**Planning Overview**
**Year 4 Measures – length, area, perimeter, capacity and mass**
***(Money is covered in the Decimals plan; Time is a separate plan)***

Convert between different units of measure [for example, kilometre to metre; hour to minute].
Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.
Find the area of rectilinear shapes by counting squares.
Estimate, compare and calculate different measures, including money in pounds and pence.

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

<table>
<tr><th></th><th>Teaching and Learning</th></tr>
<tr><td>Recap tools and language of measure. Recap units of measure and which units are used to measure different things.</td><td>
Children to sort apparatus and vocabulary into mass, capacity, length, time, temperature and money.<br><br>
Children to state which unit of measure would be appropriate in different situations.<br><br>
Focus in on different measures used for length/distance using a pairing game like the one below to reinforce known benchmarks e.g. a door frame is roughly 2m. Children may not be familiar with km as it is not part of Y3 curriculum.<br><br>
<table>
<tr><td>15mm</td><td>25cm</td><td>75cm</td><td>1m</td></tr>
<tr><td>1.5m</td><td>2m</td><td>2.5m</td><td>4m</td></tr>
<tr><td>6m</td><td>10m</td><td>20m</td><td>100m</td></tr>
<tr><td>300m</td><td>1.5km</td><td>9000m</td><td>300km</td></tr>
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<table>
<tr><td>Distance thrown with a shot put</td><td>Length of a football pitch</td><td>Height of a door</td><td>Circumference of o football</td></tr>
<tr><td>Length of a fingernail</td><td>Length of a roll of wallpaper</td><td>Length of an athletics track</td><td>Height of the Eiffel Tower</td></tr>
<tr><td>Distance from London to Manchester</td><td>Length of a shoe</td><td>Height if a shoe</td><td>Height of Mount Everest</td></tr>
<tr><td>Length of a stride</td><td>Distance jumped on the pole vault</td><td>Height of an 11-year-old</td><td>Length of a bus</td></tr>
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<br>
Consider whether children need to recap practical measuring in mm, cm and m before moving onto converting between these units. Could you practise these skills in science/DT/PE?
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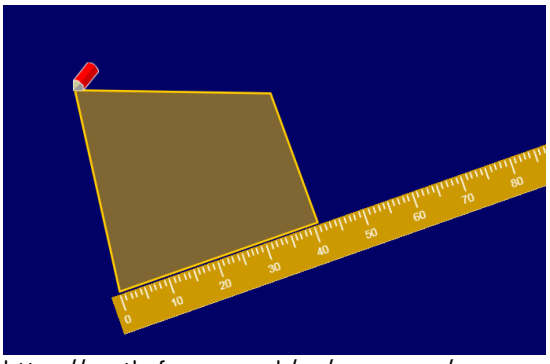
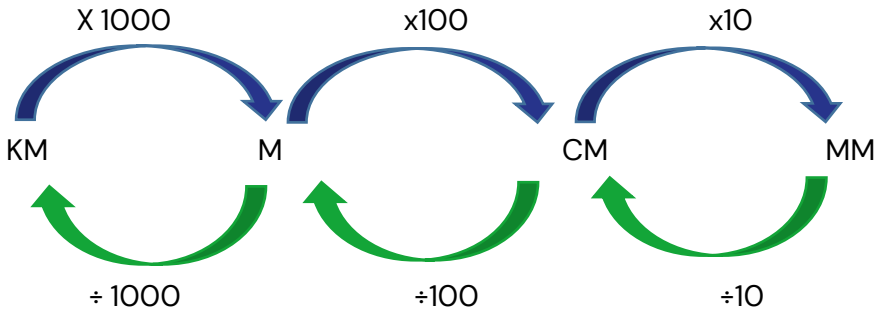
| **Convert between different units of measure [for example, kilometre to metre, mm to cm]** | Remind children of conversions they have already used in Y3 and introduce new conversions for km. Many of the units we use in the metric system are based on being 10, 100 or 1000 times bigger or smaller than another unit.<br>We can use the names to give us a clue about how much bigger or smaller something is:<br><br>kilo = 1000 times bigger<br>centi = 100 times smaller<br>milli = 1000 times smaller<br><br>Children practice converting between mm and cm using multiplying and dividing by 10.<br><br>Children use place value grids and concrete/pictorial resources if needed to move up/down the place value columns.<br><br>Children now explore decimal cm within measuring activities. 41 mm = 4.1cm<br><br>ITP ruler is useful to show this on the IWB – see image below<br><br>  <br>https://mathsframe.co.uk/en/resources/resource/99/itp-ruler<br><br>Children to explore converting between cm and m using multiplying and dividing by 100.<br><br>Children to explore converting between m and km using multiplying and dividing by 1000.<br><br>  <br> |

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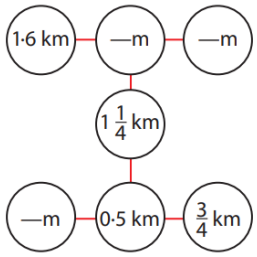
| | Children to investigate questions involving all 3 of these conversions and combinations of these e.g. mm to m. I have measured the length of my bed to be 1500mm, but the mattress I want to buy is 1.45 metres long. Will the mattress fit on the bed frame?<br>Children to answer a range of word problems involving units of length and converting between mixed units within the same problem<br><br>Dexter ran round a 400m running track 6 times. How far did he run in km?<br><br>**Mastery**<br>Complete the missing measures so that each line of three gives a total distance of 2 km.<br>  <br><br>**Mastery with Greater Depth**<br>In total Sam and Tom together cycle a distance of 120 km. Sam cycles twice the distance that Tom cycles. How far does Sam cycle? |
| **Convert between different units of measure [g to kg]** | Children to apply their previous learning from converting km to m (including decimals) to convert grams to kilograms.<br><br>This is also a great opportunity to consolidate place value understanding using practical weighing apparatus. Can children work out the scale that the apparatus is using and read the scale at various points – rounding as appropriate?<br><br>Children to answer a range of word problems involving weight. These should include representing kg as a decimal.<br><br>I need 1.5kg of flour to make some bread. I have 800g. How many more grams of flour do I need?<br><br>Hannah is making cakes for her Mum's birthday. She wants to make 40. Each cake needs 500g of flour. How many kilograms of flour does Hannah need to buy?<br><br>**Mastery**<br>An empty box weighs 0·5 kg. Ivy puts 10 toy bricks inside it and the box now weighs 2 kg.<br>How much does each brick weigh? |

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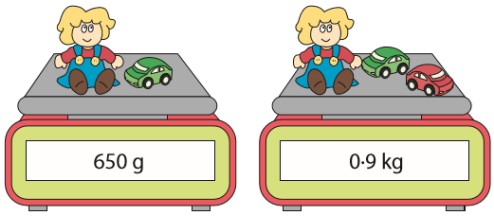
**Mastery with Greater Depth**

How much does the car weigh in grams?
How much does the doll weigh in grams?

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<tr><td>Convert between different units of measure [l to ml]</td><td>

Children to apply their previous learning from converting km to m (including decimals) to convert millilitres to litres.

This is also a great opportunity to consolidate place value understanding using practical measuring cylinders with different scales. Can children work out the scale that the apparatus is using and read the scale at various points – rounding as appropriate?

Children to answer a range of word problems involving capacity. These should include representing litres as a decimal.

I mix 700ml of orange juice and 600ml of lemonade to make a fruit drink for a party. What volume of fruit drink have I made in total? Answer in litres.

**Mastery**

Put these amounts in order starting with the largest.

- Half of 3 litres
- Quarter of 2 litres
- 300 ml

Explain your thinking.

**Mastery with Greater Depth**

Fill in the missing boxes so that the amounts are in order from smallest to greatest.

| $\frac{1}{2}$ a litre | millilitres | $\frac{1}{3}$ of 2 litres | millilitres | $\frac{1}{4}$ of 3 litres |
|---|---|---|---|---|

</td></tr>
<tr><td>Estimate, compare and calculate different measures</td><td>

Children practice their skills of estimating the length, weight or capacity of different things using known measures.

Give the children a litre jug, a metre stick and a kg and using these known facts children estimate the capacity, length and weight of a range of objects.

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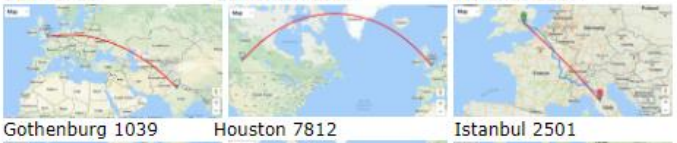
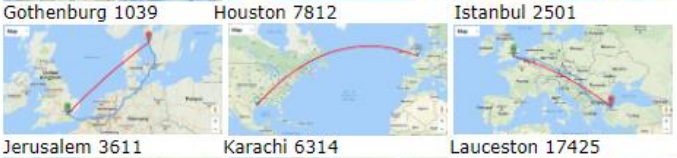
| | Once children have estimated and have discussed and justified their estimates, they can use a range of resources to accurately measure these objects (cm ruler, metre stick, litre jug demarked with ml and weighing scales).<br><br>Children to find the difference between their estimates and their accurate measurements.<br><br>Children to compare objects using < > or = symbols (e.g. the weight of the table > the weight of the book). |
| **Problem solving around the concepts covered** | Children to solve a variety of mixed measures word problems with varying language and presentation. Ensure children are switching between length, capacity and weight within this series of problems.<br><br>NRICH – What distance<br><br>**What Distance?**<br><br>**Age 7 to 11**<br>**Challenge Level** ★★<br>Here are the distances (as the crow flies) in km from London to various cities in the world:<br><br>Abu Dhabi 5480 Barcelona 1139 Cape Town 9680<br>  <br>Delhi 6718 Edmonton 6805 Florence 1209<br>  <br>Gothenburg 1039 Houston 7812 Istanbul 2501<br>  <br>Jerusalem 3611 Karachi 6314 Lauceston 17425<br>  <br><br>**Challenge 1**<br>If someone took you the first 1000km how much further would you have to go for each of the twelve journeys?<br>Rather than actually performing each calculation, could you say which you think will be the most difficult and which will be the easiest, and why?<br><br>Now create some similar questions of your own. |

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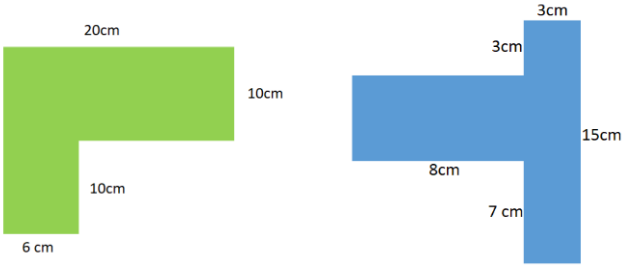
| | NRICH – Ordering journeys<br>We could be making some car journeys between these towns and so here is a chart giving us some information about distances and times.<br><br>These numbers show us direct routes. But now, suppose we go on journeys involving three or four cities.<br><br>For example, we could go from Nodo to Oxdo but go through Cado on the way.<br>Or, we could go from Lodo to Ledo but go through Oxdo on the way.<br><br>What other journeys involving three or four cities can you find?<br>When you have some of these answer these questions:<br><br>1. What is the total distance of your journey in kilometres?<br>2. How many minutes long is your journey?<br>3. How much longer (in terms of time) is the journey when passing through another city or other cities along the way compared with the direct journey between the starting city and the final destination?<br><br>Now you could try and find the longest route (in terms of distance) for visiting all five cities. (We might decide that we will only visit each city once.)<br>What about the shortest route for visiting all five cities?<br>How much longer does it take to travel the longest route compared with the shortest route? |
| **Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.** | Recap perimeter from Year 3 – children use drawings of shapes with side lengths written on to calculate perimeter by adding all the sides up.<br><br>Children to calculate the perimeter of shapes by measuring sides. Do this on a small scale (cm) and large scale (m – playing field or playground).<br><br>Children to use drawings of shapes such as rectangles, squares and regular polygons with some measures missing to calculate perimeter. Children to establish missing lengths first before calculating. Children to apply addition and multiplication knowledge to work efficiently. E.g. perimeter of a square with a side length of 5cm would be 4 x 5cm. For a rectangle with 4cm and 6cm sides, children could recognise 4+6=10 and then double this to find total perimeter or double 4 and double 6 then recognise that 8 +12 = 20.<br><br>Children to use drawings of more complex rectilinear shapes like the ones below. Children to establish missing lengths first before calculating the perimeter.<br><br>  <br><br>Children to use scaled drawings where scale is given to calculate the perimeter of the shape (e.g 1cm =3m) |

| | | | Kilometres | Miles | Hours | Minutes |
|---|---|---|---|---|---|---|
| Nodo | to | Oxdo | 272 | 169 | 3 | 35 |
| Nodo | to | Ledo | 190 | 118 | 2 | 40 |
| Nodo | to | Lodo | 190 | 118 | 2 | 40 |
| Nodo | to | Cado | 105 | 65 | 1 | 25 |
| Lodo | to | Ledo | 167 | 104 | 2 | 20 |
| Lodo | to | Oxdo | 100 | 62 | 1 | 25 |
| Lodo | to | Cado | 100 | 62 | 1 | 25 |
| Ledo | to | Oxdo | 122 | 76 | 1 | 40 |
| Ledo | to | Cado | 117 | 73 | 1 | 35 |
| Cado | to | Oxdo | 166 | 103 | 2 | 15 |

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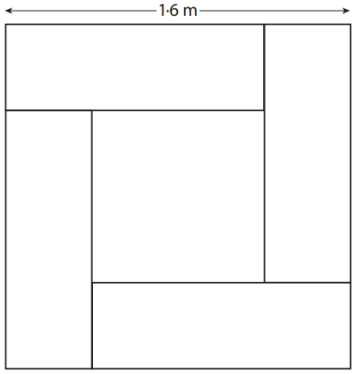
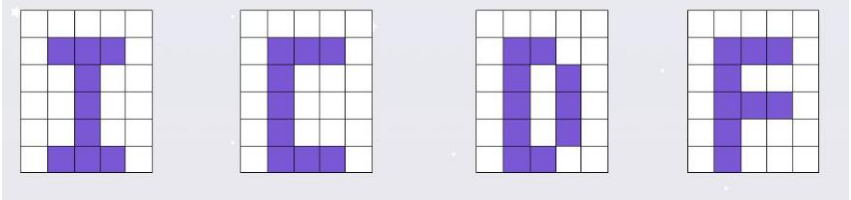
| | Problem solving around perimeter<br>If the width of a rectangle is 3cm less than the length and the perimeter is in between 20cm and 30cm, what could the dimensions of the rectangle be? Can you draw the possibilities?<br><br>**Mastery with Greater Depth**<br>The rectangular tiles here are three times as long as they are wide.<br>What is the perimeter of the centre square?<br>  |
| **Find the area of rectilinear shapes by counting squares** | Children to be taught about the concept of area as the space a shape occupies. Children to be given rectilinear shapes on squared paper and taught to count up the squares to give the area. Children to have a range of shapes to investigate.<br><br>Children to be set a problem involving an area of 12 squares. What rectilinear shapes can they make? Are they working systematically?<br><br>Look at perimeter and area of the same shapes. What do they notice?<br><br>Can they make a shape with the same area and perimeter? How can you make the perimeter go up but the area go down?<br><br>Can you draw a shape where the perimeter is twice as big as the area? Can you make the area go up and the perimeter go down?<br><br>If you want to create a rectangular patio with an area of 96 slabs, how could you arrange them? And another way? And another?<br><br>Write your initials on squared paper. What is the area and perimeter for each letter?<br><br>Look at these 4 letters. Which is the odd one out? Why?<br>  |

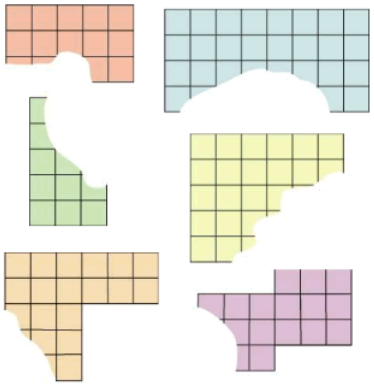
NRICH –torn shapes

## Torn Shapes

**Age 7 to 11**
**Challenge Level** ★

Jason's class cut out rectangles and some shapes which were two rectangles joined together from one centimetre squared paper.
They then counted how many squares the shapes took up.

After this they tore a piece out of some of their shapes to make a puzzle for the other groups to do.
Can you work out how many squares there were in these shapes before the bit was torn out? The orange, blue, green and yellow shapes were rectangles. The bottom two shapes, which are pale orange and purple, were each two rectangles joined together.

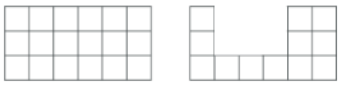


NRICH – area and perimeter

## Area and Perimeter

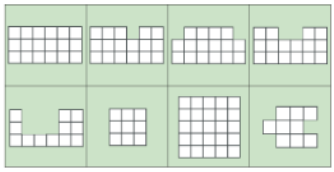
**Age 7 to 11**
**Challenge Level** ★

What can you say about these two shapes?



What is the area of each one? What is the perimeter of each one?

What can you say about the shapes below?



**Mastery**

The shape below is made from two rectangles.
Identify the perimeter of each of the two rectangles.
How many 1 cm squares would fit into the smaller rectangle?
How many more squares fit into the larger rectangle?