

MEASURES

Pupils should be taught to:

Use vocabulary related to measures

Know and use relationships between familiar units

As outcomes, Year 4 pupils should, for example:

Use, read and write:

- *unit, standard unit, metric unit, imperial unit...*
- names of standard metric units:
kilometre, metre, centimetre, millimetre...
kilogram, gram... litre, millilitre...
- names of commonly used imperial units:
mile... pint...
- length and distance: *long, short, tall, high, low, wide, narrow, deep, shallow, thick, thin... far, near, close, distance, perimeter, circumference...*
- mass: *big, bigger, small, smaller, balances...*
- weight: *heavy, light, weighs...*
- capacity: *full, empty, holds...*
- and comparative words such as: *longer, longest...*

Use correctly the abbreviations:

mm (millimetre), cm (centimetre), m (metre), km (kilometre), g (gram), kg (kilogram), ml (millilitre), l (litre), ... and cm² (square centimetre), m² (square metre).

Know that:

- 1 kilometre = 1000 metres
- 1 metre = 100 centimetres or 1000 millimetres
- 1 centimetre = 10 millimetres
- 1 kilogram = 1000 grams
- 1 litre = 1000 millilitres

Recognise the mile as a unit for measuring distance.
Know that a mile is longer than 1 km but less than 2 km.

Recognise the pint as a unit for measuring capacity.
Know that a pint is, very roughly, about half a litre.

Know the equivalent of one half, one quarter, three quarters and one tenth of 1 km, 1 m, 1 kg, 1 litre in m, cm, g and ml respectively. For example, know that:

- 500 g is one half of 1 kg;
- 75 cm is three quarters of 1 m.

Begin to write, for example:

- 1.6 m in centimetres (160 centimetres);
- 4 kg in grams (4000 grams);
- 5 litres in millilitres (5000 ml);
- 8 km in metres (8000 metres);
- 3 cm in millimetres (30 millimetres);

and vice versa.

As outcomes, Year 5 pupils should, for example:

Use, read and write, spelling correctly, the vocabulary from the previous year, and extend to:

- names of commonly used imperial units: *gallon*.

Use correctly the abbreviations:

km, m, cm, mm, kg, g, l, ml...

and cm², m², mm² (square millimetre).

Know the relationships between units from the previous year.

Recognise that:

- a mile is a unit of distance, and is a bit more than 1.5 km (about 1600 metres);
- a pint is a unit of capacity, and is slightly more than half a litre (about 570 ml);
- a gallon is a unit of capacity, and is a bit less than 5 litres.

Know the equivalent of one half, one quarter, three quarters, one tenth and one hundredth of 1 metre, 1 kilometre, 1 kilogram and 1 litre in m, cm, g and ml respectively. For example, know that:

- 10 g is one hundredth of 1 kg.

Write, for example:

- 1.6 m in centimetres (160 centimetres);
- 4.5 kg in grams (4500 grams);
- 367 cm in metres (3.67 metres);
- 2500 millilitres in litres (2.5 litres).

As outcomes, Year 6 pupils should, for example:

Use, read and write, spelling correctly, the vocabulary from the previous year, and extend to:

- names of standard metric units: *tonne, centilitre...*
- names of commonly used imperial units: *pound, ounce... yard, foot, inch...*

Use correctly the abbreviations:

km, m, cm, mm, kg, g, l, ml, cl (centilitre)...

cm², m², mm²

and, in science, N (newtons)...

and read the imperial abbreviations: lb and oz.

Know the relationships between units from the previous year, and extend to:

- 1 tonne = 1000 kilograms
- 1 litre = 100 centilitres
- 1 centilitre = 10 millilitres

Know the approximate equivalence between commonly used imperial units and metric units:

- 1 litre = 2 pints (more accurately, 1 ³/₄ pints)
- 4.5 litres = 1 gallon or 8 pints
- 1 kilogram = 2 lb (more accurately, 2.2 lb)
- 30 grams = 1 oz
- 8 kilometres = 5 miles

Make use of rhymes like:

*A metre is just three feet three.
It's longer than a yard, you see.*

*Two and a quarter pounds of jam
Is round about one kilogram.*

A litre of water's a pint and three quarters.

Know the equivalent of one thousandth of 1 km, 1 kg, 1 litre in m, g and ml respectively.

Convert a larger metric unit to a smaller.

For example:

- write 3.125 km in metres (3125 metres);
- write 1.25 litres in millilitres (1250 millilitres).

Begin to convert a smaller unit to a larger.

For example:

- write 750 grams in kilograms (0.75 kilograms);
- write 300 millilitres in litres (0.3 litres);
- write 3 centimetres in metres (0.03 metres).

MEASURES

Pupils should be taught to:

Suggest suitable units to estimate or measure length, mass or capacity

As outcomes, Year 4 pupils should, for example:

Use, read and write:

estimate...

roughly, nearly, about, approximately...

Estimate and check, using standard units, measurements such as:

- how tall a friend is;
- how long/wide a playing card is;
- how heavy a tennis ball is;
- how much a sink holds.

Respond to oral or written questions like:

Would you expect:

- a bungalow to be about 3 metres, 6 metres or 12 metres tall;
- a big potato to be 20 g, 200 g or 2000 g;
- my thumb nail to be about 1 mm, 5 mm or 10 mm wide;
- a small bottle of lemonade to hold about 250 ml or 1250 ml?

Suggest things you would measure in:

- kilometres, metres, centimetres, millimetres...
- kilograms, grams...
- litres, millilitres...
- miles, pints...

Suggest a metric unit to measure, for example:

- how far it is from London to Birmingham;
- the height of a telegraph pole;
- the length, breadth and thickness of a library book;
- the weight of some butter in a butter dish;
- the capacity of a big saucepan.

See also time (pages 98 and 100).

As outcomes, Year 5 pupils should, for example:

Use, read and write, spelling correctly:
estimate...
roughly, nearly, about, approximately...

Estimate and check, using standard metric units, measurements such as:

- how wide/high the front fence of the school is;
- the total weight of three parcels;
- the amount of rainfall collected in a week;
- the thickness of a playing card.

Respond to oral or written questions like:

Do you think that:

- the classroom is 3 metres, 6 metres or 12 metres high;
- this crayon is about 5 mm, 55 mm or 555 mm long;
- this pear weighs about 500 g, 250 g or 100 g;
- there is 1000 ml, 500 ml or 250 ml of water in this jar?

Suggest things you would measure in:

- kilometres, metres, centimetres, millimetres...
- kilograms, grams...
- litres, millilitres...
- miles, gallons, pints...

Suggest a metric unit to measure, for example:

- the distance from Bradford to Coventry;
- your height;
- the width of a dinner plate;
- the weight of a daffodil bulb;
- the amount held by a tablespoon.

See also time (pages 99 and 101).

As outcomes, Year 6 pupils should, for example:

Use, read and write, spelling correctly:
estimate...
roughly, nearly, about, approximately...

Estimate and check, using metric or imperial units, measurements such as:

- the distance from Leeds to Liverpool;
- the weight of an egg;
- the perimeter of the classroom.

Suggest how you could measure:

- the thickness of a piece of paper;
- the weight of one grain of rice;
- the quantity of water in a raindrop;
- the thickness of the glass in a window pane.

Respond to oral or written questions like:

- Do you think this box weighs about 1 N, 5 N or 25 N?

Suggest things you would measure in:

- kilometres, metres, centimetres, millimetres...
- tonnes, kilograms, grams... newtons...
- litres, millilitres, centilitres...
- miles, gallons, pints, pounds, ounces...

Suggest an imperial or metric unit to measure, for example:

- the distance from Earth to the Moon;
- the growth of mustard and cress;
- the weight of a paper clip... of a van;
- the amount of milk in a jug... in a milk tanker.

What units of measurement might you see, for example, in:

- a TV weather forecast;
- a supermarket;
- road signs;
- a garage;
- a railway station;
- a chemist's shop...?

See also time (pages 99 and 101).

MEASURES

Pupils should be taught to:

Suggest suitable measuring equipment, record estimates and readings from scales to a suitable degree of accuracy

As outcomes, Year 4 pupils should, for example:

Choose a suitable measuring instrument to measure, for example:

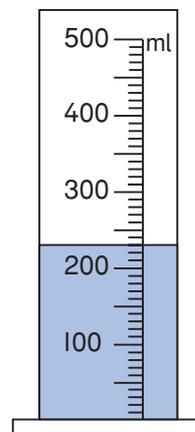
- the length of the classroom... a small library book... a fence...
- the weight of a bag of pears... a person...
- the capacity of a bottle... a teapot...

Use a ruler to measure and draw lines to the nearest 0.5 cm.

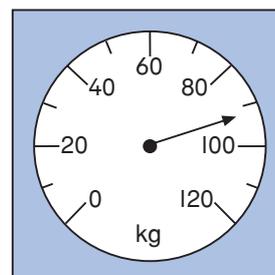
Read measuring scales to the nearest division.

For example:

- How much water is in the measuring cylinder?



- Mr Jones is standing on the bathroom scales shown below. Roughly what measurement is shown on the scales?



Record estimated and measured lengths in metres and centimetres in decimal form: 1.35 metres.

Record other estimates and measurements using a mix of units: for example, write '4125 grams' as '4 kilograms and 125 grams'.

Round measurements to the nearest ten or hundred units.

For example:

- I am about 157 cm tall, or 160 cm to the nearest 10 cm;
- our rabbit weighs 4690 grams, or 4700 grams to the nearest 100 grams.

As outcomes, Year 5 pupils should, for example:

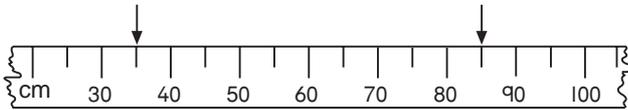
Choose a suitable measuring instrument to measure, for example:

- the height of the classroom...
- the depth of the swimming pool...
- the weight of a ball of wool...
- the capacity of a tea urn...
- the capacity of a bath...

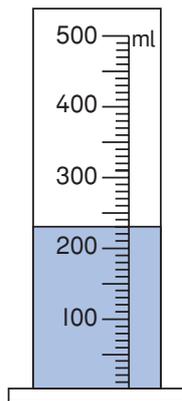
Measure and draw lines to the nearest millimetre.

Read measuring scales between divisions. For example:

- What is the distance between the two arrows?
- What is this distance in millimetres?
- What length in metres is indicated by each arrow?



- 200 ml more water is poured into the cylinder. Mark the new water level.



- 300 grams of flour are taken off the scales. How much flour is left?



Begin to record estimates and measurements involving halves, quarters or tenths of 1 km, 1 kg or 1 litre in decimal form: for example, record '1500 ml' as '1.5 litres', or '600 m' as '0.6 km'.

Begin to round decimal measurements to the nearest whole unit. For example:

- a saucepan holding 4275 millilitres holds 4 litres to the nearest litre;
- a 3.25 kg bag of carrots weighs 3 kg to the nearest kilogram.

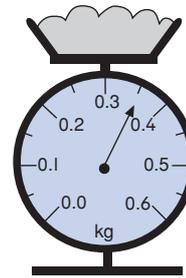
As outcomes, Year 6 pupils should, for example:

Choose a suitable measuring instrument to measure, for example:

- the thickness of a rubber band...
- the width of a manhole cover...
- the weight of a lorry...
- the mass of an insect...
- the capacity of a thimble...

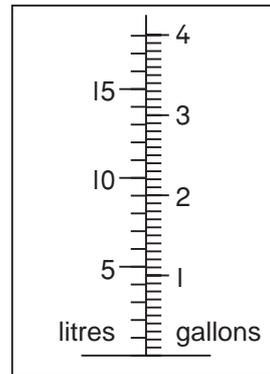
Read measuring scales, converting the unit to an equivalent metric unit. For example:

- How many grams of flour are on the scales?



Read metric and imperial units from measuring scales that show both units. For example:

- Approximately how many litres are there in 3 gallons? Give your answer to the nearest litre.
- Approximately how many gallons are there in 7 litres? Give your answer to one decimal place.



Record estimated and measured lengths, weights or capacities in decimal form: for example, write '4125 grams' as '4.125 kg'.

Round a measurement to the nearest whole unit or tenth of a unit. For example:

- 3870 grams of potatoes weigh 3.9 kg to the nearest tenth of a kilogram, or 4 kg to the nearest kilogram.

MEASURES

Pupils should be taught to:

Measure and calculate the perimeter and area of simple shapes

As outcomes, Year 4 pupils should, for example:

Use, read and write:
area, covers, surface, perimeter, distance, edge...
and use symbols for:
square centimetres (cm²).

Perimeter

Respond to questions such as:

- Draw round the edge of a rectangle with your pencil. How far did your pencil travel? Measure the distance.
- Estimate then measure the perimeter of the classroom... the top of your desk... a piece of A4 paper... a regular hexagon...
- How long is the perimeter of:
a 5 cm × 5 cm square... a 4 cm × 7 cm rectangle...
a triangle whose sides are 10 m, 20 m, and 24 m?
- The perimeter of a square is 28 cm.
What is the length of one side?
Draw two rectangles with the same perimeter as the square.
- Draw different rectangles with a perimeter of 24 cm.
Which has the largest area?

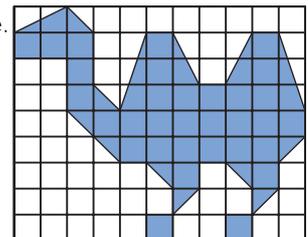
Find a short way to work out the perimeter of a rectangle.

Area

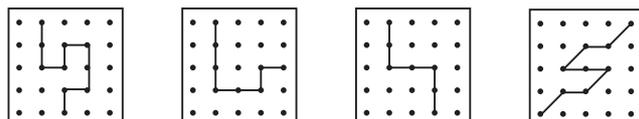
Find out which of two or more things has the greatest area by covering with, say, pennies, cubes, postcards, sheets of A4 paper, sheets of newspaper, squares... and counting.

Find areas by counting squares. For example:

- Find out which of two greetings cards has the greatest area by tracing on centimetre squared paper or by covering with a transparent centimetre grid.
- Each square is 1 square centimetre.
What area is shaded?



- Find different ways of halving the area of a 5 × 5 pinboard. Justify your results.



Choose a suitable unit and estimate the area of, for example:

- a postcard;
- a page of a book;
- this rectangle.

Measure and check.

Suggest areas to measure in square centimetres.

As outcomes, Year 5 pupils should, for example:

Use, read and write, spelling correctly:
area, covers, surface, perimeter, distance, edge...
 and use the symbols for: *square centimetres (cm²), square metres (m²), square millimetres (mm²).*

Perimeter

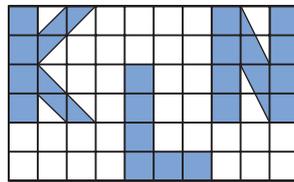
Express the formula for the perimeter of a rectangle first in words, then in letters.

Work out and express in words a formula for finding the perimeter of a regular polygon.

Respond to questions such as:

- The perimeter of a rectangle is 72 cm. The shortest side is 9 cm. What is the length of the longest side?

- Draw some shapes on squared paper. Measure the perimeters to the nearest mm.



Area

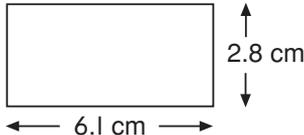
Express the formula for the area of a rectangle first in words, then in letters.

Choose a suitable unit to estimate the area of, for example:

- a sheet of newspaper... the top of a desk...
- a leaf... a postage stamp...
- the top of a matchbox...
- the cover of a book... a round table mat...
- the hall floor... the swimming pool surface...

Discuss how to find the area of each one. Measure and calculate how close the estimates were.

Respond to oral or written questions like:

- What is the approximate area of this rectangle? 
- Would you expect the area of:
 - a paperback book to be 100 cm², 600 cm² or 6000 cm²;
 - a bedroom floor to be 10 m² or 100 m²;
 - a playing card to be 5 cm², 50 cm² or 100 cm²?

Suggest areas you would measure in mm², cm², m²...

Know that 1 square metre is 10 000 cm².
 Know that 1 square centimetre is 100 mm².

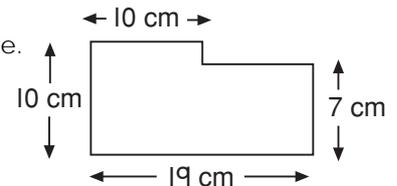
As outcomes, Year 6 pupils should, for example:

Use, read and write, spelling correctly:
area, covers, surface, perimeter, distance, edge...
 and use the symbols for: *square centimetres (cm²), square metres (m²), square millimetres (mm²).*

Perimeter

Calculate the perimeters of compound shapes that can be split into rectangles.

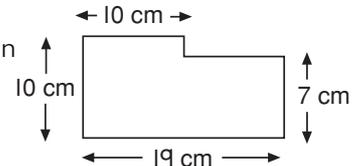
For example, find the perimeter of this shape.



Area

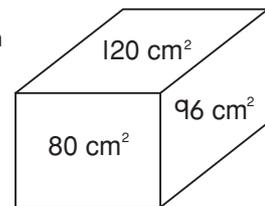
Know the formula for finding the area of a rectangle.

Begin to find the areas of compound shapes that can be split into rectangles, such as this shape.

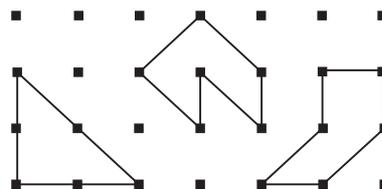


Respond to oral or written questions like:

- Find the length, breadth and height of this box. Use a calculator to find its surface area.



- Each of these shapes has an area of two square units. Draw some more. Decide which has the longest perimeter.



Find the area of a right-angled triangle by considering it as half of a rectangle.

MEASURES

Pupils should be taught to:

Use the vocabulary related to time;
suggest suitable units of time to
estimate or measure

As outcomes, Year 4 pupils should, for example:

Use, read and write:

names of days of the week, months and seasons...

day, week, fortnight, month, season, year, leap year, century, millennium, morning, afternoon, evening, night, midnight, noon, hour, minute, second, today, yesterday, tomorrow, weekend... am and pm...

how long ago, how long will it be to, arrive, depart...

faster, fastest, slower, slowest, takes longer, takes less time, earliest, latest...

Know and use:

1 millennium	= 1000 years
1 century	= 100 years
1 year	= 12 months or 52 weeks
1 week	= 7 days
1 day	= 24 hours
1 hour	= 60 minutes
1 minute	= 60 seconds

and the rhyme:

*30 days hath September,
April, June and November.
All the rest have 31,
except in February alone
which has but 28 days clear
and 29 in each leap year.*

Know their date of birth: day, month, year.

Estimate or measure, suggesting suitable units

Suggest things you would estimate or measure in:

- hours, minutes, seconds, days, weeks, months, years...

Suggest a unit to estimate or measure, for example:

- the time it will take to eat lunch...
- the time you watch TV each week...
- how long it is until the end of the year.

What measuring instrument would you use to time, for example:

- running 100 metres... cooking a cake...?

Estimate, using standard units, for example:

- how long it takes to run across the school field;
- how long it takes on the bus to the town centre;
- how long it takes to fly to Miami from London.

Use a stop watch or other timers to measure and compare times of events: for example, use a stopwatch in science to find how long it takes for water to boil, or in PE to time races.

Respond to oral or written questions like:

- Would you expect:
to cook a soft boiled egg in 3 minutes or 30 minutes;
to walk across the road in 1, 10 or 100 seconds?
- Have you lived more or less than 500 weeks?

As outcomes, Year 5 pupils should, for example:

Use, read and write, spelling correctly, the vocabulary from the previous year, and extend to:
decade...
digital/analogue clock, 24-hour clock, 12-hour clock.

Know and use:

- 1 millennium = 1000 years
- 1 century = 100 years
- 1 decade = 10 years
- 1 year = 12 months or 52 weeks or 365 days
- 1 leap year = 366 days
- 1 week = 7 days
- 1 day = 24 hours
- 1 hour = 60 minutes
- 1 minute = 60 seconds

and the rhyme: *30 days hath September...*

Estimate or measure, suggesting suitable units

Suggest things you would estimate or measure in:

- weeks, months, years, decades, centuries...

Suggest a unit to estimate or measure, for example:

- how long it takes from planting a daffodil bulb to when it flowers;
- the age of an old yew tree.

Suggest how to measure, for example:

- how long it takes for a runner bean to grow...
- how long until your birthday...

Estimate, using standard units, for example:

- the hours of darkness in December... in June...
- how long it takes to run a marathon...
- the time each week you spend sleeping... eating...

Respond to oral or written questions like:

- Would you expect:
to roast a chicken in 2 hours, 5 hours or 10 hours;
to walk a mile in 15 min, 45 min or 75 min?
- Have you lived more or less than 3650 days?
Than 100 000 hours?

As outcomes, Year 6 pupils should, for example:

Use, read and write, spelling correctly, the vocabulary from the previous year, and extend to:
Greenwich mean time, British summer time...

Know and use:

- 1 millennium = 1000 years
- 1 century = 100 years
- 1 decade = 10 years
- 1 year = 12 months or 52 weeks or 365 days
- 1 leap year = 366 days
- 1 week = 7 days
- 1 day = 24 hours
- 1 hour = 60 minutes
- 1 minute = 60 seconds

and the rhyme: *30 days hath September...*

MEASURES

Pupils should be taught to:

Read the time from clocks, calendars and timetables

As outcomes, Year 4 pupils should, for example:

Read clocks and calendars

Read the time to the minute on a 12-hour digital clock and an analogue clock. Know, for example, that 4:37, or 37 minutes past 4, or 23 minutes to 5 are all equivalent. Use am and pm.

Use this year's calendar to work out, for example:

- which day of the week is 22 June;
- the date of the third Thursday in May;
- the number of days from 27 February to 10 March;
- the number of weeks from 18 September to 13 November.

Use timetables

For example:

- Use a TV guide to work out how long favourite programmes last.
- Use the class timetable to find out how much time you spend on mathematics each day; each week; each term; each year.
- This table shows the times of buses.

8:00 am	10:30 am	1:00 pm	3:30 pm	5:00 pm
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You are at the bus stop at 2:50 pm. How long do you wait for a bus?

The 10:30 bus is 35 minutes late. What time does it arrive?
How long is it between the first and last bus?

- A bus takes 20 minutes between each stop.

Complete the timetable.

High Street	11:05		1:45
Church			
Post Office		1:05	
Sports Centre			

See also problems involving time (page 88).

As outcomes, Year 5 pupils should, for example:*Read clocks*

Read the time to the minute on a 24-hour digital clock. Understand 8:48 am, 8:48 pm, 08:48 and 20:48.

For example, fill in the gaps in this table.

seven o'clock in the evening	19:00 h	7:00 pm
quarter to ten in the morning		
	14:20 h	
	22:15 h	
midnight		
17 minutes past 4 in the afternoon		

Use timetables

Use a train timetable. For example:

Birmingham New Street	09:40	10:05	11:05	12:35
Birmingham International	09:50	10:15	11:15	12:45
Coventry	10:10	10:30	11:30	13:00
Leamington Spa	10:25	11:45	13:15
Banbury	10:45	12:05
Oxford	11:05	11:20	12:25	13:55
Reading	11:30	11:55	12:50	14:25

- What time does the 09:40 from Birmingham New Street arrive at Reading? Which is the fastest train from Birmingham New Street to Reading?
- At how many stations does the 10:15 from Birmingham International stop before it reaches Reading?
- How long does it take the 13:55 from Oxford to reach Reading?
- You have to arrive at Oxford at 2:00 pm. Which train would you catch from Coventry?
- You get to Leamington at 09:30. How long will you have to wait for a train to Reading?

See also problems involving time (page 89).

As outcomes, Year 6 pupils should, for example:*Read world time charts*

Understand different times around the world.

Use a world time chart to answer questions such as:

- It is 12:00 noon in London. What time is it in Delhi, Tokyo, Hawaii, San Francisco...?
- It is 4:36 am in Sydney. What time is it in New York?

See also problems involving time (page 89).