Planning Overview
Year 5 Measures - length, mass, capacity and volume
(Time is a separate plan, Area and perimeter are in a separate plan)

Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.
Estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]

Consider links to PE/Sports Day, Olympics/Commonwealth Games

	Teaching and Learning
Recap measuring with metric measures and how to convert between them with whole numbers	Ensure children can read a range of scales – give them a variety of scales (weight, length, capacity) and ask them to write top tips for reading scales. Ensure that children can select the most appropriate measure for a range of items and can estimate and measure/find out the answers. What do we already know about converting units of measure? How many g in a kg, ml in a l, cm in a m, etc. We can use the names to give us a clue about how much bigger or smaller something is: kilo = 1000 times bigger centi = 100 times smaller milli = 1000 times smaller **5NPV–5 Teaching guidance** Pupils should first memorise the following unit conversions: 1km = 1,000m 1m = 100cm 1cm = 10mm 1 litre = 1,000ml 1kg = 1,000g £1 = 100p Mathematics Guidance: Key Stages 1 and 2 Consider whether children need more practical measuring experiences to embed these conversions with whole numbers before moving onto converting between fractions and decimals of these units. Could you practise these skills in science/DT/PE? Once pupils can confidently recall these conversions, they should apply them to whole number conversions, from larger to smaller units and vice versa, for example, 4m = 400cm and 8,000g = 8kg.

Convert between different units of metric measure including decimals and fractions

Use their understanding of the powers of 10 to talk about conversions using the language of fractions and decimals – a ml is $\frac{1}{1000}$ the size of a litre, a g is 0.001 the size of a kg

Look at models like the one below. x1000 to get from the top row to the second row and ÷1000 to get from second to top.

<table>
<tr><td colspan="4">1km</td></tr>
<tr><td colspan="4">1000m</td></tr>
<tr><td colspan="2">0.5km</td><td colspan="2">0.5km</td></tr>
<tr><td colspan="2">½km</td><td colspan="2">½km</td></tr>
<tr><td colspan="2">500m</td><td colspan="2">500m</td></tr>
<tr><td>0.25km</td><td>0.25km</td><td>0.25km</td><td>0.25km</td></tr>
</table>

Continue with bars split into a different number of sections and with different units of measure. Children need to be fluent in the division of 1,000, 100 and 1 into 2, 4, 5 and 10 equal parts.

Apply their understanding of multiplying and dividing by 10, 100 and 1000 to convert between standard measures represented as fractions and decimals e.g. 0.25km = 250m

Pupils can use ratio tables for support

1m	100cm
$\frac{3}{4}$m	75cm

1,000ml	1 litre
3,700ml	3.7 litres

Pupils should be able to fluently convert from one unit to another by using the single unit conversion rate e.g. "1,000ml is 1 litre."

"So 3,000ml is 3 litres, and 3,700ml is 3.7 litres."

1.8 litres = ☐ ml	$\frac{3}{4}$km = ☐ m
£8.12 = ☐ p	$4\frac{1}{4}$kg = ☐ g
21mm = ☐ cm	2,250ml = ☐ litres
8,300m = ☐ km	165p = £☐

Solve measures problems with different units by converting into a common unit.

How much do the parcels weigh altogether in kg?

Parcel	Mass of parcel
A	3.2kg
B	4,500g
C	$1\frac{1}{2}$kg

Put these lengths in order:
0.45m, 10mm, 208cm, 2 ½m, 80cm, 0.9m

Mastery

Complete this:

$\frac{1}{2}$kg = ____ g

$\frac{1}{4}$kg = _____ g

Which has the greater mass?

$\frac{1}{5}$kg or $\frac{1}{10}$kg

Explain why.

Mastery with Greater Depth

True or false?

1·5 kg + 600 g = 2·1 kg + 300 g

32 cm + 1·05 m = 150 cm − 0·13 m

$\frac{3}{4}\ell + 0.05\ \ell$ = half of 1·6 ℓ

Explain your reasoning.

Understand and use approximate equivalences between metric units and common imperial units converting between them

Display a range of imperial words on the board from the list below – do children know what these are used to measure. Can they sort them into three groups (length/distance, weight, capacity)? Do they know or are they able to estimate the size of the units in metric units?

Length	Capacity	Weight
Inches	Pints	Ounces
Feet	Gallons	Pounds
Miles	Quarts	Tonnes
Yards		Stones

- 1 litre is approximately 2 pints (more accurately, 1 ¾ pints)
- 4.5 litres is approximately 1 gallon or 8 pints
- 1 kilogram is approximately 2 lb (more accurately, 2.2 lb)
- 30 grams is approximately 1 oz
- 8 kilometres is approximately 5 miles

Allow the children to explore a website such as
http://www.theonlineconverter.co.uk/

Can they create a poster that shows the conversions between different measures and what they can deduce from this?

Can they suggest a sensible estimate for different items or distances in metric and imperial e.g. Journey from London to home in miles and km. Height of a door in feet and metres.

Can they use the approximate conversions in the table below to answer simple word problems?

1 inch	*is approximately*	2.5 centimetres
1 foot	*is approximately*	30 centimetres
3 feet	*are approximately*	1 metre
5 miles	*are approximately*	8 kilometres
2.2 pounds	*are approximately*	1 kilogram
1.75 pints	*are approximately*	1 litre
1 stone	*is approximately*	6 kilograms

e.g. Birmingham is approximately 102 miles away from London and is 139 kilometres from Manchester. Which city is closer to Birmingham?

An African elephant can weigh up to 7000kg. How many pounds is this? If there are 16 pounds in a stone, how many stones is an adult African elephant?

Nrich – Weighing Fruit

Weighing Fruit

Age 7 to 11
Challenge Level ★

There are some open markets in England that would like to sell fruit by their weight in lbs (pounds), but we often buy them in kilos.

0.45 kilo = 1 lb
2.20 lb = 1 kilo

You get about 4 apples or 4 bananas in one pound (1 lb).
So, roughly, what would 6 bananas and 4 apples together weigh in kilos?

You get about 6 mangoes in a kilo.
So, roughly, what would 30 mangoes weigh in pounds (lbs)?

You get about 6 oranges in one pound (1 lb).
So, roughly, what would 20 oranges weigh in kilos?

<table>
<tr>
<td></td>
<td>Complete fluency questions that involve comparison of metric and imperial measures e.g. adding the < = > symbols to:
1.75kg $\square$ 4lb

Mastery with Greater Depth
A litre of water is approximately a pint and three quarters.

How many pints are equivalent to 2 litres of water?

Using the approximation, when will the number of litres and the equivalent number of pints be whole numbers?</td>
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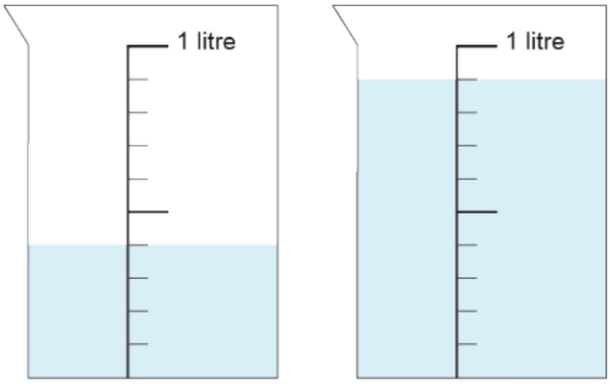
<tr>
<td>Estimate volume [for example, using 1cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water]</td>
<td>Volume is the amount of space something takes up. It is measured in cm³, m³ etc.

Capacity refers to the potential amount of a substance, an object can hold. It is measured in ml, l, gallons etc.

When water is poured into a container, that water also takes up space, so it has a volume but we normally measure this in ml, l, gallons etc. rather than m³ which can cause confusion.

What is the total volume of water in these two jugs in litres? What is the total capacity of the two jugs?



Use 1cm³ cubes to create cuboids. How many different cuboids can you make with a volume of 12cm³? What is the width, length, height of each?

Homes for Gnomes
Gnomes like to live in homes that are 16cm³ but they can’t live in a house that is symmetrical and it must have at least 2 storeys. Can you design them a house? There are 5 different gnomes in the village and they don’t like living in homes that are the same as their neighbours. How many different homes can you design for them?</td>
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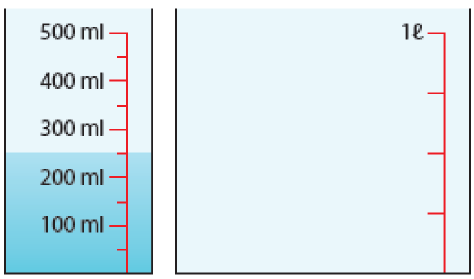
	Fluency questions based on calculating the volume of images of 3D constructions made from cubes and comparing volumes of two different constructions using < > and = signs. Investigate cuboid containers e.g. cereal box, tray and estimate the volume using cm^3 cubes to help you. Discuss how to record what they have made/measured using multiplication so 2cm x 3cm x 2cm = a volume of $12cm^3$ Investigate the capacity of different containers using water or rice. Confidently explain the difference between capacity and volume. Investigate – Is 1ml of water the same as 1 cm^3 of water? **Mastery** Hamsa has some juice in a jug and he pours it into a different jug. Draw the level of the juice in the jug on the right. 
Use addition and subtraction to solve problems involving measure [for example, length, mass, volume, money] using decimal notation	Use addition and subtraction to calculate measures problems including 2 step problems where conversions are needed to make both values into a common measure. Give children a range of word problems involving all measures, including money and time. Can children identify the key information needed to solve the problems. Can they use the bar model to support them? James jumped 2.25 metres on his second try at the long jump. This was 75 centimetres longer than on his first try. How far in metres did he jump on his first try? The jug holds 4500 millilitres of lemonade. If Jon drinks 1 litre and Amy drinks 1½ pints, how much is left in the jug in litres? There are 2kg of flour in the bag. The brownies use up 480g. The cookies use up ¼ kg. How much flour is left in the bag in kg? Ben has 7 bottles of juice. Each bottle has 250ml. Ben and his friends drink 1.2L of juice between them. How much juice is left?

Mastery

The table shows the cost of train tickets from different cities.

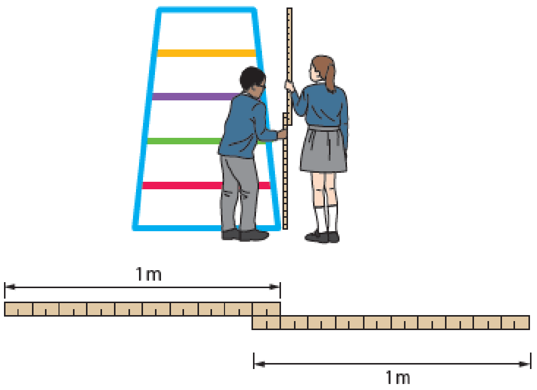
What is the total cost for a return journey to York for one adult and two children?
How much more does it cost for two adults to make a single journey to Hull than to Leeds?

		York	Hull	Leeds
Adult	Single	£13·50	£16·60	£11·00
	Return	£24·50	£30·00	£20·00
Child	Single	£9·75	£11·00	£8·00
	Return	£15·00	£18·50	£13·50

Mastery

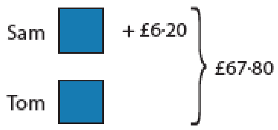
Joe and Kate are using two metre sticks to measure the height of the climbing frame. Their measurements are shown in the diagram.

How tall is the climbing frame?



Mastery with Greater Depth

Sam and Tom have £67·80 between them.
If Sam has £6·20 more than Tom, how much does Tom have?
The bar model can help children solve these type of problems, please visit ncetm.org for further information on how to build understanding.

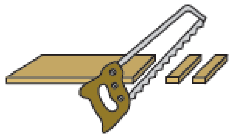
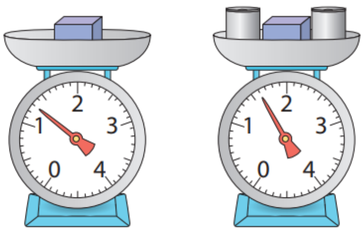


£67·80 – £6·20 = £61·60
£61·60 ÷ 2 = £30·80
Tom has £30·80

Mastery with Greater Depth

A 1·2 m ribbon and a 90 cm ribbon are joined by overlapping the ends and gluing them together. The total length of ribbon needs to be 195 cm long.

How much should the two pieces overlap?

<table>
<tr>
<td>Use multiplication and division to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling</td>
<td>
Recap on how to use multiplication and division to support scaling problems. Include 2 step problems where conversions are needed to make both values into a common measure.
Give children a range of word problems involving all measures, including money and time. Can children identify the key information needed to solve the problems. Can they use the bar model to support them?
Mastery
The weight of a football is 400 g. How much do five footballs weigh in kilograms?
Mastery
A 50 cm length of wood is cut into 4 cm pieces.
How many 4 cm pieces are cut and how much wood is left over?

Fill in the blanks to represent the problem as division:
$\square \div \square = \square$ remainder $\square$
Fill in the blanks to represent the problem as multiplication:
$\square \times \square + \square = 50$
Mastery
A box weighs 1·3 kg. A box and two tins weigh 1·6 kg.
How much does one tin weigh in grams?


Mastery with Greater Depth
A football weighs 0·4 kg.
Three footballs weigh the same as eight cricket balls.
How many grams does a cricket ball weigh?
Mastery with Greater Depth
A 1 m piece of ribbon is cut into equal pieces and a piece measuring 4 cm remains.
What might the lengths of the equal parts be?
In how many different ways can the ribbon be cut into equal pieces?

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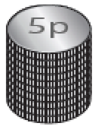
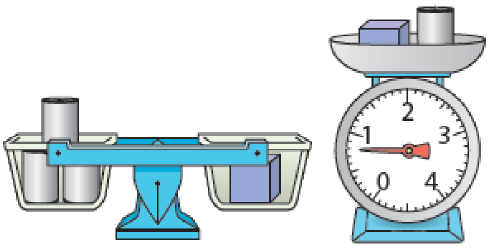
	Mastery with Greater Depth A 5p coin has a thickness of 1·7 mm. Ahmed makes a tower of 5p coins worth 50p. Write down the calculation you would use to find the height of the tower.  **Mastery with Greater Depth** Here are some tins and boxes on two different scales. How many grams does a tin weigh? How many grams does the box weigh? 
Make links to topic and real-life situations	In order to consolidate measures and to highlight the purpose of mathematics to children, aim to link work in measures to a school event. What range of measures are needed to run a sports day? Summer fair? End of school production? School trip?