Units of length – choose units of measurement

1 **Brainstorm all the units you know for measuring length. Can you show how they are connected?**

metre ——— 1 000 m = 1 km ——— kilometre

When measuring length, it is important to choose a suitable unit of measurement.
Using millimetres as the unit to measure the distance between London and Moscow is not the most efficient choice. Think of all those zeros.

2 **Choose the conventional unit of length (cm, m, km, mm) to measure the following:**

a The length of your nose ☐

b The distance between Australia and Italy ☐

c The length of an Olympic swimming pool ☐

d The length of a ladybird ☐

e The height of a basketballer ☐

f The width of a watermelon seed ☐

g The length of the Trans-Siberian Railway ☐

h The height of a Year 6 student ☐

3 **Would more than one choice of unit be appropriate for any of the items above? Which ones and which unit would you use?**

_____

4 **Name 3 things you would measure in mm, cm, km:**

mm	cm	km

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5 **Choose a distance in the school such as the length of your classroom, corridor or oval. Measure it in m, mm and cm. Record your measurements below. Which was easiest to use? Which would you recommend that someone else use if they were to do the same thing?**

mm

cm

m

6 **Play Unit Bingo with some friends. You'll each need a copy of the grid below. One of you will be the caller and the others will play. The players will need 16 counters each.**

1 Fill in the rest of your bingo card with a mixture of items where length can be measured in different measurements. You'll want a mixture of cm, mm, m and km options.

2 The caller nominates a measurement – km, m, cm or mm. If you think you have an item that would most commonly be measured in that unit, call it out.

3 The group can discuss your choice and if they disagree, the caller makes the final decision as to whether you can cover the item with a counter. Obviously there may be more than 1 choice for an object. For example, you may accept both cm and mm as an answer for the french fry.

4 The first person to cover all their squares calls "Bingo" and wins.

hand span			
		a french fry	
London to Paris			
		your tongue length	

Units of length – convert measurements

Measurements can be expressed using different units.

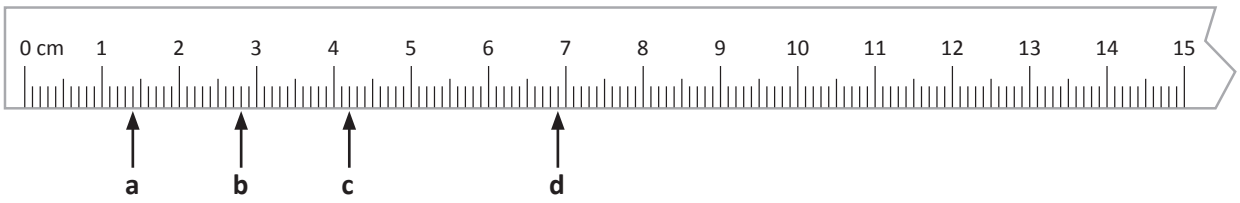
When we convert from a larger unit to a smaller unit, we multiply:

cm ⟶ mm 34 cm = (34 × 10) mm = 340 mm

When we convert from a smaller unit to a larger unit, we divide:

cm ⟶ m 34 cm = (34 ÷ 100) m = 0.34 m

1 **Express the lengths shown on the ruler in 2 ways:**



a ____ mm ____ cm **b** ____ mm ____ cm

c ____ mm ____ cm **d** ____ mm ____ cm

2 **Convert these lengths to centimetres:**

a 200 mm = ____ cm **b** 405 mm = ____ cm **c** 8 238 mm = ____ cm

d 2 m = ____ cm **e** 19 m = ____ cm **f** 450 m = ____ cm

3 **Convert these lengths to metres:**

a 400 cm = ____ m **b** 28 cm = ____ m

c 3 250 mm = ____ m **d** 482 cm = ____ m

e 123 cm = ____ m **f** 7 777 mm = ____ m

g 4 341 mm = ____ m **h** 187 cm = ____ m

i 198 mm = ____ m

Remember these key facts!

10 mm = 1 cm

100 cm = 1 m

1 000 m = 1 km

Units of length – convert measurements

When we order lengths it's easiest to convert them into the same unit first. Here, we are converting to cm:

14 cm 128 mm 1.1 m **convert** ⟶ 14 cm 12.8 cm 110 cm

Now we can clearly see the order of these lengths.

4 **Put these measurements in order from shortest to longest:**

a	13 cm	120 mm	3 m	
b	5 700 mm	5 m	540 cm	
c	3.25 m	300 cm	325 mm	

5 **Use these *Guinness World Record* facts to fill in the missing values.**

Source: *Guinness World Book Records* 2008

	metres	centimetres	millimetres
Longest tongue	0.095 m	cm	95 mm
Tallest living person	2.57 m	257 cm	mm
Longest hair	m	5 267 cm	mm
Longest fingernails	7.513 m	cm	7 513 mm
Smallest tooth	m	cm	3 mm
Longest leg hair	0.127 m	cm	mm

6 **Choose one of the above measurements and work out the length of your equivalent body part. Express your measurement in three different units.**

7 **Without revealing your findings for question 6, ask your friend to measure you. Is their answer the same as yours? If not, why do you think the answers are different?**

Units of length – estimate and measure

In real life, we often estimate measurements. Can you think of a time you would estimate instead of measuring exactly? Or a time you would estimate first, then measure more precisely?

1 **When we compare, we often use fractional language to help us. For example, "He was twice her size!" or "My bedroom is $\frac{2}{3}$ the size of this." Look at the top bar and then the bars below. What fraction of the top bar do you estimate that the lower bars represent?**

a 

b 

c 

d 

2 **Draw each of these lines in mm:**

a 64 cm

b 37 cm

c 27 cm

d 82 cm

3 **Make a choice from the box (on the right) to fill the gaps in these statements:**

a A desk is about _____ metre high.

b A basketballer is about _____ metres high.

c A dinner fork is about 19 _____ long.

d A soccer pitch is between 100 and 110 _____ long.

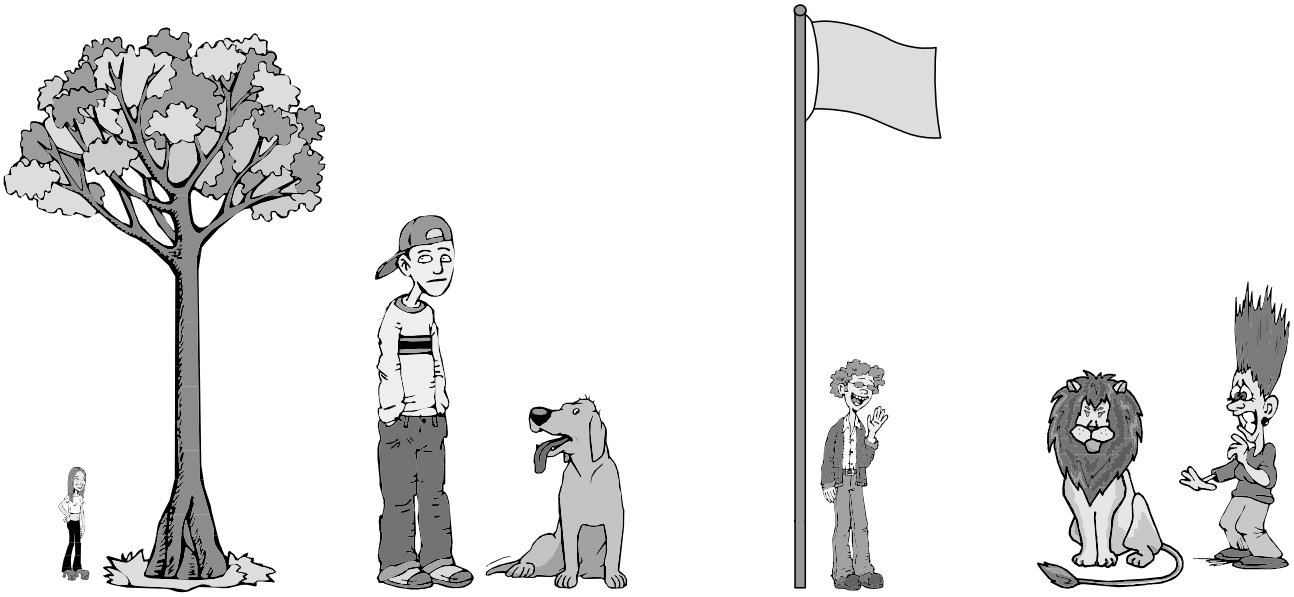
e A crayon could be about _____ cm long.

centimetres
metres
1
8.6
2

Units of length – estimate and measure

Comparing lengths or heights with a known measurement is a useful strategy. The known measurement is called a benchmark.

4 **The average height of an adult woman is around 1.6 m and a man is around 1.8 m. Use these benchmarks to estimate the height of the objects below:**



a ☐ **b** ☐ **c** ☐ **d** ☐

5 **Measure yourself. Using that measurement as a benchmark, estimate the height of 5 objects around the school. Now measure them. How close were your estimations?**

My height:

	Object	Estimation	Actual measurement
1			
2			
3			
4			
5			

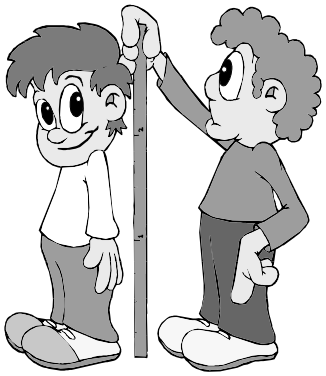
Size me up! investigate

Getting ready

The human body is a fascinating thing. In this activity you will work with a partner to compare the length of different parts of your body to find some common relationships between the measurements. You will record your measurements and findings.

You'll need a tape measure or strips of paper or lengths of string. A ruler may also help.

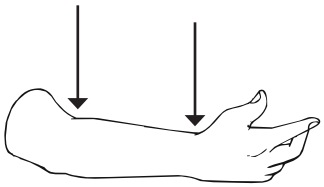
You'll need a pen and paper for recording your data.



What to do

Look at your foot. Consider the length, not how beautiful it is. Can you think of a part of your body that might be the same length? Make your prediction.

It is said that your foot is the same length as your forearm, from your wrist to your elbow. Do you think this is true for you? Test it out.



It is also said that the circumference (or length) of your neck is equal to twice the circumference of your wrist. Test that one out.

Now it's your turn to find some more. With a partner, measure at least 10 different body lengths and see if you can find connections between them.

You could measure the length of: your shin bone, your thigh bone, your navel to the floor, the top of your head to your navel, around your waist, around your head, the length of your head, or the distance between your eyes. The list goes on!

Can you find some measurements that are the same length?

Can you find some that are roughly double or half the size of each other?

What about some that are about one and a half times the length of each other?

Is measuring an exact science? What issues do you face?

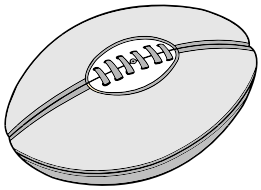
What to do next

If this activity has interested you, you are in for a treat. Use the internet to research the terms 'divine proportions' or 'golden ratio'. What do you find?

How long? apply

Getting ready

In this activity work in groups of 4 to practise and improve on estimating lengths. Note the team average of 6 attempts and see how close your team average estimate can get to the actual measurement. This is about working together, not just about individual estimates.



You'll need paper and a calculator.

What to do

1 Choose one action where length can be measured easily. You are going to measure the same action 6 times. Examples include the length of a jump, the distance of a ball throw or how far you can hop on one foot without faltering.

2 One person in the group performs the action. All group members make an estimation of its length. Record the estimations. Work out the average of the estimations. This is an important step – don't just rush to measure the length!

3 Now you can measure the length. As a whole group, how far out was your estimate? Record this on a table such as the one below:

Measurement	Group average	Difference
1.25 m	1.13 m	0.12 m

4 Try the action again and go through the same steps. Was your estimate closer?

5 Repeat the activity until you have done it 6 times.

Remember we work out averages by adding up all the estimates and dividing by the number of estimates.

A 35 cm
B 40 cm
C + 38 cm
113 cm

113 ÷ 3 = 37.66 cm

REMEMBER

What to do next

Share your process and results with the class.

Which groups improved with more practice? Did groups use strategies to assist them to get closer? If no improvement was shown, why do you think this was?