

Autumn Block 5

Converting units

Small steps

Step 1

Metric measures

Step 2

Convert metric measures

Step 3

Calculate with metric measures

Step 4

Miles and kilometres

Step 5

Imperial measures



Metric measures

Notes and guidance

Building on their experiences from earlier years, children recognise, read and write all metric measures for length, mass and capacity. This is the first time they will be introduced to tonnes as a measure for mass.

Highlight the difference between capacity (the amount an object can contain) and volume (the amount actually in an object). Children consider the most appropriate unit of measure and develop their estimation skills in context. Although metric units of measurement are used throughout, children may mention imperial units of measurement. The relationship between metric and imperial units will be explored later in the block.

Refer to the mass of an object, rather than its weight. The mass remains constant, whereas the weight of an object depends on the effect of gravity.

Things to look out for

- Children may use the terms “weight” and “mass” interchangeably.
- Based on real-world experience, children may be more familiar with imperial measures, for example “miles” rather than “kilometres”.

Key questions

- Which units could you use to measure length/mass/capacity?
- Which is the most appropriate unit to measure the _____ of a _____? Why?
- Why do you think _____ is not an appropriate estimate?
- Why would you not use kilometres to measure the length of the classroom? What would you use?
- What is the difference between capacity and volume?

Possible sentence stems

- The best unit to measure the _____ of a _____ would be _____ because ...

National Curriculum links

- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places where appropriate
- Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to 3 decimal places

Metric measures

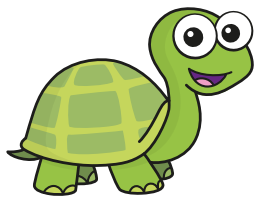
Key learning

- Sort the units of measurement into the table.



Length	Mass	Capacity

- Tiny is thinking about volume and capacity.



The volume of the glass is the same as its capacity because they measure the same thing.



Do you agree with Tiny?

Talk about it with a partner.

- Estimate the length of your classroom using appropriate units. Compare answers with a partner.

- Choose the most appropriate unit for each measurement.

- ▶ the length of a table



- ▶ the mass of a car



- ▶ the capacity of a water bottle



- Choose the most accurate estimate for each measurement.

- ▶ the mass of an apple



- ▶ the height of a door




- ▶ the capacity of a glass



Metric measures

Reasoning and problem solving




It is impossible to measure the mass of a car in grams!

Do you agree with Amir?
Explain your thinking.

No

Ron's dog is about $\frac{1}{4}$ of the height of the door.
Ron is three times the height of his dog.




Estimate the height of Ron and his dog.

A door is approximately 2 m tall, so Ron's height is approximately 150 cm and the dog's height is 50 cm.

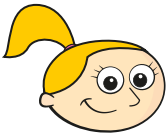
Whitney and Eva are measuring the length of a football pitch.

I am going to measure in metres.



Whitney

I am using kilometres to measure the pitch.



Eva

Which unit of measurement is more appropriate?
Explain your reasoning.

metres

Convert metric measures

Notes and guidance

In previous years, children learnt how to multiply and divide numbers by 10, 100 and 1,000. In Year 5, children learnt how to convert between metric measurements of length and mass. This small step recaps this learning and also introduces conversions between metric measurements for capacity.

Children convert between units both ways, for example from metres to centimetres and centimetres to metres. When making these conversions, children may need to be reminded about decimal place value.

When comparing measurements with different units, children need to convert them to the same unit. During this small step, highlight the inverse relationship between multiplication and division. It is important that children understand the role of zero as a place value holder when performing some calculations.

Things to look out for

- Children may think that you multiply by 1,000 when converting measurements from metres to kilometres because they know that kilometres are a greater unit of measurement than metres. This may also happen when converting between units of mass and capacity.

Key questions

- What is the same and what is different about kilometres and kilograms?
- What is the same and what is different about 1.5 km and 1.500 km?
- What do you notice about the conversions from metres to kilometres and grams to kilograms?
- Do you need to multiply or divide by 10/100/1,000? How do you know?

Possible sentence stems

- There are _____ grams in one kilogram, so there are _____ grams in _____ kilograms.

National Curriculum links

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Convert metric measures

Key learning

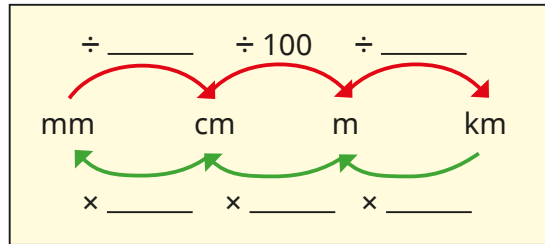
- There are 1,000 g in 1 kg and 1,000 kg in 1 tonne.

Use this fact to complete the tables.

g	kg
3,000	
	4
2,500	

kg	tonnes
7,000	
	8
9,500	

- Complete the diagram to show the conversions.



Use the diagram to complete the table.

mm	cm	m	km
1,500,000			
	250,000		
			3.4

- Complete the bar model.

1 litre	1 litre	1 litre	1 litre	$\frac{1}{2}$ litre
1,000 ml				

Complete the sentences.

- ▶ $4\frac{1}{2}$ litres = _____ ml
- ▶ _____ litres = 2,000 ml
- ▶ 3 litres = _____ ml
- ▶ 2,500 ml = _____ litres

- Write <, > or = to compare the measurements.

100 ml 0.1 l

15 cm 1.5 m

25 l 2,500 ml

1,500 mm $1\frac{1}{2}$ m

4,020 ml 4.2 l

1.5 km 150 m

- A bag of flour has a mass of 200 g. Scott uses 3 bags of flour when baking. How much flour does he use? Write your answer in kilograms.



Convert metric measures

Reasoning and problem solving

Put the capacities in order, starting with the smallest.

3 litres

3,500 ml

0.4 litres

0.035 litres

450 ml

330 ml

Compare answers with a partner.

0.035 litres
330 ml
0.4 litres
450 ml
3 litres
3,500 ml

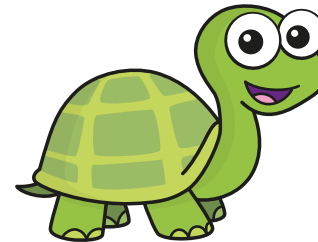
Dani thinks that 12,000 g is greater than 20 kg because $12,000 > 20$

Do you agree?

Explain your answer.

No

These measurements are all the same length.



34,000 mm

3,400 cm

34 m

0.034 km

Do you agree with Tiny?

Explain your answer.

Yes

Calculate with metric measures

Notes and guidance

Building on the previous step, children use and apply their conversion skills to solve measurement problems in context.

The use of pictorial representations, such as bar models and number lines, to represent the problem helps children to choose the correct operation(s) to solve the problem. Children need to be secure with the four operations to find the correct numerical answers. Some of the problems involve finding a fraction of an amount (covered earlier this term) and adding and subtracting decimals, which will be revisited in the Spring Term.

Things to look out for

- When finding a fraction of a unit of measurement, such as $\frac{1}{2}$ of 1 kilogram, children may not notice the relationship between kilograms and grams and therefore will not be able to confidently write this as 500 g, which is easier to work with.
- When adding or subtracting amounts with different numbers of decimal places, children may not line up the place value columns accurately.
- Children may not convert all values to the same unit of measure before calculating.

Key questions

- What operation are you going to use? Why?
- How could you use a bar model to help you understand the question?
- How many grams are there in one kilogram?
- Does it matter if the items in the question are measured in different units? Why?
- How can you convert between metres and centimetres?

Possible sentence stems

- There are _____ in a _____
- To convert from _____ to _____, multiply/divide by _____

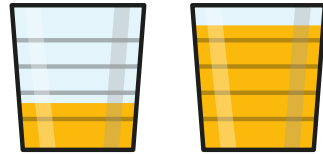
National Curriculum links

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Calculate with metric measures

Key learning

- Esther drinks 250 ml of juice.
Kim drinks 3 times as much.



- ▶ How much does Kim drink?
Give your answer in litres.

- ▶ How much do Esther and Kim drink in total?

- Brett has a piece of ribbon measuring 1.75 m.
He is given a second piece of ribbon.
Now he has 296 cm of ribbon in total.



How long is the second piece of ribbon in centimetres?

- A parcel has a mass of 440 grams.

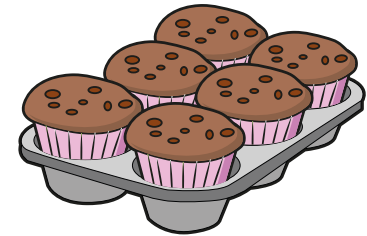


- ▶ What is the mass of 27 of these parcels?
Give your answer in kilograms.

- ▶ A postal worker can carry a maximum of 12.5 kg.
How many of these parcels can she carry?

- One gram of silver costs £0.55
How much does half a kilogram of silver cost?
- Aisha uses these ingredients to make muffins.

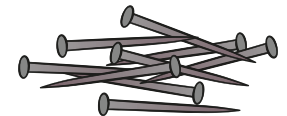
600 g caster sugar
0.6 kg butter
18 eggs
 $\frac{3}{4}$ kg flour
10 g baking powder



The mass of each egg is 50 g.

What is the total mass of the ingredients in kilograms?

- There are 28 nails in a packet.
Each nail has a mass of 2 g.



- ▶ What is the total mass of nails in 60 packets?
Give your answer in kilograms.
- ▶ The mass of nails in a large box is 0.5 kg.
How many nails does it hold?

Calculate with metric measures

Reasoning and problem solving

Ron makes a stack of his comic books.

Each comic book is 2.5 mm thick.



The total height of the stack is 11.5 cm.
How many comic books does he have?

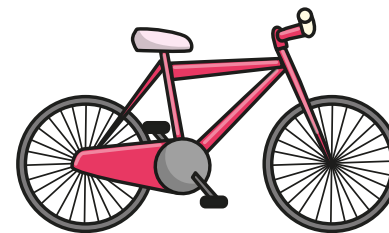
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The total mass of a box and a crate is 3.4 kg.

The crate is 900 g heavier than the box.
What is the mass of the crate?

2.15 kg or 2,150 g

Teddy, Annie and Jack cycle as far as they can in one hour.



- Teddy cycles $\frac{5}{6}$ of the distance that Jack cycles.
- Annie cycles 1,350 m less than Teddy.
- Jack cycles 5.4 km.

How far does Teddy cycle?

How far does Annie cycle?

How far do the three children cycle in total?

Teddy: 4,500 m
or 4.5 km

Annie: 3,150 m
or 3.15 km

Total: 13,050 m
or 13.05 km

Miles and kilometres

Notes and guidance

In Year 5, children explored the relationship between some imperial and metric units of measurement. This small step focuses on the relationship between miles and kilometres.

Children need to know that one mile is a greater distance than one kilometre. They learn that 5 miles is approximately equal to 8 km. Using this fact, they solve conversions from miles to kilometres and from kilometres to miles. Children need to know that the symbol “ \approx ” means “is approximately equal to”.

To provide context, distances measured in miles in the UK could be compared to distances measured in kilometres in Europe.

Things to look out for

- Children may think that a kilometre is longer than a mile, since the same distance measured in kilometres is given by a greater number than if it was measured in miles. For example, 15 miles is approximately 24 km.
- Children may try to use additive reasoning rather than multiplicative reasoning when converting between miles and kilometres. 10 miles \approx 16 km, so children may add 5 to both when finding out how many kilometres are equal to 15 miles.

Key questions

- Which is further, one mile or one kilometre?
- What does the word “approximately” mean?
- What does the symbol “ \approx ” mean?
- How can you use the key fact of 5 miles \approx 8 km to calculate how many kilometres are approximately equal to 20 miles?
- When might you need to convert between miles and kilometres?

Possible sentence stems

- _____ miles are approximately equal to 8 km.
- 10 miles are approximately equal to _____ km.

National Curriculum links

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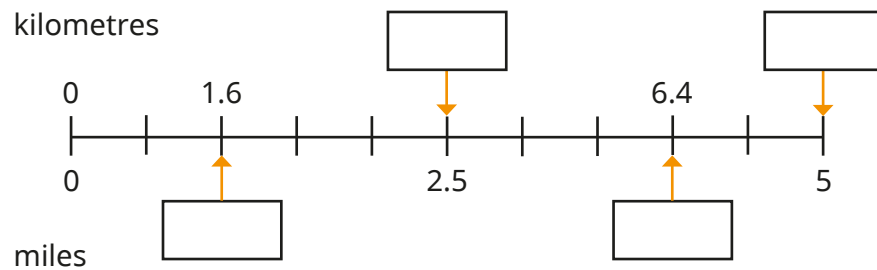
Miles and kilometres

Key learning

- Use the fact $5 \text{ miles} \approx 8 \text{ km}$ to complete the conversions.

- ▶ $10 \text{ miles} \approx \text{_____ km}$
- ▶ $32 \text{ km} \approx \text{_____ miles}$
- ▶ $15 \text{ miles} \approx \text{_____ km}$
- ▶ $40 \text{ km} \approx \text{_____ miles}$
- ▶ $25 \text{ miles} \approx \text{_____ km}$
- ▶ $64 \text{ km} \approx \text{_____ miles}$

- Fill in the missing numbers on the number line.



- Complete the conversions.

- ▶ $7.5 \text{ miles} \approx \text{_____ km}$
- ▶ $\text{_____ km} \approx 55 \text{ miles}$
- ▶ $160 \text{ km} \approx \text{_____ miles}$
- ▶ $\text{_____ miles} \approx 320 \text{ km}$
- ▶ $96 \text{ miles} \approx \text{_____ km}$
- ▶ $\text{_____ km} \approx 250 \text{ miles}$

- Use a map of your local area. Find something that is approximately:

- 1 mile away from your school
- 1 km away from your school
- 2 miles away from your school
- 2 km away from your school

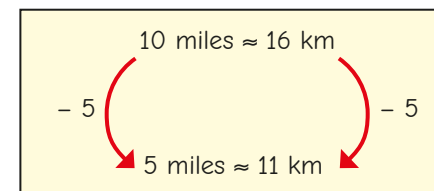
Compare answers with a partner.

- Write $<$, $>$ or $=$ to compare the distances.

$100 \text{ km} \bigcirc 100 \text{ miles}$ $48 \text{ km} \bigcirc 28 \text{ miles}$

$1.6 \text{ km} \bigcirc 1 \text{ mile}$ $0.5 \text{ miles} \bigcirc 1 \text{ km}$

- Here are Tiny's workings to convert 5 miles to kilometres.

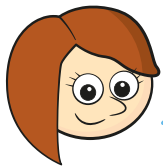


Explain Tiny's mistake.

Miles and kilometres

Reasoning and problem solving

Rosie and Tommy are running a 5-mile race.



Rosie

I have run 6.4 km so far.



Tommy

I have run 3.8 miles so far.

Who has the furthest left to run?

Compare methods with a partner.

Tommy

Mo cycles 45 miles over the course of 3 days.

On day 1, he cycles 16 km.

On day 2, he cycles 10 miles further than he did on day 1

How far does he cycle on day 3?

Give your answer in miles and in kilometres.

15 miles
24 km

The distance from Acton to Bigton is 120 miles.

Mr Smith is driving from Acton to Bigton.

He stops at a service station 84 km into his journey.

How far does Mr Smith have left to travel?

Give your answer in miles and kilometres.

67.5 miles
108 km

Imperial measures

Notes and guidance

In this small step, children continue to explore imperial measures and the relationships between imperial and metric measures. Children need to know and use the following facts:

- 1 inch \approx 2.5 cm
- 1 stone = 14 pounds
- 1 foot = 12 inches
- 1 gallon = 8 pints
- 1 pound = 16 ounces

They use these facts to perform related conversions, both within imperial measures and between imperial and metric measures.

Attention should be drawn to the fact that the conversion between inches and cm is approximate while the others are exact.

Things to look out for

- Children may have less prior experience of some of the imperial measures, so they may be dealing with a lot of new vocabulary.
- Some of the relationships will be new, for example children may recognise feet and inches as measuring length but not know the relationship between them.

Key questions

- When do you use imperial measures instead of metric measures?
- Why is it easier to convert between metric measures than between imperial measures?
- Which is greater, one foot or one metre?
- Which is shorter, one centimetre or one inch?
- Which is heavier, one pound or one stone?

Possible sentence stems

- As 1 inch is approximately equal to _____ cm, _____ inches are approximately equal to _____ cm.
- There are _____ inches in 1 foot, so there are _____ inches in _____ feet.

National Curriculum links

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Imperial measures

Key learning

- Sort the units of measurement into the table.

millilitre	centimetre	mile	gram	litre
stone	inch	metre	millimetre	tonne
gallon	ounce	pound	foot	kilometre

	Length	Mass	Capacity
Metric			
Imperial			

1 inch \approx 2.5 cm

1 foot = 12 inches

Use these key facts to complete the conversions.

- ▶ 2 inches \approx _____ cm
- ▶ _____ inches \approx 7.5 cm
- ▶ _____ inches \approx 25 cm
- ▶ 12 inches \approx _____ cm
- ▶ 2 feet = _____ inches
- ▶ 5 feet = _____ inches
- ▶ 20 feet = _____ inches
- ▶ 100 feet = _____ inches

1 gallon = 8 pints

Use this key fact to complete the conversions.

- ▶ 2 gallons = _____ pints
- ▶ 10 gallons = _____ pints
- ▶ _____ gallons = 40 pints
- ▶ _____ gallons = 104 pints

1 pound (lb) = 16 ounces

1 stone = 14 pounds (lb)

Use these key facts to complete the conversions.

- ▶ 2 pounds = _____ ounces
- ▶ 5 pounds = _____ ounces
- ▶ _____ pounds = 240 ounces
- ▶ 2 stones = _____ lb
- ▶ 5 stones = _____ lb
- ▶ _____ stones = 154 lb

- Scott's bike has a mass of 24 pounds. Nijah's bike has a mass of $1\frac{1}{2}$ stones. What is the difference between the mass of the two bikes?

- At sports day, Huan jumps 2 feet and 3 inches. Dora jumps 15 cm further than Huan. How far does Dora jump?

Imperial measures

Reasoning and problem solving

At sports day, the children drink a total of 60 gallons of water.

Each child drinks 3 pints.

How many children are at the sports day?

Compare methods with a partner.



160 children



Mr Hall is 6 foot 2 inches tall.

Ms Lee is 162 cm tall.

Who is taller?

How much taller are they?

Compare methods with a partner.



Mr Hall: 185 cm

He is 23 cm taller than Ms Lee.



Amir wants to make a cake.

Here are some of the ingredients he needs:

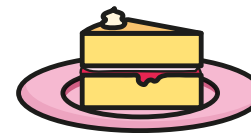
- 8 ounces caster sugar
- 6 ounces flour
- 6 ounces butter

This is what he has in his cupboards:

- 0.5 lb caster sugar
- 0.25 lb flour
- $\frac{3}{8}$ lb butter

Does Amir have enough ingredients to bake the cake?

If not, how much more does he need to buy?



Amir has the exact amount of caster sugar and butter.

He does not have enough flour. He needs another 2 ounces.