Spring Block 3

Length and height

Small steps

Step 1   Measure in centimetres

Step 2   Measure in metres

Step 3   Compare lengths and heights

Step 4   Order lengths and heights

Step 5   Four operations with lengths and heights

Measure in centimetres

Notes and guidance

In Year 1, children measured lengths and heights using non-standard units, such as cubes, and then began to look at measuring using a ruler. In this small step, they focus on measuring lengths and heights using a ruler, with a specific focus on measuring in centimetres. Children may need reminding that the abbreviation for centimetres is "cm" and that they should record this with their written answers.

It is essential that children understand the importance of starting from zero when measuring, and that not lining their ruler up correctly will lead to incorrect answers. They should be exposed to examples that highlight why this is so important.

Things to look out for

- Children may try to use a ruler to measure the lengths of lines that are not straight.

- Children may not line up the object they are measuring with zero on the ruler.

- Children may think that they cannot measure the length or height of anything beyond 15 cm if they are using a 15 cm ruler.

- Children may not include units with their answer.

Key questions

- What do the numbers on the ruler mean?

- Where do you need to start measuring from?

- What number does the start/end of the object line up with?

- How long/tall is the object?

- What is "cm" short for?

- Why do you need to start measuring from zero?

Possible sentence stems

- The start of the object is lined up with _____ cm.

  The end of the object is lined up with _____ cm.

  The length/height of the object is _____ cm.

- "cm" is short for _____

National Curriculum links

- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit using rulers, scales, thermometers and measuring vessels
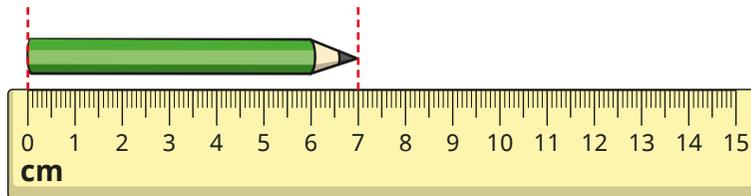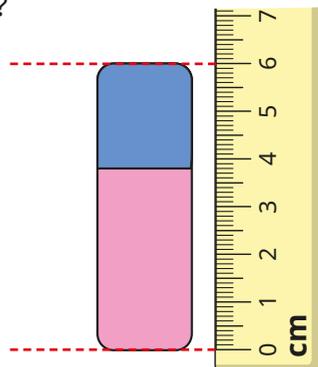
Measure in centimetres

Key learning

Give children a ruler and ask them to measure the lengths and heights of different objects in the classroom.

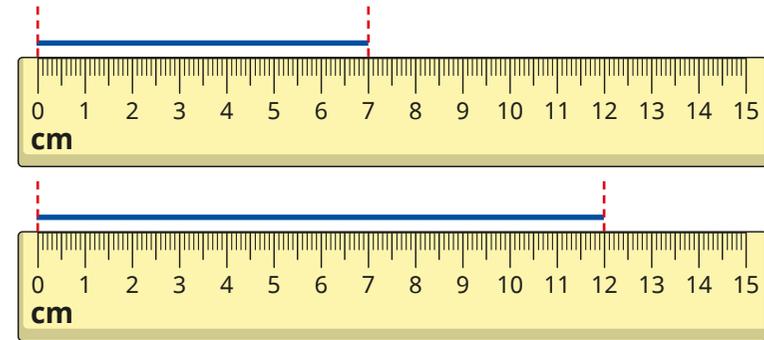Ask them to record their measurements, using centimetres as their units.
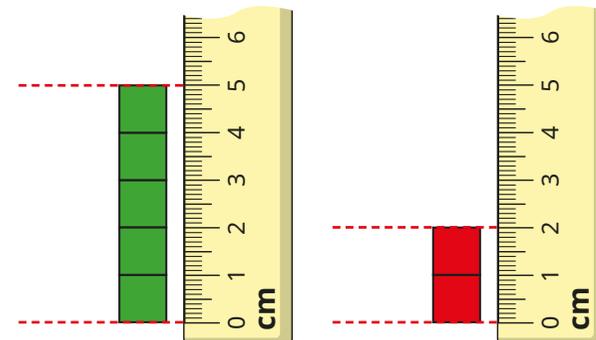
- How long is the pencil?

- How tall is the rubber?

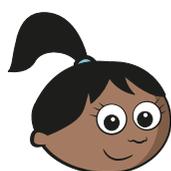- How long is each line?

- How tall is each tower?

- Use a pencil and ruler to draw the lines.

| 4 cm long | 10 cm long | 6 cm tall | 2 cm tall |

Measure in centimetres

Reasoning and problem solving

Sam uses a ruler to measure the length of the toy train.
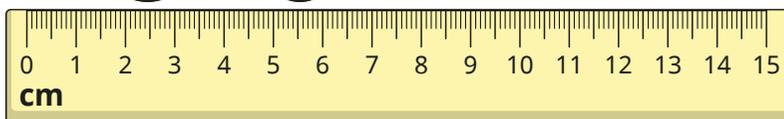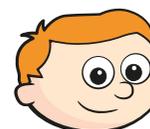
The train is 8 cm long.

Do you agree with Sam?

Explain your answer.

No

Ron and Jo want to measure the length of the string.

It is impossible!

Ron

Explain why Ron thinks this.

I think that I can find a way.

Jo

What way might Jo be thinking of?

Explore with pieces of string.

Children explore straightening out pieces of string to measure their lengths, ensuring that they start measuring from zero.

Measure in metres

Notes and guidance

Building on the previous small step, children now begin to measure lengths and heights using metre sticks and tape measures, with a specific focus on measuring in metres. This is likely to be the first time that children have measured in metres, although they may be familiar with the terminology being used in everyday life.

Children will need formally introducing to "m" as the abbreviation of metres. Remind them of the importance of recording units with their answers.

The examples within this step refer only to full metre lengths and children are not expected to work with mixed units at this point. They do not need to be aware of the conversion between metres and centimetres, but should know that a metre is bigger than a centimetre and so metres are more commonly used when measuring larger objects.

Things to look out for

- Children may not line up the object they are measuring with zero, leading to an incorrect measurement.
- When using metre sticks to measure, children may not line them up correctly.

Key questions

- What do the numbers on the tape measure mean?
- How long is a metre stick?
- Why do you need to start measuring from zero?
- What number does the end of the object line up with?
- How long/tall is the object?
- What is "m" short for?
- Is a metre longer or shorter than a centimetre?

Possible sentence stems

- The object is _____ metre sticks long.
- The start of the object is lined up with _____ m.
  The end of the object is lined up with _____ m.
  The length/height of the object is _____ m.
- "m" is short for _____

National Curriculum links

- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit using rulers, scales, thermometers and measuring vessels

Measure in metres

Key learning

Give children a metre stick and ask them to measure the lengths and heights of different objects in the classroom to the nearest metre.

Get them to say out loud: "_____ is _____ metres long/tall."

Ask them to record their measurements, using m as their units.

Ask children to use metre sticks to measure the length of the school hall to the nearest metre.

Observe how they do it and check that they line up their metre sticks correctly.

Give children a metre stick or tape measure and ask them to find different objects outside that are either longer or shorter than a metre.

Get them to draw their objects in a sorting diagram.
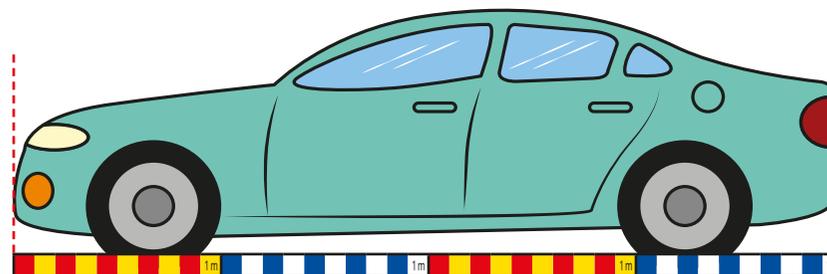
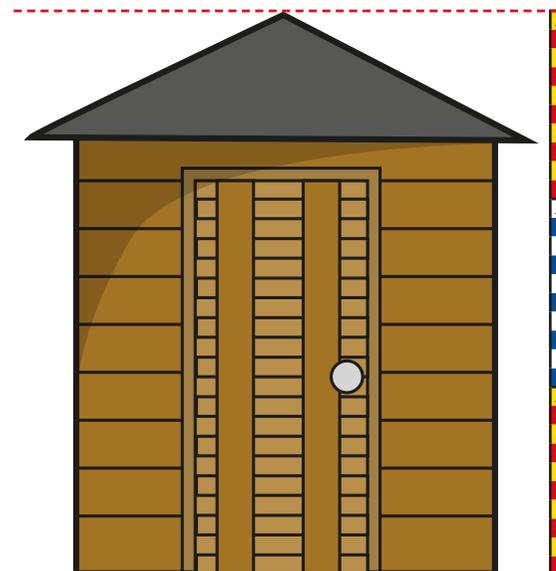| longer than a metre | shorter than a metre |

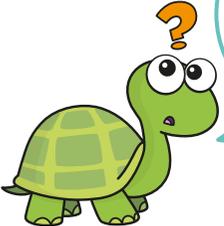- Here are two different coloured metre sticks.

▶ What is the length of the car?

▶ What is the height of the shed?

Measure in metres

Reasoning and problem solving

Tiny has a metre stick.

> I cannot measure the length of the classroom, because my metre stick is not long enough.
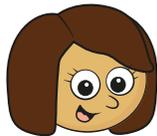
Is Tiny correct?

Explain your answer.

No

> The height of the classroom is about 3 cm.

What mistake do you think Mo has made?

He has used centimetres instead of metres.

Kim and Max want to measure the length of the playground.

> I am going to measure in centimetres.

Kim

> I am going to measure in metres.

Max

Max's

Whose way of measuring will be easier?

Explain your answer.

Compare lengths and heights

Notes and guidance

In this small step, children compare the lengths and heights of objects using language such as "longer than", "shorter than" and "taller than". They also revisit the inequality symbols covered earlier in the year as a way of comparing lengths and heights.

At this stage, children only compare the lengths and heights of pairs of objects; ordering lengths and heights is covered in the next step.

The focus is on comparing lengths and heights given the same unit of measure, for example 75 cm and 62 cm. However, using learning from the previous step, children could also compare lengths and heights where the numerical value is the same, but the unit is different, for example 6 cm and 6 m. They use their knowledge that metres are greater than centimetres to support these comparisons.

Things to look out for

- Children may think that centimetres are bigger than metres because the word is longer.
- Children may confuse the words "longer" and "taller".
- Children may need reminding of the meanings of the inequality symbols.

Key questions

- Which object is longer? How do you know?
- Which object is taller? How do you know?
- Which object is shorter? How do you know?
- Which is longer, 1 cm or 1 m?
- What does "</>/=" mean?
- What is the difference between "longer" and "taller"?

Possible sentence stems

- _____ is _____ cm/m long/tall.
- _____ cm/m is greater/less than _____ cm/m.
- _____ is longer/taller than _____
- _____ is shorter than _____

National Curriculum links

- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit using rulers, scales, thermometers and measuring vessels
- Compare and order lengths, mass, volume/capacity and record the results using >, < and =
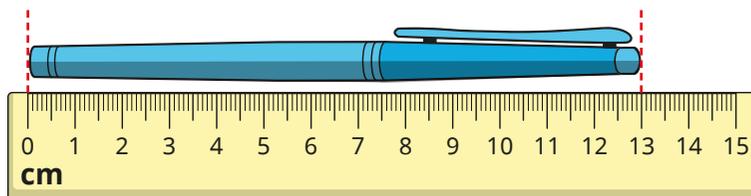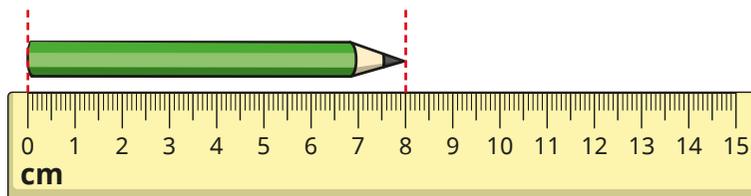
Compare lengths and heights

Key learning

Give children two objects.

Ask them, without measuring, which is longer. How do they know?

Now ask them to measure the length of each object. Ask how this shows which one is longer. What do they notice?

Repeat for finding which of a pair of objects is taller.

- Kay measures the lengths of a pencil and a pen.

  ▶ How long is the pencil? How long is the pen?

  ▶ Write **longer** or **shorter** to complete the sentences.

    The pen is _____ than the pencil.

    The pencil is _____ than the pen.

- Choose a phrase to compare the lengths.

    | longer than | | shorter than | | the same as |

  ▶ 15 cm is _____ 60 cm.

  ▶ Sixty metres is _____ 60 m.

  ▶ 96 m is _____ 69 m.

  ▶ 1 cm is _____ 1 m.

- Write **<** , **>** or **=** to complete the statements.

    7 metres ◯ 17 metres

    18 cm ◯ 18 m
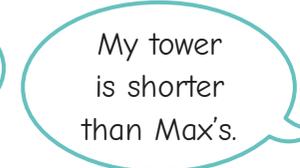
    32 cm ◯ 32 centimetres

- Max and Jo have each made a tower.

    My tower is 8 cm tall.

    Max

    My tower is shorter than Max's.

    Jo

    What could the height of Jo's tower be?

Compare lengths and heights

Reasoning and problem solving

Give each child an object.

Ask them to measure the length or height of their object.

Then challenge them to find something that is:

- longer/taller
- shorter
- the same length

Ask them to measure the objects that they identify for each comparison.

They record their comparisons using the sentences and inequality symbols.

_____ is longer/taller than _____

_____ is shorter than _____

_____ < _____

_____ > _____

_____ = _____

Answers will vary, depending on the objects.

A plant is 6 cm tall.

A tree is 6 m tall.

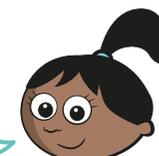The plant is the same height as the tree, because they are both 6

Ron

The tree is taller than the plant.

Mo

The tree is shorter than the plant.

Sam

Mo

Who is correct?

How do you know?

Order lengths and heights

Notes and guidance

Building on the previous step, children now begin to order lengths and heights. The new language introduced in this step is "shortest", "longest" and "tallest", but they also continue to use "shorter", "longer" and "taller" when describing the order of the objects. They order lengths from longest to shortest, heights from tallest to shortest and vice versa. Children order given lengths and heights, as well as objects that they have measured themselves.

As in the previous step, the focus is on ordering lengths and heights where the unit of measure is the same. This supports children's understanding of ordering numbers within 100, which they covered earlier in the year. Children could be stretched to ordering lengths and heights such as 30 cm, 15 cm and 30 m, where they need to consider the units for two values and the numerical values for the other two.

Things to look out for

- Children may use the inequality symbols incorrectly by using two different ones in the same statement, for example writing 14 cm < 20 cm > 18 cm.

- Children may confuse the language of "longer", "longest", "taller" and "tallest".

Key questions

- Which object is longest? How do you know?

- Which object is tallest? How do you know?

- Which object is shortest? How do you know?

- Which is longer, 1 cm or 1 m?

- What is the difference between "longest" and "tallest"?

Possible sentence stems

- _____ cm/m is greater/less than _____ cm/m.

- _____ cm/m is longer/taller than _____ cm/m.

- _____ cm/m is shorter than _____ cm/m.

- _____ is the shortest.

- _____ is the longest/tallest.

National Curriculum links

- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit using rulers, scales, thermometers and measuring vessels

- Compare and order lengths, mass, volume/capacity and record the results using >, < and =

Order lengths and heights

Key learning

Give children three objects.

Ask them, without measuring, which is the longest. How do they know?

Ask them which is the shortest. How do they know?

Now ask them to measure the length of each object. Ask how this shows which one is the longest and which one is the shortest. What do they notice?
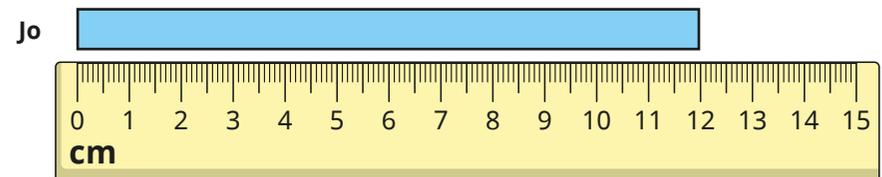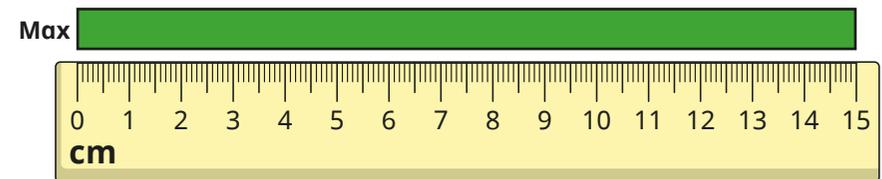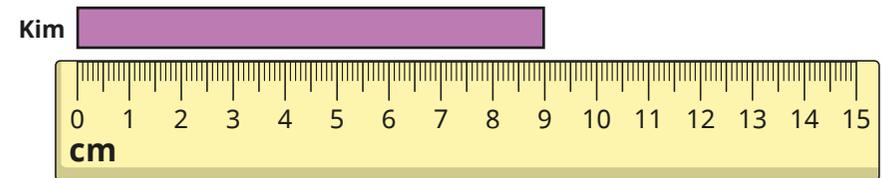
Repeat for finding which objects are the tallest and shortest.

- The height of three buildings is shown.
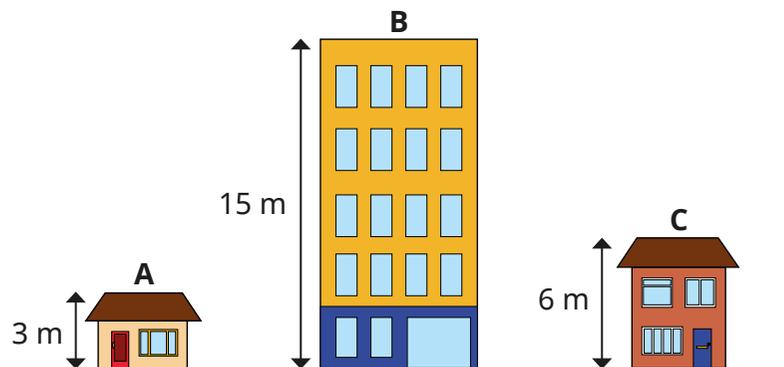
- ▶ Which building is the tallest?
- ▶ Which building is the shortest?
- ▶ Put the buildings in order, from tallest to shortest.

- Kim, Max and Jo are comparing the lengths of ribbons.

- ▶ Whose ribbon is the longest? Whose ribbon is the shortest?
- ▶ Put the ribbons in order, from longest to shortest.

- Write the lengths in order.

  Start with the shortest length.

25 cm	7 cm	10 cm

Order lengths and heights

Reasoning and problem solving

Four children are measuring their heights.

Fay is taller than Ann, but not as tall as Dan.

Tom is taller than Dan.

Write the children's names in order of their heights.

Start with the shortest child.

Ann, Fay, Dan, Tom

An oak tree is 20 m tall.

An elm tree is 15 m tall.

A pine tree is taller than an elm tree, but shorter than an oak tree.

How tall could the pine tree be?

Compare answers with a partner.
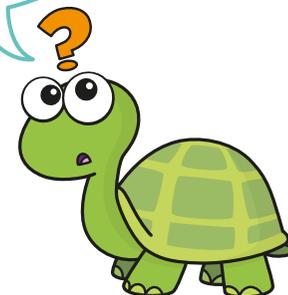
16 m, 17 m, 18 m, 19 m

A plane is 55 m long.

A boat is 95 m long.

A scooter is 55 cm long.

Tiny wants to put the lengths in order.

I cannot order the lengths, because the units are different.

No

Do you agree with Tiny?

Why?

Four operations with lengths and heights

Notes and guidance

In this small step, children draw on their knowledge of the four operations from earlier in the year and apply it to their understanding of lengths and heights.

Children solve both one-step and two-step problems relating to lengths and heights. They use concrete and pictorial representations to support them in understanding the questions, and in calculating efficiently.

It is important that children understand that when adding and subtracting with lengths and heights, the units that they are working with need to be the same. At this stage, they are not required to calculate with mixed units.

Things to look out for

- Children may add and subtract lengths and heights with different units.

- Children may write a unit on a multiplier. For example, when finding 4 times the size of 3 cm, they may write 4 cm × 3 cm = 12 cm.

- Word problems can often be more difficult for children to unpick, and concrete and pictorial representations can be used to support this understanding.

Key questions

- What do you need to do first? How do you know?

- Is the length/height longer/shorter? How do you know?

- Is _____ taller or shorter than _____ ? How do you know?

- Do you need to add or subtract?

- Do you need to multiply or divide?

- Are you working with centimetres or metres?

Possible sentence stems

- _____ is _____ cm/m long/tall.

- _____ lots of _____ cm/m is _____ cm/m.
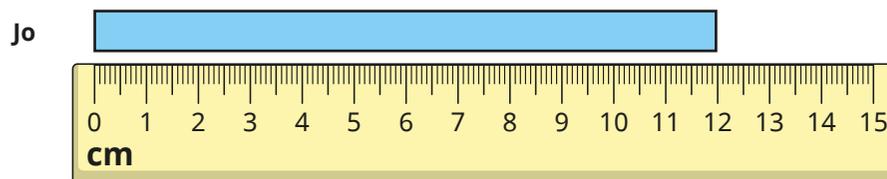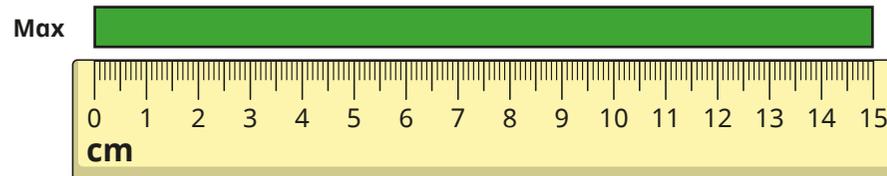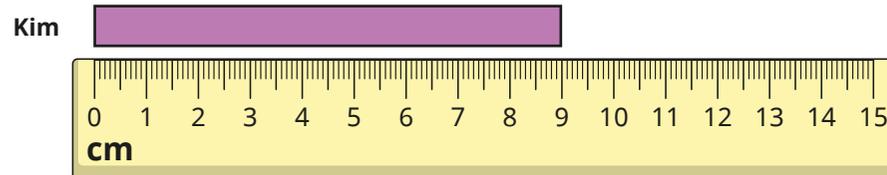
  _____ of _____ cm/m is _____ cm/m.

National Curriculum links

- Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures

- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

Four operations with lengths and heights

Key learning

- Kim, Max and Jo each have a piece of ribbon.

  Kim

  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  cm

  Max

  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  cm

  Jo

  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  cm

  - ▶ How much longer is Max's ribbon than Kim's?
  - ▶ Max and Jo put their ribbons together.

    How long are they altogether?

- A pencil is 12 cm long.

  A pen is 3 cm longer than the pencil.

  - ▶ How long is the pen?
  - ▶ What is the total length of the pen and the pencil?

- Ben has a toy train, a toy plane and a toy car.

  - ▶ The train is 28 cm long.

    The plane is 16 cm longer.

    How long is the plane?

  - ▶ The train is double the length of the car.

    How long is the car?

- An ash tree is 10 m tall.

  An oak tree is twice as tall as the ash tree.

  How tall is the oak tree?

- A rubber is 5 cm long.

  A bookmark is 4 times as long as the rubber.

  How long is the bookmark?

- A house is 6 m tall.

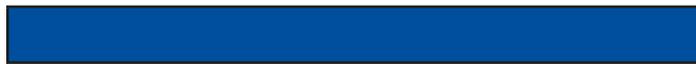 The garage is half as tall as the house.

  How tall is the garage?

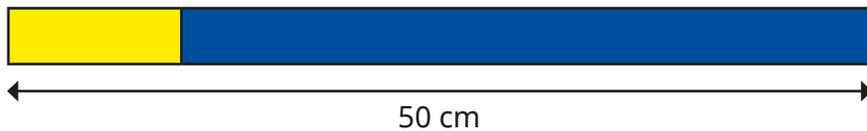# Four operations with lengths and heights

Reasoning and problem solving

Here is a strip of yellow paper.

A blue strip of paper is 4 times longer than the yellow strip.

The strips are joined end to end.

← 50 cm →

How long is the yellow strip?

How long is the blue strip?

10 cm

40 cm

There are three teddies called Flo, Tim and Bo.

- Flo is 15 cm taller than Tim.
- Tim is 3 cm shorter than Bo.
- Bo is 42 cm tall.

How tall is Flo?

How tall is Tim?

How much taller is Flo than Bo?

How did you work out the answers?

Flo = 54 cm

Tim = 39 cm

12 cm