Planning Overview
Year 3 Measures
(Time and money are separate plans)

Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
Measure the perimeter of simple 2-D shapes

	Teaching and Learning
Number lines **Addition and Subtraction Strategies**	Consider whether the teaching of number lines and calculation strategies needs to be revisited before moving on to the teaching of measures. Are children secure with finding the mid-point on a number line and checking validity of their answers? Have children got a range of calculation strategies secure e.g. addition, finding the difference, counting back?
Measure, compare, add and subtract lengths (m/cm/mm)	Discuss what children already know about length, they will have measured in cm in Year 2 – assess their retention of these skills. Can they measure the length of a line/side of a shape accurately? What happens when a side is in between 2 whole cm readings? Introduce mm as a way of measuring more accurately. Recap from decimals that a cm can be broken into tenths to give us mm. Children could measure the same lines in cm and mm. What do they notice? Teach children how to draw a line of a given length accurately in cm and mm. These skills could be linked to an Art/DT project, a science investigation or PE activities to make them more engaging and purposeful. NRICH – Car Journey **Car Journey** Age 7 to 11 Challenge Level ★  Here are three little cars, each going on a journey. For this activity, you will need three little cars. We are going to see how far they can travel. You might use a small wooden ramp, like this: 

NRICH – Olympic Starters

Olympic Starters

Age 7 to 11
Challenge Level ★

This is the start of the **100** metres in **1896**. In that year Thomas Burke from the USA won the race in **12** seconds.

I wonder how far you could run in **12** seconds.

You and your friends could use a stop watch and then measure how far you ran.

This is the finish of the **200** metres in **1924**. Jackson Scholz from USA won that race in just over **21** seconds.

I wonder if you could run the **100** metres in that time?

Or you could see how far you could run in **22** seconds.

This is the high jump in **1906**. It shows Ray Ewry from the United States.

He jumped **1** metre **56** centimetres.

How high can you jump?

See how high **1** metre **56** centimetres is.

Can you find someone who can jump that high?

Children practise estimating by finding an object that they think is just shorter/longer than a metre/ centimetre and can check if they are right using appropriate apparatus for each situation.

Children need to develop benchmarks to help them develop estimating skills e.g. they might know that the height of a door is roughly 2m.

Children could sort cards deciding which units of measure (mm, cm or m) would be suitable for different situations e.g. measuring length of a football pitch, length of a grain of rice, height to the ceiling, height of a cuddly toy etc.

Make links to reading scales accurately where not all numbers are given and calculating what each number is worth. e.g.

How many centimetres long is the ribbon?

Mathematics guidance: key stages 1 and 2 Non-statutory guidance for the national curriculum in England.

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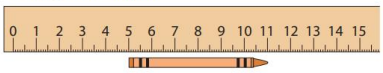
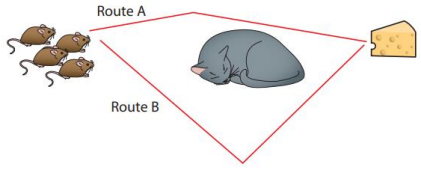
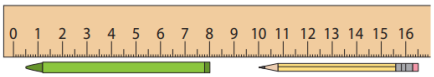
<tr>
<td></td>
<td>
Mastery
I have 2 m of ribbon. How many 60 cm lengths can I cut from it?

How long is the crayon?


Find the total length of route A. Find the total length of route B. How much longer is route A than route B?


Mastery with Greater Depth
A crocodile is 3 times as long as a pig. An elephant is 1·2 m longer than the crocodile. The elephant is 4·2 m long. How long is the pig?

Ahmed's ruler is broken. Explain how he can still use it to measure things in the classroom.


What is the difference in length between the pen and the pencil?


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<tr>
<td>Measure and compare lengths using mixed units e.g. 1m and 20cm and convert between the different units</td>
<td>
Teach children known facts about measures of length. Ask them to use these to work out equivalents.

1m = 100cm so 5m = 500cm
1cm = 10mm so 3cm = 30mm
1 cm 2mm would be 12mm

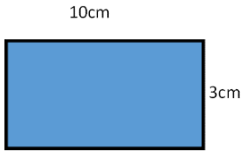
Conversion practice – convert measures of length between different units using known facts.

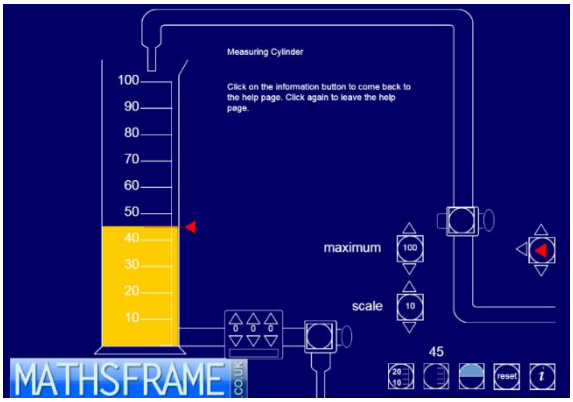
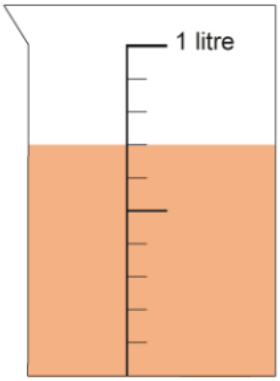
Compare measures where there is a mixed unit of measure. E.g. Place the correct symbol between the measurements > or <
306cm ☐ Half a metre
Explain your thinking.

Children could order measures with mixed units by converting them to a common unit. E.g. Put these measurements in order starting with the largest.
Half a metre
75cm
1m 43cm
Explain how you did this.

Solve word problems where children need to convert one or both measures to calculate.

A sunflower was 2m tall. It grew by another 83cm. How tall is the sunflower now? Give your answer in centimetres.
</td>
</tr>
</table>

Measure the perimeter of simple 2-D shapes	Display a rectangle that has the length of its sides labelled. Ask the children how we would find out how many cm a ladybird (or similar small creature) would need to walk to travel around the entire outside of the shape? Model taking your finger for a walk around the outside of the shape and call out the side lengths as you go. 'I've just walked 10cm, now I've walked 3cm, I've just walked 10cm and now I'm walking my last 3cm. Write this as an addition sentence under the shape 'I walked 10cm + 3cm + 10cm + 3cm' So, what is the total? Model the language of perimeter 'The perimeter of this shape is 26cm' Children to practice calculating the perimeter of shapes that have all sides labelled. What if a shape has equivalent length sides? Do we need to have both of those sides labelled? Can we deduce the length of a side from the opposite side? What about a regular shape like a square? If we know the length of one side, do we know the length of all the sides? Can children create an efficient way to calculate the perimeter of shapes with equivalent sides or regular shapes? 10cm x 2 3cm x 2  For a square, do they understand that they can multiply the known side length by 4? Children to practise their measuring skills and measure shapes to state the perimeter. Ask children to measure large and small perimeters such as their classroom or the field. Children draw shapes that need to have a given perimeter. Is there more than one way to draw a rectangle with a perimeter of 24cm? Children work out a missing side length if they know the perimeter. One side of a rectangle is 8cm long. If the perimeter is 20cm, what is the missing length? 

Measure, compare, add and subtract volume/ capacity (l/ml)	Ensure that children understand the two terms volume and capacity. Capacity is the amount a container can hold. Volume is how much a container is holding. i.e. it might be half full. Have a range of measuring equipment and empty containers available. Make sure you have a good variety of shapes and sizes e.g. tall and thin and short and wide. Predict and order unmarked containers by capacity. Use water, sand, rice or similar in a measuring jug or cylinder to check whether you were correct. Record the volume of water to fill each container in millilitres next to each container. Order them by volume/capacity. Ask questions such as 'How many of container A would we need to fill Container B?' 'If container C was half full, which container could we tip the contents into and it would be full?' Use measuring cylinder ITP to look at the range of scales that could be used on the side of a measuring cylinder or jug. Reinforce number line estimating skills when not all numbers on the scales are marked. Reinforce addition and subtraction skills such as complements to 100. How much more liquid do we need to add to fill the measuring cylinder?  Children need to convert from ml to litres and vice versa. Also consider how fractions relate to capacity. If 1 litre = 1000ml, what else do you know? Sofia had a jug containing $\frac{7}{10}$ of a litre of juice. She drank $\frac{4}{10}$ of a litre. How much does she have left? 

Mathematics guidance: key stages 1 and 2 Non-statutory guidance for the national curriculum in England.

Put these measurements in order starting with the largest.

- Half a litre
- Quarter of a litre
- 300 ml

Explain your thinking.

Compare measures where there is a mixed unit of measure. E.g. Place the correct symbol between the measurements > or <

930ml ☐ 1 litre

Explain your thinking.

NRICH – Oh! Harry!

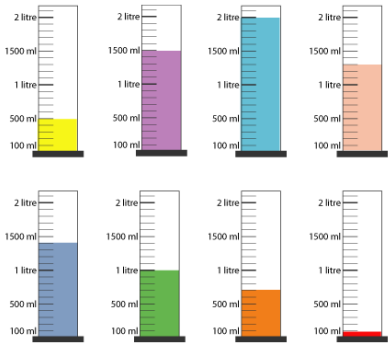
Oh! Harry!

Age 7 to 11
Challenge Level ★★

A group of eight children in Class 6 were measuring water using measuring cylinders. They coloured the water to make reading the scales easier.

They lined up the cylinders in two neat rows, each labelled with a child's name and the amount they had measured out.

Then Harry opened the window and the wind blew most of the labels onto the floor! "Oh! Harry!" they all wailed. Can you relabel the cylinders for them?



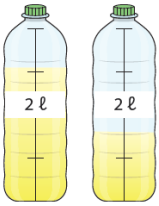
Mastery

There is a tea urn and a teapot. The bottles next to them show their capacity.

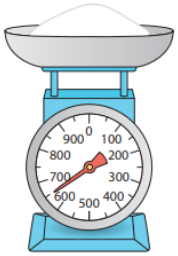
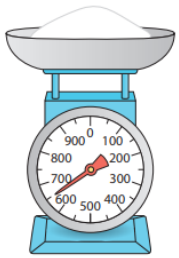
How much more water does the urn hold than the teapot?

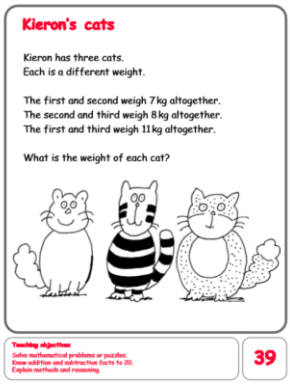
Mastery with Greater Depth

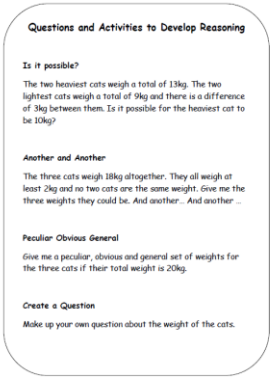
These lemonade bottles each have a capacity of 2 litres.
One of them is $\frac{3}{4}$ full, and one of them contains $\frac{3}{4}$ of a litre of water.
Which is which?



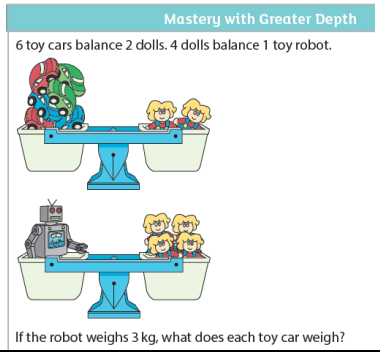
How much water is in the bottle which is $\frac{3}{4}$ full?
What fraction of the bottle is full in the bottle which contains $\frac{3}{4}$ of a litre?

Measure, compare, add and subtract mass (kg/g);	Provide packages with hidden weights inside. Children to weight the packages against each other and order the packages by weight using a balance. Children to feel the weight of a 100g weight and a kg and predict how many grams they think each package weighs. Children to test their predictions by using the weights in the balance alongside the packages. Is there a different type of weighing scale we can use? When do we weigh things in our daily lives? Show children various scales with dials and digital scales e.g. kitchen scales, bathroom scales, post office scales. Ask children to estimate which object in the classroom is about 100 g/1 kilogram/half-kilogram and use one of the scales to check how close they were. Children to use the known fact that 1000g is a kg to work out what half a kg is in g, a quarter of a kg, etc. Using scales of varying types, children to measure the weight of different objects and record this accurately in kg and grams e.g. 1500g or 1 ½ kg or 1kg and 500g. Make links to number line work for reading scales where not all numbers on the scale are shown. **Mastery** What is the mass of flour on the scales?  I need $\frac{3}{4}$ kg of flour to make a cake. How much more flour do I need to add to the scales?  Use mass as an opportunity to develop problem solving skills and to reinforce addition, subtraction, multiplication and division strategies.





https://www.first4maths.co.uk/product/maths-challenges-with-reasoning/



Add and subtract: lengths (m/cm/mm); mass (kg/g); volume/ capacity (l/ml)	Word problems within measures are a really useful way to reinforce efficient addition and subtraction strategies. The train is 70m long. It adds another carriage that is 60m long. How long is the train now? I am trying to hit a ball 199m My first hit is 89m then I run and pick it up again and my second hit takes it the rest of the 199m. How far did I hit it the second time? Dan needs 1kg of flour to bake brownies for the cake sale. There are 450 g left in the bag. How much more does he need to buy? I had a 2l bottle of lemonade and gave 250ml to Jan and 320ml to Ben. How much lemonade is left in the bottle? If there are 630ml of water in a jug. How much water do you need to add to end up with a litre of water? What if there was 450 ml to start with? Make up some more questions like this. How would a bar model help establish it we needed to add or subtract? Do we know the parts in the problem or the whole? If we know the two parts then we add, if we know the whole and one part we subtract. What method would we use to calculate the answer? Reinforce efficient strategies.

<table>
<tr>
<td>Word Problems – linked to multiplication and division</td>
<td>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables to solve measures word problems e.g. If one pot plant weighs 4kg, how much do 8 plants cost?

I need 21 litres of paint. Paint comes in 3 litre tins. How many tins do I need to buy?

Complete simple scaling by integers problems e.g. a given quantity or measure is twice as long or five times as high.

The tree is 6 times taller than the daffodil. The daffodil is 8cm tall. How tall is the tree? The same tree is 4 times taller than the rose bush. How tall is the rose bush?

Mastery with Greater Depth
A crocodile is 3 times as long as a pig. An elephant is 1·2 m longer than the crocodile. The elephant is 4·2 m long. How long is the pig?</td>
</tr>
<tr>
<td>Consolidation</td>
<td>Links to Olympic maths/Commonwealth maths/PE lessons/Science

Example link to PE lesson

<u>Standing Long Jump</u>
<table><tr><th>Name</th><th>Estimate</th><th>Actual Jump Distance</th><th>Difference Between Estimate and Actual Distance</th></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
Order the jumps from longest to shortest
Longest Shortest
<table><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>
NRICH – Order, Order!
Order, Order!
Age 5 to 11
Challenge Level ★

Have a look at the sets of four quantities below. Can you rank them in order from smallest to largest?

To help you decide, you may need to find extra information or carry out some experiments.

Can you convince us that your order is right?

 
Time
Taken to travel to school
For mustard and cress to grow from seeds
Taken to eat a biscuit
Between your 6th and 7th birthdays

 
Distance
You could jump up in the air
You can kick a football
You can run in half a minute
Length of a bug

 
Mass
Of a blown-up balloon
Of a bar of chocolate
Of a loaf of bread
Of your teacher</td>
</tr>
</table>