CAMBRIDGE
Primary Mathematics

Learner's Book 5

Mary Wood & Emma Low

Introduction

Welcome to Stage 5 of Cambridge Primary Mathematics. We hope this book will show you how interesting Mathematics can be and make you want to explore and investigate mathematical ideas.

Mathematics is everywhere. Developing our skills in mathematics makes us better problem-solvers through understanding how to reason, analyse and reflect. We use mathematics to understand money and complete practical tasks like cooking and decorating. It helps us to make good decisions in everyday life.

In this book you will work like a mathematician to find the answers to questions like these:

- What is a prime number and how do you know if a number is prime?
- How can you quickly find out if 642824 is divisible by 8?
- If three-quarters of a number is 24, what is the number?
- What time is it in Mumbai when it is 9 a.m. in Mexico City?
- What is a reflex angle?
- How do you draw a waffle diagram?
- How can a shape be translated?

Talk about the mathematics as you explore and learn. This helps you to reflect on what you did and refine the mathematical ideas to develop a more effective approach or solution.

You will be able to practise new skills, check how you are doing and also challenge yourself to find out more. You will be able to make connections between what seem to be different areas of mathematics.

We hope you enjoy thinking and working like a mathematician.

Mary Wood and Emma Low

Contents

How to use this book ▶

In this book you will find lots of different features to help your learning:

Questions to find out what you know already.

Getting started

1 Use digits to write these numbers.
   a Five thousand, two hundred and seventy-one.
   b One hundred and nine thousand and ninety.

2 What is the value of the digit 6 in these numbers?
   a 6703   b 9060   c 765 430

3 Copy and complete to decompose these numbers.
   a 805 469 = ☐ + 5000 + ☐ + ☐ + 9
   b 689 567 = 600 000 + ☐ + ☐ + 500 + ☐ + ☐

4 Zara scored 649 points in a computer game.
   Which of the following is not a correct way to show her score?
   a 600 + 40 + 9   b 600 + 49
   c 609 + 4   d 609 + 40

What you will learn in the unit.

We are going to ...

- estimate the size of an answer before calculating it
- multiply whole numbers by 1-digit and 2-digit whole numbers.

Important words that you will use.

frequency diagram line graph

Step-by-step examples showing a way to solve a problem.

There are often many different ways to solve a problem.

Worked example 3

Write a different prime number in each box to make this calculation correct.

☐ + ☐ + ☐ = 10

The prime numbers are:
2, 3, 5, 7, ...

2 + 3 + 5 = 10

Start by writing a list of prime numbers.

Test different numbers to work out which ones make the calculation correct.

When you test numbers like this you are specialising.

These questions will help you develop your skills of thinking and working mathematically.

5 Sofia is calculating 299 × 60.
She estimates that the answer is 180 000.
Has she made a good estimate?
Explain your answer.

An investigation to carry out with a partner or in groups. Where this icon appears ◁, the activity will help develop your skills of thinking and working mathematically.

Think like a mathematician

You need four cards.

3   5   4   6
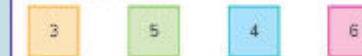
Arrange the cards as a multiplication calculation.

Investigate different answers. Try to find as many as you can and then find the largest and smallest answers.

You will show you are specialising when you find solutions to the problem.

× ☐

Questions to help you think about how you learn.

Think about the questions in this exercise. Which question was the most difficult? If you were asked to do a similar question, what would you do differently?

This is what you have learned in the unit.

Look what I can do!

☐ I can estimate the size of an answer before calculating it.
☐ I can divide whole numbers by 1-digit whole numbers.

Questions that cover what you have learned in the unit.

Check your progress

1 Calculate.
   a 408 × 7   b 46 × 24   c 504 ÷ 9

2 Calculate, writing the remainder as a fraction.
   a 98 ÷ 5   b 86 ÷ 3   c 89 ÷ 7

3 Copy the sorting diagram. Write these numbers in the correct place on the diagram.
   23 456   51 466   62 848   76 343   97 631

At the end of several units, there is a project for you to carry out using what you have learned. You might make something or solve a problem.

Projects and their accompanying teacher guidance have been written by the NRICH Team. NRICH is an innovative collaboration between the Faculties of Mathematics and Education at the University of Cambridge, which focuses on problem solving and on creating opportunities for students to learn mathematics through exploration and discussion: nrich.maths.org.
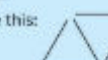
◷ ▷ Project 2

Pattern prediction

Marcus and Zara were asked to draw this matchstick pattern:

Marcus drew this first:

Then he added more to make this:

Then this:

Then finally:

Can you describe how Marcus drew the pattern?
How many triangles did he draw?
How many matchsticks did he use in the finished picture?

Thinking and Working Mathematically

There are some important skills that you will develop as you learn mathematics.

Specialising
is when I choose an example and check to see if it satisfies or does not satisfy specific mathematical criteria.

Characterising
is when I identify and describe the mathematical properties of an object.

Generalising
is when I recognise an underlying pattern by identifying many examples that satisfy the same mathematical criteria.

Classifying
is when I organise objects into groups according to their mathematical properties.

Critiquing
is when I compare and evaluate mathematical ideas, representations or solutions to identify advantages and disadvantages.

Improving
is when I refine mathematical ideas or representations to develop a more effective approach or solution.

Conjecturing is when I form mathematical questions or ideas.

Convincing
is when I present evidence to justify or challenge a mathematical idea or solution.

1 ▶ The number system

Getting started

1 Use digits to write these numbers.

   a Five thousand, two hundred and seventy-one.

   b One hundred and nine thousand and ninety.

2 What is the value of the digit 6 in these numbers?

   a 6703   b 9060   c 765 430

3 Copy and complete to decompose these numbers.

   a 805 469 = ☐ + 5000 + ☐ + ☐ + 9

   b 689 567 = 600 000 + ☐ + ☐ + 500 + ☐ + ☐

4 Zara scored 649 points in a computer game.

   Which of the following is not a correct way to show her score?

   A 600 + 40 + 9   B 600 + 49

   C 609 + 4   D 609 + 40

5 Which of these numbers is 100 times larger than three hundred and thirty-three?

   A 333   B 3330

   C 33 300   D 333 000

6 Write the missing numbers.

   a ☐ ÷ 10 = 64   b 509 × ☐ = 5090

   c ☐ × 100 = 8000   d 4400 ÷ ☐ = 44

Place value is important because it helps you understand the meaning of a number. You need place value to understand the order of numbers. If someone offers you 30 dollars or 300 dollars, you need to know that 300 is more than 30.

When you go shopping you will see lots of price labels.

What do these labels have in common?

€1.^{00} $1.^{49} ¥0.^{99} £2.^{99}
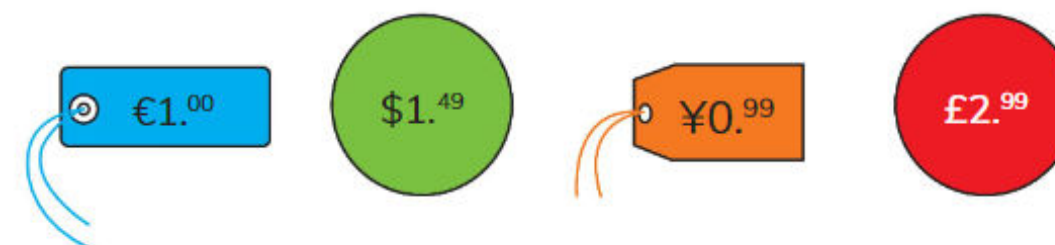
In this unit you will learn more about decimal numbers. Look at the examples in these pictures and talk with your partner about where you have seen decimal numbers.

SALE

Women's Shoes Selected Styles 59.99

❯ 1.1 Understanding place value

We are going to ...

- explain the value of a digit in a decimal number (tenths and hundredths)
- multiply and divide whole numbers by 1000
- multiply and divide decimals by 10 and 100.

It is very important for a doctor to give the correct amount of medicine. A dose of 10 ml is ten times greater than a dose of 1 ml and ten times smaller than a dose of 100 ml.

– 15 ml
– 10 ml
– 5 ml

compose   decimal   decimal place
decimal point   decompose   hundredth
place value   tenth

The value of a digit depends on its position in the number.
Think about what the digit 5 is worth in these numbers.

Water $1.50   Water $1.50   Water $1.50

2.35 m

25 cents
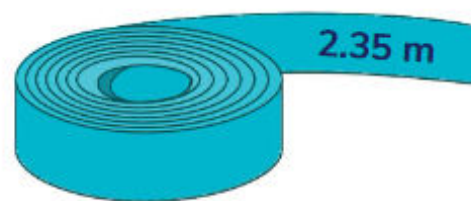
Worked example 1

Write this number in words and digits.

$10\,000 + 2000 + 300 + 40 + 5 + 0.6 + 0.07$

Answer:

12 345.67

Twelve thousand, three hundred and forty-five point six seven.

Use a place value grid to help you.

Tip

Remember to write the decimal part of the number as 'six seven' and not as 'sixty-seven'.

ten thousands

tenths   hundredths

10 000s	1000s	100s	10s	1s	$\frac{1}{10}$s	$\frac{1}{100}$s
1	2	3	4	5	6	7

Exercise 1.1

1. Write these numbers in digits.

   a. One thousand and one point zero one

   b. Five hundred thousand and five point nine

   c. Four hundred and three thousand, and thirty-four point six six

2. Write these numbers in words.

   a. 345.09   b. 5378.12

   c. 158 035.4   d. 3030.03

3. What is the value of the digit 7 in these numbers?

   a. 6703.46   b. 70 213.8

   c. 606 456.7   d. 234 560.07

4 Write these numbers in words and digits.

a $200\,000 + 6000 + 300 + 2 + 0.1$

b $900\,000 + 90\,000 + 900 + 9 + 0.9$

c $100\,000 + 20\,000 + 5000 + 600 + 20 + 5 + 0.4 + 0.03$

Swap books with your partner and check their answers.

5 Write the missing numbers.

a $358 \times 100 = \boxed{}$

b $2700 \div \boxed{} = 27$

c $5600 \div 1000 = \boxed{}$

d $456 \times 1000 = \boxed{}$

6 Sofia multiplies a number by 10, then again by 10 and then again by 10.
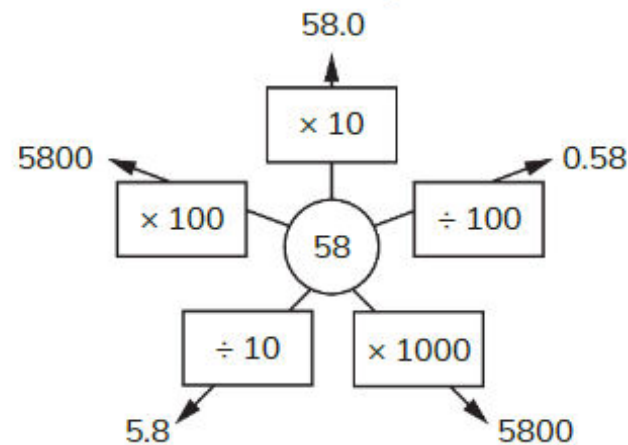
Her answer is 20 000.

What number did she start with?

7 Write the missing numbers.

a $3.45 \times 100 = \boxed{}$

b $16.8 \div 10 = \boxed{}$

c $6.5 \times 10 = \boxed{}$

8 Find and correct the mistakes in this diagram.

```
                    58.0
                     ↑
                 ┌────────┐
                 │  × 10  │
   5800 ◄──────  └────────┘   ──────► 0.58
      ┌────────┐             ┌────────┐
      │ × 100  │    ╭────╮    │ ÷ 100  │
      └────────┘    │ 58 │    └────────┘
            ┌────────┐  ┌────────┐
            │  ÷ 10  │  │ × 1000 │
            └────────┘  └────────┘
      5.8 ◄                        ► 5800
```

9 Which missing number is the odd one out?

A $33 \div 10 = \boxed{}$

B $\boxed{} \times 100 = 330$

C $\boxed{} \times 10 = 30.3$

D $3300 \div 1000 = \boxed{}$

Explain your answer.

Look back over your answers. Did you use the worked example to help you? Did you find any question particularly hard? Why?

Think like a mathematician

Zara is thinking of a decimal number less than 1.

> The hundredths digit is four more than the tenths digit. The sum of the tenths digit and the hundredths digit is 10.

What number is Zara thinking of?

Make up a similar question to test your partner.

You will show you are **specialising** when you identify examples that fit the given criteria.

Look what I can do!

☐ I can explain the value of a digit in a decimal number (tenths and hundredths).

☐ I can multiply and divide whole numbers by 1000.

☐ I can multiply and divide decimals by 10 and 100.

› 1.2 Rounding decimal numbers

We are going to …

• round numbers with 1 decimal place to the nearest whole number.

Rounding makes it easier to describe and understand numbers. It is easier to understand 'an African elephant is approximately 3 metres tall' than 'the average height of an African elephant is 3.3 metres'.

nearest   round
round to the nearest …

Can you round these heights to the nearest whole number?
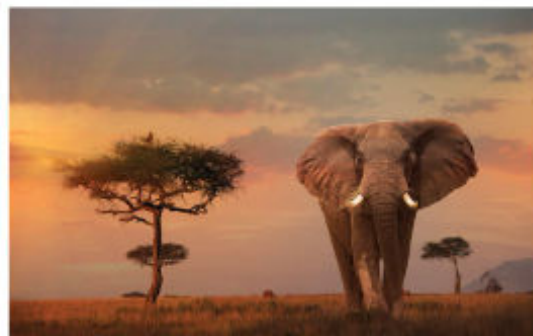
Height of elephant 3.3 m

Height of giraffe 5.5 m

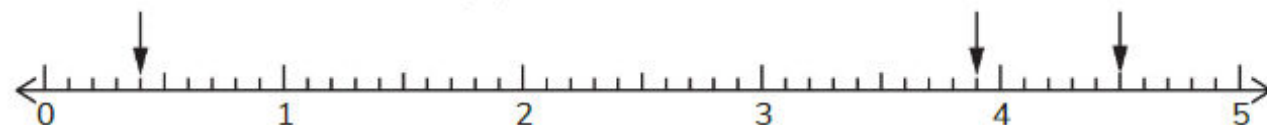Height of ostrich 2.7 m

How tall are you?

Worked example 2

Round these measurements to the nearest whole number.

a 3.9 m   b 4.5 m   c 0.4 m

You can use a number line to help you.

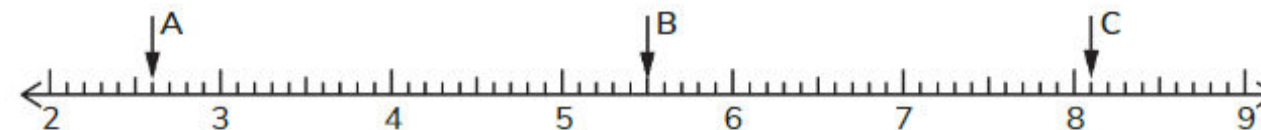**Answer:**

a 4 m   If the tenths digit is 0, 1, 2, 3 or 4, round down to the nearest whole number.

b 5 m   If the tenths digit is 5, 6, 7, 8 or 9, round up to the nearest whole number.

c 0 m

Exercise 1.2

1 Identify the numbers marked by arrows. Round each number to the nearest whole number.

2 Round these numbers to the nearest whole number.

a 65.8   b 101.1

c 44.4   d 55.5

3 Round these measures to the nearest whole centimetre.

a 2.8 cm   b 8.5 cm

Round these measures to the nearest whole metre.

c 7.3 m   d 0.3 m

4 A number with 1 decimal place is rounded to the nearest whole number.

a What is the smallest number that rounds to 5?

b What is the largest number that rounds to 5?

Ask your partner to check your answers. Did you both choose the same numbers?

5

74.5 is 74 to the nearest whole number.

Is Marcus correct?

Explain your answer.

6 Use a calculator to help you answer this question.

Two numbers each with 1 decimal place round to 231 to the nearest whole number.

The sum of the two numbers is 462.

What could the numbers be?

7   Use the clues to identify the correct number.

| 10.42 | 9.73 | 9.9 | 9.37 |
| 7.83 | 10.1 | 8.7 | 9.55 |

The number:

- has no hundredths digit
- has a tenths digit which is odd
- rounds to 10 to the nearest whole number
- is less than 10.

Swap books with your partner and check their answers.

Think about the questions you have just answered. If you were asked similar questions, what would you do differently?

Think like a mathematician

Roll a dice twice and make a number with 1 decimal place.

Find all the different numbers you can make.

Round each of your numbers to the nearest whole number.

2.5 rounds to 3
5.2 rounds to 5

Roll the dice again and make some more numbers.

What numbers with 1 decimal place are possible?

Find all the possible numbers these could round to.

Look what I can do!

☐   I can round numbers with 1 decimal place to the nearest whole number.

Check your progress

1   What is the value of the digit 3 in these numbers?

 a   6703.46   b   7021.83   c   606 456.35

2   Write these numbers in words and digits.

 a   100 000 + 3000 + 500 + 7 + 0.9

 b   600 000 + 60 000 + 600 + 6 + 0.06

3   a   What number is ten times bigger than 0.03?

 b   What number is one hundred times smaller than 555?

4   Round these lengths to the nearest whole number.

 a   5.1 m   b   16.5 cm   c   10.4 m   d   10.7 cm

5   Look at these number cards.

 A   450 000   B   45 000   C   4500   D   450

 E   45   F   4.5   G   0.45

 Write the letter of the card that is one hundredth of 45.

6   Write the missing numbers.

 a   ☐ ÷ 1000 = 20

 b   543 × 1000 = ☐ × 10

7   What is the missing number?

 100 × 10 = 10 000 ÷ ☐

8   Sofia, Arun, Marcus and Zara each think of a number.

 Their numbers are 3.5, 0.35, 35 and 0.53.

 Use these clues to find the number each is thinking of.

- Arun's number is ten times smaller than Marcus's number.
- Zara's number is **not** ten times smaller than Sofia's or Arun's or Marcus's numbers.
- Sofia's number is ten times smaller than Arun's number.