●●○○○ **Level 2 · Mathematics** **M2.6**

Measuring

Measure the world in metric units, and read the time on any clock.

Measure length in millimetres, centimetres, metres and kilometres, mass in grams and kilograms, and capacity in millilitres and litres. Read clocks, work out how long things take, and find perimeter and area.

YOU ARE READY FOR THIS BOOK IF

You can measure a pencil in centimetres with a ruler.

One step up	M3.6 Perimeter, area and volume
This book	**M2.6 Measuring**
One step down	M1.6 Longer, heavier, fuller, and o'clock

Contents

M2.6.1 Centimetres and metres

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M2.6.6 Telling the time

M2.6.7 How long it takes

M2.6.8 Perimeter and area

Key words, A to Z

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M2.6.1 CHAPTER 1

Centimetres and metres

My table is 2 m long. Is that the same as 200 cm?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** No. 2 m is 2 cm, because the number is 2.
- ☐ **B** No. 2 m is 20 cm.
- ☐ **C** Yes. 100 cm make 1 m, so 2 m is 200 cm.

BY THE END YOU CAN

- Measure and draw lines to the nearest centimetre
- Measure a room in metres and centimetres
- Change 2 m 35 cm into 235 cm

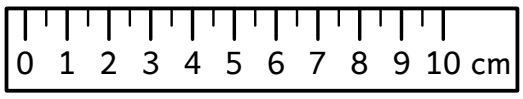
Look at a ruler. It has a row of marks and numbers.

The gap between two numbers is one **centimetre**. We write cm.

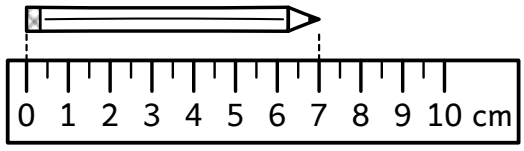
To measure a pencil, line up one end with the 0 mark.

DRAW IT FIRST

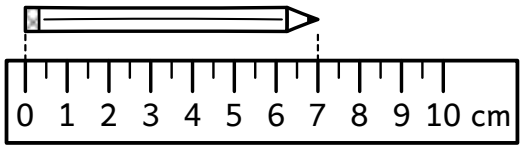
Measure a pencil



1 A ruler starts at 0. Find the 0 mark.



2 Put one end of the pencil on the 0 mark.



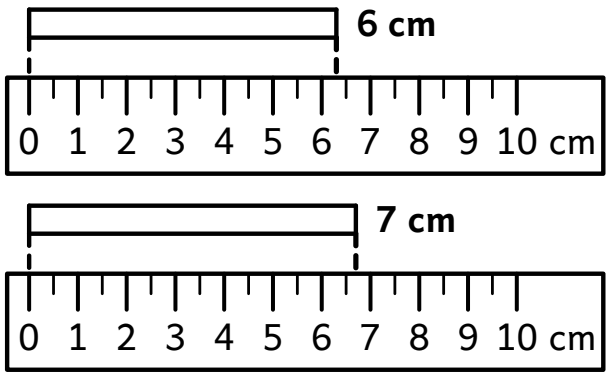
The pencil is 7 cm long

3 Read the number at the other end. It is 7 cm.

Do not start at the end of the ruler. Start at the 0 mark.

Sometimes the end falls between two marks.

The length to the **<u>nearest</u>** centimetre is the closest whole number.



The short tick is half way between two numbers. Before it, stay on the lower number. Past it, go up.

A ruler is too short for a room. For long things we use the **metre**.

100 cm make 1 m. We write m.

WORKED EXAMPLE

A table is 2 m 35 cm long. Write this in centimetres.

1. 1 m is 100 cm. So 2 m is 200 cm.
2. 2 m 35 cm is 200 cm and 35 cm more.
3. 200 + 35 = 235.

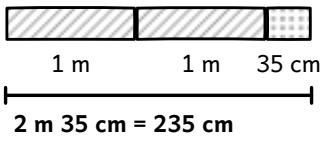
Answer: 235 cm

SEE IT THREE WAYS

With things

Lay a 1 m string along a wall two times. Then measure 35 cm more with a ruler.

As a picture



In symbols

200 cm + 35 cm = 235 cm.

TRY IT

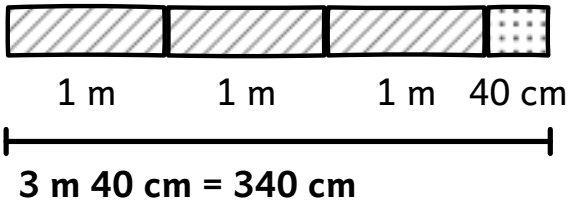
Make a metre string and measure a room

You need: a piece of string, longer than 1 m, a ruler, a pencil.

1. Put one end of the string on the 0 mark.
2. Pinch the string at the ruler's last number, such as 30. Put the 0 mark on your pinch and repeat.
3. Keep adding the centimetres. Stop when you reach 100 cm. Tie a knot there.
4. Lay your string along one wall of a room. Count how many strings fit.
5. Measure what is left with the ruler. Write the length as metres and centimetres.

What you will see: Your string is 1 m, which is 100 cm. You can change your answer to centimetres: each string is 100 cm.

If you cannot try it, this is what happens.



A WRONG IDEA MANY PEOPLE HAVE

~~200 cm is longer than 2 m. After all, 200 is more than 2.~~

Why it feels right: We learn that a bigger number means a bigger amount.

The test that breaks it: Measure a wall 3 m long two ways. Use your 1 m string, then a 30 cm ruler. The string fits 3 times. The ruler fits 10 times.

What is true: The wall did not change. A small unit fits more times, so its number is bigger. 200 cm and 2 m are the same length.

KEY WORDS

centimetre
a small length. The *gap* between two numbers on *a* ruler. We write cm.

metre
a length of 100 cm. We write m.

nearest
closest. The nearest centimetre is the closest whole number of cm.

BACK TO YOUR GUESS

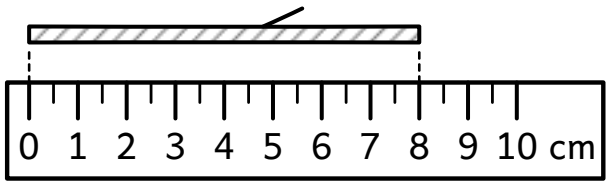
The answer is C: Yes. 100 cm make 1 m, so 2 m is 200 cm.

Yes. 100 cm make 1 m, so 2 m is 200 cm. The same table, two ways to say its length.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. How long is the stick?



   A 9 cm

   B 8 cm

   C 10 cm

   Answer at the back of the book.

2. A leaf is longer than 9 cm. Its tip is past the half way tick to 10. How long is it to the nearest centimetre?

   A 9 cm

   B 10 cm

   Answer at the back of the book.

3. Amina measures a wall. It is 4 m 5 cm long. How many centimetres is that?

   A 450 cm

   B 45 cm

   C 405 cm

   Answer at the back of the book.

4. Change 3 m 20 cm into centimetres.

   Answer at the back of the book.

5. Which is longer, 150 cm or 2 m?

   A 150 cm

   B 2 m

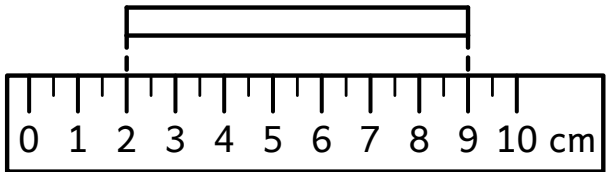
   C They are the same

   Answer at the back of the book.

6. Draw a line 8 cm long with a ruler. How do you do it?

   Answer at the back of the book.

7. A stick lies on a ruler. Its left end is on the 2 mark. Its right end is on the 9 mark. How long is the stick?



   A 7 cm

   B 9 cm

   C 8 cm

   Answer at the back of the book.

8. A rope is 3 m long. How many centimetres is that?

A 30 cm

B 3 000 cm

C 300 cm

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

Put the 0 mark at one end. Read the other end. 100 cm make 1 m. 2 m 35 cm is 200 + 35 = 235 cm.

Draw: A ruler with a pencil from 0 to 7. Under it, write 100 cm = 1 m.

M2.6.2 CHAPTER 2

Millimetres and kilometres

Which unit is for an ant? Which is for a long road?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Use cm for both the ant and the road.
- ☐ **B** Use mm for the ant and km for the road.
- ☐ **C** Use km for the ant and mm for the road.

BY THE END YOU CAN

- Measure small things to the nearest millimetre
- Say that 1 000 m make 1 km
- Choose the right unit: mm, cm, m or km

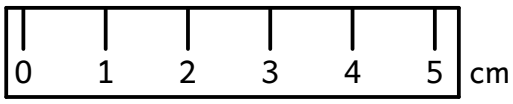
A centimetre is too big for a grain of rice.

A metre is too small for the road to the next town.

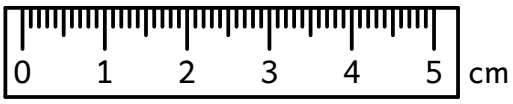
A **millimetre** is very small. We write mm. Ten sheets of paper in a pile are about 1 mm thick.

DRAW IT FIRST

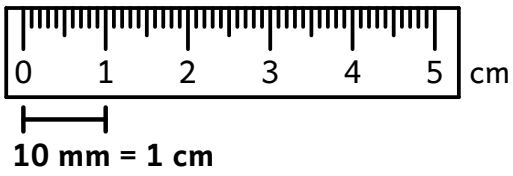
Look closely at one centimetre



1 Look at the gap from 0 to 1 on the ruler. It is 1 cm.



2 Between 0 and 1 there are 10 small gaps. Each one is 1 mm.

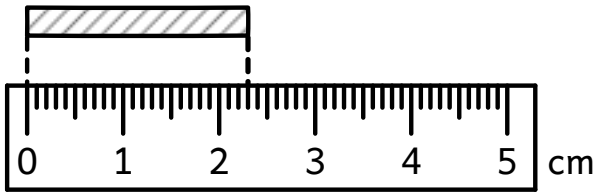


3 Count the small gaps. 10 mm make 1 cm.

10 mm make 1 cm. 100 cm make 1 m. So 1 000 mm make 1 m.

To read mm, first read the whole cm. Then count the small marks after it.

If the end is between two small marks, pick the nearer one.



The strip ends 2 cm and 3 small marks from 0.

WORKED EXAMPLE

A paper strip is 2 cm 3 mm long. Write this in mm.

1. 1 cm is 10 mm. So 2 cm is 20 mm.
2. 2 cm 3 mm is 20 mm and 3 mm more.
3. 20 + 3 = 23.

Answer: 23 mm

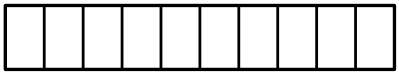
For a long way we use the **kilometre**. We write km.

SEE IT THREE WAYS

With things

Walk along a field that is 100 m long. Walk its length 10 times. You have walked 1 000 m, or 1 km.

As a picture



10 × 100 m = 1 km

In symbols

10 × 100 m = 1 000 m = 1 km.

Most people walk 1 km in about 12 to 15 minutes.

Pick the unit that fits the thing you measure.

Unit	Use it for
mm	an ant
cm	a book
m	a room
km	a long road

A good unit gives a number you can picture.

TRY IT

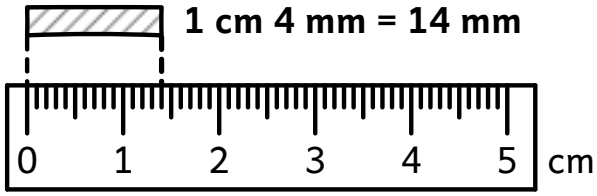
Measure small things in mm

You need: a ruler with mm marks, a bean, a seed or a button.

1. Lay the small thing next to the ruler. Put one end on the 0 mark.
2. Read the whole cm just before the other end.
3. Count the small marks after it. Each one is 1 mm.
4. Write the length in mm. A length of 1 cm 4 mm is 14 mm.

What you will see: You count small marks of 1 mm each. A grain of rice is only a few mm wide.

If you cannot try it, this is what happens.



A WRONG IDEA MANY PEOPLE HAVE

~~**1 km is 100 m, because 100 cm make 1 m.**~~

Why it feels right: Going from cm to m uses 100. It seems that m to km will too.

The test that breaks it: Walk across a field 100 m long. It takes a bit more than a minute. Walking 1 km takes 12 to 15 minutes. That is about 10 times as long.

What is true: 1 km is 1 000 m. It is 10 fields of 100 m, end to end.

KEY WORDS

millimetre
a very small length. 10 mm make 1 cm. We write mm.

kilometre

a long length. 1 000 m make 1 km. We write km.

BACK TO YOUR GUESS

The answer is B: Use mm for the ant and km for the road.

Use a small unit for a small thing. Use a big unit for a long way. So mm for the ant, and km for the road.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. Which unit is best for the distance between two towns?

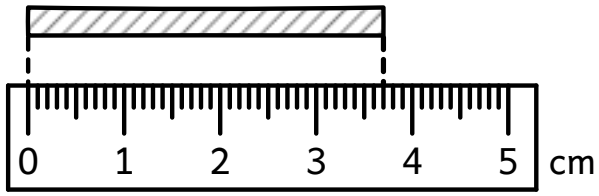
   A mm

   B m

   C km

   Answer at the back of the book.

2. The strip ends at 3 cm and 7 small marks. How many mm long is it?



   Answer at the back of the book.

3. Change 4 km into metres.

   Answer at the back of the book.

4. **From an earlier chapter**

   Kofi has a string 1 m 40 cm long. How many centimetres is that?

   Answer at the back of the book.

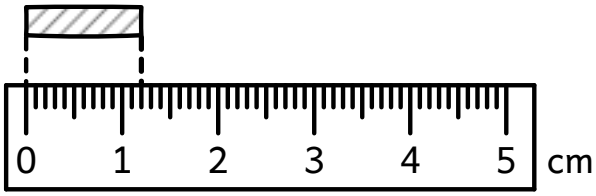
5. A road is 2 km 500 m long. How many metres is that?

   Answer at the back of the book.

6. How many mm make 1 m?

   Answer at the back of the book.

7. A seed ends 1 cm and 2 small marks from 0. How many mm long is it?



   A 12 cm

   B 12 mm

   C 102 mm

   Answer at the back of the book.

8. Which is the longest: 900 m, 1 500 mm or 1 km?

   A 900 m

   B 1 500 mm

   C 1 km

   Answer at the back of the book.

9. Ravi has a pencil 14 cm long. How many mm is that?

   A 140 mm

   B 14 mm

   C 1 400 mm

   Answer at the back of the book.

10. Which length is about right for a pencil?

A 18 mm

B 18 cm

C 18 m

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

10 mm make 1 cm. 1 000 mm make 1 m. 1 000 m make 1 km. Use mm for an ant. Use cm for a book. Use m for a room. Use km for a road.

Draw: A ruler with 1 cm split into 10 small gaps. Write 10 mm = 1 cm.

M2.6.3 CHAPTER 3

Tenths and the decimal point

My ruler says 1.5 m. Is that 1 m 5 cm?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Yes. 1.5 m is 1 m and 5 cm.
- ☐ **B** No. 1.5 m is 1 m and 50 cm.
- ☐ **C** No. 1.5 m is 15 m.

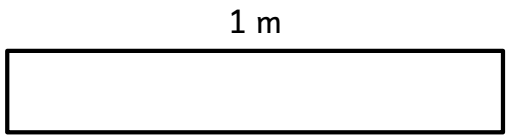
BY THE END YOU CAN

- Read 0.1 as one tenth, the same as $^{1}/_{10}$
- Write 1 m 50 cm as 1.5 m
- Read 1.5 and 1,5 as the same number, written two ways

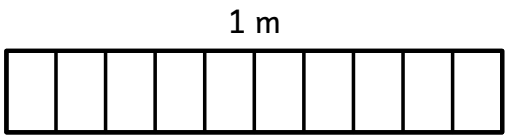
Think of 1 m cut into 10 equal parts. Each part is 10 cm.

DRAW IT FIRST

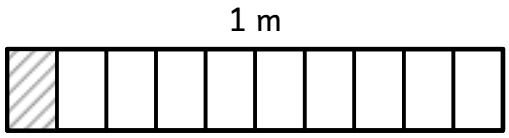
Cut *a* metre into tenths



1 This bar is 1 m long.



2 Cut it into 10 equal parts. Each part is 10 cm.



one tenth

$\frac{1}{10}$ = 0.1 m = 10 cm

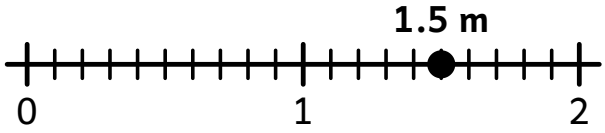
3 One part is one tenth of *a* metre. It is 0.1 m.

One part is one **tenth** of the metre.

$^1/_{10}$ and 0.1 are two ways to write one tenth.

The dot in 0.1 is the **decimal point**. Digits after it are tenths.

In 1.5 m, the 1 is one whole metre. The 5 is five tenths.



On the number line, 1.5 is 5 tenths past 1.

5 tenths of a metre is 50 cm. That is half a metre.

WORKED EXAMPLE

Write 1 m 50 cm in metres, with a decimal point.

1. 10 cm is one tenth of a metre.
2. 50 cm is 5 lots of 10 cm. That is 5 tenths.
3. 1 m and 5 tenths is 1.5 m.

Answer: 1.5 m

Many countries use a comma as the decimal mark.

So 1,5 and 1.5 are the same number. Use the mark your own books use.

1.5 m = **1,5 m**

Two ways to write the same length.

SEE IT THREE WAYS

With things

Mark a 1 m string every 10 cm. Count 5 marks from the start. That is 50 cm.

As a picture



5 tenths of 1 m

In symbols

5 tenths = $^{5}/_{10}$ = 0.5. So 1 m 50 cm = 1.5 m.

TRY IT

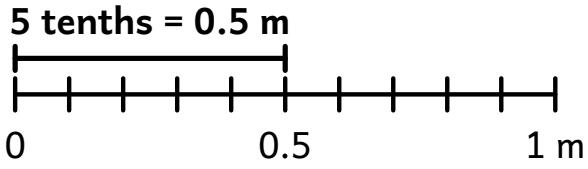
Mark tenths on your metre string

You need: your metre string from chapter 1, a ruler, a pencil.

1. Lay your string beside a ruler. Make a pencil mark at 10 cm.
2. Make a mark at every 10 cm after that. You get 10 parts.
3. Count 5 parts from the start. Measure them. You find 50 cm.
4. Lay the string along a chair or a box. Count the parts.
5. Say the length in tenths of a metre, like this: 0.8 m.

What you will see: Each part is one tenth of 1 m. 3 parts is 0.3 m. 7 parts is 0.7 m.

If you cannot try it, this is what happens.



A WRONG IDEA MANY PEOPLE HAVE

~~1 m 5 cm is 1.5 m.~~

Why it feels right: The digits 1 and 5 are there. It seems you just add a dot between them.

The test that breaks it: Mark 5 cm on your marked string. Then find the 5th tenth mark. They are far apart. The 5th tenth mark is at 50 cm.

What is true: 1.5 m is 1 m 50 cm. 1 m 5 cm is a little more than 1 m. It is much less than 1.5 m.

KEY WORDS

tenth
one of 10 equal parts. We write $^1/_{10}$ or 0.1.

decimal point

the dot in a number like 1.5. In many countries it is a comma.

BACK TO YOUR GUESS

The answer is B: No. 1.5 m is 1 m and 50 cm.

The 5 after the point means 5 tenths. 5 tenths of a metre is 50 cm. So 1.5 m is 1 m 50 cm.

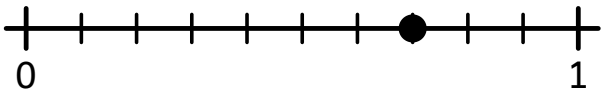
CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. Write 1 m 20 cm in metres, with a decimal point.

   Answer at the back of the book.

2. What number is the dot on?



   A 0.07

   B 0.7

   C 7

   Answer at the back of the book.

3. Which is the same as 0.1?

   A ten

   B one half

   C one tenth

   Answer at the back of the book.

4. Which is longer, 1.5 m or 1 m 5 cm?

   A 1 m 5 cm

   B 1.5 m

   C They are the same

   Answer at the back of the book.

5. Ana lives where a comma is the decimal mark. Her tape says 2,4 m. Write it with a point, and in m and cm.

   Answer at the back of the book.

6. **From an earlier chapter**

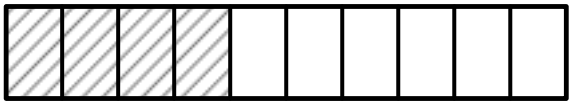
   Which is longer, 1 km or 900 m?

   A 900 m

   B 1 km

   Answer at the back of the book.

7. Kofi cuts a 1 m string into 10 equal parts. He keeps the 4 shaded parts. How many cm is that?



4 of the 10 parts of 1 m

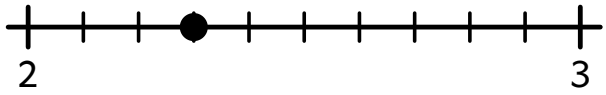
   A 40 cm

   B 4 cm

   C 400 cm

   Answer at the back of the book.

8. A rope ends at the dot on the line. How long is the rope?



The numbers are metres, m

A 2.7 m

B 23 m

C 2.3 m

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

One tenth is $^{1}/_{10}$ and 0.1. 10 tenths make 1. 1 m 50 cm is 1.5 m. 1,5 and 1.5 are the same number.

Draw: A bar for 1 m cut into 10 parts. Shade 5 and write 0.5 m.

M2.6.4 CHAPTER 4

Grams and kilograms

Is a big thing always heavier than a small thing?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Yes. A bigger thing is always heavier.
- ☐ **B** No. A small thing can be heavier than a big thing.
- ☐ **C** No. A big light thing, such as a bag of leaves, weighs nothing.

BY THE END YOU CAN

- Weigh things on a scale in grams and kilograms
- Read a scale where the marks go up in 100 g
- Change 2 kg 300 g into 2 300 g

We can weigh things on a scale. For light things we use the **gram**. We write g.

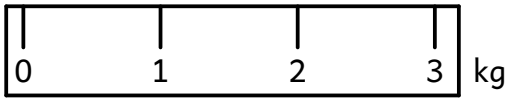
For heavier things we use the **kilogram**. We write kg.

1 000 g make 1 kg. The water in a 1 litre bottle weighs about 1 kg.

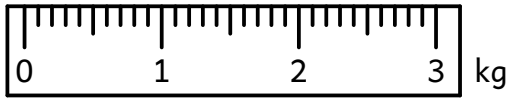
Look at this scale. The numbers on it are kilograms.

DRAW IT FIRST

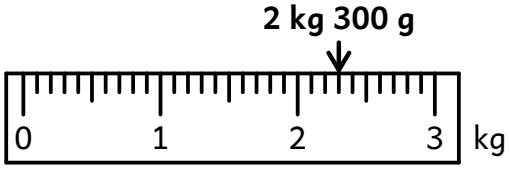
Read a scale



1 The numbers on this scale are kilograms.



2 Between two numbers there are 10 marks. Each mark is 100 g.



3 The arrow is 3 marks past 2. That is 2 kg 300 g.

To read a scale, find the last number the arrow passed.

Then count the small marks after it. Each one is 100 g.

WORKED EXAMPLE

Write 2 kg 300 g in grams.

1. 1 kg is 1 000 g. So 2 kg is 2 000 g.
2. 2 kg 300 g is 2 000 g and 300 g more.
3. 2 000 + 300 = 2 300.

Answer: 2 300 g

SEE IT THREE WAYS

With things

The water in a 1 litre bottle weighs about 1 kg. That is 1 000 g.

As a picture



1 kg = 10 × 100 g

In symbols

10 × 100 g = 1 000 g = 1 kg. So 2 kg 300 g = 2 300 g.

A **balance** shows which of two things is heavier.

TRY IT

Make a balance

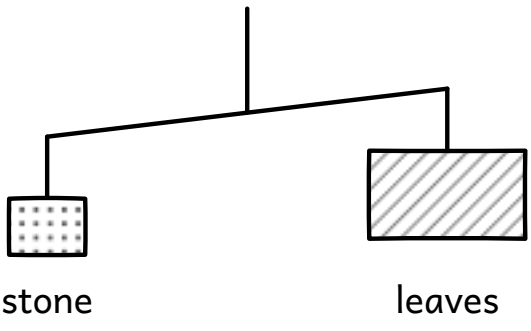
You need: a stick or a coat hanger, string, two bags the same, a stone as big as your fist, and dry leaves.

Be safe: Hang the balance low. Keep your feet and face away from the stone. Wash your hands after you touch leaves or soil.

1. Tie a string to the middle of the stick. Hang it from a hook.
2. Slide the string until the stick hangs level.
3. Hang a bag from each end, the same distance from the middle.
4. Put the stone in one bag. Fill the other bag with dry leaves.
5. Watch which side goes down.

What you will see: The stone side goes down. The small stone is heavier than the bag of leaves.

If you cannot try it, this is what happens.



A WRONG IDEA MANY PEOPLE HAVE

~~A bigger thing is always heavier.~~

Why it feels right: Big rocks and big boxes are often heavy.

The test that breaks it: Fill a bag with dry leaves. Put a stone as big as your fist in the other bag. The leaves take far more room. The stone side goes down.

What is true: Size is not weight. A bag of dry leaves is big but light. A small stone is heavy. Weigh them to find out.

KEY WORDS

gram
a small amount of weight. We write g.

kilogram
1 000 g. We write kg.

balance
two bags on a stick. The lower side is heavier.

BACK TO YOUR GUESS

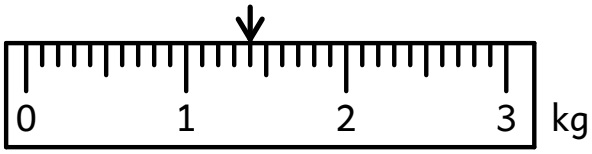
The answer is B: No. A small thing can be heavier than a big thing.

No. A small stone can be heavier than a big bag of leaves. The leaves still weigh something, only less. Size alone does not tell you.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. What does the arrow show?



A 1 kg 4 g

B 1 kg 400 g

C 4 kg

Answer at the back of the book.

2. Change 4 kg 50 g into grams.

A 450 g

B 4 500 g

C 4 050 g

Answer at the back of the book.

3. Change 5 000 g into kilograms.

Answer at the back of the book.

4. Tariq says a big pillow must be heavier than a small stone. Is he right?

A Yes, because it is bigger.

B No. A bigger thing is not always heavier.

C No. A pillow is soft, so it weighs nothing.

Answer at the back of the book.

5. **From an earlier chapter**

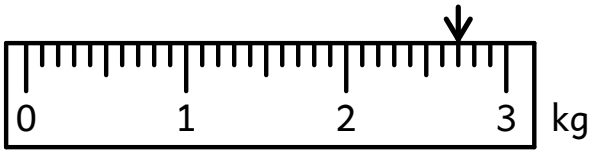
Write 3 m 70 cm in metres, with a decimal point.

Answer at the back of the book.

6. The arrow is 5 marks past 2 kg. Each mark is 100 g. Write the weight in grams.

Answer at the back of the book.

7. What weight does the arrow show?



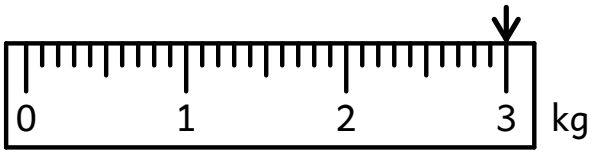
A 2 kg 700 g

B 3 kg 300 g

C 2 kg 70 g

Answer at the back of the book.

8. The arrow points at 3 kg. How many grams is that?



A 3 000 g

B 300 g

C 3 g

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

1 000 g make 1 kg. 2 kg 300 g is 2 300 g. On a scale, count 100 g marks from the last number. Big is not always heavy.

Draw: A scale from 0 to 3 kg. Draw an arrow 3 marks past 2. Write 2 kg 300 g.

M2.6.5 CHAPTER 5

Millilitres and litres

How do I read how much water is in a jug?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Read the number at the top of the jug.
- ☐ **B** Read the mark at the flat top of the water.
- ☐ **C** Read the mark nearest the bottom of the jug.

BY THE END YOU CAN

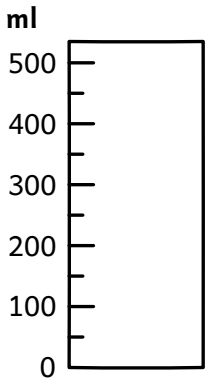
- Read the water level on a measuring jug in millilitres
- Say that 1 000 ml make 1 litre
- Estimate how many cups fill a 1 litre bottle

A **millilitre** is a very small amount of water. We write ml for short. A teaspoon holds about 5 ml.

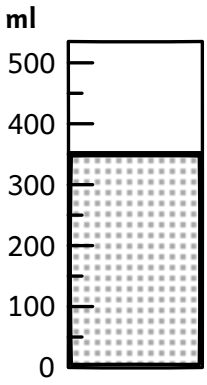
A measuring jug has marks up its side. Look at this jug. It holds up to 500 ml.

DRAW IT FIRST

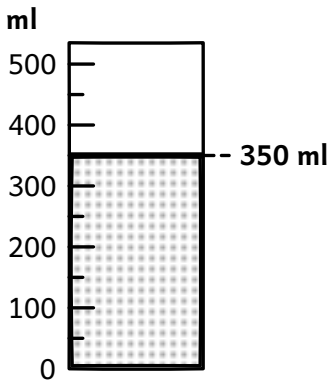
Read the water level



1 The long marks are 100 ml apart. The short marks are halfway, at 50 ml.

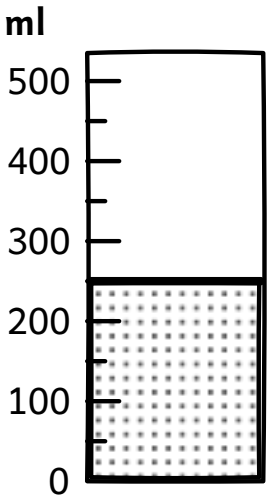


2 Pour in some water. The top of the water is flat.



3 The water is at the short mark after 300 ml. It is 350 ml.

Always put your eyes level with the water. Looking from above or below gives a wrong number.



The water stands halfway between 200 ml and 300 ml.

WORKED EXAMPLE

The water is halfway between 200 ml and 300 ml. How much water is there?

1. The long mark before the water is 200 ml.
2. The long mark after the water is 300 ml.
3. Halfway between 200 and 300 is 250. So there is 250 ml.

Answer: 250 ml

A bigger unit is the **litre**. 1 000 ml make 1 litre. We write L for short.

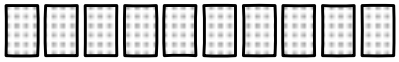
The most a container can hold is its **capacity**. A 1 litre bottle has a capacity of 1 000 ml.

SEE IT THREE WAYS

With things

Take a small cup that holds 100 ml. Pour 10 of these into one big jug.

As a picture

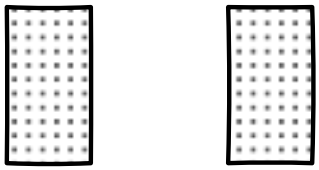


10 × 100 ml
= 1 000 ml = 1 litre

In symbols

10 × 100 ml = 1 000 ml. 1 000 ml = 1 L.

To change litres into ml, use × 1 000. 2 litres is 2 × 1 000 ml.



1 litre
1 000 ml

1 litre
1 000 ml

Each bottle holds 1 litre, which is 1 000 ml.

WORKED EXAMPLE

Change 2 litres into ml.

1. 1 litre is 1 000 ml.
2. 2 litres is 2 × 1 000 ml.
3. 2 × 1 000 = 2 000.

Answer: 2 000 ml

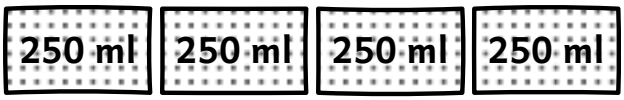
A cup holds about 200 to 250 ml. How many cups fill a 1 litre bottle?

WORKED EXAMPLE

A cup holds 250 ml. How many cups fill a 1 litre bottle?

1. 1 litre is 1 000 ml.
2. Count on in 250s: 250, 500, 750, 1 000. That is 4 cups.
3. Check: 1 000 ÷ 250 = 4.

Answer: 4 cups



4 cups fill 1 litre

Four cups of 250 ml fill a 1 litre bottle.

Real cups differ. If your cup holds 200 ml, it takes 5 cups. So this is an estimate. Say 4 or 5 cups.

TRY IT

How many cups fill a litre?

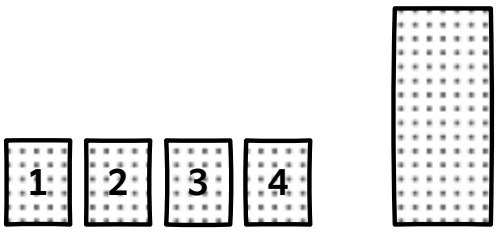
You need: a bottle marked 1 litre, 1 L or 1 000 ml, one cup, a bowl of clean water, a tray to catch spills.

Be safe: Do not drink the water from this activity. Pour it on a plant after.

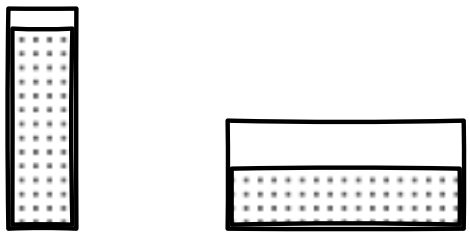
1. Fill the cup to the top. Pour it into the empty bottle.
2. Make a mark on paper for each cup.
3. Stop when the water is at the top of the bottle.
4. Count your marks. Count a part cup as a half.

What you will see: It takes about 4 or 5 cups. A bigger cup needs fewer cups.

If you cannot try it, this is what happens.



about 4 cups 1 litre



tall thin glass wide bowl

The glass is poured into the bowl. The water looks low. It is the same water.

A WRONG IDEA MANY PEOPLE HAVE

~~A tall thin glass holds more than a wide bowl.~~

Why it feels right: Tall things look big. In a thin glass, a little water stands high.

The test that breaks it: Fill a tall thin glass. Pour it into a wide bowl. The water covers only the bottom. The bowl has lots of room, so it holds more.

What is true: Height alone does not tell you how much a container holds. Measure the water in ml to compare.

KEY WORDS

millilitre
a very small amount of water. 1 000 ml make 1 litre.

litre
1 000 millilitres. Many water bottles hold 1 litre.

capacity
the most a container can hold.

BACK TO YOUR GUESS

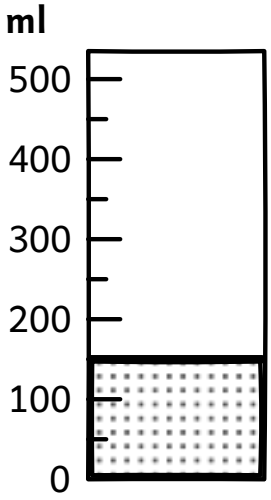
The answer is B: Read the mark at the flat top of the water.

Put your eyes level with the water. Read the mark at the flat top of the water. The top mark shows only how much the jug holds.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. How much water is in the jug?



   A 100 ml

   B 150 ml

   C 200 ml

   Answer at the back of the book.

2. How many millilitres are in 3 litres?

   Answer at the back of the book.

3. Mei has a cup that holds 250 ml. How many cups fill a 1 litre bottle?

   Answer at the back of the book.

4. Amina pours a full tall thin glass into a wide pan. The water looks low in the pan. Is there less water now?

   A Yes. It is lower, so there is less.

   B No. There is more now, because it covers more of the pan.

   C No. It is the same water.

   Answer at the back of the book.

5. A pot holds 4 000 ml of water. How many litres is that?

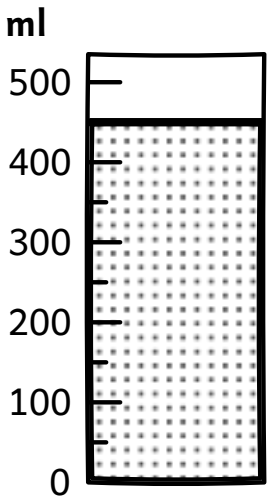
   Answer at the back of the book.

6. **From an earlier chapter**

   A bag of rice weighs 2 kg 500 g. How many grams is that?

   Answer at the back of the book.

7. How much water is in the jug?



   A 450 ml

   B 500 ml

   C 400 ml

   Answer at the back of the book.

8. Which bottle holds more, 1 litre or 900 ml?

   A 900 ml

   B 1 litre

   C You cannot tell

   Answer at the back of the book.

9. Ravi has a cup that holds 100 ml. How many cups fill a 1 litre bottle?

   A 10 cups

   B 4 cups

   C 100 cups

   Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

Read the mark at the flat top of the water. 1 000 ml make 1 litre. A cup holds about 200 to 250 ml. A litre takes 4 or 5 cups.

Draw: A jug with marks every 100 ml. Draw water up to a mark and write the number.

M2.6.6 CHAPTER 6

Telling the time

> **A clock has two hands. How do I know which one tells the hour?**

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** The long hand tells the hour. The short hand tells the minutes.
- ☐ **B** The short hand tells the hour. The long hand tells the minutes.
- ☐ **C** Both hands tell the hour.

BY THE END YOU CAN

- Read a clock face to the nearest 5 minutes
- Read a clock face to the nearest minute
- Match a clock face to a 24 hour time like 15:40

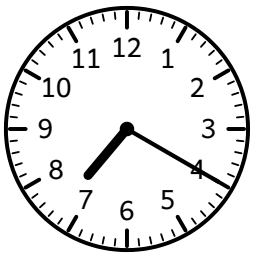
Look at a clock. It has a short thick hand and a long thin hand.

The short hand is the **hour hand**. It shows the hour.

The long hand is the **minute hand**. It shows the minutes.

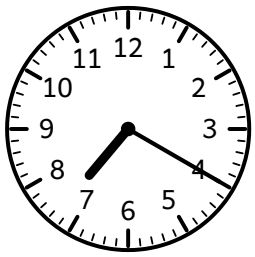
DRAW IT FIRST

Read the clock in four steps



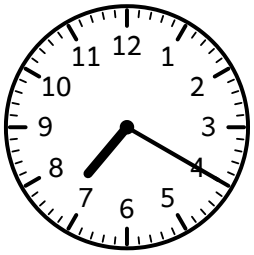
hour hand is past 7

1 The short hand is past 7, but not at 8. The hour is 7.



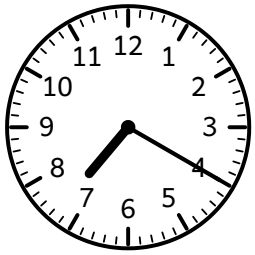
hour hand is past 7
minute hand points to 4

2 The long hand points to 4.



hour hand is past 7
minute hand points to 4
4 × 5 = 20 minutes

3 Each number is 5 minutes. 4 × 5 = 20 minutes.



hour hand is past 7
minute hand points to 4
4 × 5 = 20 minutes
7:20

4 The time is 7:20.

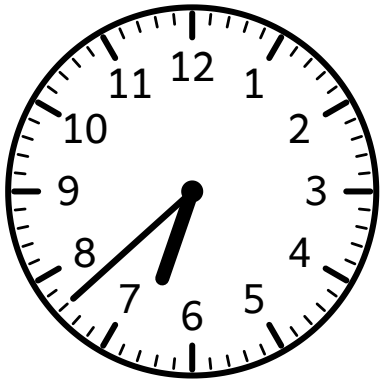
The minute hand goes round once in 60 minutes. Each number is 5 minutes. Count in fives: 5, 10, 15, 20, and on.

hand at	mins	we say
12	0	o'clock
1	5	5 past
2	10	10 past
3	15	quarter past
6	30	half past
9	45	quarter to

Where the long hand points, and how many minutes that is.

Past 30 minutes, we can count to the next hour. 7:40 is 20 minutes to 8.

The small marks are single minutes. Between two numbers there are 4 small marks.



The long hand is 3 small marks past the 7.

WORKED EXAMPLE

Read the clock above. The long hand is 3 small marks past the 7. The short hand is past 6.

1. The 7 is 7 × 5 = 35 minutes.
2. Add the 3 small marks. 35 + 3 = 38 minutes.
3. The short hand is past 6, but not at 7. The hour is 6.

Answer: 6:38

The hour hand moves slowly all the time. At half past 7 it is halfway between 7 and 8.

A day has 24 hours. The hour hand goes round the clock twice.

24 hour time counts the hours from midnight. It needs no morning or afternoon.

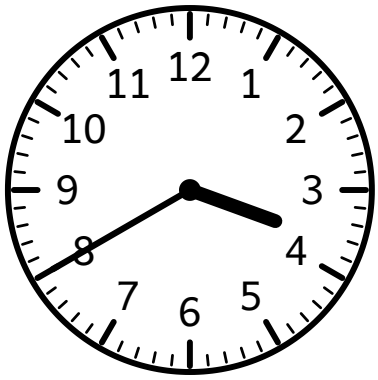
Midnight is 00:00. Midday is 12:00. From 1 o'clock after midday, add 12 to the hour.

SEE IT THREE WAYS

With things

Use a paper clock. Put the short hand past 3. Put the long hand on 8. It is the afternoon.

As a picture



3:40

In symbols

3:40 in the afternoon. 12 + 3 = 15. So it is 15:40.

---

we say	24 hour
midnight	00:00
7:00 morning	07:00
midday	12:00
3:40 afternoon	15:40
9:15 night	21:15

From 1 o'clock after midday until midnight, the hour is 12 more.

15:40 is also 20 minutes to 4.

TRY IT

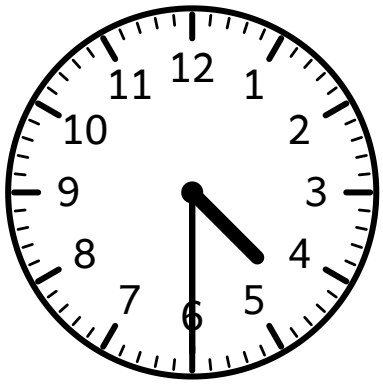
Make a paper clock

You need: a sheet of paper, a plate to draw round, two strips of paper, one long and one short, a pencil.

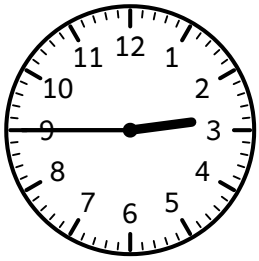
1. Draw round a plate to make a circle. Write 1 to 12 round the edge.
2. Lay both strips with their ends at the middle of the circle.
3. Show 4:30. Point the long strip at 6. Point the short strip halfway between 4 and 5.
4. Now show 5:30. Look at where the short strip goes.

What you will see: At half past, the short hand is halfway between two numbers. It is not on a number.

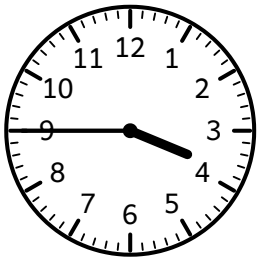
If you cannot try it, this is what happens.



4:30



2:45



3:45

In both clocks, the long hand is at 9. The short hand is nearly at the next number.

A WRONG IDEA MANY PEOPLE HAVE

~~At 2:45 the short hand is nearly at 3. So the time is 3:45.~~

Why it feels right: We read the hour from the number the short hand is nearest.

The test that breaks it: Set a paper clock to 3:00. Count back 15 minutes. You reach 2:45. The short hand backs away from 3. The long hand points at 9.

What is true: Read the hour from the number the short hand has passed. At 2:45 it has passed 2, so the hour is 2.

KEY WORDS

hour hand
the short hand. It shows the hour.

minute hand
the long hand. It shows the minutes.

24 hour time
time that counts the hours from midnight, from 00:00 to 23:59.

BACK TO YOUR GUESS

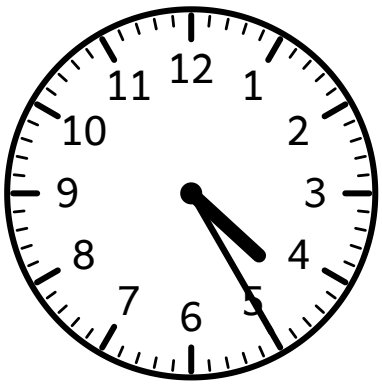
The answer is B: The short hand tells the hour. The long hand tells the minutes.

The short hand shows the hour. The long hand shows the minutes. The long hand goes round 24 times a day. The short hand goes round twice.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. What time does the clock show?



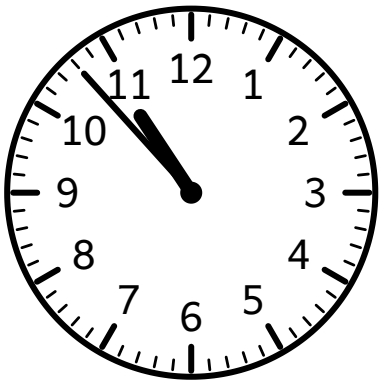
A 4:25

B 4:05

C 5:25

Answer at the back of the book.

2. What time does this clock show? Read it to the nearest minute.



Answer at the back of the book.

3. Which time is 18:30 in 24 hour time?

   A half past 6 in the morning

   B half past 6 in the evening

   C half past 8 in the evening

   Answer at the back of the book.

4. Write 8:15 in the evening in 24 hour time.

   Answer at the back of the book.

5. It is half past 9. Where is the short hand?

   A exactly on 9

   B halfway between 9 and 10

   C exactly on 10

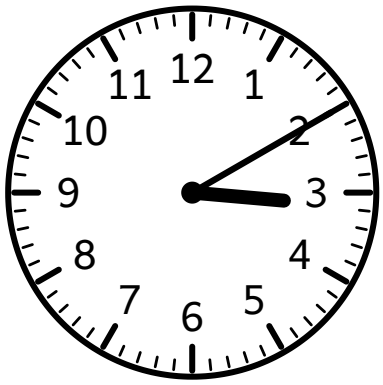
   Answer at the back of the book.

6. **From an earlier chapter**

   A road is 3 km long. How many metres is that?

   Answer at the back of the book.

7. What time does the clock show?



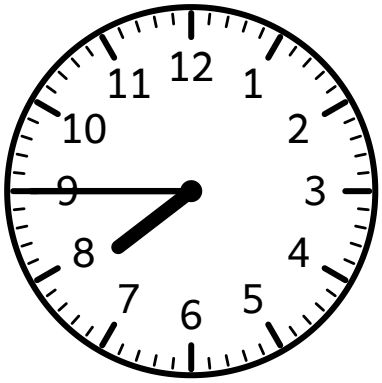
   A 2:15

   B 3:02

   C 3:10

   Answer at the back of the book.

8. The clock shows a time in the evening. Which is its 24 hour time?



A 19:45

B 07:45

C 17:45

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

The short hand shows the hour. The long hand shows the minutes. Each number is 5 minutes. From 1 o'clock after midday, add 12 for 24 hour time.

Draw: A clock showing 7:20. Write 4 × 5 = 20 beside it.

M2.6.7 CHAPTER 7

How long it takes

A bus leaves at 09:40 and arrives at 11:15. How long is the journey?

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** 1 hour 75 minutes, because 1115 − 940 = 175.
- ☐ **B** 1 hour 35 minutes.
- ☐ **C** 2 hours 25 minutes.

BY THE END YOU CAN

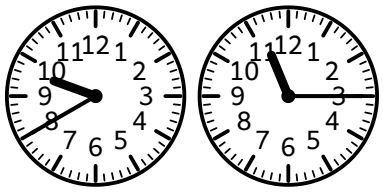
- Use clock faces to find how long from 09:40 to 11:15
- Change hours to minutes and minutes to seconds
- Count days and weeks on a calendar

A bus leaves at 09:40. It arrives at 11:15. How long is the journey?

Jump to the next hour first. Then jump a whole hour. Then jump to the end time.

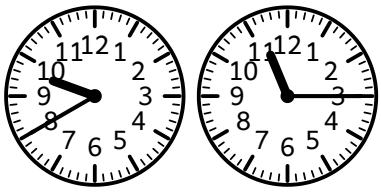
DRAW IT FIRST

Jump from the start to the end



9:40 11:15

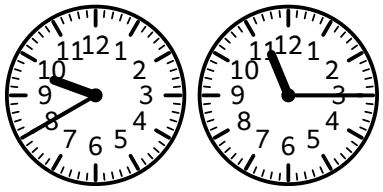
1 The bus leaves at 9:40. It arrives at 11:15.



9:40 11:15

9:40 to 10:00 = 20 minutes
10:00 to 11:00 = 60 minutes

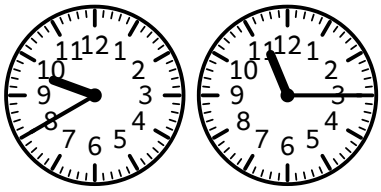
2 Jump from 9:40 to 10:00. That is 20 minutes. Then jump to 11:00. That is 60 minutes.



9:40 11:15

9:40 to 10:00 = 20 minutes
10:00 to 11:00 = 60 minutes
11:00 to 11:15 = 15 minutes

3 Jump from 11:00 to 11:15. That is 15 minutes.



9:40 11:15

9:40 to 10:00 = 20 minutes
10:00 to 11:00 = 60 minutes
11:00 to 11:15 = 15 minutes
20 + 60 + 15 = 95 minutes
That is 1 hour 35 minutes

4 Add the jumps. 20 + 60 + 15 = 95 minutes. That is 1 hour 35 minutes.

An **hour** is 60 minutes. A **minute** is 60 seconds. A **second** is one tick of a clock.

Time	is
1 hour	60 minutes
2 hours	120 minutes
1 minute	60 seconds
2 minutes	120 seconds
1 week	7 days

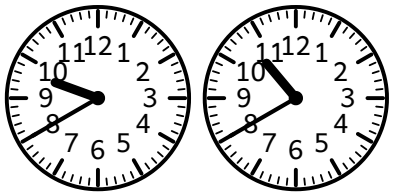
Each hour has 60 minutes. Each minute has 60 seconds.

SEE IT THREE WAYS

With things

Watch a clock. Wait until the long hand has gone once round. One hour has passed.

As a picture

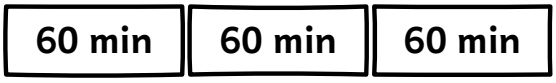


9:40 **10:40**

one hour later

In symbols

1 hour = 60 minutes. 2 hours = 2 × 60 = 120 minutes.



3 hours

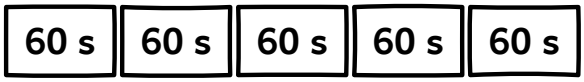
Each hour is a box of 60 minutes.

WORKED EXAMPLE

How many minutes are in 3 hours?

1. 1 hour is 60 minutes.
2. 3 hours is 3 × 60 minutes.
3. 3 × 60 = 180.

Answer: 180 minutes



5 minutes

Each minute is a box of 60 seconds, 60 s.

WORKED EXAMPLE

How many seconds are in 5 minutes?

1. 1 minute is 60 seconds.
2. 5 minutes is 5 × 60 seconds.
3. 5 × 60 = 300.

Answer: 300 seconds

A calendar shows days in rows of 7. Each row is one **week**. A week is 7 days.

Months have 28 to 31 days. This calendar shows 28 days.

1	2	3	4	5	6	7
8	9	10	11	12	13	14

Go down one row and you move 7 days. Day 3 to day 10 is one week.

WORKED EXAMPLE

Ana plants a seed on day 5. It sprouts 2 weeks later. Which day is that?

1. 1 week is 7 days.
2. 2 weeks is 2 × 7 = 14 days.
3. Count on 14 days from day 5. 5 + 14 = 19.

Answer: day 19

TRY IT

Make a four week calendar

You need: a sheet of paper, a pencil, a ruler or a straight stick.

1. Draw 4 rows of 7 squares. Use the ruler for straight lines.
2. Write 1 to 7 in the top row. Write 8 to 14 in the next row.
3. Keep going to 28.
4. Shade day 2. Count on 7 days and shade that day. Keep going.

What you will see: The shaded days make a straight line down. Each one is 7 days after the one above.

If you cannot try it, this is what happens.

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

A WRONG IDEA MANY PEOPLE HAVE

~~11:15 take away 9:40 is 1 hour 75 minutes.~~

Why it feels right: 1115 − 940 = 175. So it looks like 1 hour 75 minutes.

The test that breaks it: Count on from 9:40. One hour later is 10:40. Add 75 more minutes. That is 11:55, not 11:15.

What is true: An hour has 60 minutes, not 100. Jump to the next hour, then count on.

KEY WORDS

hour
60 minutes.

minute

60 seconds.

second
one tick of a clock. 60 seconds make a minute.

week
7 days.

BACK TO YOUR GUESS

The answer is B: 1 hour 35 minutes.

It is 1 hour 35 minutes, which is 95 minutes. An hour has 60 minutes, not 100. So you cannot take times away like ordinary numbers.

CHECK YOURSELF

Try each one before you look. A wrong answer tells you where to go next.

1. How long is it from 08:50 to 10:20? Write hours and minutes.

   Answer at the back of the book.

2. A film starts at 14:30 and ends at 16:10. How long is the film?

   A 1 hour 80 minutes

   B 1 hour 40 minutes

   C 2 hours 20 minutes

   Answer at the back of the book.

3. How many minutes are in 4 hours?

   Answer at the back of the book.

4. How many seconds are in 3 minutes?

   Answer at the back of the book.

5. Today is day 12. Kofi's seeds sprout 2 weeks later. Which day is that?

   Answer at the back of the book.

6. **From an earlier chapter**

A jug holds 1 litre. Mei pours out 400 ml. How much water is left?

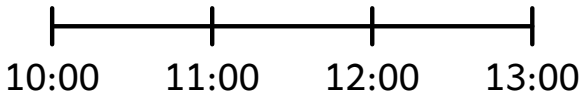
A 1 400 ml

B 100 ml

C 600 ml

Answer at the back of the book.

7. A walk starts at 10:00 and ends at 13:00. How many hours is the walk?



A 4 hours

B 2 hours

C 3 hours

Answer at the back of the book.

8. How many minutes is 1 hour 20 minutes?

A 120 minutes

B 21 minutes

C 80 minutes

Answer at the back of the book.

9. Mei plants a seed on the shaded day. It sprouts one week later. Which day is that?

1	2	3	4	5	6	7
8	9	10	11	12	13	14

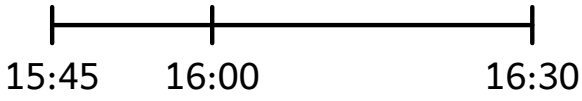
A day 10

B day 11

C day 7

Answer at the back of the book.

10. A game starts at 15:45 and ends at 16:30. How long is the game?



A 15 minutes

B 85 minutes

C 45 minutes

Answer at the back of the book.

11. How many seconds are in 4 minutes?

A 400 seconds

B 240 seconds

C 64 seconds

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

To find how long, jump to the next hour, then count on. 1 hour is 60 minutes. 1 minute is 60 seconds. 1 week is 7 days.

Draw: Two clocks, 9:40 and 11:15. Write the jumps 20, 60 and 15 under them.

M2.6.8 CHAPTER 8

Perimeter and area

> **I made two shapes from 12 squares. Is the way round the same?**

YOUR GUESS

Pick one before you read on. It is fine to be wrong.

- ☐ **A** Yes. The same squares always give the same way round.
- ☐ **B** No. The way round can change when the shape changes.
- ☐ **C** Yes, if both shapes are rectangles.

BY THE END YOU CAN

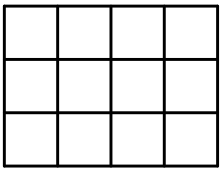
- Find the perimeter of a shape by adding its sides
- Find the area of a shape by counting squares
- Draw two shapes with the same area but different perimeters

A garden needs a fence round it. The garden also covers some ground. These are two different questions.

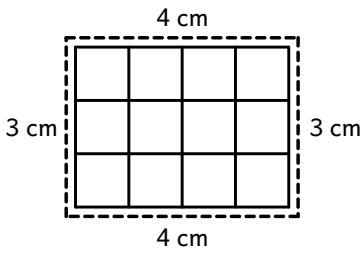
The distance all the way round the edge is the **perimeter**. The flat space inside is the ***area***.

DRAW IT FIRST

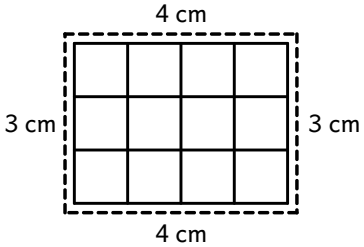
Perimeter and area of a rectangle



1 This shape is 4 squares long and 3 squares wide. Each square is 1 cm wide.

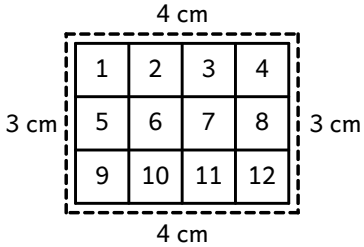


2 Walk round the edge. Write each side: 4, 3, 4 and 3.



perimeter
4 + 3 + 4 + 3 = 14 cm

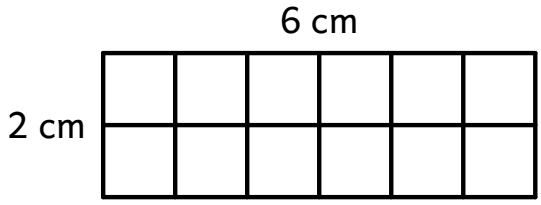
3 Add all the sides. 4 + 3 + 4 + 3 = 14 cm. That is the perimeter.



perimeter
4 + 3 + 4 + 3 = 14 cm
area
12 squares

4 Count the squares inside. There are 12. That is the area.

Perimeter is a length, so it has units like cm. Area is counted in squares.



Each square is 1 cm wide.

WORKED EXAMPLE

A rectangle is 6 squares long and 2 squares wide. Each square is 1 cm wide. Find the perimeter.

1. The sides are 6, 2, 6 and 2.
2. Add them all. 6 + 2 + 6 + 2 = 16.

Answer: 16 cm

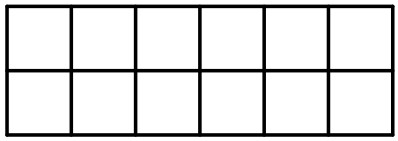
To find an area, count one row. Then add the rows. 2 rows of 6 squares is 6 + 6 = 12 squares.

SEE IT THREE WAYS

With things

Lay 12 squares of paper in 2 rows of 6. Count the edges all round. Then count the squares.

As a picture



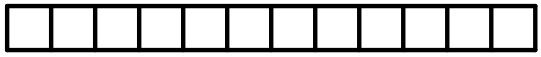
perimeter 16 cm

area 12 squares

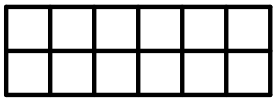
In symbols

6 + 2 + 6 + 2 = 16 cm. 6 + 6 = 12 squares.

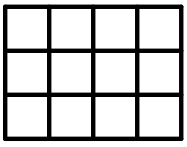
Now take the same 12 squares. Make other rectangles. Look at the perimeters.



1 by 12: perimeter 26 cm



2 by 6: perimeter 16 cm



3 by 4: perimeter 14 cm

All three have an area of 12 squares. The perimeters are not the same.

TRY IT

Same squares, different edge

You need: 12 small squares of paper, all the same size, a pencil.

Be safe: A grown up cuts the paper if you need scissors. You can also tear it along a fold.

1. Make a line of 12 squares, touching side to side. Count the edges all round.
2. Make 2 rows of 6. Count the edges all round.
3. Make 3 rows of 4. Count the edges all round.
4. Write the three numbers.

What you will see: The squares stay the same. The way round gets shorter as the shape gets fatter.

If you cannot try it, this is what happens.

shape	squares	edges
1 by 12	12	26
2 by 6	12	16
3 by 4	12	14

A WRONG IDEA MANY PEOPLE HAVE

~~**Shapes with the same area have the same perimeter.**~~

Why it feels right: Both shapes use all 12 squares. It seems the edge should match.

The test that breaks it: Make 12 squares into a line. Count the edges all round: 26. Now make a block of 3 by 4. Count again: 14.

What is true: Area counts the squares inside. Perimeter measures the way round. A long thin shape has a longer way round.

KEY WORDS

perimeter
the distance all the way round the edge of a shape.

area
the flat space inside a shape. We count it in squares.

BACK TO YOUR GUESS

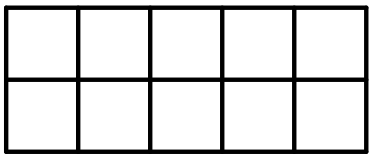
The answer is B: No. The way round can change when the shape changes.

The way round can change. A long thin shape has a longer way round. Two rectangles from 12 squares can have different ways round.

CHECK YOURSELF

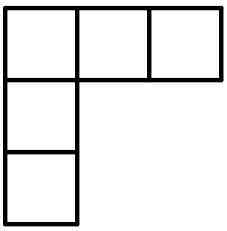
Try each one before you look. A wrong answer tells you where to go next.

1. Each square is 1 cm wide. What is the perimeter of this rectangle?



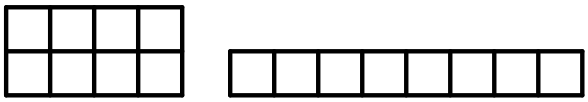
Answer at the back of the book.

2. How many squares cover this shape?



Answer at the back of the book.

3. Both shapes are made of 8 squares. Each square is 1 cm wide. Which has the longer perimeter?



A B

A Shape A

B Shape B

C They are the same

Answer at the back of the book.

4. Each square is 1 cm wide. Draw two shapes that cover 6 squares but have different perimeters. Write both perimeters.

Answer at the back of the book.

5. A rectangle has a perimeter of 18 cm. Two opposite sides are each 5 cm. How long is each of the other two sides?

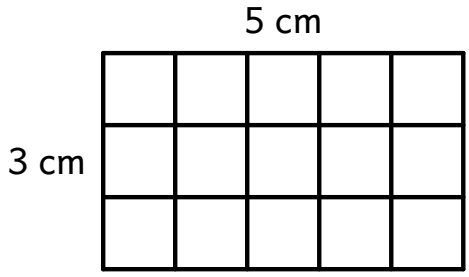
Answer at the back of the book.

6. **From an earlier chapter**

Change 3 m 40 cm into centimetres.

Answer at the back of the book.

7. What is the perimeter of this rectangle?



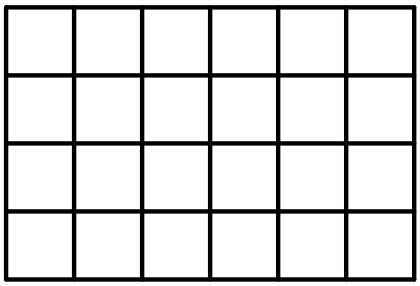
A 16 cm

B 15 cm

C 8 cm

Answer at the back of the book.

8. Each square is 1 cm wide. How many squares cover this shape?



each square is 1 cm wide

A 20 squares

B 16 squares

C 24 squares

Answer at the back of the book.

9. Amina puts a fence round her garden. What does she need to measure?

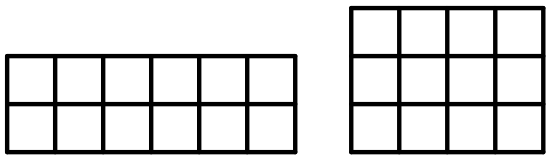
A the area

B the perimeter

C The area and the perimeter are the same.

Answer at the back of the book.

10. Each shape is made of 12 squares. Which sentence is true?



A B

each square is 1 cm wide

A The areas are the same. The perimeters are different.

B The areas are the same, so the perimeters are the same.

C The fatter shape has the longer perimeter.

Answer at the back of the book.

KEEP IT

Copy this into your exercise book.

Perimeter is the way round. Add all the sides. Area is how many squares cover a shape. Same area can have different perimeters.

Draw: A rectangle of 3 by 4 squares. Write 3 + 4 + 3 + 4 = 14 and 12 squares.

Key words, A to Z

Every key word in this book, what it means, and the chapter that teaches it.

24 hour time
time that counts the hours from midnight, from 00:00 to 23:59. M2.6.6

area
the flat space inside a shape. We count it in squares. M2.6.8

balance
two bags on a stick. The lower side is heavier. M2.6.4

capacity
the most a container can hold. M2.6.5

centimetre
a small length. The gap between two numbers on a ruler. We write cm. M2.6.1

decimal point
the dot in a number like 1.5. In many countries it is a comma. M2.6.3

gram
a small amount of weight. We write g. M2.6.4

hour
60 minutes. M2.6.7

hour hand
the short hand. It shows the hour. M2.6.6

kilogram
1 000 g. We write kg. M2.6.4

kilometre
a long length. 1 000 m make 1 km. We write km. M2.6.2

litre
1 000 millilitres. Many water bottles hold 1 litre. M2.6.5

metre
a length of 100 cm. We write m. M2.6.1

millilitre
a very small amount of water. 1 000 ml make 1 litre. M2.6.5

millimetre
a very small length. 10 mm make 1 cm. We write mm. M2.6.2

minute
60 seconds. M2.6.7

minute hand
the long hand. It shows the minutes. M2.6.6

nearest
closest. The nearest centimetre is the closest whole number of cm. M2.6.1

perimeter
the distance all the way round the edge of a shape. M2.6.8

second
one tick of a clock. 60 seconds make a minute. M2.6.7

tenth
one of 10 equal parts. We write $^{1}/_{10}$ or 0.1. M2.6.3

week
7 days. M2.6.7

Answers

M2.6.1. Centimetres and metres

1. **8 cm**

   The stick starts at 0 and ends at the 8 mark. So it is 8 cm long.

   - **If you chose A:** You may have counted every mark, including 0. The 0 mark is the start, not a centimetre.
   - **If you chose C:** You read the end of the ruler. Read the number where the stick ends.

2. **10 cm**

   The tip is past the half way tick. It is closer to 10 than to 9.

   - **If you chose A:** The tip is past half way. It is nearer to 10 than to 9. Go up to 10.

3. **405 cm**

   4 m is 400 cm. 400 + 5 = 405.

   - **If you chose A:** You wrote 5 cm as 50 cm. 5 cm is only 5. 4 m is 400 cm, and 400 + 5 = 405.
   - **If you chose B:** You joined 4 and 5. 4 m is 400 cm, not 4 cm.

4. **320 cm**

   3 m is 300 cm. 300 + 20 = 320.

5. **2 m**

   2 m is 200 cm. 200 is more than 150.

   - **If you chose A:** You compared 150 with 2. Change to the same unit first. 2 m is 200 cm.
   - **If you chose C:** 2 m is 200 cm. 200 is not the same as 150.

6. **Put a dot at the 0 mark. Put another dot at the 8 mark. Join the dots with the ruler as a guide.**

   The line starts at 0 and ends at 8. So it is 8 cm long. Measure it again to check.

7. **7 cm**

   The stick starts at 2 and ends at 9. The length is the gap between them. 9 − 2 = 7. You can also count the centimetres from 2 to 9: 7.

   - **If you chose B:** You read the right end only, as if it began at 0. The stick began at 2. The first 2 cm are not part of it.
   - **If you chose C:** You counted the numbers 2, 3, 4 and on to 9. That is 8 numbers. A length counts the centimetres between them. There are 7.

8. **300 cm**

   1 m is 100 cm. 3 m is 3 × 100 = 300 cm.

   - **If you chose A:** You used 10 cm for 1 m. A metre is 100 cm. So 3 m is 3 lots of 100 cm.
   - **If you chose B:** That is 1 000 cm for each metre. A metre is 100 cm. So 3 m is 300 cm.

M2.6.2. Millimetres and kilometres

1. **km**

   Towns are far apart. A kilometre is a long length, so it fits.

   - **If you chose A:** A millimetre is tiny. It is for things like a grain of rice.
   - **If you chose B:** A metre suits a room. Towns are thousands of metres apart. Use km.

2. **37 mm**

   3 cm is 30 mm. Then 7 small marks make 7 mm more. 30 + 7 = 37.

3. **4 000 m**

   1 km is 1 000 m. So 4 km is 4 × 1 000 = 4 000 m.

4. **140 cm**

   1 m is 100 cm. 100 + 40 = 140.

5. **2 500 m**

   2 km is 2 000 m. 2 000 + 500 = 2 500.

6. **1 000 mm**

   1 m is 100 cm. Each cm is 10 mm. So 100 × 10 = 1 000.

7. **12 mm**

   1 cm is 10 mm. Then 2 small marks make 2 mm more. 10 + 2 = 12.

   - **If you chose A:** You read 1 and 2 together as 12 cm. The seed is only 1 cm and 2 mm long.
   - **If you chose C:** 1 cm is 10 mm, not 100 mm. So 1 cm 2 mm is 10 + 2 = 12 mm.

8. **1 km**

   Use metres for all three. 1 000 mm is 1 m. So 1 500 mm is less than 2 m. 1 km is 1 000 m. The most is 1 km.

   - **If you chose A:** You may have used 100 m for 1 km. 1 km is 1 000 m. That is more than 900 m.
   - **If you chose B:** You picked the biggest number. 1 500 mm is 1 m 50 cm, which is short.

9. **140 mm**

   1 cm is 10 mm. So 14 cm is 14 × 10 = 140 mm.

   - **If you chose B:** You kept the same number. But 1 cm is 10 mm. So 14 cm is 14 lots of 10.
   - **If you chose C:** You used 100 mm for 1 cm. 1 cm is only 10 mm. So 14 cm is 140 mm.

10. **18 cm**

    A pencil is about as long as a hand. That is about 18 cm. 18 mm is too short and 18 m is too long.

    - **If you chose A:** You may have mixed up mm and cm. 18 mm is less than 2 cm, about a thumb wide.
    - **If you chose C:** You may have mixed up m and mm. 18 m is longer than most classrooms. A pencil fits in your hand.

M2.6.3. Tenths and the decimal point

1. **1.2 m**

   20 cm is 2 lots of 10 cm. That is 2 tenths. So 1 m 20 cm is 1.2 m.

2. **0.7**

   Each step is one tenth. The dot is on the 7th step. That is 7 tenths, or 0.7.

   - **If you chose A:** That is far too small. The dot is on the 7th mark. That is 7 tenths.
   - **If you chose C:** The line only goes up to 1. The dot is 7 tenths of the way, so it is 0.7.

3. **one tenth**

   0.1 is one tenth, the same as $^{1}/_{10}$.

   - **If you chose A:** Ten is a whole number. 0.1 is a small part of one.
   - **If you chose B:** One half is 0.5, which is five tenths. 0.1 is only one tenth.

4. **1.5 m**

   1.5 m is 1 m 50 cm. 50 cm is more than 5 cm.

   - **If you chose A:** The .5 may look small. It means 5 tenths of a metre, which is 50 cm. 50 cm is more than 5 cm.
   - **If you chose C:** You read 1.5 m as 1 m 5 cm. The 5 means 5 tenths, which is 50 cm.

5. **2.4 m, or 2 m 40 cm**

   A comma and a point mean the same. 4 tenths of a metre is 40 cm.

6. **1 km**

   1 km is 1 000 m. 1 000 is more than 900.

   - **If you chose A:** You compared 1 with 900. Change to the same unit first. 1 km is 1 000 m. Go to M2.6.2.

7. **40 cm**

   1 m is 100 cm. 10 parts, so each part is 10 cm. 4 parts are 4 × 10 = 40 cm.

   - **If you chose B:** You counted 4 parts and called each part 1 cm. Each part is 10 cm.
   - **If you chose C:** You used 100 cm for each part. 100 cm is the whole string, not one part.

8. **2.3 m**

   The dot is 3 steps after 2. Each step is one tenth. So the rope is 2 m and 3 tenths, 2.3 m.

   - **If you chose A:** You counted the steps back from 3. Count the steps forward from 2. There are 3.
   - **If you chose B:** The line only runs from 2 m to 3 m. The dot is between them. So the rope is between 2 m and 3 m.

M2.6.4. Grams and kilograms

1. **1 kg 400 g**

   The arrow passed 1 kg. It is 4 marks further. 4 × 100 g = 400 g.

   - **If you chose A:** You counted 4 marks, but each mark is 100 g. So 4 marks are 400 g.
   - **If you chose C:** You counted only the marks. First read the last number the arrow passed. That is 1 kg.

2. **4 050 g**

   4 kg is 4 000 g. 4 000 + 50 = 4 050.

   - **If you chose A:** You put 4 and 50 side by side. 4 kg is 4 000 g, not 400 g.
   - **If you chose B:** You wrote 50 g as 500 g. 4 000 + 50 is 4 050.

3. **5 kg**

   1 000 g make 1 kg. 5 000 ÷ 1 000 = 5.

4. **No. A bigger thing is not always heavier.**

   A pillow is big but light. A stone is small but heavy. A balance shows which is heavier.

   - **If you chose A:** Size is not weight. A big pillow is full of air, so it can be light.
   - **If you chose C:** Every thing has weight, soft things too. A pillow is light, but a scale shows some weight.

5. **3.7 m**

   70 cm is 7 lots of 10 cm. That is 7 tenths. So 3 m 70 cm is 3.7 m.

6. **2 500 g**

   2 kg is 2 000 g. 5 marks are 5 × 100 = 500 g. 2 000 + 500 = 2 500.

7. **2 kg 700 g**

   The arrow passed 2 kg. It is 7 marks further. 7 × 100 g = 700 g.

   - **If you chose B:** You started at 3 kg. The arrow has not reached 3 yet. Start at 2, the last number it passed. Count 7 marks on.
   - **If you chose C:** Each mark is 100 g, not 10 g. So 7 marks are 700 g.

8. **3 000 g**

   1 kg is 1 000 g. So 3 kg is 3 × 1 000 = 3 000 g.

   - **If you chose B:** You used 100 g for 1 kg. 1 kg is 1 000 g. So 3 kg is 3 000 g.
   - **If you chose C:** You kept the same number. But 1 kg is 1 000 g. So 3 kg is 3 lots of 1 000 g.

M2.6.5. Millilitres and litres

1. **150 ml**

   The water is at the short mark halfway between 100 and 200. 100 + 50 = 150.

   - **If you chose A:** That is the long mark below the water. The water is past it, at the short mark halfway to 200.
   - **If you chose C:** That is the next long mark. The water has not reached it yet.

2. **3 000 ml**

   1 litre is 1 000 ml. 3 × 1 000 = 3 000.

3. **4 cups**

   1 litre is 1 000 ml. 1 000 ÷ 250 = 4, because 250 + 250 + 250 + 250 = 1 000.

4. **No. It is the same water.**

   Pouring water into a wider container does not change the amount. It only changes how high it stands.

   - **If you chose A:** The water spread out wide, so it stands lower. Nothing was lost. The amount is the same.
   - **If you chose B:** It spread out, so it seems like more. Nothing was added. The amount is the same.

5. **4 litres**

   1 000 ml make 1 litre. 4 000 ÷ 1 000 = 4.

6. **2 500 g**

   1 kg is 1 000 g. 2 × 1 000 + 500 = 2 500.

7. **450 ml**

   The water is at the short mark halfway between 400 and 500. 400 + 50 = 450.

   - **If you chose B:** That is the top mark. It shows what the jug can hold. It is not the water.
   - **If you chose C:** That is the long mark below the water. The water is past it, at the short mark.

8. **1 litre**

   1 litre is 1 000 ml. 1 000 is more than 900. So the 1 litre bottle holds more.

   - **If you chose A:** You compared 900 with 1. Change to the same unit first. 1 litre is 1 000 ml.
   - **If you chose C:** You can compare them. Write both in ml. 1 litre is 1 000 ml. That is more than 900 ml.

9. **10 cups**

   1 litre is 1 000 ml. Count on in 100s: 100, 200, 300 and on to 1 000. That is 10 cups.

   - **If you chose B:** That is for a 250 ml cup. This cup holds 100 ml, much less. So more cups fill the bottle.
   - **If you chose C:** You took the cup size as the count. Count on in 100s: 100, 200, up to 1 000. That is 10 cups.

M2.6.6. Telling the time

1. **4:25**

   The long hand points at 5. That is 5 × 5 = 25 minutes. The short hand has passed 4. So it is 4:25.

   - **If you chose B:** You read the 5 as 5 minutes. Each number is 5 minutes, so the 5 means 25 minutes.
   - **If you chose C:** The short hand has not reached 5. The hour is the number it has passed, which is 4.

2. **10:53**

   The 10 is 10 × 5 = 50 minutes. Add 3 small marks to get 53. The short hand has passed 10, so the hour is 10.

3. **half past 6 in the evening**

   18 is more than 12, so it is after midday. 18 − 12 = 6. So 18:30 is half past 6 in the evening.

   - **If you chose A:** In the morning, the 24 hour time is below 12. 18 is after midday.
   - **If you chose C:** You took away 10. Take away 12 instead: 18 − 12 = 6.

4. **20:15**

   In the evening, add 12 to the hour. 8 + 12 = 20. So it is 20:15.

5. **halfway between 9 and 10**

   The short hand moves all the time. Half an hour is half of the way from 9 to 10.

   - **If you chose A:** It is exactly on 9 only at 9 o'clock. Half an hour later it has moved on.
   - **If you chose C:** It reaches 10 only at 10 o'clock. At half past 9 it is on its way.

6. **3 000 m**

   1 km is 1 000 m. 3 × 1 000 = 3 000.

7. **3:10**

   The long hand points at 2. That is 2 × 5 = 10 minutes. The short hand has passed 3. So it is 3:10.

   - **If you chose A:** You read the short hand as the minutes. The short hand shows the hour. The long hand shows the minutes.
   - **If you chose B:** You read the 2 as 2 minutes. Each number is 5 minutes, so the 2 means 10 minutes.

8. **19:45**

   The clock shows 7:45. In the evening, add 12 to the hour. 7 + 12 = 19. So it is 19:45.

   - **If you chose B:** You read the clock right. But in the evening, 24 hour time adds 12 to the hour.
   - **If you chose C:** You added 10 to the hour. Add 12 instead. 7 + 12 = 19.

M2.6.7. How long it takes

1. **1 hour 30 minutes**

   08:50 to 09:00 is 10 minutes. 09:00 to 10:00 is 60 minutes. 10:00 to 10:20 is 20 minutes. 10 + 60 + 20 = 90 minutes, which is 1 hour 30 minutes.

2. **1 hour 40 minutes**

   14:30 to 15:00 is 30 minutes. 15:00 to 16:00 is 60 minutes. 16:00 to 16:10 is 10 minutes. 30 + 60 + 10 = 100 minutes, which is 1 hour 40 minutes.

   - **If you chose A:** You took the times away like ordinary numbers: 1610 − 1430 = 180. An hour has 60 minutes, not 100.
   - **If you chose C:** You took 14 from 16, and 10 from 30. Jump instead. 14:30 to 15:00 is 30 minutes.

3. **240 minutes**

   1 hour is 60 minutes. 4 × 60 = 240.

4. **180 seconds**

   1 minute is 60 seconds. 3 × 60 = 180.

5. **day 26**

   2 weeks is 2 × 7 = 14 days. 12 + 14 = 26.

6. **600 ml**

   1 litre is 1 000 ml. 1 000 − 400 = 600.

   - **If you chose A:** You added. Pouring out takes water away. 1 litre is 1 000 ml, so take 400 from 1 000. Go to M2.6.5.
   - **If you chose B:** You used 500 ml for a litre. 1 litre is 1 000 ml. Take 400 from 1 000. Go to M2.6.5.

7. **3 hours**

   The walk starts at 10:00. It goes to 11:00, then 12:00, then 13:00. That is 3 gaps, so 3 hours.

   - **If you chose A:** You counted the 4 marks, and the first mark is the start. Count the gaps between the marks.
   - **If you chose B:** You counted only the marks in the middle, 11:00 and 12:00. Count the gaps between all the marks.

8. **80 minutes**

   1 hour is 60 minutes. 60 + 20 = 80 minutes.

   - **If you chose A:** You counted 1 hour as 100 minutes. An hour is 60 minutes. So 60 + 20 = 80.
   - **If you chose B:** You added 1 and 20. The 1 is a whole hour, and an hour is 60 minutes.

9. **day 11**

   1 week is 7 days. Count on 7 days from day 4. 4 + 7 = 11. That is one row down.

   - **If you chose A:** You counted day 4 as the first of the 7 days. The 7 days begin after day 4.
   - **If you chose C:** A week is 7 days. The seed sprouts 7 days after day 4, not on day 7.

10. **45 minutes**

    15:45 to 16:00 is 15 minutes. 16:00 to 16:30 is 30 minutes. 15 + 30 = 45 minutes.

    - **If you chose A:** You took 30 from 45, the small minute from the big one. Jump instead. 15:45 to 16:00 is 15 minutes. 16:00 to 16:30 is 30 more.
    - **If you chose B:** You took the times away like ordinary numbers: 1630 − 1545 = 85. An hour has 60 minutes.

11. **240 seconds**

    1 minute is 60 seconds. 4 minutes are 4 × 60 = 240 seconds.

    - **If you chose A:** You used 100 seconds for a minute. A minute is 60 seconds. 4 × 60 = 240.
    - **If you chose C:** You added 4 to 60. Each minute is 60 seconds. So 4 minutes are 4 lots of 60.

M2.6.8. Perimeter and area

1. **14 cm**

   The sides are 5, 2, 5 and 2. 5 + 2 + 5 + 2 = 14.

2. **5 squares**

   Count the top row: 3. Count the two below: 2. 3 + 2 = 5.

3. **Shape B**

   Shape A has a perimeter of 12 cm. Shape B has 18 cm. The long thin shape has the longer way round.

   - **If you chose A:** Shape A is 2 by 4. 2 + 4 + 2 + 4 = 12. Shape B is 1 by 8. 1 + 8 + 1 + 8 = 18. B is longer.
   - **If you chose C:** Both have 8 squares, so the area is the same. The perimeter is not. Count the edges all round.

4. **A line of 6 squares has a perimeter of 14 cm. 2 rows of 3 have a perimeter of 10 cm.**

   Both cover 6 squares. 1 + 6 + 1 + 6 = 14 and 2 + 3 + 2 + 3 = 10. There are other answers too.

5. **4 cm**

   5 + 5 = 10. 18 − 10 = 8. The other two sides share 8, so each is 4 cm.

6. **340 cm**

   1 m is 100 cm. 3 m is 300 cm. 300 + 40 = 340.

7. **16 cm**

   The sides are 5, 3, 5 and 3. 5 + 3 + 5 + 3 = 16.

   - **If you chose B:** 15 is the number of squares inside. That is the area. The perimeter is the way round.
   - **If you chose C:** You added only two sides, 5 and 3. A rectangle has four sides. Add all of them.

8. **24 squares**

   Count one row: 6. There are 4 rows. 6 + 6 + 6 + 6 = 24.

   - **If you chose A:** 20 is the way round, 6 + 4 + 6 + 4. The area is all the squares inside.
   - **If you chose B:** You counted only the squares along the edge. The squares in the middle count too.

9. **the perimeter**

   A fence goes all the way round the edge. The distance round the edge is the perimeter.

   - **If you chose A:** The area is the flat space inside. A fence goes round the edge, so she needs the way round.
   - **If you chose C:** They are different. The area is the space inside. The perimeter is the way round.

10. **The areas are the same. The perimeters are different.**

    Both cover 12 squares, so the areas are the same. A has a perimeter of 16 cm and B has 14 cm.

    - **If you chose B:** The same squares can make different edges. A has a perimeter of 16 cm. B has 14 cm.
    - **If you chose C:** A long thin shape has the longer way round. A is long and thin, and it is 16 cm. B is 14 cm.

About this book

For learners who can measure a pencil in centimetres with a ruler. In many schools this fits children of about 8 to 10, and older learners can start here too. Activities use a ruler, string, cups, bottles, water and a home made balance. A kitchen scale and a measuring jug help but are not needed. A learner can work alone: every exercise has its answer and the reason for it.

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