{4} = 9\frac{3}{4} \quad \text{change to a mixed number}$$

### Exercise 7.4

Change the mixed numbers to improper fractions. Simplify before multiplying the fractions. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } 1\frac{1}{2} \times 2\frac{1}{6} = \overset{1}{\cancel{3}} \times \frac{13}{\underset{2}{\cancel{6}}} = \frac{13}{4} = \left(3\frac{1}{4}\right) \quad \text{b) } 1\frac{1}{4} \times 1\frac{1}{2} =$$

$$\text{c) } 2\frac{2}{5} \times 1\frac{1}{3} =$$

$$\text{d) } 2\frac{4}{6} \times 1\frac{5}{7} =$$

### Exercise 7.4 continued

e)  $6\frac{2}{5} \times 1\frac{3}{8} =$

f)  $4\frac{2}{10} \times 2\frac{3}{6} =$

g)  $1\frac{2}{4} \times 1\frac{3}{4} =$

h)  $4\frac{1}{2} \times 3\frac{1}{3} =$

i)  $5\frac{1}{5} \times 1\frac{2}{13} =$

j)  $3\frac{6}{8} \times 2\frac{2}{3} =$

k)  $1\frac{1}{2} \times \frac{20}{21} =$   
change the mixed number to improper  
and multiply

l)  $4\frac{4}{6} \times 1\frac{3}{7} =$

#### Answers to Exercise 7.4

a)  $\frac{13}{4} = 3\frac{1}{4}$

b)  $\frac{15}{8} = 1\frac{7}{8}$

c)  $\frac{16}{5} = 3\frac{1}{5}$

d)  $\frac{32}{7} = 4\frac{4}{7}$

e)  $\frac{44}{5} = 8\frac{4}{5}$

f)  $\frac{21}{2} = 10\frac{1}{2}$

g)  $\frac{21}{8} = 2\frac{5}{8}$

h)  $\frac{15}{1} = 15$

i)  $\frac{6}{1} = 6$

j)  $\frac{10}{1} = 10$

k)  $\frac{10}{7} = 1\frac{3}{7}$

l)  $\frac{20}{3} = 6\frac{2}{3}$

## **7.5 Word Problems – Multiplying Fractions**

The problem solving skills we learn in math can be very useful to help us solve problems we have in our day-to-day lives. To solve a problem, it is a good idea to have a plan. Consider the steps below for solving word problems.

Watch for **key words** when you are solving multiplication word problems.

**product** - the answer in a multiplication problem

**double**- multiply by 2

**half** – multiply by  $\frac{1}{2}$

**triple**- multiply by 3

**of** – indicates the whole

The words **how many** and **how much** are used in multiplication word programs and are also used in addition. So be careful how you read the word problem.

### **Problem Solving Steps**

**Step 1:** Read the problem.

**Step 2:** List the information you found.

**Step 3:** Use key words to decide what you have to find out.

**Step 4:** Solve the problem.

**Step 5:** Does your answer make sense?

**Step 6:** Write your answer in a word sentence.

## Word Problems continued

**Example A** Maria's co-workers ate  $\frac{2}{3}$  of the 24 cupcakes she made. How many cupcakes did they eat?

The key word is **how many** which means to multiply.

|                                                          |                                                                      |                                                      |
|----------------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------|
| Write the equation.                                      | $\frac{2}{3} \times 24 =$                                            | Put the 24 over 1. $\frac{24}{1}$                    |
| Reduce the numerator and denominator by the same factor. | $\frac{2}{\cancel{3}_1} \times \frac{\overset{8}{\cancel{24}}}{1} =$ | The common factor is 3.                              |
| Multiply the numerators.                                 | $2 \times 8 = 16$                                                    |                                                      |
| and                                                      |                                                                      | $\frac{2}{1} \times \frac{8}{1} = \frac{16}{1} = 16$ |
| Multiply the denominators.                               | $1 \times 1 = 1$                                                     |                                                      |

*Maria's co-workers ate 16 cupcakes.*

---

**Example B** John wants to prepare  $\frac{1}{2}$  the smoothie recipe. Calculate the amounts for each ingredient.

**Banana Smoothie Recipe:**

$1\frac{3}{4}$  cup of milk      1 banana

$\frac{1}{2}$  cup of yogurt       $\frac{2}{3}$  teaspoon sugar

There are four calculations to do.

Milk  $\frac{1}{2} \times 1\frac{3}{4} = \frac{1}{2} \times \frac{7}{4} = \frac{7}{8}$  cup

Banana  $\frac{1}{2} \times \frac{1}{1} = \frac{1}{2}$  banana

Yogurt  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$  cup

Sugar  $\frac{1}{2} \times \frac{2}{3} =$

$\frac{1}{\cancel{2}_1} \times \frac{\overset{1}{\cancel{2}}}{3} = \frac{1}{1} \times \frac{1}{3} = \frac{1}{3}$  teaspoon (reduce by 2)

*Half of the recipe would be  $\frac{7}{8}$  cup of milk,  $\frac{1}{2}$  banana,  $\frac{1}{4}$  cup of yogurt and  $\frac{1}{3}$  teaspoon of sugar.*

**Exercise 7.5** Read the word problem. Write the equation and solve. Reduce the answer to simplest terms. Write your answer in a sentence. Check the answer using the answer key. Use the previous examples as a guide.

a) Jay spent  $\frac{2}{3}$  of his 30 minute lunch hour exercising. How many minutes did Jay exercise?

b) If  $\frac{1}{2}$  of the 18 students will attend the award ceremony, how many students will attend?

c) Double the ingredients in the recipe for hot chocolate.

4 cups of milk \_\_\_\_\_  $1\frac{3}{4}$  tablespoons of thick cream \_\_\_\_\_

$\frac{3}{2}$  teaspoons of sugar \_\_\_\_\_ 3 tablespoons of cocoa \_\_\_\_\_

d) Sandy had  $\frac{8}{9}$  of a kilogram of rice in a bag. Over the week she used  $\frac{1}{4}$  of the rice. How much rice did she use?

e) Sam had  $\frac{5}{6}$  of a pie. He ate  $\frac{2}{5}$  of the remaining pie. How much of the total pie did Sam eat?

f) Dan picked  $2\frac{3}{4}$  of a kilogram of strawberries. He ate  $\frac{1}{4}$  of what he picked. What fraction of the strawberries did he eat?

g) A recipe asks for  $\frac{2}{3}$  cup of flour. How much flour will be needed if the recipe is doubled? Write your answer as a mixed fraction in simplest form.

How much flour will be needed if the recipe is tripled? Write your answer as a whole number.

#### Answers to Exercise 7.5

a)  $\frac{2}{3} \times \frac{30}{1} = 20$  Jay will exercise for 20 minutes.

b)  $\frac{1}{2} \times \frac{18}{1} = 9$  Nine (9) students will attend.

c) Double means times 2.  $2 \times 4 = 8$  cups of milk

$$2 \times 1\frac{3}{4} = \frac{2}{1} \times \frac{7}{4} = \frac{7}{2} = 3\frac{1}{2} \text{ tablespoons of thick cream}$$

$$2 \times \frac{3}{2} = \frac{3}{1} = 3 \text{ teaspoons of sugar} \quad 2 \times 3 = 6 \text{ or } 6 \text{ tablespoons of cocoa}$$

d)  $\frac{8}{9} \times \frac{1}{4} = \frac{2}{9}$  Sandy used  $\frac{2}{9}$  of a kilogram of rice.

e)  $\frac{5}{6} \times \frac{2}{5} = \frac{1}{3}$  Sam ate  $\frac{1}{3}$  of the pie.

f)  $2\frac{3}{4} \times \frac{1}{4} = \frac{11}{4} \times \frac{1}{4} = \frac{11}{16}$  Dan ate  $\frac{11}{16}$  of the strawberries he picked.

g)  $\frac{2}{3} \times 2 = \frac{2}{3} \times \frac{2}{1} = \frac{4}{3} = 1\frac{1}{3}$  If doubled, the recipe will require  $1\frac{1}{3}$  cup of flour.

Tripled means times 3

$$\frac{2}{3} \times 3 = \frac{2}{3} \times \frac{3}{1} = \frac{2}{1} = 2 \quad \text{If tripled, the recipe will require 2 cups of flour.}$$

## **7.1 – 7.5 Review: Multiplying Fractions**

**A. Multiply. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.**

a) What is  $\frac{2}{3}$  of  $\frac{2}{3}$ ?

b)  $\frac{1}{4} \times \frac{2}{5} =$

c)  $\frac{6}{7} \times \frac{3}{4} =$

d) What is  $\frac{1}{2}$  of  $\frac{6}{7}$ ?

e)  $4 \times \frac{5}{6} =$

f)  $\frac{8}{9} \times 3 =$

g) What is  $\frac{3}{4}$  of 10?

h)  $0 \times \frac{1}{6} =$

i)  $5\frac{2}{5} \times 1\frac{2}{9} =$

j)  $3\frac{1}{3} \times 1\frac{1}{2} =$

**B. Word Problems. Solve these word problems. They may be multiplication or division. Write your answer in a word sentence.**

k) There are 3 pizzas left over after the party. Each pizza has  $\frac{3}{8}$  pieces remaining. If combined, how much pizza is left over?

l) Maria sent out 16 invitations to her friends for her graduation ceremony.  $\frac{3}{4}$  of the people responded that they would attend. How many of Maria's friends will attend the ceremony?

**Answers to Mid-Unit Review - Multiplying Fractions**

a)  $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$

b)  $\frac{1}{4} \times \frac{2}{5} = \frac{1}{10}$  reduce by 2

c)  $\frac{6}{7} \times \frac{3}{4} = \frac{9}{14}$  reduce by 2

d)  $\frac{1}{2} \times \frac{6}{7} = \frac{3}{7}$  reduce by 2

e)  $\frac{4}{1} \times \frac{5}{6} = \frac{10}{3} = 3\frac{1}{3}$  reduce by 2

f)  $\frac{8}{9} \times \frac{3}{1} = \frac{8}{3} = 2\frac{2}{3}$  reduce by 3

g)  $\frac{3}{4} \times 10 = \frac{15}{2} = 7\frac{1}{2}$

h)  $0 \times \frac{1}{6} = 0$

i)  $\frac{33}{5} = 6\frac{3}{5}$

j)  $\frac{5}{1} = 5$

k)  $\frac{3}{1} \times \frac{3}{8} = \frac{9}{8} = 1\frac{1}{8}$  After the party there was  $1\frac{1}{8}$  pizza left over.

l)  $\frac{16}{1} \times \frac{3}{4} = \frac{12}{1} = 12$  Twelve of Maria's friends are attending her graduation ceremony.

## 7.6 Dividing Fractions

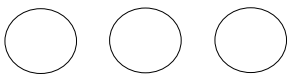
Remember what we learned about division. When dividing, take the total amount and separate it (divide it) into equal parts or groups.

$$\text{dividend} \div \text{divisor} = \text{quotient}$$

$$12 \div 3 = 4$$

12 is what we are dividing (dividend), 3 is what we are dividing by (divisor), and 4 is the answer (quotient).

---

**Example A**      $3 \div \frac{1}{2} =$      

What are we dividing? 3

What are you dividing it into?  $\frac{1}{2}$  halves

Divide each circle in half.



How many halves do you have? 6

Write the equation.      $3 \div \frac{1}{2} = 6$

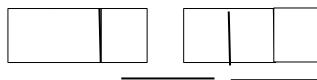
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**Example B**      $2 \div \frac{2}{3} =$      

What are we dividing? 2

What are you dividing it into?  $\frac{2}{3}$

Divide each rectangle in three.



Notice there are 3 groups  
of  $\frac{2}{3}$  groups in the 2 rectangles.

Write the equation.      $2 \div \frac{2}{3} = 3$

## Reciprocals

A reciprocal is used when dividing fractions. To find a reciprocal of a fraction, flip it over. This is called inverting the fraction. When dividing with fractions, find the reciprocal of the second fraction or the divisor.

**Example A** Find the reciprocal of  $\frac{3}{4}$

The reciprocal of  $\frac{3}{4}$  is  $\frac{4}{3}$

Try another. Find the reciprocal of  $\frac{8}{7}$

The reciprocal of  $\frac{8}{7}$  is  $\frac{7}{8}$

Try another. Find the reciprocal of 5

Put 5 over 1  $\frac{5}{1}$

The reciprocal of  $\frac{5}{1}$  is  $\frac{1}{5}$

Try another Find the reciprocal of  $\frac{1}{6}$

The reciprocal of  $\frac{1}{6}$  is  $\frac{6}{1}$  or 6

**NOTE: Zero does not have a reciprocal. We don't include it in these rules.**

## Multiplying Reciprocals

A fraction multiplied by its reciprocal will always equal 1.

**Example B**      The reciprocal of  $\frac{3}{4}$  is  $\frac{4}{3}$

Reduce and multiply       $\frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{4}}} \times \frac{\overset{1}{\cancel{4}}}{\underset{1}{\cancel{3}}} =$       reduce by 3/reduce by 4

Rewrite the fraction       $\frac{1}{1} \times \frac{1}{1} = 1$

---

### Try another

The reciprocal of 5 is  $\frac{1}{5}$

Reduce and multiply       $\frac{\overset{1}{\cancel{5}}}{1} \times \frac{1}{\underset{1}{\cancel{5}}} =$       reduce by 5

Rewrite the fraction       $\frac{1}{1} \times \frac{1}{1} = 1$

---

**Try another**      The reciprocal of  $\frac{1}{6}$  is  $\frac{6}{1}$

Reduce and multiply       $\frac{1}{\underset{1}{\cancel{6}}} \times \frac{\overset{1}{\cancel{6}}}{1} =$       reduce by 6

Rewrite the fraction       $\frac{1}{1} \times \frac{1}{1} = 1$

## Exercise 7.6a

Find the reciprocal. Then, multiply the fraction by its reciprocal. Write your answer as a whole number. Check your work using the answer key. The first one a) is done for you.

| Fraction         | Reciprocal    | Multiplication                                                                                                                                                                                  |
|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a) $\frac{2}{5}$ | $\frac{5}{2}$ | $\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{5}}} \times \frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{2}}} = \frac{1}{1} \times \frac{1}{1} = 1$ <i>reduce by 5, reduce by 6</i> |
| b) $\frac{8}{3}$ |               |                                                                                                                                                                                                 |
| c) $\frac{1}{2}$ |               |                                                                                                                                                                                                 |
| d) 5             |               |                                                                                                                                                                                                 |
| e) $\frac{3}{4}$ |               |                                                                                                                                                                                                 |
| f) 10            |               |                                                                                                                                                                                                 |
| g) $\frac{1}{3}$ |               |                                                                                                                                                                                                 |

### Answers to Exercise 7.6a

- a)  $\frac{2}{5} \times \frac{5}{2} =$  reduce by 2, reduce by 5  $= \frac{1}{1} \times \frac{1}{1} = 1$       b)  $\frac{8}{3} \times \frac{3}{8} =$  reduce by 8, reduce by 3  $= \frac{1}{1} \times \frac{1}{1} = 1$   
c)  $\frac{1}{2} \times \frac{2}{1} =$  reduce by 2,  $= \frac{1}{1} \times \frac{1}{1} = 1$       d)  $\frac{5}{1} \times \frac{1}{5} =$  reduce by 5,  $= \frac{1}{1} \times \frac{1}{1} = 1$   
e)  $\frac{3}{4} \times \frac{4}{3} =$  reduce by 3, reduce by 4  $= \frac{1}{1} \times \frac{1}{1} = 1$       f)  $\frac{10}{1} \times \frac{1}{10} =$  reduce by 10,  $= \frac{1}{1} \times \frac{1}{1} = 1$   
g)  $\frac{1}{3} \times \frac{3}{1} =$  reduce by 3,  $= \frac{1}{1} \times \frac{1}{1} = 1$

## Dividing fractions by fractions

To divide fractions, multiply the first fraction by the reciprocal of the second fraction.  
Or we say, multiply the dividend by the reciprocal of the divisor.

### Example A

Divide  $\frac{3}{4}$  by  $\frac{1}{2}$

Write the equation

$$\frac{3}{4} \div \frac{1}{2} =$$

Change the  $\div$  to  $\times$

$$\frac{3}{4} \times \frac{2}{1} =$$

Flip the second fraction

Reduce and multiply

$$\frac{\cancel{3}}{\cancel{4}_2} \times \frac{2^1}{1} = \text{reduce by 2}$$

Rewrite the fraction

$$\frac{3}{2} \times \frac{1}{1} =$$

Multiply the numerators

$$3 \times 1 = 3$$

and

$$\frac{3}{2} \times \frac{1}{1} = \frac{3}{2} = 1\frac{1}{2}$$

Multiply the denominators

$$2 \times 1 = 2$$

Change to a mixed number

---

### Example B

Divide  $\frac{7}{8}$  by  $\frac{3}{4}$

Write the equation

$$\frac{7}{8} \div \frac{3}{4} = \frac{7}{8} \times \frac{4}{3} =$$

$\times$  and flip

Reduce and multiply

$$\frac{7}{\cancel{8}_2} \times \frac{4^1}{3} = \text{reduce by 4}$$

Rewrite the fraction

$$\frac{7}{2} \times \frac{1}{3} = \frac{7}{6} = 1\frac{1}{6}$$

Multiply numerators

Multiply denominators

Change to mixed number

**Exercise 7.6b**

Divide. Reduce your answer to simplest terms. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } \frac{5}{8} \div \frac{3}{10} = \frac{5}{\cancel{8}^4} \times \frac{\cancel{10}^5}{3} = \frac{25}{12} = 2\frac{1}{12}$$

$$\text{b) } \frac{7}{2} \div \frac{3}{5} =$$

$$\text{c) } \frac{4}{5} \div \frac{6}{5} =$$

$$\text{d) } \frac{5}{8} \div \frac{7}{16} =$$

$$\text{e) } \frac{1}{2} \div \frac{3}{8} =$$

$$\text{f) } \frac{2}{3} \div \frac{8}{9} =$$

$$\text{g) } \frac{5}{8} \div \frac{4}{3} =$$

$$\text{h) } \frac{1}{5} \div \frac{1}{2} =$$

$$\text{i) } \frac{1}{4} \div \frac{3}{2} =$$

$$\text{j) } \frac{5}{6} \div \frac{5}{5} =$$

**Answers to Exercise 7.6b**

$$\text{a) } \frac{5}{4} \times \frac{5}{3} = \frac{25}{12} = 2\frac{1}{12}$$

$$\text{b) } \frac{7}{2} \times \frac{5}{3} = \frac{35}{6} = 5\frac{5}{6}$$

$$\text{c) } \frac{4}{5} \times \frac{5}{6} = \frac{2}{3} \quad \text{reduce by 5, reduce by 2} \quad \text{d) } \frac{5}{8} \times \frac{16}{7} = \frac{10}{7} = 1\frac{3}{7} \quad \text{reduce by 8}$$

$$\text{e) } \frac{1}{2} \times \frac{8}{3} = \frac{4}{3} = 1\frac{1}{3} \quad \text{reduce by 2} \quad \text{f) } \frac{2}{3} \times \frac{9}{8} = \frac{3}{4} \quad \text{reduce by 2, reduce by 3}$$

$$\text{g) } \frac{5}{8} \times \frac{3}{4} = \frac{15}{32} \quad \text{h) } \frac{1}{5} \times \frac{2}{1} = \frac{2}{5}$$

$$\text{i) } \frac{1}{4} \times \frac{2}{3} = \frac{1}{6} \quad \text{reduce by 2} \quad \text{j) } \frac{5}{6} \times \frac{5}{5} = \frac{5}{6} \quad \text{reduce by 5}$$

## Dividing fractions and whole numbers

### Example C

Divide 5 by  $\frac{2}{3}$

Write the equation  
x and flip

$$\frac{5}{1} \div \frac{2}{3} = \frac{5}{1} \times \frac{3}{2} =$$

Reduce and multiply

$$\frac{5}{1} \times \frac{3}{2} =$$
 there is nothing to reduce

$$\frac{5}{1} \times \frac{3}{2} = \frac{15}{2} = 7\frac{1}{2}$$

Multiply numerators  
Multiply denominators  
Change to mixed number

---

### Example D

Divide  $\frac{8}{9}$  by 4

Write the equation  
x and flip

$$\frac{8}{9} \div \frac{4}{1} = \frac{8}{9} \times \frac{1}{4} =$$

Reduce and multiply

$$\overset{2}{\cancel{8}} \times \frac{1}{\underset{1}{\cancel{4}}} =$$
 reduce by 4

Rewrite the equation

$$\frac{2}{9} \times \frac{1}{1} = \frac{2}{9}$$

Multiply numerators  
Multiply denominators

**Exercise 7.6c**

Divide. Reduce your answer to simplest terms. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } 6 \div \frac{3}{4} = \frac{6}{1} \times \frac{4}{3} = \frac{8}{1} = 8$$

$$\text{b) } 2 \div \frac{5}{6} =$$

$$\text{c) } 9 \div \frac{1}{3} =$$

$$\text{d) } 5 \div \frac{10}{13} =$$

$$\text{e) } 2 \div \frac{1}{2} =$$

$$\text{f) } \frac{3}{8} \div 3 =$$

$$\text{g) } \frac{6}{11} \div 3 =$$

$$\text{h) } \frac{2}{5} \div 10$$

$$\text{i) } \frac{1}{2} \div 2 =$$

$$\text{j) } \frac{9}{5} \div 6 =$$

**Answers to Exercise 7.6c**

$$\text{a) } \frac{6}{1} \times \frac{4}{3} = \frac{8}{1} = 8 \text{ reduce by 3}$$

$$\text{b) } \frac{2}{1} \times \frac{6}{5} = \frac{12}{5} = 2\frac{2}{5}$$

$$\text{c) } \frac{9}{1} \times \frac{3}{1} = 27$$

$$\text{d) } \frac{5}{1} \times \frac{13}{10} = \frac{13}{2} = 6\frac{1}{2} \text{ reduce by 5}$$

$$\text{e) } \frac{2}{1} \times \frac{2}{1} = \frac{4}{1} = 4$$

$$\text{f) } \frac{3}{8} \times \frac{1}{3} = \frac{1}{8} \text{ reduce by 3}$$

$$\text{g) } \frac{6}{11} \times \frac{1}{3} = \frac{2}{11} \text{ reduce by 3}$$

$$\text{h) } \frac{2}{5} \times \frac{1}{10} = \frac{1}{25} \text{ reduce by 2}$$

$$\text{i) } \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$\text{j) } \frac{9}{5} \times \frac{1}{6} = \frac{3}{10} \text{ reduce by 3}$$

## 7.7 Dividing Mixed Numbers

When dividing mixed numbers change the mixed number to an improper fraction, then divide.

### Example A

$$6\frac{2}{3} \div 1\frac{2}{3} =$$

$$\frac{20}{3} \div \frac{5}{3} = \quad \text{change to improper fractions}$$

$$\frac{20}{3} \times \frac{3}{5} = \quad \text{find the reciprocal of 2<sup>nd</sup> fraction}$$

$$\begin{array}{r} 4 \\ \cancel{20} \\ 3 \\ 1 \end{array} \times \begin{array}{r} 1 \\ \cancel{3} \\ \cancel{5} \\ 1 \end{array} = \quad \text{reduce or simplify (} \div 3 \text{ and then } \div 5 \text{)}$$

$$\frac{4}{1} \times \frac{1}{1} = \frac{4 \times 1}{1 \times 1} = \frac{4}{1} \quad \text{multiply}$$

$$\frac{4}{1} = 4 \quad \text{change to a mixed number}$$

### Exercise 7.7

Change the mixed numbers to improper fractions. Solve. Check your work using the answer key. The first one a) is done for you.

a)  $2\frac{1}{2} \div 1\frac{1}{6}$

$$\frac{5}{2} \div \frac{7}{6} = \frac{5}{\cancel{2}} \times \frac{6}{\cancel{7}^3} = \frac{15}{7} = 2\frac{1}{7}$$

b)  $4\frac{3}{8} \div 1\frac{1}{4} =$

c)  $4\frac{7}{8} \div 2\frac{1}{6} =$

d)  $8\frac{1}{4} \div 1\frac{5}{6} =$

### Exercise 7.7 continued

e)  $6\frac{1}{2} \div 8\frac{2}{3} =$

f)  $6\frac{2}{3} \div 7\frac{1}{2} =$

g)  $10\frac{1}{2} \div 1\frac{3}{4} =$

h)  $1\frac{3}{4} \div 2\frac{1}{2} =$

i)  $3\frac{1}{3} \div 2 =$   
change 2 to  $\frac{2}{1}$

j)  $8\frac{1}{4} \div 3\frac{2}{3} =$

k)  $1\frac{1}{2} \div \frac{1}{2} =$

l)  $4\frac{1}{5} \div 1\frac{3}{4} =$

#### Answers to Exercise 7.7

a)  $\frac{15}{7} = 2\frac{1}{7}$

b)  $\frac{7}{2} = 3\frac{1}{2}$

c)  $\frac{9}{4} = 2\frac{1}{4}$

d)  $\frac{9}{2} = 4\frac{1}{2}$

e)  $\frac{3}{4}$

f)  $\frac{8}{9}$

g) 6

h)  $\frac{7}{10}$

i)  $\frac{5}{3} = 1\frac{2}{3}$

j)  $\frac{9}{4} = 2\frac{1}{4}$

k) 3

l)  $\frac{12}{5} = 2\frac{2}{5}$

## **7.8 Word Problems – Dividing Fractions**

The problem solving skills we learn in math can be very useful to help us solve problems we have in our day-to-day lives. To solve a problem, it is a good idea to have a plan. Consider the steps below for solving word problems.

Watch for **key words** when you are solving division word problems.

|                  |               |
|------------------|---------------|
| <b>separated</b> | <b>split</b>  |
| <b>cut</b>       | <b>shared</b> |

### **Problem Solving Steps**

- Step 1:** Read the problem.
- Step 2:** List the information you found.
- Step 3:** Use key words to decide what you have to find out.
- Step 4:** Solve the problem.
- Step 5:** Does your answer make sense?
- Step 6:** Write your answer in a word sentence.

In division, ask

“What am I dividing?”

“What am I dividing it into?”

## Word Problems continued

### Example A

Three friends made  $\frac{1}{2}$  kilogram of cookie dough. They shared it equally. How much cookie dough did each person get?

The key word is **shared** which means to dividing.

What are you dividing?  $\frac{1}{2}$  kilogram of cookie dough

What are you dividing it by? 3 friends

Write the equation.

$$\frac{1}{2} \div 3 =$$

Put the 3 over 1.  $\frac{3}{1}$

x and flip

$$\frac{1}{2} \times \frac{1}{3}$$

Multiply the numerators.

$$1 \times 1 = 1$$

and

$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

Multiply the denominators.

$$2 \times 3 = 6$$

*Each person gets  $\frac{1}{6}$  kilogram of cookie dough.*

### Example B

John wants to divide the smoothie recipe in 2. Calculate the amounts for each ingredient.

#### Banana Smoothie Recipe:

$1\frac{3}{4}$  cup of milk

1 banana

$\frac{1}{2}$  cup of yogurt

$\frac{2}{3}$  teaspoon sugar

There are four calculations to do.

Milk  $1\frac{3}{4} \div 2 = \frac{7}{4} \div \frac{2}{1} = \frac{7}{4} \times \frac{1}{2} = \frac{7}{8}$  cup      Banana  $1 \div 2 = \frac{1}{1} \div \frac{2}{1} = \frac{1}{1} \times \frac{1}{2} = \frac{1}{2}$  banana

Yogurt  $\frac{1}{2} \div 2 = \frac{1}{2} \div \frac{2}{1} = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$  cup      Sugar  $\frac{2}{3} \div 2 = \frac{2}{3} \div \frac{2}{1} = \frac{2}{3} \times \frac{1}{2} = \frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$  tsp

*Dividing the recipe by 2 would be  $\frac{7}{8}$  cup of milk,  $\frac{1}{2}$  banana,  $\frac{1}{4}$  cup of yogurt and  $\frac{1}{3}$  teaspoon of sugar.*

## Exercise 7.8

Read the word problem. Write the equation and solve. Check your work using the answer key. Use the previous examples as your guide.

a) A rope is 5 metres long. Jay wants to cut it into  $\frac{1}{2}$  metre pieces. How many  $\frac{1}{2}$  metre pieces will Jay have after he cuts the rope?

b) Jack wants to cut a  $\frac{2}{3}$  metre piece of wood into 6 sections. How long will each section be after he cuts the wood?

c) Sam wants to make only half the recipe below. How much of each ingredient will Sam need for hot chocolate.

4 cups of milk \_\_\_\_\_  $\frac{3}{4}$  tablespoons of thick cream \_\_\_\_\_

$1\frac{1}{2}$  teaspoons of sugar \_\_\_\_\_ 3 tablespoons of cocoa \_\_\_\_\_

d) Sandy had  $1\frac{6}{10}$  of a kilogram of rice in a bag. She wants to divide the bag of rice into smaller containers that hold  $\frac{1}{5}$  of a kilogram. How many containers will she need?

### Exercise 7.8 continued

e) Sam had  $\frac{5}{6}$  of a pie. He shared the pie with 3 friends. (4 people altogether ate pie). How much of the pie did each person get?

f) Dan picked  $\frac{3}{4}$  of a kilogram of strawberries. He split the strawberries into 6 containers. How much did each container hold?

g) A recipe asks for  $\frac{2}{3}$  cup of flour. How much flour will be needed if the recipe cut in half?

How much flour will be needed if the recipe is cut in 4.

#### Answers to Exercise 7.8

a)  $5 \div \frac{1}{2} = \frac{5}{1} \times \frac{2}{1} = 10$  Jay will have 10 pieces of rope.

b)  $\frac{2}{3} \div 6 = \frac{2}{3} \times \frac{1}{6} = \frac{1}{9}$  Each section will be  $\frac{1}{9}$  metres long.

c)  $4 \div 2 = 2$  cups of milk  
 $\frac{3}{4} \div 2 = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$  tablespoons of thick cream  
 $\frac{3}{2} \div 2 = \frac{3}{2} \times \frac{1}{2} = \frac{3}{4}$  teaspoons of sugar  
 $3 \div 2 = \frac{3}{1} \times \frac{1}{2} = \frac{3}{2}$  or  $1\frac{1}{2}$  tablespoons of cocoa

d)  $1\frac{6}{10} \div \frac{1}{5} = \frac{16}{10} \times \frac{5}{1} = \frac{16}{2} = 8$  She will need 8 containers.

e)  $\frac{5}{6} \div 4 = \frac{5}{6} \times \frac{1}{4} = \frac{5}{24}$  Each of the 4 persons will get  $\frac{5}{24}$  of the pie.

f)  $\frac{3}{4} \div 6 = \frac{3}{4} \times \frac{1}{6} = \frac{1}{8}$  Each container held  $\frac{1}{8}$  of a kilogram of strawberries.

g)  $\frac{2}{3} \div 2 = \frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$  If halved, the recipe will require  $\frac{1}{3}$  cup of flour.

$\frac{2}{3} \div 4 = \frac{2}{3} \times \frac{1}{4} = \frac{1}{6}$  If cut in 4, the recipe will require  $\frac{1}{6}$  cup of flour.

## **Unit 7 Review – Multiplying and Dividing Fractions**

You will now practice all the skills you learned in Unit 7. Check your work using the answer key at the end of the review.

**A. Multiply. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.**

a) What is  $\frac{2}{5}$  of  $\frac{2}{3}$ ?

b)  $\frac{7}{8} \times \frac{2}{3} =$

c)  $\frac{8}{9} \times \frac{3}{2} =$

d) What is  $\frac{5}{8}$  of  $\frac{1}{10}$ ?

e)  $\frac{7}{8} \times \frac{12}{14} =$

f)  $\frac{7}{4} \times \frac{8}{7} =$

g)  $\frac{1}{3} \times \frac{3}{7} =$

h)  $\frac{7}{4} \times \frac{1}{5} =$

i)  $7 \times \frac{2}{3} =$

j)  $3 \times \frac{2}{5} =$

k) What is  $\frac{1}{2}$  of 14?

l)  $\frac{3}{8} \times 4 =$

### Multiplying and Dividing Fractions Review continued

m)  $0 \times \frac{1}{4} =$

n)  $3 \times \frac{3}{4} =$

o)  $\frac{12}{15} \times \frac{10}{24} =$

p)  $2\frac{2}{7} \times 1\frac{6}{8} =$

**B. Divide. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.**

a)  $\frac{7}{2} \div \frac{3}{4} =$

b)  $\frac{3}{10} \div \frac{6}{5} =$

c)  $\frac{5}{8} \div \frac{7}{24} =$

d)  $\frac{1}{8} \div \frac{3}{4} =$

e)  $\frac{2}{3} \div \frac{7}{9} =$

f)  $\frac{5}{8} \div 1\frac{1}{4} =$

g)  $\frac{1}{5} \div \frac{1}{4} =$

h)  $\frac{11}{15} \div \frac{1}{5} =$

i)  $4 \div \frac{3}{2} =$

j)  $8 \div \frac{4}{5} =$

**Multiplying and Dividing Fractions Review continued**

**B. Divide. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.**

k)  $\frac{3}{7} \div 6 =$

l)  $\frac{15}{9} \div 3 =$

m)  $2\frac{1}{4} \div 1\frac{2}{7} =$

n)  $8 \div \frac{4}{7} =$

o)  $4 \div \frac{1}{4} =$

p)  $\frac{1}{2} \div \frac{1}{2} =$

**C. Word Problems. Solve these word problems. They may be multiplication or division. Write your answer in a word sentence.**

a) There are 4 boxes of cereal in the cupboard. Each box is  $\frac{3}{4}$  full. How many full boxes would there be if they were all put together?

b) At the evening GED class,  $\frac{2}{3}$  of the students are attending. If there are 15 students registered, how many students are attending?

## Multiplying and Dividing Fractions Review continued

**C. Word Problems. Solve these word problems. They may be multiplication or division. Write your answer in a word sentence.**

c) A recipe calls for  $\frac{2}{3}$  cup of sugar and  $\frac{1}{2}$  tablespoons of cinnamon. If the recipe is halved, how much of each ingredient would be needed?

d) Sandy had  $\frac{1}{4}$  metres of fabric to make doll dresses. Each dress takes  $\frac{1}{16}$  metres of fabric. How many dresses can she make from the fabric she has?

e) Joe practices piano  $\frac{3}{4}$  hour each day. How much time does practice piano in one week. (Remember 7 days in 1 week)

f) Kate makes 5 pies. She wants to divide each of them into  $\frac{1}{2}$  and put them in freezer containers. How many containers will she need to freeze her half pies?

### Answers to Unit 7 Review

#### A. Multiply.

a)  $\frac{2}{5} \times \frac{2}{3} = \frac{4}{15}$

b)  $\frac{7}{8} \times \frac{2}{3} = \frac{7}{12}$  reduce by 2

c)  $\frac{8}{9} \times \frac{3}{2} = \frac{4}{3} = 1\frac{1}{3}$  reduce by 4, reduce by 3

d)  $\frac{5}{8} \times \frac{1}{10} = \frac{1}{16}$  reduce by 5

e)  $\frac{7}{8} \times \frac{12}{14} = \frac{3}{4}$  reduce by 7, reduce by 4

f)  $\frac{7}{4} \times \frac{8}{7} = \frac{2}{1} = 2$  reduce by 7, reduce by 2

g)  $\frac{1}{3} \times \frac{3}{7} = \frac{1}{7}$

h)  $\frac{7}{4} \times \frac{1}{5} = \frac{7}{20}$

continued on the next page

**Answers to Unit 7 Review****A. Multiply continued**

i)  $\frac{7}{1} \times \frac{2}{3} = \frac{14}{3} = 4\frac{2}{3}$

j)  $\frac{3}{1} \times \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$

k)  $\frac{1}{2} \times \frac{14}{1} = \frac{7}{1} = 7$  reduce by 7

l)  $\frac{3}{8} \times \frac{4}{1} = \frac{3}{2} = 1\frac{1}{2}$  reduce by 4

m)  $0 \times \frac{1}{4} = 0$

n)  $\frac{3}{1} \times \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$

o)  $\frac{12}{15} \times \frac{10}{24} = \frac{1}{3}$  reduce by 12, by 5, and by 2

p)  $\frac{16}{7} \times \frac{14}{8} = \frac{4}{1} = 4$  reduce by 7, reduce by 8

**B. Divide.**

a)  $\frac{7}{2} \times \frac{4}{3} = \frac{14}{3} = 4\frac{2}{3}$  reduce by 2

b)  $\frac{3}{10} \times \frac{5}{6} = \frac{1}{4}$  reduce by 3, reduce by 5

c)  $\frac{5}{8} \times \frac{24}{7} = \frac{15}{7} = 2\frac{1}{7}$  reduce by 8

d)  $\frac{1}{8} \times \frac{4}{3} = \frac{1}{6}$  reduce by 4

e)  $\frac{2}{3} \times \frac{9}{7} = \frac{6}{7}$  reduce by 3

f)  $\frac{5}{8} \times \frac{4}{5} = \frac{1}{2}$  reduce by 4, reduce by 5

g)  $\frac{1}{5} \times \frac{4}{1} = \frac{4}{5}$

h)  $\frac{11}{15} \times \frac{5}{1} = \frac{11}{3} = 3\frac{2}{3}$  reduce by 5

i)  $\frac{4}{1} \times \frac{2}{3} = \frac{8}{3} = 2\frac{2}{3}$

j)  $\frac{8}{1} \times \frac{5}{4} = \frac{10}{1} = 10$  reduce by 4

k)  $\frac{3}{7} \times \frac{1}{6} = \frac{1}{14}$

l)  $\frac{15}{9} \times \frac{1}{3} = \frac{5}{9}$  reduce by 3,

m)  $\frac{9}{4} \times \frac{7}{9} = \frac{7}{4} = 1\frac{3}{4}$  reduce by 9

n)  $\frac{8}{1} \times \frac{7}{4} = \frac{14}{1} = 14$  reduce by 4

o)  $\frac{4}{1} \times \frac{4}{1} = \frac{16}{1} = 16$

p)  $\frac{1}{2} \times \frac{2}{1} = \frac{1}{1} = 1$  reduce by 2,

**C. Word problems**

a) multiply  $4 \times \frac{3}{4} = \frac{4}{1} \times \frac{3}{4} = 3$  There will be 3 full boxes of cereal.

b) multiply  $\frac{2}{3} \times 15 = \frac{2}{3} \times \frac{15}{1} = 10$  Ten students are attending the GED class.

c) divide  $\frac{2}{3} \div 2 = \frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$  cup of sugar  $\frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$  tablespoon

If the recipe were halved, it would call for  $\frac{2}{3}$  cup of sugar and  $\frac{1}{2}$  tablespoon of cinnamon.

d) divide  $\frac{1}{4} \div \frac{1}{16} = \frac{1}{4} \times \frac{16}{1} = \frac{4}{1} = 4$  She can make 4 doll dresses.

e) multiply  $\frac{3}{4} \times 7 = \frac{3}{4} \times \frac{7}{1} = \frac{21}{4} = 5\frac{1}{4}$  He practices  $5\frac{1}{4}$  hours in one week.

f)  $5 \div \frac{1}{2} = \frac{5}{1} \times \frac{2}{1} = \frac{10}{1} = 10$  Kate needs 10 containers.

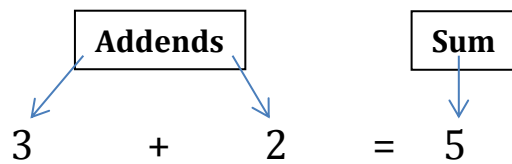


# Unit 8: Adding & Subtracting Fractions

## 8.1 Adding Like Fractions

### Vocabulary review

**Addition** puts amounts together.

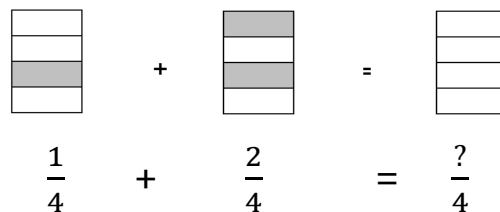


$$\frac{1}{2} \quad \frac{\text{numerator}}{\text{denominator}}$$

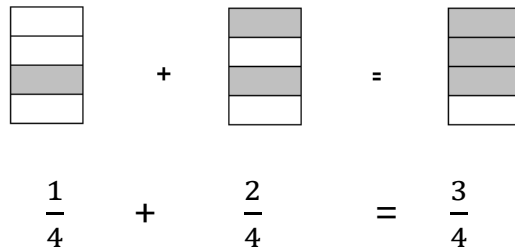
**Like fractions:** Fractions that have the same denominator.  $\frac{1}{4} \quad \frac{2}{4} \quad \frac{3}{4} \quad \frac{4}{4}$

Adding and subtracting fractions have different rules than multiplying and dividing fractions.

**Example A** Take a look at these fractions. How many parts do you have in total?

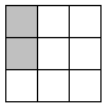
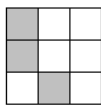
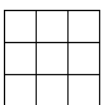


Shade in the fractions to get the total.



## Exercise 8.1a

Add the fractions. Shade in the answer as was done in the above example and write your answer as a fraction. Check your fraction using the answer key.

a)  +  = 

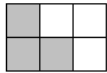
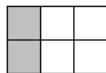
$$\frac{2}{9} + \frac{3}{9} = \frac{\quad}{9}$$

b)  +  = 

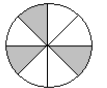
$$\frac{2}{4} + \frac{1}{4} = \frac{\quad}{4}$$

c)  +  = 

$$\frac{1}{3} + \frac{1}{3} = \frac{\quad}{3}$$

d)  +  = 

$$\frac{3}{6} + \frac{2}{6} = \frac{\quad}{6}$$

e)  +  = 

$$\frac{3}{8} + \frac{4}{8} = \frac{\quad}{8}$$

### Answers to Exercise 8.1a

a)  $\frac{5}{9}$

b)  $\frac{3}{4}$

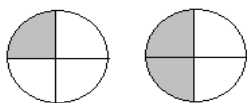
c)  $\frac{2}{3}$

d)  $\frac{5}{6}$

e)  $\frac{7}{8}$

## Adding Like Fractions continued

**Example B** What is the sum of these two fractions?



What is  $\frac{1}{4}$  and  $\frac{2}{4}$ ?

If you said  $\frac{3}{4}$ , you are correct.



Write the equation.

$$\frac{1}{4} + \frac{2}{4} =$$

Add the numerators.

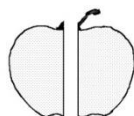
and

$$\frac{1+2}{4} = \frac{3}{4}$$

The denominator stays the same.

---

**Example C** What is the sum of  $\frac{1}{2}$  and  $\frac{1}{2}$ ?



Write the equation.

$$\frac{1}{2} + \frac{1}{2} =$$

Add the numerators.

and

$$\frac{1+1}{2} = \frac{2}{2} = 1$$

Denominator stays the same.

You get 1 apple.

---

## Adding Like Fractions continued

When adding fractions, the fractions have a common denominator. That is, each fraction must have the same denominator.

To get the total, we add the numerators and keep the denominator the same.

**Example D** What is  $\frac{2}{5}$  and  $\frac{1}{5}$ ? How many parts do you have in total?

Write the equation.  $\frac{2}{5} + \frac{1}{5} =$

Add the numerators.

and  $\frac{2+1}{5} = \frac{3}{5}$

Denominator stays the same.

**Example E** What is  $\frac{1}{7}$  and  $\frac{2}{7}$  and  $\frac{3}{7}$ ? How many parts do you have in total?

Write the equation.  $\frac{1}{7} + \frac{2}{7} + \frac{3}{7} =$

Add the numerators.

and  $\frac{1+2+3}{7} = \frac{6}{7}$

Denominator stays the same.

## Exercise 8.1b

Add the fractions. Write your answer as a fraction. Check your work using the answer key. The first one a) is done for you.

a)  $\frac{2}{4} + \frac{1}{4} = \frac{2+1}{4} = \frac{3}{4}$

b)  $\frac{3}{5} + \frac{1}{5} =$

c)  $\frac{1}{3} + \frac{1}{3} =$

d)  $\frac{1}{7} + \frac{3}{7} =$

**Exercise 8.1b continued**

e)  $\frac{1}{5} + \frac{1}{5} =$

f)  $\frac{3}{8} + \frac{4}{8} =$

g)  $\frac{2}{11} + \frac{7}{11} =$

h)  $\frac{3}{22} + \frac{4}{22} =$

i)  $\frac{1}{5} + \frac{2}{5} =$

j)  $\frac{3}{6} + \frac{2}{6} =$

k)  $\frac{14}{20} + \frac{3}{20} + \frac{2}{20} =$

l)  $\frac{4}{9} + \frac{1}{9} + \frac{2}{9} =$

**Answers to Exercise 8.1b**

a)  $\frac{3}{4}$

b)  $\frac{4}{5}$

c)  $\frac{2}{3}$

d)  $\frac{4}{7}$

e)  $\frac{2}{5}$

f)  $\frac{7}{8}$

g)  $\frac{9}{11}$

h)  $\frac{7}{22}$

i)  $\frac{3}{5}$

j)  $\frac{5}{6}$

k)  $\frac{19}{20}$

l)  $\frac{7}{9}$

## 8.2 Simplify After Adding Fractions

In the previous exercise, the fractions do not require simplifying after adding them together. They were all in their simplest form at lowest terms.

**Example A**      What is  $\frac{1}{8}$  and  $\frac{3}{8}$ ?      How many parts do you have in total?

Write the equation.       $\frac{1}{8} + \frac{3}{8} =$

Add the numerators.

and

$$\frac{1+3}{8} = \frac{4}{8}$$

Denominator stays the same.

Reduce the answer to simplest form       $\frac{4}{8}$       reduce by 4  
or      reduce by 2 and then 2 again.

$$\frac{1+3}{8} = \frac{\cancel{4}^1}{\cancel{8}_2} = \frac{1}{2}$$

---

**Example B**      What is  $\frac{3}{4}$  and  $\frac{2}{4}$ ?      How many parts do you have in total?

Write the equation.       $\frac{3}{4} + \frac{2}{4} =$

Add the numerators.

and

$$\frac{3+2}{4} = \frac{5}{4}$$

Denominator stays the same.

Reduce the answer to simplest form       $\frac{5}{4}$       This is an improper fraction.  
Change it to a mixed number.

$$\frac{3+2}{4} = \frac{5}{4} = 1\frac{1}{4}$$

## Exercise 8.2

Add the fractions. Reduce the answer to simplest form. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } \frac{2}{3} + \frac{1}{3} = \frac{\cancel{2}^1}{\cancel{3}_1} = 1$$

*Divide numerator  
& denominator by 3*

$$\text{b) } \frac{3}{5} + \frac{4}{5} =$$

$$\text{c) } \frac{7}{10} + \frac{1}{10} =$$

$$\text{d) } \frac{1}{4} + \frac{1}{4} =$$

$$\text{e) } \frac{1}{5} + \frac{4}{5} =$$

$$\text{f) } \frac{4}{6} + \frac{5}{6} =$$

$$\text{g) } \frac{1}{2} + \frac{3}{2} =$$

$$\text{h) } \frac{2}{8} + \frac{3}{8} + \frac{4}{8} =$$

$$\text{i) } \frac{2}{3} + \frac{2}{3} =$$

$$\text{j) } \frac{3}{4} + \frac{3}{4} =$$

### Answers to Exercise 8.2

$$\text{a) } \frac{3}{3} = 1$$

$$\text{b) } \frac{7}{5} = 1\frac{2}{5}$$

$$\text{c) } \frac{8}{10} = \frac{4}{5}$$

$$\text{d) } \frac{2}{4} = \frac{1}{2}$$

$$\text{e) } \frac{5}{5} = 1$$

$$\text{f) } \frac{9}{6} = 1\frac{3}{6} = 1\frac{1}{2}$$

$$\text{g) } \frac{4}{2} = 2$$

$$\text{h) } \frac{9}{8} = 1\frac{1}{8}$$

$$\text{i) } \frac{4}{3} = 1\frac{1}{3}$$

$$\text{j) } \frac{6}{4} = 1\frac{2}{4} = 1\frac{1}{2}$$

## **8.3 Adding Mixed Numbers**

When adding mixed numbers with common denominators, first add the whole numbers, then add the fractions, and finally reduce the answer to simplest form.

**Example A**      What is  $3\frac{1}{4}$  and  $1\frac{1}{4}$  ?

Write the equation.       $3\frac{1}{4} + 1\frac{1}{4} =$

Add the whole numbers.  
and       $3 + 1 = 4$

Add the like fractions.       $\frac{1+1}{4} = \frac{2}{4}$

Combine the whole number and fraction.       $3\frac{1}{4} + 1\frac{1}{4} = 4\frac{2}{4}$

Reduce to simplest form.       $4\frac{2}{4} = 4\frac{1}{2}$

---

**Example B**      What is  $2\frac{5}{8}$  and  $3\frac{2}{8}$  ?

Write the equation.       $2\frac{5}{8} + 3\frac{2}{8}$

Add the whole numbers.  
and       $2 + 3 = 5$

Add the like fractions.       $\frac{5+2}{8} = \frac{7}{8}$

Combine the whole number and fraction.       $2\frac{5}{8} + 3\frac{2}{8} = 5\frac{7}{8}$

### Exercise 8.3

Add the mixed numbers. Reduce the answer to simplest form. Check your work using the answer key. The first one a) is done for you.

a)  $1\frac{1}{3} + 2\frac{1}{3} = 3\frac{2}{3}$

b)  $4\frac{3}{5} + 3\frac{1}{5} =$

c)  $1\frac{7}{10} + 1\frac{1}{10} =$

d)  $2\frac{1}{7} + \frac{2}{7} =$

e)  $2\frac{1}{5} + 3\frac{4}{5} =$

f)  $1\frac{4}{6} + 2\frac{3}{6} =$

g)  $6\frac{3}{4} + 1\frac{2}{4} =$

h)  $3\frac{2}{8} + 2\frac{3}{8} =$

i)  $3\frac{2}{3} + \frac{2}{3} =$

j)  $1\frac{3}{4} + 1\frac{3}{4} =$

#### Answers to Exercise 8.3

a)  $3\frac{2}{3}$

b)  $7\frac{4}{5}$

c)  $2\frac{8}{10} = 2\frac{4}{5}$

d)  $2\frac{3}{7}$

e)  $5\frac{5}{5} = 5 + 1 = 6$

f)  $3\frac{7}{6} = 3 + 1\frac{1}{6} = 4\frac{1}{6}$

g)  $7\frac{5}{4} = 7 + 1\frac{1}{4} = 8\frac{1}{4}$

h)  $5\frac{5}{8}$

i)  $3\frac{4}{3} = 3 + 1\frac{1}{3} = 4\frac{1}{3}$

j)  $2\frac{6}{4} = 2 + 1\frac{2}{4} = 3\frac{2}{4} = 3\frac{1}{2}$

## 8.4 Word Problems – Adding Mixed Numbers

### Example A

David walked for  $1\frac{1}{4}$  hour on Saturday and  $\frac{1}{4}$  of an hour on Sunday. For how long did he walk in total?

The key words are **in total** which means to add.

$$1\frac{1}{4} + \frac{1}{4} = 1\frac{2}{4}$$

Reduce to simplest form.

$$1\frac{2}{4} = 1\frac{\cancel{2}^1\cancel{4}_2}{2} = 1\frac{1}{2}$$

David walked for  $1\frac{1}{2}$  hours in total.

### Example B

Two boxes of books weigh  $5\frac{3}{8}$  kilograms and  $3\frac{2}{8}$  kilograms. All together, how much do the two boxes of books weigh?

The key words are **all together** which means to add.

$$5\frac{3}{8} + 4\frac{2}{8} = 9\frac{5}{8}$$

The two boxes of books weigh  $9\frac{5}{8}$  kilograms.

### Exercise 8.4

Solve each word problem. Give your answer in simplest form in a sentence. Check your work using the answer key. The sentence you write may be a little different than the sentence in the answer key.

- a) John used  $1\frac{1}{4}$  metres of fabric to sew a shirt, and he used 2 metres of fabric to sew pants and a jacket. Combined, how much fabric did John use?

### Exercise 8.4 continued

b) Ali's school is  $12\frac{1}{10}$  kilometres from her house. How far does Ali travel going to and from school in one round trip? A round trip is the distance to and from.

c) Maria studies 1 hour on Monday,  $1\frac{1}{4}$  hours on Tuesday, 2 hours on Wednesday,  $\frac{2}{4}$  of an hour on Thursday. How many hours in total does she study in these four days?

d) After the bake sale, Jane had quite a few leftovers. She had  $1\frac{1}{12}$  dozen ginger cookies,  $2\frac{5}{12}$  dozen chocolate chip cookies, and  $3\frac{3}{12}$  dozen oatmeal cookies remaining. How many dozens of cookies were left over after the bake sale?

#### Answers to Exercise 8.4 – Word Problems

a)  $1\frac{1}{4} + 2 = 3\frac{1}{4}$  John used  $3\frac{1}{4}$  metres of fabric.

b)  $12\frac{1}{10} + 12\frac{1}{10} = 24\frac{2}{10} = 24\frac{1}{5}$  Ali travels  $24\frac{1}{5}$  kilometres to and from school.

c)  $1 + 1\frac{1}{4} + 2 + \frac{2}{4} = 4\frac{3}{4}$  Maria studies  $4\frac{3}{4}$  hours in four days.

d)  $1\frac{1}{12} + 2\frac{5}{12} + 3\frac{3}{12} = 6\frac{9}{12} = 6\frac{3}{4}$  After the bake sale, there were  $6\frac{3}{4}$  dozen cookies remaining.

## **8.1 – 8.4 Review: Adding Fractions and Mixed Numbers**

**A. Add. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.**

a) What is  $\frac{2}{5}$  and  $\frac{1}{5}$ ?

b)  $\frac{3}{4} + \frac{2}{4} =$

c)  $\frac{7}{12} + \frac{2}{12} =$

d) What is  $\frac{1}{2}$  and  $\frac{1}{2}$ ?

e)  $4\frac{1}{6} + 1\frac{4}{6} =$

f)  $\frac{8}{9} + 0 =$

g) What is  $\frac{1}{4}$  and  $10\frac{2}{4}$ ?

h)  $\frac{1}{12} + \frac{3}{12} + \frac{2}{12} =$

**B. Word Problems. Solve these word problems. They may be multiplication or division. Write your answer in a word sentence.**

i) A recipe for chocolate chip banana bread asks for  $\frac{3}{4}$  of a cup of chocolate chips for the bread and  $\frac{1}{4}$  of a cup of chocolate chips for the melted topping.

How many cups of chocolate chips are needed for the banana bread and the topping?

How many cups of chocolate chips are needed if the recipe is doubled?

j) Mark enjoys running. He runs  $1\frac{1}{4}$  hour on Friday,  $\frac{2}{4}$  of an hour on Saturday and , 2 hours on Sunday. For how many hours did he run during the three days?

**Answers to 8.1 – 8.4 Review - Multiplying Fractions**

a)  $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$

b)  $\frac{3}{4} + \frac{2}{4} = \frac{5}{4} = 1\frac{1}{4}$

c)  $\frac{7}{12} \times \frac{2}{12} = \frac{9}{12} = \frac{3}{4}$

d)  $\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$

e)  $4\frac{1}{6} + 1\frac{4}{6} = 5\frac{5}{6}$

f)  $\frac{8}{9} + 0 = \frac{8}{9}$

g)  $\frac{1}{4} + 10\frac{2}{4} = 10\frac{3}{4}$

h)  $\frac{1}{12} + \frac{3}{12} + \frac{2}{12} = \frac{6}{12} = \frac{1}{2}$

i)  $\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$  cup

One (1) cup of chocolate chips is needed.  
If the recipe is doubled, than 2 cups will be needed.

j)  $1\frac{1}{4} + \frac{2}{4} + 2 = 3\frac{3}{4}$

Mark runs  $3\frac{3}{4}$  hours over the three days.

## 8.5 Subtracting Like Fractions

### Vocabulary review

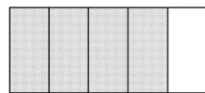
**Subtraction takes away** an amount from another amount.

The answer or result of subtraction is called the **difference**.

**Like fractions:** Fractions that have the same denominator.  $\frac{1}{4}$   $\frac{2}{4}$   $\frac{3}{4}$   $\frac{4}{4}$

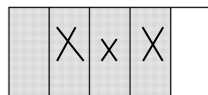
Adding and subtracting fractions has different rules than multiplying and dividing fractions.

**Example A** Take a look at these fractions. How many parts do you have in total?



$$\frac{4}{5}$$

Take away  $\frac{3}{5}$



$$\frac{4}{5} - \frac{3}{5} = \frac{1}{5}$$

When subtracting fractions, the fractions must have the same denominator.

To get the total, we subtract the numerators and keep the denominator the same.

### Exercise 8.5

Subtract the fractions. Check your fraction using the answer key. The first one a) is done for you.

a)  $\frac{2}{4} - \frac{1}{4} = \frac{2-1}{4} = \frac{1}{4}$

b)  $\frac{3}{5} - \frac{1}{5} =$

c)  $\frac{3}{3} - \frac{1}{3} =$

d)  $\frac{6}{7} - \frac{2}{7} =$

e)  $\frac{4}{5} - \frac{2}{5} =$

f)  $\frac{7}{8} - \frac{4}{8} =$

g)  $\frac{10}{11} - \frac{7}{11} =$

h)  $\frac{13}{22} - \frac{12}{22} =$

i)  $\frac{5}{4} - \frac{2}{4} =$

j)  $\frac{5}{6} - \frac{4}{6} =$

k)  $\frac{14}{20} - \frac{3}{20} =$

l)  $\frac{4}{9} - \frac{2}{9} =$

#### Answers to Exercise 8.5

a)  $\frac{1}{4}$

b)  $\frac{2}{5}$

c)  $\frac{2}{3}$

d)  $\frac{4}{7}$

e)  $\frac{2}{5}$

f)  $\frac{3}{8}$

g)  $\frac{3}{11}$

h)  $\frac{1}{22}$

i)  $\frac{3}{4}$

j)  $\frac{1}{6}$

k)  $\frac{11}{20}$

l)  $\frac{2}{9}$

## 8.6 Simplify After Subtracting Fractions

The answer or difference may have to be reduced to simplest form.

**Example B** What is the difference between these two fractions?

$$\frac{3}{4} \text{ and } \frac{1}{4} ?$$

If you said  $\frac{2}{4}$  you are correct.

But,  $\frac{2}{4}$  is not in its simplest form.

Write the equation.

$$\frac{3}{4} - \frac{1}{4} =$$

Subtract the numerators.

Denominator stays the same.

$$\frac{3-1}{4} = \frac{\overset{1}{\cancel{2}}}{\underset{2}{\cancel{4}}} = \frac{1}{2}$$

Reduce to simplest form.  
(reduce by  $\div 2$ )

---

**Example C** What is the difference between  $\frac{1}{2}$  and  $\frac{1}{2}$  ?

Write the equation.

$$\frac{1}{2} - \frac{1}{2} =$$

Subtract the numerators.

Denominator stays the same.

$$\frac{1-1}{2} = \frac{0}{2} = 0$$

There is nothing left.

---

**Example D** What is the difference between  $\frac{7}{5}$  and  $\frac{2}{5}$  ?

Write the equation.

$$\frac{7}{5} - \frac{2}{5} =$$

Subtract the numerators.

Denominator stays the same.

$$\frac{7-2}{5} = \frac{5}{5} = 1$$

Change to whole number

### Exercise 8.6

Find the difference. Write your answer in simplest form. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } \frac{5}{6} - \frac{2}{6} = \frac{5-2}{6} = \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{6}}} = \frac{1}{2}$$

$$\text{b) } \frac{7}{8} - \frac{1}{8} =$$

$$\text{c) } \frac{4}{3} - \frac{1}{3} =$$

$$\text{d) } \frac{9}{10} - \frac{3}{10} =$$

$$\text{e) } \frac{2}{3} - \frac{2}{3} =$$

$$\text{f) } \frac{7}{4} - \frac{2}{4} =$$

$$\text{g) } \frac{11}{12} - \frac{3}{12} =$$

$$\text{h) } \frac{13}{15} - \frac{8}{15} =$$

$$\text{i) } \frac{15}{7} - \frac{1}{7} =$$

$$\text{j) } \frac{5}{12} - \frac{2}{12} =$$

$$\text{k) } \frac{13}{20} - \frac{3}{20} =$$

$$\text{l) } \frac{4}{9} - \frac{1}{9} =$$

#### Answers to Exercise 8.6

$$\text{a) } \frac{1}{2}$$

$$\text{b) } \frac{6}{8} = \frac{3}{4}$$

$$\text{c) } \frac{3}{3} = 1$$

$$\text{d) } \frac{6}{10} = \frac{3}{5}$$

$$\text{e) } \frac{0}{3} = 0$$

$$\text{f) } \frac{5}{4} = 1\frac{1}{4}$$

$$\text{g) } \frac{8}{12} = \frac{2}{3}$$

$$\text{h) } \frac{5}{15} = \frac{1}{3}$$

$$\text{i) } \frac{14}{7} = 2$$

$$\text{j) } \frac{3}{12} = \frac{1}{4}$$

$$\text{k) } \frac{10}{20} = \frac{1}{2}$$

$$\text{l) } \frac{3}{9} = \frac{1}{3}$$

## **8.7 Subtracting Mixed Numbers**

When subtracting mixed numbers that have common denominators, first subtract the fractions and then subtract the whole numbers. This is different than what is done when adding mixed numbers.

**Example A**      What is  $4\frac{3}{5}$  less  $3\frac{1}{5}$ ?

Write the equation.  $4\frac{3}{5} - 3\frac{1}{5} =$

Subtract the numerators.  $\frac{3-1}{5} = \frac{2}{5}$

and

Subtract the whole numbers.  $4 - 3 = 1$

$$4\frac{3}{5} - 3\frac{1}{5} = 1\frac{2}{5}$$

---

**Example B**      What is  $4\frac{5}{8}$  less  $1\frac{3}{8}$ ?

Write the equation.  $4\frac{5}{8} - 1\frac{3}{8}$

Subtract like fractions.  $\frac{5-3}{8} = \frac{2}{8}$

and

Subtract the whole numbers.  $4 - 1 = 3$

$$4\frac{5}{8} - 1\frac{3}{8} = 3\frac{2}{8}$$

Reduce to simplest form  $3\frac{2}{8} = 3\frac{1}{4}$

## Subtracting Mixed Numbers continued

**Example C** What is  $5\frac{2}{3}$  less 2 ?

There is no fraction (you do not have to write  $\frac{0}{3}$  in)

Write the equation.

$$5\frac{2}{3} - 2\frac{0}{3} =$$

Notice there is no fraction to subtract.

Subtract like fractions.

$$\frac{2}{3} - \frac{0}{3} = \frac{2}{3} \quad (\text{There is nothing to subtract.})$$

and

Subtract the whole numbers.

$$5 - 2 = 3$$

$$5\frac{2}{3} - 2 = 3\frac{2}{3}$$

### Exercise 8.7

Find the difference. Reduce the answer to simplest form. Check your work using the answer key. The first one a) is done for you.

$$\text{a) } 4\frac{5}{6} - 2\frac{1}{6} = 2\frac{4}{6} = 2\frac{2}{3}$$

$$\text{b) } 4\frac{3}{5} - 4\frac{1}{5} =$$

$$\text{c) } 7\frac{7}{10} - 1\frac{1}{10} =$$

$$\text{d) } 2\frac{3}{7} - \frac{2}{7} =$$

**Exercise 8.7 continued**

e)  $12\frac{4}{5} - \frac{4}{5} =$

f)  $4\frac{4}{6} - 2\frac{1}{6} =$

g)  $6\frac{3}{4} - 1\frac{2}{4} =$

h)  $3\frac{7}{8} - 2 =$

i)  $4\frac{3}{4} - 1\frac{1}{4} =$

j)  $1\frac{3}{4} - 1\frac{3}{4} =$

**Answers to Exercise 8.7**

a)  $2\frac{2}{3}$

b)  $\frac{2}{5}$

c)  $6\frac{6}{10} = 6\frac{3}{5}$

d)  $2\frac{1}{7}$

e) 12

f)  $2\frac{3}{6} = 2\frac{1}{2}$

g)  $5\frac{1}{4}$

h)  $1\frac{7}{8}$

i)  $3\frac{2}{4} = 3\frac{1}{2}$

j) 0

## 8.8 Word Problems – Subtracting Mixed Numbers

### Example A

David had  $\frac{3}{4}$  of an hour to write a quiz. He only used  $\frac{2}{4}$  of an hour. How much time was remaining?

The key word is **remaining** which means to take away or subtract.

$$\frac{3}{4} - \frac{2}{4} = \frac{1}{4}$$

*There was  $\frac{1}{4}$  of an hour remaining.*

### Example B

A box of books weighed  $5\frac{3}{8}$  kilograms. Some books weighing  $3\frac{1}{8}$  kilograms were removed. What is the weight of the box of books after some were removed?

The key word is **removed** which means to subtract.

$$5\frac{3}{8} - 3\frac{1}{8} = 2\frac{2}{8}$$

Reduce to simplest form

$$2\frac{\overset{1}{\cancel{2}}}{\underset{4}{\cancel{8}}} = 2\frac{1}{4}$$

*After some books were removed, the box weighed  $2\frac{1}{4}$  kilograms.*

### Exercise 8.8

Solve each word problem. Give your answer in simplest form in a sentence. Check your work using the answer key. The sentence you write may be a little different than the sentence in the answer key.

- a) John had  $3\frac{1}{4}$  metres of fabric. He used  $1\frac{1}{4}$  metres to sew a shirt. How much fabric was left over?

### Exercise 8.8 continued

b) The store where Ali works is  $9\frac{7}{10}$  kilometres from her house. She takes the bus for most of the distance, except for  $3\frac{4}{10}$  kilometres when she walks. How many kilometres does she travel on the bus to get to work?

c) Maria spent  $4\frac{3}{4}$  hours at the mall on Saturday. Just after she arrived to the mall, she saw a movie that was  $2\frac{1}{4}$  hours long. How much time was remaining after she saw the movie?

d) Jane had  $6\frac{5}{12}$  dozen ginger cookies for sale at her bake sale. After the sale, she had  $1\frac{1}{12}$  dozen remaining. How many dozen ginger cookies did she sell?

#### Answers to Exercise 8.8 – Word Problems

a)  $3\frac{1}{4} - 1\frac{1}{4} = 2$  John had 2 metres of fabric left over.

b)  $9\frac{7}{10} - 3\frac{4}{10} = 6\frac{3}{10}$  Ali travels  $6\frac{3}{10}$  on the bus to work.

c)  $4\frac{3}{4} - 2\frac{1}{4} = 2\frac{2}{4} = 2\frac{1}{2}$  There was  $2\frac{1}{2}$  hours remaining after Maria saw the movie.

d)  $6\frac{5}{12} - 1\frac{1}{12} = 5\frac{4}{12} = 5\frac{1}{3}$  Jane sold  $5\frac{1}{3}$  dozen ginger cookies at her bake sale.

# **Review of Rules for Adding, Subtracting, Multiplying & Dividing Fractions**

## **Addition of Fractions – A common denominator is required.**

1. Find the lowest common denominator if necessary.
2. Change fractions into equivalent fractions having the lowest common denominator.
3. Add numerators.
4. Use the common denominator in the answer
5. Reduce to simplify the answer if necessary.

## **Subtraction of Fractions – A common denominator is required.**

1. Find the lowest common denominator if necessary.
2. Change fractions into equivalent fractions having the lowest common denominator.
3. Change to improper fractions or borrow if necessary.
4. Subtract numerators.
5. Use the common denominator in the answer
6. Reduce to simplify the answer if necessary.

## **Multiplication of Fractions – A common denominator is NOT required**

1. Change mixed numbers to improper fractions and whole numbers to fractions over 1 if necessary.
2. Cancel if possible.
3. Multiply the numerators.
4. Multiply the denominators
5. Simplify the answer if required.

## **Division of Fractions - A common denominator is NOT required**

1. Change mixed numbers to improper fractions and whole numbers to fractions over 1 if necessary.
2. Invert the 2<sup>nd</sup> fraction and change the  $\div$  sign to  $\times$ . (kiss (x) and flip).
3. Cancel if possible.
4. Multiply the numerators.
5. Multiply the denominators
6. Simplify the answer if required.

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## **Unit 8 Review – Adding and Subtracting Fractions**

You will now practice all the skills you learned in Unit 8. Check your work using the answer key at the end of the review.

**A. Add. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.**

a) What is  $\frac{1}{5}$  and  $\frac{2}{5}$ ?

b)  $\frac{3}{8} + \frac{4}{8} =$

c)  $\frac{8}{9} + \frac{2}{9} =$

d) What is  $\frac{5}{8}$  and  $\frac{3}{8}$ ?

e)  $\frac{9}{14} + \frac{3}{14} =$

f)  $\frac{1}{4} + \frac{1}{4} =$

g)  $\frac{1}{3} + \frac{3}{3} =$

h)  $2\frac{1}{4} + \frac{1}{4} =$

i)  $7\frac{2}{5} + 1\frac{1}{5} =$

j)  $3\frac{1}{6} + 2\frac{2}{6} =$

k) What is  $\frac{1}{4}$  and  $3\frac{1}{4}$ ?

l)  $2\frac{3}{8} + \frac{0}{8} =$

### **Adding and Subtracting Fractions Review continued**

m)  $\frac{1}{14} + \frac{6}{14} =$

n)  $\frac{12}{4} + \frac{3}{4} =$

o)  $\frac{2}{4} + \frac{1}{4} =$

p)  $\frac{5}{9} + \frac{3}{9} =$

**B. Subtract. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.**

a)  $\frac{7}{8} - \frac{2}{8} =$

b)  $\frac{9}{10} - \frac{6}{10} =$

c)  $\frac{5}{8} - \frac{3}{8} =$

d)  $\frac{3}{4} - \frac{1}{4} =$

e)  $\frac{7}{9} - \frac{4}{9} =$

f)  $\frac{8}{4} - \frac{4}{4} =$

g)  $3\frac{4}{5} - 1\frac{1}{5} =$

h)  $4\frac{11}{15} - 1\frac{1}{15} =$

i)  $4\frac{3}{4} - \frac{2}{4} =$

j)  $\frac{4}{5} - \frac{4}{5} =$

### **Adding and Subtracting Fractions Review continued**

k)  $2\frac{3}{7} - 1\frac{1}{7} =$

l)  $4\frac{5}{9} - 3\frac{2}{9} =$

m)  $\frac{12}{14} - \frac{5}{14} =$

n)  $8\frac{7}{10} - 1\frac{7}{10} =$

o)  $\frac{5}{8} - \frac{2}{8} =$

p)  $\frac{11}{12} - \frac{8}{12} =$

**C. Word Problems. Solve these word problems. They may be adding or subtracting. Write your fraction or mixed number in simplest form and in a word sentence.**

a) Jack has a box of cereal that is  $\frac{3}{4}$  full. If he eats  $\frac{1}{4}$  of the box of cereal in a week, then how much remains?

b) At the evening GED class the instructor gave a test. The highest mark on the test would be  $\frac{25}{25}$ .

Joe answered  $\frac{21}{25}$  questions correctly. What fraction of questions did Joe answer incorrectly?

### **Adding and Subtracting Fractions Review continued**

**C. Word Problems. Solve these word problems. They may be addition or subtraction. Write your answer in simplest form in a word sentence.**

c) A recipe calls for  $\frac{2}{3}$  cup of sugar per pie. Kate is going to triple the recipe. How many cups of sugar will she need?

d) Sandy made two doll dresses which used  $\frac{1}{16}$  of a metre of fabric each. How much fabric did she use in total?

e) The car trip took  $3\frac{3}{4}$  hours from start to finish. Within that time was a  $\frac{1}{4}$  hour rest break from driving. How much of the time was spent driving?

f) Maria carried three boxes of books to her car. The first box weighed  $6\frac{1}{10}$  kilograms. The second box weighed  $3\frac{2}{10}$  kilograms and the third box weighed  $5\frac{2}{10}$  kilograms. How much do the three boxes weigh in total?

#### **Answers to Unit 8 Review**

##### **A. Add.**

a)  $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

b)  $\frac{3}{8} + \frac{4}{8} = \frac{7}{8}$

c)  $\frac{8}{9} + \frac{2}{9} = \frac{10}{9} = 1\frac{1}{9}$

d)  $\frac{5}{8} + \frac{3}{8} = \frac{8}{8} = 1$

e)  $\frac{9}{14} + \frac{3}{14} = \frac{12}{14} = \frac{6}{7}$  reduce by 2

f)  $\frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$  reduce by 2

g)  $\frac{1}{3} + \frac{3}{3} = \frac{4}{3} = 1\frac{1}{3}$

h)  $2\frac{1}{4} + \frac{1}{4} = 2\frac{2}{4} = 2\frac{1}{2}$  reduce by 2

continued on next page

## Answers to Unit 8 Review

### A. Adding continued

i)  $7\frac{2}{5} + 1\frac{1}{5} = 8\frac{3}{5}$

j)  $3\frac{1}{6} + 2\frac{2}{6} = 5\frac{3}{6} = 5\frac{1}{2}$  reduce by 2

k)  $\frac{1}{4} + 3\frac{1}{4} = 3\frac{2}{4} = 3\frac{1}{2}$  reduce by 2

l)  $2\frac{3}{8} + 0 = 2\frac{3}{8}$

m)  $\frac{1}{14} + \frac{6}{14} = \frac{7}{14} = \frac{1}{2}$  reduce by 2

n)  $\frac{12}{4} + \frac{3}{4} = \frac{15}{4} = 3\frac{3}{4}$

o)  $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

p)  $\frac{5}{8} + \frac{3}{9} = \frac{8}{9}$

### B. Subtract.

a)  $\frac{7}{8} - \frac{2}{8} = \frac{5}{8}$

b)  $\frac{9}{10} - \frac{6}{10} = \frac{3}{10}$

c)  $\frac{5}{8} - \frac{3}{8} = \frac{2}{8} = \frac{1}{4}$  reduce by 2

d)  $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$  reduce by 2

e)  $\frac{7}{9} - \frac{4}{9} = \frac{3}{9} = \frac{1}{3}$

f)  $\frac{8}{4} - \frac{4}{4} = \frac{4}{4} = 1$

g)  $3\frac{4}{5} - 1\frac{1}{5} = 2\frac{3}{5}$

h)  $4\frac{11}{15} - 1\frac{1}{15} = 3\frac{10}{15} = 3\frac{2}{3}$  reduce by 5

i)  $4\frac{3}{4} - \frac{2}{4} = 4\frac{1}{4}$

j)  $\frac{4}{5} - \frac{4}{5} = 0$

k)  $2\frac{3}{7} - 1\frac{1}{7} = 1\frac{2}{7}$

l)  $4\frac{5}{9} - 3\frac{2}{9} = 1\frac{3}{9} = 1\frac{1}{3}$  reduce by 3

m)  $\frac{12}{14} - \frac{5}{14} = \frac{7}{14} = \frac{1}{2}$  reduce by 7

n)  $8\frac{7}{10} - 1\frac{7}{10} = 7$

o)  $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$

p)  $\frac{11}{12} - \frac{8}{12} = \frac{3}{12} = \frac{1}{4}$

### C. Word problems

a) subtract  $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$  reduce by 2 Jack will have  $\frac{1}{2}$  box of cereal remaining.

b) subtract  $\frac{25}{25} - \frac{21}{25} = \frac{4}{25}$  Joe answered  $\frac{4}{25}$  questions incorrectly.

c) add  $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{6}{3} = 2$  cups If the recipe were tripled, Kate will need 2 cups of sugar.

d) add  $\frac{1}{16} + \frac{1}{16} = \frac{2}{16} = \frac{1}{8}$  Sandy used  $\frac{1}{8}$  of a metre of fabric.

e) subtract  $3\frac{3}{4} - \frac{1}{4} = 3\frac{1}{2}$  Three hours were spent driving.

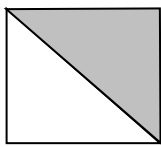
f) add  $6\frac{1}{10} + 3\frac{2}{10} + 5\frac{2}{10} = 14\frac{5}{10} = 14\frac{1}{2}$  The three boxes weighed  $14\frac{1}{2}$  kilograms.

## Units 6, 7 & 8 Fractions Review

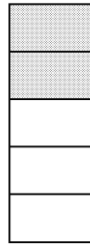
1) In the fraction  $\frac{2}{7}$ , the 2 is called the \_\_\_\_\_  
and the 7 is called the \_\_\_\_\_.

2) What part of the whole is shaded? Write your answer as a fraction.

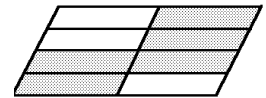
a)



b)



c)



3) Write the following fractions in words:

a)  $\frac{1}{2}$  \_\_\_\_\_

b)  $\frac{3}{4}$  \_\_\_\_\_

4) Compare the following fractions. Use < or > or = signs.

a)  $\frac{2}{9}$        $\frac{5}{9}$

b)  $\frac{3}{10}$        $\frac{1}{10}$

5) Types of Fractions

a) Circle the proper fractions.       $\frac{4}{7}$        $\frac{8}{3}$        $\frac{1}{2}$        $\frac{4}{4}$

b) Circle the improper fractions.       $\frac{5}{2}$        $\frac{3}{3}$        $\frac{2}{7}$        $1\frac{2}{9}$

c) Circle the mixed numbers.       $4\frac{1}{4}$        $7\frac{3}{8}$        $\frac{2}{3}$        $\frac{14}{3}$

## Units 6, 7 & 8 Fraction Review continued

6) Change the following improper fractions to mixed or whole numbers.

a)  $\frac{7}{5}$  \_\_\_\_\_      b)  $\frac{8}{3}$  \_\_\_\_\_      c)  $\frac{5}{5}$  \_\_\_\_\_      d)  $\frac{6}{2}$  \_\_\_\_\_

7) Change the following mixed and whole numbers to improper fractions:

a)  $1\frac{3}{5}$  \_\_\_\_\_      b)  $2\frac{5}{7}$  \_\_\_\_\_      c)  $7\frac{1}{4}$  \_\_\_\_\_      d) 5 \_\_\_\_\_

8) Factors and Factorization

Find the common factors and the Greatest Common Factor (GCF).

|    | Numbers  | Factors | Common Factors | GCF |
|----|----------|---------|----------------|-----|
| a) | 12<br>18 |         |                |     |
| b) | 15<br>30 |         |                |     |

9) Use cross products to determine if the fractions are equivalent. If they are equivalent, write = . If they are not equivalent, write  $\neq$  .

a)  $\frac{2}{4}$  and  $\frac{8}{16}$                       b)  $\frac{6}{9}$  and  $\frac{5}{6}$

## Units 6, 7 & 8 Fraction Review continued

10) Use a factor tree to find the prime factors for each number.  
Write the prime numbers in an equation

a) 18

b) 40

11) Solve the fraction equations. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.

a)  $\frac{7}{8} \times \frac{2}{3} =$

b)  $\frac{4}{15} \times \frac{5}{8} =$

b)  $0 \times \frac{1}{4} =$

d)  $5 \times \frac{3}{5} =$

d)  $1\frac{2}{7} \times 1\frac{3}{4} =$

f)  $3\frac{1}{3} \times \frac{6}{15} =$

## Units 6, 7 & 8 Fraction Review continued

Solve the fraction equations. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.

g)  $\frac{7}{2} \div \frac{3}{4} =$

h)  $\frac{3}{10} \div \frac{6}{5} =$

i)  $\frac{3}{7} \div 6 =$

j)  $\frac{15}{9} \div 3 =$

k)  $2\frac{1}{4} \div 1\frac{2}{7} =$

l)  $9 \div \frac{3}{7} =$

## Units 6, 7 & 8 Fraction Review continued

Solve the fraction equations. Write your answer in simplest form. If your answer is an improper fraction, change it to a mixed number.

m)  $\frac{1}{3} + \frac{3}{3} =$

n)  $2\frac{1}{4} + \frac{1}{4} =$

o)  $7\frac{2}{5} + 1\frac{1}{5} =$

p)  $3\frac{1}{6} + 2\frac{2}{6} =$

q)  $\frac{7}{9} - \frac{4}{9} =$

r)  $\frac{8}{4} - \frac{4}{4} =$

s)  $3\frac{4}{5} - 1\frac{1}{5} =$

t)  $4\frac{11}{15} - 1\frac{1}{15} =$

## Units 6, 7 & 8 Fraction Review continued

12) Fractions in word problems. Write the answer in the simplest form. Write the answer in a sentence.

a) Kate sews tablecloths which require  $1\frac{1}{4}$  metres of fabric. How many tablecloths can she sew from 10 metres of fabric?

b) The school is  $4\frac{2}{3}$  kilometres from John's home. He has walked  $\frac{1}{2}$  of the way. How many kilometres remain?

c) Karen rides her bike  $5\frac{7}{8}$  kilometers. David rides his bike  $4\frac{1}{8}$  kilometers. How many kilometers did they ride their bikes in total?

How much further did Karen ride her bike than David?

## Units 6, 7 & 8 Fraction Review continued

Fractions in word problems. Write the answer in the simplest form.  
Write the answer in a sentence.

- d) Jack bought  $5\frac{1}{4}$  kilograms of rice. After he buys it, he separates it into  $\frac{1}{4}$  kilogram containers. How many containers will he need?
- e) There are 4 pie plates. Each plate contains  $\frac{5}{8}$  of a pie. How many pies are there in all?
- f) Linda practiced the piano for  $1\frac{3}{4}$  of an hour on Saturday and for  $\frac{3}{4}$  of an hour on Sunday. How many hours did she practice altogether?
- g) Mary used  $3\frac{5}{8}$  cups of flour for making bread. She used  $1\frac{4}{8}$  cups of flour for cookies. How much more flour did she use for making bread?

## Units 6, 7 & 8 Fraction Review continued

### Answers to Units 6, 7 & 8 Fractions Review

1) 2 is called the numerator and the 7 is called the denominator. 2) a)  $\frac{1}{2}$  b)  $\frac{2}{5}$  c)  $\frac{5}{8}$

3) a) one-half, one over two or one out of two b) three-quarters, three-fourths, three out of four or three over four

4a)  $\frac{2}{9} < \frac{5}{9}$  b)  $\frac{3}{10} > \frac{1}{10}$  5) a) proper  $\frac{4}{7}$   $\frac{1}{2}$  b) improper  $\frac{5}{2}$   $\frac{3}{3}$  c) mixed  $4\frac{1}{4}$   $7\frac{3}{8}$

6) a)  $\frac{7}{5} = 1\frac{2}{5}$  b)  $\frac{8}{3} = 2\frac{2}{3}$  c)  $\frac{5}{5} = 1$  d)  $\frac{6}{2} = 3$

7) a)  $1\frac{3}{5} = \frac{8}{5}$  b)  $2\frac{5}{7} = \frac{19}{7}$  c)  $7\frac{1}{4} = \frac{29}{4}$  d)  $5 = \frac{5}{1}$

| 8. Factors Numbers | Factors                                                              | Common Factors | Greatest Common Factor |
|--------------------|----------------------------------------------------------------------|----------------|------------------------|
| a) 12, 18          | ... of 12 are 1, 2, 3, 4, 6, 12<br>... of 18 are 1, 2, 3, 6, 9, 18   | 1, 2, 3, 6     | 6                      |
| b) 15, 30          | ... of 15 are 1, 3, 5, 15<br>... of 30 are 1, 2, 3, 5, 6, 10, 15, 30 | 1, 3, 5, 15    | 15                     |

9) Cross products a) is equivalent =  $2 \times 16 = 32$   $4 \times 8 = 32$   
b) is not equivalent  $\neq$   $6 \times 6 = 36$   $9 \times 5 = 45$

10) a)  $2 \times 3 \times 3 = 18$  b)  $2 \times 2 \times 2 \times 5 = 40$

11) a)  $\frac{7}{8} \times \frac{2}{3} = \frac{7}{12}$  b)  $\frac{4}{3} \times \frac{1}{2} = \frac{1}{6}$  c) 0 (anything times 0 is 0) d)  $\frac{1}{1} \times \frac{3}{1} = \frac{3}{1} = 3$

e)  $\frac{9}{1} \times \frac{1}{4} = \frac{9}{4} = 2\frac{1}{4}$  f)  $\frac{10}{1} \times \frac{2}{3} = \frac{4}{3} = 1\frac{1}{3}$

Change to multiplication and flip the second fraction

g)  $\frac{7}{1} \times \frac{2}{3} = \frac{14}{3} = 4\frac{2}{3}$  h)  $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$  i)  $\frac{1}{7} \times \frac{1}{2} = \frac{1}{14}$

j)  $\frac{5}{9} \times \frac{1}{3} = \frac{5}{9}$  k)  $\frac{1}{2} \times \frac{1}{1} = \frac{1}{2}$  l)  $\frac{3}{1} \times \frac{7}{1} = \frac{21}{1} = 21$

### Answers to Units 6, 7 & 8 Fractions Review

11) m)  $\frac{4}{3} = 1\frac{1}{3}$

n)  $2\frac{2}{4} = 2\frac{1}{2}$

o)  $8\frac{3}{5}$

p)  $5\frac{3}{6} = 5\frac{1}{2}$

q)  $\frac{3}{9} = \frac{1}{3}$

r)  $\frac{4}{4} = 1$

s)  $2\frac{3}{5}$

t)  $3\frac{10}{15} = 3\frac{2}{3}$

#### Word problems

12) a) divide  $10 \div 1\frac{1}{4} = 8$  Kate can sew 8 tableclothes.

b) multiply  $4\frac{2}{3} \times \frac{1}{2} = \frac{7}{3} = 2\frac{1}{3}$  John has  $2\frac{1}{3}$  km left to walk.

c) add  $5\frac{7}{8} + 4\frac{1}{8} = 9\frac{8}{8} = 9 + 1 = 10$  They rode their bikes 10 kilometres in total.

subtract  $5\frac{7}{8} - 4\frac{1}{8} = 1\frac{6}{8} = 1\frac{3}{4}$  Karen rode her bike  $1\frac{3}{4}$  kilometres more than David.

d) divide  $5\frac{1}{4} \div \frac{1}{4} = 21$  Jack will need 21 containers.

e) multiply  $4 \times \frac{5}{8} = \frac{5}{2} = 2\frac{1}{2}$  In total there are  $2\frac{1}{2}$  pies.

f) add  $1\frac{3}{4} + \frac{3}{4} = 1\frac{6}{4} = 1\frac{3}{2} = 1 + 1\frac{1}{2} = 2\frac{1}{2}$  In total she practiced  $2\frac{1}{2}$  hours.

g) subtract  $3\frac{5}{8} - 1\frac{4}{8} = 2\frac{1}{8}$  She used  $2\frac{1}{8}$  cups more flour when making bread.

# **Basic Math 1 Course Review**

## **Part 1: Whole Numbers**

1) Write the following numbers in words:

a) 3008\_\_\_\_\_

b) 5324\_\_\_\_\_

c) 66 023\_\_\_\_\_

d) 201 111\_\_\_\_\_

e) 27 263 303\_\_\_\_\_

\_\_\_\_\_

2) Write the following numbers in standard form:

a) seven hundred twenty-four \_\_\_\_\_

b) eleven thousand twelve \_\_\_\_\_

c) six hundred thousand \_\_\_\_\_

d) five thousand eight hundred \_\_\_\_\_

e) three million two hundred three thousand five \_\_\_\_\_

3) Write the following number in expanded notation.

**42 135**

4) Write the place value of the 5 in each number given below:

a) 45 \_\_\_\_\_

b) 52 113 \_\_\_\_\_

c) 6503 \_\_\_\_\_

d) 711 569 \_\_\_\_\_

5) Look at the number below and answer the following questions

**68 370 542 196**

The 8 is in the \_\_\_\_\_place

The 0 is in the \_\_\_\_\_place

The 2 is in the \_\_\_\_\_place

The 7 is in the \_\_\_\_\_place

The 9 is in the \_\_\_\_\_place

6) Round the number below to the tens place.

a) 254\_\_\_\_\_

Round the number below to the hundreds place.

b) 67 463\_\_\_\_\_

Round the number below to the thousands place.

c) 887 345\_\_\_\_\_

Round the number below to the ten thousands place.

d) 52 467 789\_\_\_\_\_

Round the number below to the hundred thousands place.

e) 1 723 271\_\_\_\_\_

Round the number below to the millions place.

f) 1 723 271\_\_\_\_\_

7) Arrange the numbers below in columns and add:

a)  $9579 + 614 + 11283 + 64 =$

b.  $1032 + 4 + 23130 + 798 + 31 =$

8) Provide the actual and the estimated sum for each of the following two questions.

a)  $1289 + 5697 + 1314 + 912 =$

**Actual**

**Estimated**

b)  $564 + 3214 + 68 =$

**Actual**

**Estimated**

9) John went on a cycle tour for 4 days. He cycled 119 km on the first day, 82 km on the second day, 108 km on the third day, and only 24 km on the fourth day. How far did he cycle altogether?

10) Last week Leon earned \$789. This week he earned \$812. How much did he earn in all?  
How much more money did he earn this week?

11) Find the difference for each of the following questions:

a)  $900 - 394 =$

b)  $73\,483 - 20\,261 =$

12) Find the actual and the estimated sum for each of the following two questions.

a)  $641 - 348 =$

*Actual*

*Estimated*

b)  $653\,747 - 103\,916 =$

*Actual*

*Estimated*

13) Last week Jane's Potatoes plant processed 229 000 kilograms of potatoes. This week they processed 102 132 kilograms. How many fewer kilograms of potatoes did they process this week?

14) Kate collects fancy scarves. She has 195 of them and over the holidays added 10 to her collection. Betty also collects fancy scarves. She has 172 of them and over the holidays added 13 to her collection. How many more scarves does Kate have than Betty at the end of the holidays?

15)  $37 \times 0 =$

16)  $541 \times 1 =$

17) Rewrite the following questions in columns and solve:

a)  $814 \times 3 =$

b)  $786 \times 15 =$

c)  $5200 \times 795 =$

18) Find the actual and the estimated answer for the following question.

$58\,411 \times 45 =$   
*Actual*

*Estimated*

19) A television distributor, distributes 16 460 televisions in a week. How many televisions can be distributed in 15 weeks?

20) Chung wants to buy a used vehicle. The bank has told him that he needs to put \$5,000 down and then pay the rest over the next 4 years. Chung will pay \$400 a month for 48 months. How much will Chung end up paying for his car in total?

21) Provide the solutions to the following four questions:

a)  $12 \div 0 =$

b)  $17 \div 17 =$

c)  $0 \div 15 =$

d)  $131 \div 1 =$

22) Rewrite each of the following questions and solve. Show the remainder.

a)  $752 \div 5 =$

b)  $9654 \div 8 =$

c)  $694 \div 26 =$

d)  $72\,652 \div 11 =$

23) Maluth earned \$4472 last year delivering morning papers. How much did he earn each week? (There are 52 weeks in a year.)

24) Rewrite and solve the following question and use multiplication to check your answer.

$$7425 \div 225 =$$

25) Give the correct term for the following:

a) What is the answer to an addition question? \_\_\_\_\_

b) What is the answer to a subtraction question? \_\_\_\_\_

c) What is the answer to a multiplication question? \_\_\_\_\_

d) What is the answer to a division question? \_\_\_\_\_

26) There were 9420 seats in a concert hall. There were 30 seats in each row. How many rows were there in the concert hall?

27) Ira wants to build a fence around the perimeter of his corn field. The length of his field is 150 meters and the width is 75 meters. How many meters of fence does he have to build?

28) Solve:

a)  $2 + 3 \times 8 =$

b)  $55 - 28 \div 7 \times (36 \div 4) =$

c)  $10 + (10 - 2) \div 2 + 4 =$

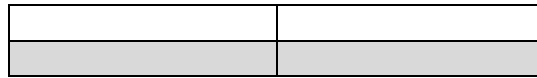
**The answer key is after the Fractions Review.**

## PART 2: Fractions

1) In the fraction  $\frac{3}{4}$

- a) the numerator is \_\_\_\_\_  
b) the denominator is \_\_\_\_\_

2) In the fraction below, what is the fraction represented by the shaded part? \_\_\_\_\_



3) Simplify the following fractions:

- a)  $\frac{3}{3}$                       b)  $\frac{7}{1}$                       c)  $\frac{0}{4}$                       d)  $\frac{5}{0}$

4) Show the following numbers as products of prime factors:

- a) 48                                              b) 55

5) Write the number 8 as a fraction. \_\_\_\_\_

6) Place the following fractions in order from smallest to largest.

$\frac{3}{8}$        $\frac{1}{8}$        $\frac{5}{8}$        $\frac{8}{8}$

\_\_\_\_\_

7) Reduce each of the following fractions to simplest form:

- a)  $\frac{12}{30}$                       b)  $\frac{10}{15}$                       c)  $\frac{6}{18}$                       d)  $\frac{3}{4}$

8) Prove whether these fractions are equal or not. Write = or  $\neq$  between the fractions.

a)  $\frac{3}{4}$        $\frac{7}{8}$

b)  $\frac{2}{3}$        $\frac{8}{12}$

c)  $\frac{1}{5}$        $\frac{4}{20}$

d)  $\frac{3}{8}$        $\frac{7}{16}$

9) Identify the following fractions as proper, improper or mixed.

$\frac{1}{8}$

$\frac{11}{6}$

$2\frac{1}{3}$

$\frac{4}{9}$

$\frac{22}{5}$

$\frac{1}{1}$

$\frac{0}{8}$

$12\frac{11}{18}$

proper \_\_\_\_\_

improper \_\_\_\_\_

mixed \_\_\_\_\_

10) Change the following improper fractions below to mixed numbers. Reduce the fraction to simplest form if necessary.

a)  $\frac{14}{7}$

b)  $\frac{26}{3}$

c)  $\frac{18}{4}$

11) Change the following mixed numbers to improper fractions.

a)  $10\frac{3}{5}$

b)  $2\frac{1}{4}$

c)  $2\frac{11}{12}$

12) Multiply the following fractions. **Reduce to lowest terms.**

a.  $\frac{3}{4} \times \frac{8}{9}$

b.  $1\frac{1}{2} \times 4\frac{3}{4}$

c)  $8 \times \frac{15}{16}$

d.  $\frac{2}{5} \times \frac{10}{11} \times 2\frac{1}{5}$

e.  $\frac{6}{7} \times \frac{2}{3} \times \frac{7}{8}$

f.  $1\frac{1}{6}$  of  $2\frac{2}{5}$

g.  $2\frac{7}{8} \times 1\frac{1}{3}$

h.  $\frac{2}{5}$  of 500

13) On Tuesday Erin brought in \$5000 of sales for the company she works for. She earns  $\frac{2}{5}$  of the money she makes on sales. How much does she earn?

14) A hotel has 100 rooms. Of these rooms  $\frac{9}{10}$  are for non-smokers. How many rooms are for non-smokers?

15) On the blanks below the fractions, give the reciprocals of each of the following numbers:

a.  $\frac{1}{4}$

\_\_\_\_\_

b.  $\frac{2}{3}$

\_\_\_\_\_

c.  $\frac{3}{5}$

\_\_\_\_\_

d. 8

\_\_\_\_\_

16) Divide the following fractions. **Reduce to lowest terms.**

a.  $10 \div \frac{1}{2}$

b.  $\frac{7}{8} \div \frac{15}{16}$

c.  $4\frac{2}{3} \div 1\frac{3}{4}$

d.  $3\frac{3}{5} \div 9$

e.  $\frac{2}{5} \div \frac{3}{4}$

f.  $3\frac{1}{5} \div 1\frac{3}{5}$

**Give your answer to the all word problems as a fraction in simplest form in a word sentence.**

17) How many  $\frac{3}{4}$  liter fuel tanks can be filled from 15 liters of fuel?

18) How many  $\frac{2}{3}$  liter sprayers can be filled from 36 liters of insect spray?

19) There are 18 meters of material. Saba requires  $2\frac{1}{4}$  meters for each skirt she wishes to make. How many skirts can Saba make?

20) Last week Moira worked for 10 hours at her part time job. She makes  $12\frac{1}{2}$  dollars for each hour she works. How much money did Moira make last week?

21) If a car requires  $2\frac{5}{8}$  liters of paint to have it painted, find the number of liters needed to paint 8 cars.

22) Add the following fractions. **Reduce to lowest terms.**

a)  $\frac{3}{4} + \frac{1}{4} =$

b)  $\frac{1}{5} + \frac{3}{5} =$

c)  $\frac{3}{27} + \frac{6}{27} =$

d)  $\frac{16}{30} + \frac{4}{30} =$

e)  $\frac{10}{12} + \frac{1}{12} =$

f)  $8\frac{1}{7} + 2\frac{3}{7} =$

g)  $3\frac{2}{15} + 1\frac{9}{15} =$

h)  $1\frac{4}{12} + 2\frac{5}{12} =$

23) Marie and Sharifa both bought tomatoes. Marie bought  $2\frac{1}{4}$  kilograms and Sharifa bought  $3\frac{1}{4}$  kilograms. How many kilograms did they purchase in total together?

24) Subtract the following fractions. Reduce to lowest terms.

a.  $\frac{7}{8} - \frac{3}{8} =$

b.  $13\frac{11}{12} - 10\frac{7}{12} =$

c.  $\frac{28}{2} - \frac{1}{2} =$

d.  $\frac{4}{10} - \frac{3}{10} =$

e.  $\frac{8}{14} - \frac{3}{14} =$

f.  $7\frac{15}{20} - 4\frac{3}{20} =$

25) Charles ordered  $8\frac{3}{4}$  cases of bananas from his distributor on last week. This week he is ordering  $6\frac{1}{4}$  cases. How many more cases did he order last week than this week?

## Answers to Basic Math 1 Course Review

### Whole Numbers

- 1) a) three thousand eight                      b) five thousand three hundred twenty-four  
c) sixty-six thousand twenty-three              d) two hundred one thousand one hundred eleven  
e) twenty-seven million two hundred sixty-three thousand three hundred three
- 2) a) 724              b) 11 012              c) 600 000              d) 5800              e) 3 203 005
- 3)  $40\,000 + 2000 + 100 + 30 + 5$
- 4) a) 45, ones      b) 52 113, ten thousands,              c) 6503, hundreds              d) 711 569, hundreds
- 5) 8, billions,      0, millions              2, thousands              7, ten millions              9, tens
- 6) a) 250              b) 67 500              c) 887 000              d) 52 470 000              e) 1 700 000              f) 2 000 000
- 7) a) 21 540              b) 24 995
- 8) a) 9212               $1000+6000+1000+900 = 8900$               b) 3846               $600+3000+70 = 3670$
- 9) 333 km              John rode 333 km altogether.
- 10) Leon earned \$1601 in total. This week he earned \$23 more.      11) a) 506              b) 53 222
- 12) a) 293               $600-300 = 300$               b) 549 831               $700\,000 - 100\,000 = 600\,000$
- 13)  $229\,000 - 102\,132 = 126\,868$  There were 26 868 fewer kilograms of potatoes produced.
- 14)  $195+10 = 205$                $172+13 = 185$                $205 - 185 = 20$  pounds. Kate has 20 more scarves.
- 15) 0              16) 541              17) a) 2442              b) 11 790              c) 4 134 000
- 18) 2 628 495               $60\,000 \times 50 = 3\,000\,000$               19) 246 900
- 20)  $400 \times 48 = 19\,200$                $19\,200 + 5000 = 24\,200$  Chung will pay \$24 200 for the car.
- 21) a) undefined              b) 1              c) 0              d) 131
- 22) a) 150 R2              b) 1206 R6              c) 26 R18              d) 6604 R8
- 23) divide.              Maluth earned \$86 per week.              24) 33              Check  $33 \times 225 = 7425$
- 25) a) sum              b) difference              c) product              d) quotient
- 26) divide              314 rows              There were 314 rows in the concert hall.
- 27)  $150+75+150+75 = 450\text{m}$               He has to build 450 metres of fence.
- 28) a)  $2 + 24 = 26$               b)  $55 - 4 \times 9 = 55 - 36 = 19$               c)  $10 + 8 \div 2 + 4 = 10 + 4 + 4 = 18$

**Answers to Basic Math 1 Course Review**  
**Fractions**

1) a) numerator is 3      b) denominator is 4      2)  $\frac{2}{4}$

3) a) 1    b) 7      c) 0      d) undefined

4) a)  $2 \times 2 \times 2 \times 2 \times 3 = 48$     b)  $11 \times 5 = 55$       5)  $\frac{8}{1}$       6)  $\frac{1}{8} \quad \frac{3}{8} \quad \frac{5}{8} \quad \frac{8}{8}$

7) a)  $\frac{2}{5}$     b)  $\frac{2}{3}$       c)  $\frac{1}{3}$       d)  $\frac{3}{4}$       8) a)  $\neq$     b)  $=$       c)  $=$       d)  $\neq$

9) proper  $\frac{1}{8} \quad \frac{4}{9} \quad \frac{0}{8}$       improper  $\frac{11}{6} \quad \frac{22}{5} \quad \frac{1}{1}$       mixed  $2\frac{1}{3} \quad 12\frac{11}{18}$

10) a) 2    b)  $8\frac{2}{3}$     c)  $4\frac{1}{2}$       11) a)  $\frac{53}{5}$     b)  $\frac{9}{4}$     c)  $\frac{35}{12}$

12) a)  $\frac{2}{3}$     b)  $7\frac{1}{8}$     c)  $7\frac{1}{2}$     d)  $\frac{4}{5}$     e)  $\frac{1}{2}$     f)  $2\frac{4}{5}$     g)  $3\frac{5}{6}$     h) 200

13) multiply      Erin earned \$2000.      14) multiply    There are 90 rooms for non-smokers.

15) a)  $\frac{4}{1}$     b)  $\frac{3}{2}$       c)  $\frac{5}{3}$       d)  $\frac{1}{8}$

16) a) 20      b)  $\frac{14}{15}$     c)  $2\frac{2}{3}$     d)  $\frac{2}{5}$     e)  $\frac{8}{15}$     f) 2

17)  $15 \div \frac{3}{4} = 20$     Twenty fuel tanks can be filled.      18)  $36 \div \frac{2}{3} = 54$     They can fill 54 sprayers.

19)  $18 \div 2\frac{1}{4} = 8$     Saba can make 8 dresses.      20)  $12\frac{1}{2} \times 10 = 125$     Moira made \$125.

21)  $2\frac{5}{8} \times 8 = 21$     They need 21 litres of paint.      22) a)  $\frac{4}{4} = 1$     b)  $\frac{4}{5}$       c)  $\frac{9}{27} = \frac{1}{3}$     d)  $\frac{20}{30} = \frac{2}{3}$

22e)  $\frac{11}{12}$       f)  $10\frac{4}{7}$       g)  $4\frac{11}{15}$

h)  $3\frac{9}{12} = 3\frac{3}{4}$

23)  $2\frac{1}{4} + 3\frac{1}{4} = 5\frac{2}{4} = 5\frac{1}{2}$     They purchased  $5\frac{1}{2}$  kilograms of tomatoes.

24) a)  $\frac{4}{8} = \frac{1}{2}$       b)  $3\frac{4}{12} = 3\frac{1}{3}$       c)  $\frac{28}{2} - \frac{1}{2} = \frac{27}{2} = 13\frac{1}{2}$       d)  $\frac{1}{10}$

e)  $\frac{5}{14}$       f)  $3\frac{12}{20} = 3\frac{3}{5}$

25)  $8\frac{3}{4} - 6\frac{1}{4} = 2\frac{2}{4} = 2\frac{1}{2}$     Charles purchased  $2\frac{1}{2}$  cases more last week than this week.

# **Glossary**

**Addends** The numbers to be added together in an addition question.  
In  $3 + 5 = 8$ , the addends are 3 and 5.

**Balance** Balance has many meanings. In money matters, the balance is the amount left over. It might be the amount left in a bank account (bank balance) or it might be the amount you still must pay on a bill (balance owing).

**Cross multiply** Multiply the numerator of the first fraction by the denominator of the second fraction. Then multiply the denominator of the first fraction by the numerator of the second fraction. In a true proportion, the products of the cross multiplication are equal.

**Cross product** The answer after cross multiplying in a proportion.

**Denominator** The bottom number in a fraction; the denominator tells into how many equal parts the whole thing has been divided.

**Difference** The result of a subtraction question, the answer. Subtraction gives the difference between two numbers.

**Digit** Any of the ten numerals (0 to 9) are digits. This term comes from our ten fingers which are called digits. The numerals came to be called "digits" from the practice of counting on the fingers!

**Divide** To separate into equal parts.

**Dividend** The number or quantity to be divided; what you start with before you divide.

**Divisor** The number of groups or the quantity into which a number (the dividend) is to be separated.

**Equal** = Equal means "the same as".

**Equation** A mathematical statement that two quantities are equal. An equation may use numerals with a letter to stand for an unknown quantity.  $6 + Y = 9$ .

**Equivalent** Equal in value; equivalent numbers (whole or fractions) can be used interchangeably; that is, they can be used instead of each other.

**Estimate** Make an approximate answer. Use the sign  $\approx$  to mean approximately equal.

**Factors** The numbers or quantities that are multiplied together to form a given product.  $5 \times 2 = 10$ ,  $1 \times 10 = 10$  So 5, 2, 1 and 10 are factors of 10. 1, 2, 5 10 are factors of 10.

**Fraction** Part of the whole; a quantity less than one unit.

**Horizontal** In a flat position, eg. we are horizontal when we lie in a bed. A horizontal line goes across the page. The sun dips below the horizon.

**Improper fraction** The numerator is equal to or greater than the denominator. An improper fraction has a value equal to 1 or more than 1.

**Invert** To turn upside down. A fraction is inverted when finding the reciprocal.

**Like fractions** Like fractions have the same denominators.

**Lowest terms** The fraction is in lowest terms (also called simplest form). The fraction can not be reduced any more. There are no more factors in the numerator and denominator.

**Minuend** The first number in a subtraction question.

**Mixed number** A whole number and a fraction.  $1\frac{1}{2}$

**Multiple** If a certain number is multiplied by another number, the product is a multiple of the numbers. Think of the multiplication tables. For example, 2, 4, 6, 8, 10, 12, 14...are multiples of 2.

**Multiplicand** The number to be multiplied.

**Multiplier** The number you multiply by.

**Numbers** Numbers represent the amount, the place in a sequence; *number* is the idea of quantity or order.

**Numerals** The digits 1,2,3,4,5,6,7,8,9,0 are also called numerals. These ten digits are combined to make infinite numerals. Digits are like letters, numerals are like words, and numbers are the meaning.

**Numerator** The top number in a fraction; the numerator tells how many parts of the whole thing are being considered.

**Percent (%)** Percent means per hundred. All percents are out of one hundred.

**Place value** We understand numbers by the way the digits (numerals) are arranged in relationship to each other and to the decimal point. Each position has a certain value. Our number system is a **decimal system**. The place value is based on **ten**.

**Prime number** A number that can only be divided evenly by itself and 1.

**Product** The answer in multiplication.

**Proper fraction** In a proper fraction, the numerator is less than the denominator. A proper fraction will have a value less than one.

**Quotient** The answer to a division question.

**Reciprocal** A reciprocal is a fraction flipped. Eg. The reciprocal of  $\frac{3}{4}$  is  $\frac{4}{3}$   
When multiplied together,  $\frac{3}{4} \times \frac{4}{3} = 1$

**Reduce** Write a fraction in lowest terms or simplify. Divide the numerator and denominator by the same factor.

**Remainder** The amount left when a divisor does not divide evenly into the dividend. The remainder must be less than the divisor.

**Simplify** Write a fraction in lowest terms or reduce. Divide the numerator and denominator by the same factor.

**Subtrahend** The amount that is taken away in a subtraction question.

**Sum** The result of an addition question, the answer to an addition question.

**Symbol** A written or printed mark, letter, abbreviation etc. that stands for something else.

**Total** The amount altogether.

**Transaction** One piece of business. A transaction often involves money. When you pay a bill, take money from the bank or write a cheque, you have made a transaction.

**Unit** A unit of measure. Eg. 50 kilometres, 4 people, \$75.00, 5 books.  
Kilometer, people, \$, books are types of units. The word unit can also mean one.

**Unit price** The price for one unit. Eg. price per one litre, price per one gram.

**Unlike fractions** Fractions that have different denominators.

**Vertical** In an up and down position, eg. we are vertical when we are standing up. On a page, a vertical line is shown from the top to the bottom of the page.

**Glossary continued**

Write down any words and definitions on this page.

## Multiplication Fact practice

a)  $\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$

b)  $\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$

c)  $\begin{array}{r} 1 \\ \times 0 \\ \hline \end{array}$

d)  $\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$

e)  $\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$

f)  $\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$

g)  $\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$

h)  $\begin{array}{r} 1 \\ \times 3 \\ \hline \end{array}$

i)  $\begin{array}{r} 2 \\ \times 10 \\ \hline \end{array}$

j)  $\begin{array}{r} 3 \\ \times 7 \\ \hline \end{array}$

k)  $\begin{array}{r} 1 \\ \times 5 \\ \hline \end{array}$

l)  $\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$

m)  $\begin{array}{r} 9 \\ \times 9 \\ \hline \end{array}$

n)  $\begin{array}{r} 1 \\ \times 6 \\ \hline \end{array}$

o)  $\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$

p)  $\begin{array}{r} 2 \\ \times 0 \\ \hline \end{array}$

q)  $\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$

r)  $\begin{array}{r} 2 \\ \times 9 \\ \hline \end{array}$

s)  $\begin{array}{r} 2 \\ \times 4 \\ \hline \end{array}$

t)  $\begin{array}{r} 3 \\ \times 7 \\ \hline \end{array}$

u)  $\begin{array}{r} 9 \\ \times 10 \\ \hline \end{array}$

v)  $\begin{array}{r} 2 \\ \times 4 \\ \hline \end{array}$

w)  $\begin{array}{r} 3 \\ \times 10 \\ \hline \end{array}$

x)  $\begin{array}{r} 1 \\ \times 5 \\ \hline \end{array}$

y)  $\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array}$

z)  $\begin{array}{r} 0 \\ \times 0 \\ \hline \end{array}$

aa)  $\begin{array}{r} 1 \\ \times 10 \\ \hline \end{array}$

bb)  $\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |       |      |        |        |       |       |
|-------|-------|-------|-------|-------|------|--------|--------|-------|-------|
| a) 36 | b) 18 | c) 0  | d) 12 | e) 9  | f) 8 | g) 14  | h) 3   | i) 20 | j) 21 |
| k) 5  | l) 36 | m) 81 | n) 6  | o) 24 | p) 0 | q) 24  | r) 18  | s) 8  | t) 21 |
| u) 90 | v) 8  | w) 30 | x) 5  | y) 16 | z) 0 | aa) 10 | bb) 24 |       |       |

## Multiplication Fact practice

a) 
$$\begin{array}{r} 2 \\ \times 3 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$$

d) 
$$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 1 \\ \times 9 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 0 \\ \times 8 \\ \hline \end{array}$$

h) 
$$\begin{array}{r} 2 \\ \times 6 \\ \hline \end{array}$$

i) 
$$\begin{array}{r} 1 \\ \times 1 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 2 \\ \times 10 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

m) 
$$\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 0 \\ \times 2 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 3 \\ \times 5 \\ \hline \end{array}$$

q) 
$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

r) 
$$\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$$

s) 
$$\begin{array}{r} 2 \\ \times 2 \\ \hline \end{array}$$

t) 
$$\begin{array}{r} 1 \\ \times 7 \\ \hline \end{array}$$

u) 
$$\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$$

v) 
$$\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$$

w) 
$$\begin{array}{r} 1 \\ \times 4 \\ \hline \end{array}$$

x) 
$$\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array}$$

y) 
$$\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$$

z) 
$$\begin{array}{r} 0 \\ \times 4 \\ \hline \end{array}$$

aa) 
$$\begin{array}{r} 2 \\ \times 1 \\ \hline \end{array}$$

bb) 
$$\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |      |       |       |       |      |       |
|-------|-------|-------|-------|------|-------|-------|-------|------|-------|
| a) 6  | b) 27 | c) 10 | d) 14 | e) 9 | f) 9  | g) 0  | h) 12 | i) 1 | j) 20 |
| k) 27 | l) 25 | m) 14 | n) 30 | o) 0 | p) 15 | q) 54 | r) 18 | s) 4 | t) 7  |
| u) 12 | v) 42 | w) 4  | x) 16 | y) 8 | z) 0  | aa) 2 | bb) 6 |      |       |

## Multiplication Fact practice

a) 
$$\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$$

d) 
$$\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 6 \\ \times 10 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$$

h) 
$$\begin{array}{r} 6 \\ \times 3 \\ \hline \end{array}$$

i) 
$$\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 6 \\ \times 4 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$$

m) 
$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 6 \\ \times 0 \\ \hline \end{array}$$

q) 
$$\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$$

r) 
$$\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$$

s) 
$$\begin{array}{r} 4 \\ \times 0 \\ \hline \end{array}$$

t) 
$$\begin{array}{r} 5 \\ \times 10 \\ \hline \end{array}$$

u) 
$$\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$$

v) 
$$\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$$

w) 
$$\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$$

x) 
$$\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$$

y) 
$$\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$$

z) 
$$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$$

aa) 
$$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$$

bb) 
$$\begin{array}{r} 5 \\ \times 0 \\ \hline \end{array}$$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| a) 30 | b) 6  | c) 28 | d) 35 | e) 60 | f) 8  | g) 20 | h) 18 | i) 16 | j) 30 |
| k) 24 | l) 28 | m) 54 | n) 20 | o) 10 | p) 0  | q) 35 | r) 36 | s) 0  | t) 50 |
| u) 36 | v) 5  | w) 30 | x) 12 | y) 45 | z) 12 | aa) 4 | bb) 0 |       |       |

## Multiplication Fact practice

a) 
$$\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$$

d) 
$$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 4 \\ \times 6 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$$

h) 
$$\begin{array}{r} 4 \\ \times 10 \\ \hline \end{array}$$

i) 
$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 6 \\ \times 10 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$$

m) 
$$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$$

q) 
$$\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$$

r) 
$$\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$$

s) 
$$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$$

t) 
$$\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$$

u) 
$$\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$$

v) 
$$\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$$

w) 
$$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$$

x) 
$$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$$

y) 
$$\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$$

z) 
$$\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$$

aa) 
$$\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$$

bb) 
$$\begin{array}{r} 6 \\ \times 0 \\ \hline \end{array}$$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |       |       |        |       |       |       |
|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|
| a) 48 | b) 15 | c) 32 | d) 6  | e) 24 | f) 40 | g) 42  | h) 40 | i) 25 | j) 60 |
| k) 28 | l) 30 | m) 4  | n) 25 | o) 12 | p) 16 | q) 54  | r) 12 | s) 20 | t) 6  |
| u) 45 | v) 36 | w) 32 | x) 10 | y) 48 | z) 20 | aa) 15 | bb) 0 |       |       |

## Multiplication Fact practice

a)  $\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$

b)  $\begin{array}{r} 1 \\ \times 6 \\ \hline \end{array}$

c)  $\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$

d)  $\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$

e)  $\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$

f)  $\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$

g)  $\begin{array}{r} 3 \\ \times 1 \\ \hline \end{array}$

h)  $\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$

i)  $\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$

j)  $\begin{array}{r} 1 \\ \times 1 \\ \hline \end{array}$

k)  $\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$

l)  $\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$

m)  $\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$

n)  $\begin{array}{r} 6 \\ \times 0 \\ \hline \end{array}$

o)  $\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$

p)  $\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$

q)  $\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$

r)  $\begin{array}{r} 0 \\ \times 5 \\ \hline \end{array}$

s)  $\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$

t)  $\begin{array}{r} 1 \\ \times 7 \\ \hline \end{array}$

u)  $\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$

v)  $\begin{array}{r} 2 \\ \times 8 \\ \hline \end{array}$

w)  $\begin{array}{r} 6 \\ \times 3 \\ \hline \end{array}$

x)  $\begin{array}{r} 5 \\ \times 10 \\ \hline \end{array}$

y)  $\begin{array}{r} 2 \\ \times 0 \\ \hline \end{array}$

z)  $\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$

aa)  $\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$

bb)  $\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |       |       |        |        |       |      |
|-------|-------|-------|-------|-------|-------|--------|--------|-------|------|
| a) 24 | b) 6  | c) 28 | d) 18 | e) 16 | f) 12 | g) 3   | h) 25  | i) 32 | j) 1 |
| k) 15 | l) 27 | m) 14 | n) 0  | o) 12 | p) 30 | q) 8   | r) 0   | s) 45 | t) 7 |
| u) 20 | v) 16 | w) 18 | x) 50 | y) 0  | z) 48 | aa) 10 | bb) 20 |       |      |

## Multiplication Fact practice

a)  $\begin{array}{r} 1 \\ \times 1 \\ \hline \end{array}$

b)  $\begin{array}{r} 6 \\ \times 10 \\ \hline \end{array}$

c)  $\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$

d)  $\begin{array}{r} 0 \\ \times 0 \\ \hline \end{array}$

e)  $\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$

f)  $\begin{array}{r} 4 \\ \times 10 \\ \hline \end{array}$

g)  $\begin{array}{r} 2 \\ \times 1 \\ \hline \end{array}$

h)  $\begin{array}{r} 1 \\ \times 7 \\ \hline \end{array}$

i)  $\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$

j)  $\begin{array}{r} 6 \\ \times 4 \\ \hline \end{array}$

k)  $\begin{array}{r} 1 \\ \times 2 \\ \hline \end{array}$

l)  $\begin{array}{r} 0 \\ \times 10 \\ \hline \end{array}$

m)  $\begin{array}{r} 1 \\ \times 3 \\ \hline \end{array}$

n)  $\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$

o)  $\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$

p)  $\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$

q)  $\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$

r)  $\begin{array}{r} 3 \\ \times 10 \\ \hline \end{array}$

s)  $\begin{array}{r} 5 \\ \times 0 \\ \hline \end{array}$

t)  $\begin{array}{r} 1 \\ \times 10 \\ \hline \end{array}$

u)  $\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$

v)  $\begin{array}{r} 6 \\ \times 3 \\ \hline \end{array}$

w)  $\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$

x)  $\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$

y)  $\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$

z)  $\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$

aa)  $\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$

bb)  $\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |       |       |        |        |       |       |
|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|
| a) 1  | b) 60 | c) 4  | d) 0  | e) 35 | f) 40 | g) 2   | h) 7   | i) 18 | j) 24 |
| k) 2  | l) 0  | m) 3  | n) 40 | o) 42 | p) 20 | q) 30  | r) 30  | s) 0  | t) 10 |
| u) 30 | v) 18 | w) 28 | x) 32 | y) 36 | z) 25 | aa) 27 | bb) 48 |       |       |

## Multiplication Fact practice

a)  $\begin{array}{r} 8 \\ \times 7 \\ \hline \end{array}$

b)  $\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$

c)  $\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$

d)  $\begin{array}{r} 8 \\ \times 10 \\ \hline \end{array}$

e)  $\begin{array}{r} 9 \\ \times 7 \\ \hline \end{array}$

f)  $\begin{array}{r} 7 \\ \times 3 \\ \hline \end{array}$

g)  $\begin{array}{r} 8 \\ \times 6 \\ \hline \end{array}$

h)  $\begin{array}{r} 9 \\ \times 1 \\ \hline \end{array}$

i)  $\begin{array}{r} 9 \\ \times 6 \\ \hline \end{array}$

j)  $\begin{array}{r} 8 \\ \times 10 \\ \hline \end{array}$

k)  $\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$

l)  $\begin{array}{r} 5 \\ \times 10 \\ \hline \end{array}$

m)  $\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$

n)  $\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$

o)  $\begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$

p)  $\begin{array}{r} 1 \\ \times 9 \\ \hline \end{array}$

q)  $\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$

r)  $\begin{array}{r} 9 \\ \times 9 \\ \hline \end{array}$

s)  $\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$

t)  $\begin{array}{r} 7 \\ \times 2 \\ \hline \end{array}$

u)  $\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$

v)  $\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$

w)  $\begin{array}{r} 9 \\ \times 7 \\ \hline \end{array}$

x)  $\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$

y)  $\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$

z)  $\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$

aa)  $\begin{array}{r} 8 \\ \times 0 \\ \hline \end{array}$

bb)  $\begin{array}{r} 7 \\ \times 10 \\ \hline \end{array}$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |       |       |       |        |       |       |
|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| a) 56 | b) 72 | c) 42 | d) 80 | e) 63 | f) 21 | g) 48 | h) 9   | i) 54 | j) 80 |
| k) 12 | l) 50 | m) 16 | n) 56 | o) 18 | p) 9  | q) 63 | r) 81  | s) 16 | t) 14 |
| u) 64 | v) 7  | w) 63 | x) 32 | y) 28 | z) 27 | aa) 0 | bb) 70 |       |       |

## Multiplication Fact practice

a) 
$$\begin{array}{r} 9 \\ \times 0 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 8 \\ \times 7 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$$

d) 
$$\begin{array}{r} 9 \\ \times 5 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 8 \\ \times 5 \\ \hline \end{array}$$

h) 
$$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$$

i) 
$$\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 8 \\ \times 10 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 9 \\ \times 10 \\ \hline \end{array}$$

m) 
$$\begin{array}{r} 8 \\ \times 6 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 8 \\ \times 9 \\ \hline \end{array}$$

q) 
$$\begin{array}{r} 9 \\ \times 4 \\ \hline \end{array}$$

r) 
$$\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$$

s) 
$$\begin{array}{r} 7 \\ \times 3 \\ \hline \end{array}$$

t) 
$$\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$$

u) 
$$\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$$

v) 
$$\begin{array}{r} 9 \\ \times 9 \\ \hline \end{array}$$

w) 
$$\begin{array}{r} 7 \\ \times 2 \\ \hline \end{array}$$

x) 
$$\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$$

y) 
$$\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$$

z) 
$$\begin{array}{r} 8 \\ \times 1 \\ \hline \end{array}$$

aa) 
$$\begin{array}{r} 9 \\ \times 6 \\ \hline \end{array}$$

bb) 
$$\begin{array}{r} 7 \\ \times 0 \\ \hline \end{array}$$

### Answers to Self-Test Multiplication Facts

a) 0   b) 56   c) 35   d) 45   e) 42   f) 72   g) 40   h) 56   i) 72   j) 80

k) 28   l) 90   m) 48   n) 49   o) 27   p) 72   q) 36   r) 24   s) 21   t) 72

u) 64   v) 81   w) 14   x) 16   y) 63   z) 8   aa) 54   bb) 0

## Multiplication Fact practice

a) 
$$\begin{array}{r} 3 \\ \times 1 \\ \hline \end{array}$$

b) 
$$\begin{array}{r} 5 \\ \times 2 \\ \hline \end{array}$$

c) 
$$\begin{array}{r} 0 \\ \times 9 \\ \hline \end{array}$$

d) 
$$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$$

e) 
$$\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$$

f) 
$$\begin{array}{r} 1 \\ \times 3 \\ \hline \end{array}$$

g) 
$$\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$$

h) 
$$\begin{array}{r} 1 \\ \times 4 \\ \hline \end{array}$$

i) 
$$\begin{array}{r} 8 \\ \times 7 \\ \hline \end{array}$$

j) 
$$\begin{array}{r} 9 \\ \times 0 \\ \hline \end{array}$$

k) 
$$\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$$

l) 
$$\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$$

m) 
$$\begin{array}{r} 1 \\ \times 9 \\ \hline \end{array}$$

n) 
$$\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$$

o) 
$$\begin{array}{r} 2 \\ \times 5 \\ \hline \end{array}$$

p) 
$$\begin{array}{r} 0 \\ \times 1 \\ \hline \end{array}$$

q) 
$$\begin{array}{r} 7 \\ \times 7 \\ \hline \end{array}$$

r) 
$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

s) 
$$\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$$

t) 
$$\begin{array}{r} 9 \\ \times 4 \\ \hline \end{array}$$

u) 
$$\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$$

v) 
$$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$$

w) 
$$\begin{array}{r} 7 \\ \times 1 \\ \hline \end{array}$$

x) 
$$\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$$

y) 
$$\begin{array}{r} 3 \\ \times 9 \\ \hline \end{array}$$

z) 
$$\begin{array}{r} 9 \\ \times 7 \\ \hline \end{array}$$

aa) 
$$\begin{array}{r} 1 \\ \times 3 \\ \hline \end{array}$$

bb) 
$$\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$$

### Answers to Self-Test Multiplication Facts

|       |       |      |       |       |       |       |        |       |       |
|-------|-------|------|-------|-------|-------|-------|--------|-------|-------|
| a) 3  | b) 10 | c) 0 | d) 32 | e) 30 | f) 3  | g) 42 | h) 4   | i) 56 | j) 0  |
| k) 18 | l) 35 | m) 9 | n) 24 | o) 10 | p) 0  | q) 49 | r) 8   | s) 48 | t) 36 |
| u) 20 | v) 12 | w) 7 | x) 40 | y) 27 | z) 63 | aa) 3 | bb) 16 |       |       |

## Multiplication Fact practice

a)  $\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$

b)  $\begin{array}{r} 6 \\ \times 3 \\ \hline \end{array}$

c)  $\begin{array}{r} 1 \\ \times 8 \\ \hline \end{array}$

d)  $\begin{array}{r} 2 \\ \times 2 \\ \hline \end{array}$

e)  $\begin{array}{r} 4 \\ \times 7 \\ \hline \end{array}$

f)  $\begin{array}{r} 0 \\ \times 5 \\ \hline \end{array}$

g)  $\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$

h)  $\begin{array}{r} 9 \\ \times 6 \\ \hline \end{array}$

i)  $\begin{array}{r} 8 \\ \times 1 \\ \hline \end{array}$

j)  $\begin{array}{r} 3 \\ \times 0 \\ \hline \end{array}$

k)  $\begin{array}{r} 4 \\ \times 4 \\ \hline \end{array}$

l)  $\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$

m)  $\begin{array}{r} 9 \\ \times 5 \\ \hline \end{array}$

n)  $\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$

o)  $\begin{array}{r} 0 \\ \times 9 \\ \hline \end{array}$

p)  $\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$

q)  $\begin{array}{r} 3 \\ \times 2 \\ \hline \end{array}$

r)  $\begin{array}{r} 1 \\ \times 1 \\ \hline \end{array}$

s)  $\begin{array}{r} 8 \\ \times 6 \\ \hline \end{array}$

t)  $\begin{array}{r} 2 \\ \times 7 \\ \hline \end{array}$

u)  $\begin{array}{r} 2 \\ \times 9 \\ \hline \end{array}$

v)  $\begin{array}{r} 5 \\ \times 1 \\ \hline \end{array}$

w)  $\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$

x)  $\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$

y)  $\begin{array}{r} 1 \\ \times 10 \\ \hline \end{array}$

z)  $\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$

aa)  $\begin{array}{r} 0 \\ \times 7 \\ \hline \end{array}$

bb)  $\begin{array}{r} 6 \\ \times 4 \\ \hline \end{array}$

### Answers to Self-Test Multiplication Facts

|       |       |       |       |       |       |       |        |       |       |
|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| a) 45 | b) 18 | c) 8  | d) 4  | e) 28 | f) 0  | g) 28 | h) 54  | i) 8  | j) 0  |
| k) 16 | l) 56 | m) 45 | n) 15 | o) 0  | p) 36 | q) 6  | r) 1   | s) 48 | t) 14 |
| u) 18 | v) 5  | w) 27 | x) 35 | y) 10 | z) 24 | aa) 0 | bb) 24 |       |       |

$$0 \times 6 =$$

$$0 \times 3 =$$

$$0 \times 0 =$$

$$0 \times 7 =$$

$$0 \times 4 =$$

$$0 \times 1 =$$

$$0 \times 8 =$$

$$0 \times 5 =$$

$$0 \times 2 =$$

|   |   |   |
|---|---|---|
| O | O | O |
| O | O | O |
| O | O | O |

$$1 \times 3 =$$

$$0 \times 12 =$$

$$0 \times 9 =$$

$$1 \times 4 =$$

$$1 \times 1 =$$

$$0 \times 10 =$$

$$1 \times 5 =$$

$$1 \times 2 =$$

$$0 \times 11 =$$

|   |   |   |
|---|---|---|
| 0 | 0 | 0 |
| 2 | 1 | 0 |
| 5 | 4 | 3 |

$$1 \times 12 =$$

$$1 \times 9 =$$

$$1 \times 6 =$$

$$2 \times 2 =$$

$$1 \times 10 =$$

$$1 \times 7 =$$

$$2 \times 3 =$$

$$1 \times 11 =$$

$$1 \times 8 =$$

|    |    |   |
|----|----|---|
| 6  | 11 | 8 |
| 4  | 10 | 7 |
| 12 | 9  | 6 |

$$2 \times 10 =$$

$$2 \times 7 =$$

$$2 \times 4 =$$

$$2 \times 11 =$$

$$2 \times 8 =$$

$$2 \times 5 =$$

$$2 \times 12 =$$

$$2 \times 9 =$$

$$2 \times 6 =$$

|    |    |    |
|----|----|----|
| 24 | 18 | 12 |
| 22 | 16 | 10 |
| 20 | 14 | 8  |

$$3 \times 9 =$$

$$3 \times 6 =$$

$$3 \times 3 =$$

$$3 \times 10 =$$

$$3 \times 7 =$$

$$3 \times 4 =$$

$$3 \times 11 =$$

$$3 \times 8 =$$

$$3 \times 5 =$$

|    |    |    |
|----|----|----|
| 33 | 24 | 15 |
| 30 | 21 | 12 |
| 27 | 18 | 9  |

$$4 \times 9 =$$

$$4 \times 6 =$$

$$3 \times 12 =$$

$$4 \times 10 =$$

$$4 \times 7 =$$

$$4 \times 4 =$$

$$4 \times 11 =$$

$$4 \times 8 =$$

$$4 \times 5 =$$

|    |    |    |
|----|----|----|
| 44 | 32 | 20 |
| 40 | 28 | 16 |
| 36 | 24 | 36 |

$$5 \times 10 =$$

$$5 \times 7 =$$

$$4 \times 12 =$$

$$5 \times 11 =$$

$$5 \times 8 =$$

$$5 \times 5 =$$

$$5 \times 12 =$$

$$5 \times 9 =$$

$$5 \times 6 =$$

|    |    |    |
|----|----|----|
| 60 | 45 | 30 |
| 55 | 40 | 25 |
| 50 | 35 | 48 |

$$6 \times 12 =$$

$$6 \times 9 =$$

$$6 \times 6 =$$

$$7 \times 7 =$$

$$6 \times 10 =$$

$$6 \times 7 =$$

$$7 \times 8 =$$

$$6 \times 11 =$$

$$6 \times 8 =$$

|    |    |    |
|----|----|----|
| 56 | 66 | 48 |
| 49 | 60 | 42 |
| 72 | 54 | 36 |

$$8 \times 10 =$$

$$7 \times 12 =$$

$$7 \times 9 =$$

$$8 \times 11 =$$

$$8 \times 8 =$$

$$7 \times 10 =$$

$$8 \times 12 =$$

$$8 \times 9 =$$

$$7 \times 11 =$$

|    |    |    |
|----|----|----|
| 96 | 72 | 77 |
| 88 | 64 | 70 |
| 80 | 84 | 63 |

$$10 \times 12 =$$

$$9 \times 12 =$$

$$9 \times 9 =$$

$$11 \times 11 =$$

$$10 \times 10 =$$

$$9 \times 10 =$$

$$11 \times 12 =$$

$$10 \times 11 =$$

$$9 \times 11 =$$

|     |     |    |
|-----|-----|----|
| 132 | 110 | 99 |
| 121 | 100 | 90 |
| 120 | 108 | 81 |

|                  |  |  |
|------------------|--|--|
| $12 \times 12 =$ |  |  |
|                  |  |  |
|                  |  |  |

|  |  |     |
|--|--|-----|
|  |  | 144 |
|  |  |     |
|  |  |     |