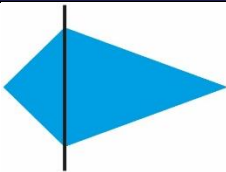


Fractions


Key National Curriculum statement	
<p><b>Year 1</b></p> <p>Recognise, find and name a half as one of two equal parts of an object, shape or quantity</p> <p>Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity</p>	<p><b>Year 2</b></p> <p>Recognise, find, name and write fractions <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{2}{4}</math> and <math>\frac{3}{4}</math> of a length, shape, set of objects or quantity</p>
Related National Curriculum statements	
<ul style="list-style-type: none"><li>• solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher</li><li>• recognise and name common 2-D and 3-D shapes, including:<ul style="list-style-type: none"><li>▪ 2-D shapes [for example, rectangles (including squares), circles and triangles]</li></ul></li><li>• compare, describe and solve practical problems for:<ul style="list-style-type: none"><li>- lengths and heights (for example, long/short, longer/shorter, tall/short, double/half)</li><li>- capacity and volume (full/empty, more than, less than, half, half full, quarter)</li></ul></li><li>• tell the time to the hour and half past the hour and draw the hands on a clock face to show these times</li><li>• describe position, direction and movement, including whole, half, quarter and three-quarter turns</li></ul>	<ul style="list-style-type: none"><li>• write simple fractions for example, <math>\frac{1}{2}</math> of 6 = 3 and recognise the equivalence of <math>\frac{2}{4}</math> and <math>\frac{1}{2}</math></li><li>• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</li><li>• identify 2-D shapes on the surface of 3-D shapes [for example a circle on a cylinder and a triangle on a pyramid]</li><li>• interpret and construct simple pictograms, tally charts, block diagrams and simple tables</li><li>• <i>Pupils should count in fractions up to 10, starting from any number and using the <math>\frac{1}{2}</math> and <math>\frac{2}{4}</math> equivalence on the number line (for example, <math>1\frac{1}{4}</math>, <math>1\frac{2}{4}</math> or <math>1\frac{1}{2}</math>, <math>1\frac{3}{4}</math>, 2).</i></li><li>• know the number of minutes in an hour and the number of hours in a day</li><li>• choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels</li></ul>
Key concepts	
<p>This learning sequences covers all the fractions learning for Y1 and Y2 in a variety of contexts. This builds on the pupils’ understanding of division.</p> <p>The initial steps enable the pupils to explore and understand that a fraction is an equal part of the whole, Cuisenaire is used to support this understanding. Year 2 pupils are also be encouraged to identify the equivalence <math>\frac{1}{2} = \frac{2}{4}</math>. This will be proven to be correct throughout the learning sequence in a range of contexts – on a number line, within shapes. Pupils will continue to develop their understanding of fractions as numbers that can be placed within the number system. Pupils will have opportunities to count in fractions, applying this to familiar contexts and the Year 2 pupils will then place fractions beyond 1 whole on a number line.</p> <p>Further links to division and part, whole models are made when pupils are taught how to calculate fractions of amounts. Once pupils have explored finding fractions within shapes (ensuring that they fully understand the equality of the pieces within the shape) fractions of amount within shapes are calculated.</p> <p>In the last few steps pupils will have the opportunity to apply their learning to continuous quantities (measures). This provides further practice of their understanding in a range of contexts and makes links across a number of areas of mathematics.</p>	

Curriculum progression: tracking back			
1&2_LS17	1&2_LS14	RLS15	RLS14
Steps within the Learning Sequence			
<p>Step 1: Finding equal parts of a whole (halves)</p> <p>Step 2: Finding equal parts of a whole (quarters)</p> <p>Step 3: Placing fractions on a number line</p> <p>Step 4: Deepening understanding of halves and quarters beyond 1 whole</p> <p>Step 5: Finding half an amount <b>R+R</b></p> <p>Step 6: Finding a quarter of an amount <b>R+R</b></p> <p>Step 7: Finding halves and quarters of amounts in context</p> <p>Step 8: Identifying whether a shape has been halved or not</p> <p>Step 9: Identifying whether a shape has been quartered or not</p> <p>Step 10: Identifying and finding halves of an amount in the context of shapes <b>R+R</b></p> <p>Step 11: Identifying and finding quarters of an amount in the context of shapes <b>R+R</b></p> <p>Step 12: Fractions in the context of capacity</p> <p>Step 13: Fractions in the context of length</p> <p>Step 14: Fractions of a turn in the context of a clock face <b>R+R</b></p>		<p>Step 1: Splitting a whole into equal groups (halves, thirds and quarters)</p> <p>Step 2: Exploring <math>\frac{1}{2}, \frac{2}{4}</math> equivalence using Cuisenaire rods <b>R+R</b></p> <p>Step 3: Comparing <math>\frac{1}{2}, \frac{1}{4}</math> equivalence on a number line <b>R+R</b></p> <p>Step 4: Counting fractions in context and using a number line <b>R+R</b></p> <p>Step 5: Finding half of an amount, linked to division and sharing a whole into two equal groups <b>R+R</b></p> <p>Step 6: Finding <math>\frac{1}{3}</math> and <math>\frac{1}{4}</math> of amounts linked to sharing <b>R+R</b></p> <p>Step 7: Finding <math>\frac{3}{4}</math> of an amount <b>R+R</b></p> <p>Step 8: Recognising shapes split equally into halves, quarters and thirds</p> <p>Step 9: Finding <math>\frac{1}{2}, \frac{1}{4}</math> and <math>\frac{1}{3}</math> of 2-D shapes <b>R+R</b></p> <p>Step 10: Finding fractions of amounts within the context of shapes and identifying equivalence <b>R+R</b></p> <p>Step 11: Identifying <math>\frac{3}{4}</math> of a shape and finding <math>\frac{3}{4}</math> in the context of shapes <b>R+R</b></p> <p>Step 12: Fractions in the context of capacity</p> <p>Step 13: Fractions in the context of length</p> <p>Step 14: Fractions of time <b>R+R</b></p>	

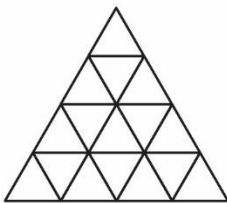
Year 1 Destination Questions



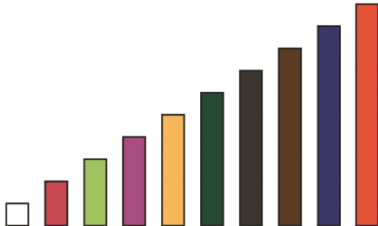
Victor says, "A kite cannot be halved because these two parts are not equal." Is he correct?



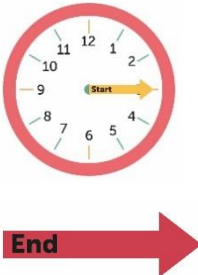
Show two different ways of splitting this shape into quarters.



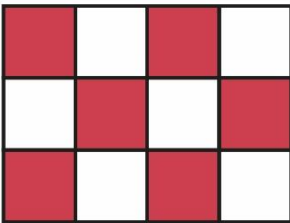
Colour one quarter of this shape.



Jayne says that only every other rod, starting with the red rod, can be halved. Is she correct?




What numbers could the end hand could be pointing to if it had turned more than  $\frac{1}{4}$  of a turn but less than  $\frac{1}{2}$  a turn?



$\frac{1}{2}$  of this shape is shaded. True or False? Explain your thinking.


Draw the bar model to represent:  $\frac{1}{2}$  of 10 = 5



All these are half full. True or false? Explain your thinking.

$\frac{1}{4}$  of 20 =

20			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>



Describe the position of these coins in relation to the measurements on the border roll.

Year 2 Destination Questions

$\frac{1}{2}$  of 50 =  $50 \div \square$


Half of  $\square = \frac{1}{\square}$  of 16

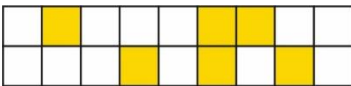
90 shared by  $\square = \square \div 2$

Mary walked for  $\frac{3}{4}$  of an hour each day for 3 days.

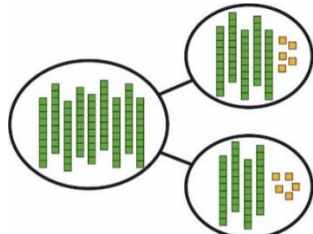
In total, did she walk for more than 2 hours?

How do you know?






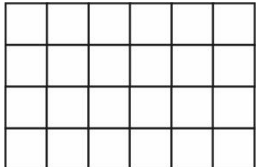
What fraction of the shape is shaded?  $\frac{1}{4}$  of 16 =









Write two ways of recording what is represented in the part whole model.



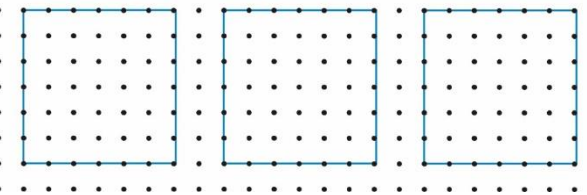
James says that the blue rod has been halved because two rods are equal to it. Is he correct? Explain your thinking.




Shade three quarters of this grid red. Can you find at least 3 different ways?

Quarters	Not Quarters
  	  

Spot the mistake in the table.

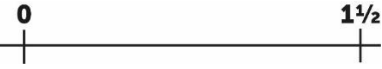


Show  $\frac{1}{2}$  on the first square,  $\frac{1}{4}$  on the second square and  $\frac{1}{3}$  on the third square. Can you complete each one in three different ways?



Can you prove  $\frac{1}{2} = \frac{2}{4}$  using this rod?


$\square = \frac{3}{4}$  of 80




Where would  $1$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  and  $1\frac{2}{4}$  be placed on this number line?

Anika had some ribbons.

She knew the blue spotty ribbon was 2m long. Estimate the length of the other ribbons.





What fraction would you count in, on this counting stick? How do you know?

Y1 - Step one

Finding equal parts of a whole (halves)

Check that pupils know that when something is halved, it is split into two equal groups. They will have heard and used half in previous sequences.

- Show the orange Cuisenaire rod.

Can you find a rod that is half the length of the orange rod?

I think the yellow rod is half of the orange rod.

I can prove it is half because two yellow rods together are equal in length to the orange rod.

Introduce  $\frac{1}{2}$  as a representation of 'half'. Explain that the bottom number (the denominator) tells you how many equal parts the whole has been shared into and the top number (the numerator) tells you how many parts you have.

- Write: ' $\frac{1}{2}$  of the orange rod equals a yellow rod.'

Provide pupils with all of the Cuisenaire rods. Ask them to explore whether all of the rods can be halved. Use handout\_1LS32\_step1\_speaking\_frame to support the language.

The purple rod can be split in half  $\frac{1}{2}$  because two red rods are equal to it.

The yellow rod cannot be split in half  $\frac{1}{2}$  because no two rods of the same colour are equal to it.

Fractions: splitting a whole into halves

The ... rod **can** be split in half  $\frac{1}{2}$  because two ... rods are equal to it.

The ... rod **cannot** be split in half  $\frac{1}{2}$  because no two rods of the same colour are equal to it.

Y2 - Step one

Splitting a whole into equal groups (halves, thirds and quarters)

Display the fractions:  $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ .

Ensure that pupils understand that the bottom number (the denominator) is the number of equal groups the whole is split into and the top number (the numerator) is the number of parts we have. As the focus is on the whole and the parts, it can be explored using the bar model.

Display the orange Cuisenaire rod.

If this is the whole can you find Cuisenaire rods that show it can be split in half?

The orange rod can be split in half, two equal parts, because 2 yellow rods equal the orange rod.

Provide pupils with the opportunity to explore finding halves using the Cuisenaire rods as the whole and the equal parts (handout\_2LS28\_step1\_speaking\_frame).

The purple rod can be split in half ( $\frac{1}{2}$ ) because two red rods are equal to it.

The yellow rod cannot be split in half ( $\frac{1}{2}$ ) because no two rods of the same colour are equal to it.

Pupils then repeat the activity exploring thirds and quarters (handout\_2LS28\_step1\_speaking\_frame). For example:

The blue rod can be split into thirds ( $\frac{1}{3}$ ) because three light green rods are equal to it.

The black rod cannot be split into thirds ( $\frac{1}{3}$ ) because no three rods of the same colour are equal to it.

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Y1 - Step two

Finding equal parts of a whole (quarters)

Show pupils  $\frac{1}{4}$ . Remind pupils that the denominator tells us how many equal groups the whole has been shared into and the numerator tells us how many parts we have. Therefore, this fraction tells us the whole has been split into 4 equal parts and we have 1 part. Explain that this is called a 'quarter' and when something is shared equally between 4 it is shared into 'quarters'.

Discuss where they have heard the word 'quarter(s)' before.

I use quarter when talking about time because I know school finishes at quarter past 3.

Daddy uses quarters when we share a pizza. We have a quarter each because there are 4 people in my family.

Provide pupils with a purple Cuisenaire rod.

Can you find 4 of the same rods that match the purple rod?

4 of the white cubes together are equal in length to the purple rod.

One white cube is  $\frac{1}{4}$  of the purple rod.

Repeat with the brown rod as the whole.

What do you notice about the half and quarters?

Is the relationship between half and quarters the same when you build a wall with the purple rod as the whole?

Y2 - Step two

Exploring  $\frac{1}{2}$ ,  $\frac{2}{4}$  equivalence using Cuisenaire rods

In 2LS28, pupils used Cuisenaire rods to explore halves.

Use the brown Cuisenaire rod.

How can we show half of this rod?

I know that two purple rods are the same length as the brown rod.

Prove this using the rods.

Are there any other layers in the 'wall' that are equal parts?

Yes, I can see that four red rods are the same length as the brown rod.

Yes, the red rod is a quarter of the brown rod because there are 4 red rods in one layer.

Ask pupils to build other layers of the 'wall'.

Can you prove that  $\frac{1}{2}$  and  $\frac{2}{4}$  are equivalent with the Cuisenaire rods ?

A purple rod is half the brown rod. Two red rods are the same as one purple rod.

One purple = two red  $\frac{1}{2} = \frac{2}{4}$

Look at the layers that show equal parts, halves, quarters.

Ask pupils to prove that  $\frac{1}{2}$  and  $\frac{2}{4}$  are equivalent (the same) with the Cuisenaire rods.

Can you prove that  $\frac{1}{2}$  and  $\frac{2}{4}$  are equivalent with the Cuisenaire rods ?

A purple rod is half the brown rod. Two red rods are the same as one purple rod.

One purple = two red  $\frac{1}{2} = \frac{2}{4}$

Provide pupils with opportunity to find equivalent fractions using the Cuisenaire rods (use handout\_2LS31\_step2\_half\_and\_two\_quarter\_equivalence).

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Y1 - Step three

Placing fractions on a number line

Display a number line (counting stick) separated into 4 equal parts with '0' at the start and '1' at the end.

Provide pupils with fraction vocabulary (handout\_2LS31\_step3\_fractions\_vocabulary\_and\_numbers) cut up into cards.

whole

two quarters

quarter

half

three quarters

Where do these go on the counting stick?

Place them on the number line. Check pupils understand that 'quarter' means 'one quarter' (one part out of four) and 'half' means 'one half' (one part out of two). Draw attention to the fact that half and two quarters are in the same place.

Then provide pupils with the fractions numbers cut up into cards. Discuss where they should be positioned and place them on the number line.

Look at  $\frac{1}{2}$  and  $\frac{2}{4}$ .

What do you notice?

I noticed that they are in the same place on the number line.

Y2 - Step three

Comparing  $\frac{1}{2}$ ,  $\frac{2}{4}$  equivalence on a number line

Display a number line (counting stick) separated into 4 equal parts with '0' at the start and '1' at the end.

Provide pupils with fraction vocabulary (handout\_2LS31\_step3\_fractions\_vocabulary\_and\_numbers) cut up into cards.

whole

two quarters

quarter

half

three quarters

Where do these go on the counting stick?

Place them on the number line. Check pupils understand that 'quarter' means 'one quarter' (one part out of four) and 'half' means 'one half' (one part out of two). Draw attention to the fact that half and two quarters are in the same place.

Then provide pupils with the fractions numbers cut up into cards. Discuss where they should be positioned and place them on the number line.

Look at  $\frac{1}{2}$  and  $\frac{2}{4}$ .

What do you notice?

I noticed that the top and bottom numbers in  $\frac{2}{4}$  are double those in a half.

Activities for exploring ideas at greater depth

$\frac{2}{2}$

$\frac{4}{4}$

Where do these go on the counting stick?

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## Y1 - Step four

Deepening understanding of halves and quarters beyond 1 whole.



How could we count these pieces of pizza?

I could count the pieces. There are 8 halves of a pizza.

I could count in halves. Half, one, one and a half...

Establish that to count the pieces, you would have to count in halves. But that you could find the total by counting the pieces.

Model counting:  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ , 2,  $2\frac{1}{2}$ , 3,  $3\frac{1}{2}$ , 4.

There are eight halves, which equals a total of four whole pizzas.

Provide pupils with opportunities to count halves in context ensuring that the shapes vary.

For example:

- half slices of toast
- pears cut in half.

Repeat using real life objects that are cut into quarters.

For example:



How could we count these pieces of apple?

Agree that each whole apple has been cut into 4 equal pieces. So each apple is in quarters.

Practise counting in quarters:  $\frac{1}{4}$ ,  $\frac{2}{4}$ ,  $\frac{3}{4}$ . When counting  $\frac{4}{4}$ , clarify that this is equivalent to the whole. So we can say 1. Continue:  $1\frac{1}{4}$ ,  $1\frac{2}{4}$ ,  $1\frac{3}{4}$ , 2...

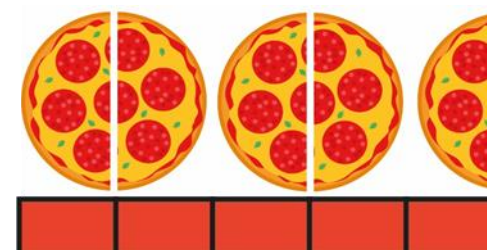
Provide other opportunities for pupils to count in quarters in context.

## Y2 - Step four

Counting fractions in context and using a number line

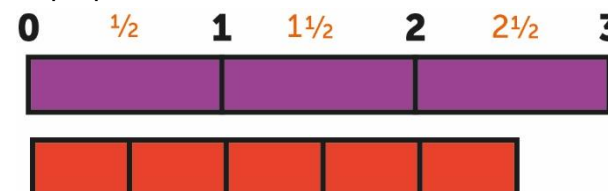
Start by counting fractions in context as in the Y1 step for learning. Ensure pupils have opportunity to count in halves, quarters and thirds.

Display a line of 5 red rods and 5 halves of pizza.



I can count  $2\frac{1}{2}$  pizzas. If each red Cuisenaire rods is  $\frac{1}{2}$  I can also count those.  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ , 2,  $2\frac{1}{2}$

Place the purple rods above the red rods to show the 'wholes'.



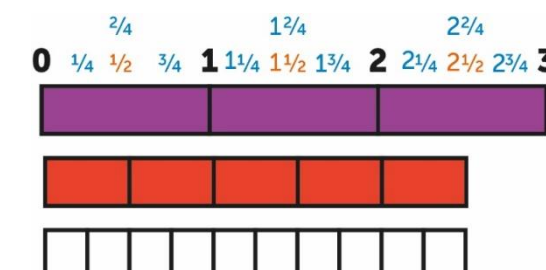
Where would you place the 'halves'?

They would go halfway between the whole numbers.

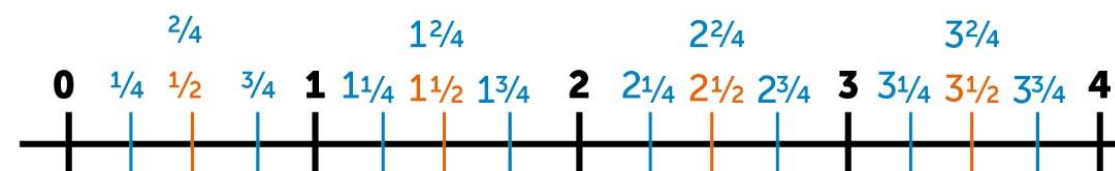
Relate this to positioning on a number line.



Repeat with quarters and recap the equivalent fractions  $\frac{1}{2} = \frac{2}{4}$ .

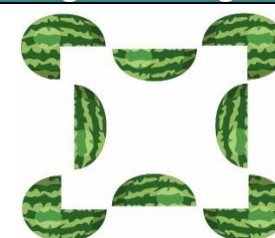


Add quarters to the number line.



Provide pupils with opportunities to count up and down in halves, quarters and thirds.

Activities for exploring ideas at greater depth



How many watermelons are in the picture?



## Y1 - Step five

### Finding half of an amount

Show pupils a tower of 10 multilink cubes.

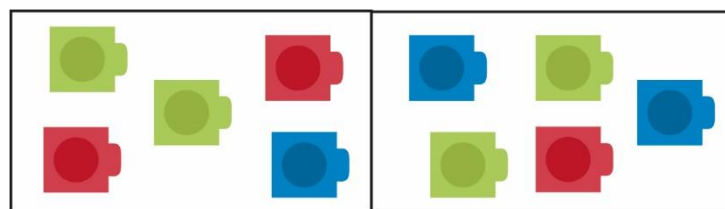
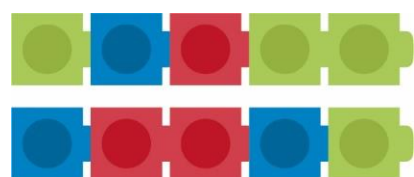


How could we find half?

We could break it in two and check the two new towers are the same length.

We could share the cubes between two groups.

Model both of these ideas.



Agree both show that there are 5 cubes in half of the original tower.

Show a pile of cubes.



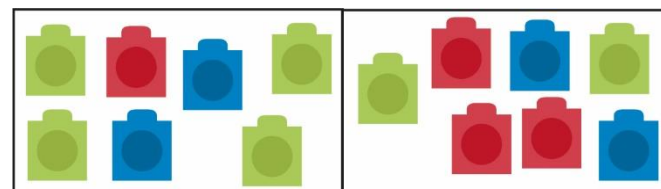
How could we find half?

We could put them into a tower and then split it in two.

We could share it into two groups.

Discuss which idea would be the most efficient.

Model sharing the pile practically using handout\_1LS32\_step3\_finding\_half\_of\_an\_amount.



Then illustrate by drawing the bar model:

14 cubes	
$\frac{1}{2}$	$\frac{1}{2}$
7	7

When you share 14 into two equal groups, there are 7 in each group.

Half of 14 is 7.

$\frac{1}{2}$  of 14 = 7

Provide pupils with piles of even numbers of cubes to half.

Use handout\_1LS32\_step3\_finding\_half\_of\_an\_amount to structure their thinking.

Encourage them to record the bar model and  $\frac{1}{2}$  of  $\square = \square$ .

### Activities for exploring ideas at greater depth

I have 3 cubes.

This is half of what I started with.

How many cubes did I start with?



## Y2 - Step five

### Finding half of an amount, linked to division and sharing a whole into two equal groups

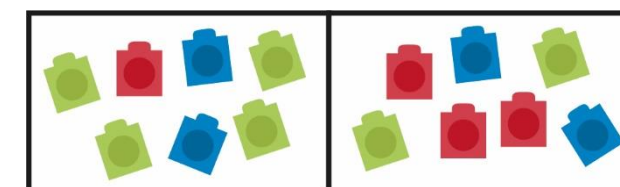
Use a pile of 14 cubes.



How could 14 cubes be shared between 2?

You could count them out into two groups.

How could this be recorded?



14 shared between 2 is 7.

$14 \div 2 = 7$

Half of 14 is 7.

Check that pupils make the link to division and the vocabulary 'half' as explored in previous sequences.

Introduce another way of recording:

$$\frac{1}{2} \text{ of } 14 = 7.$$

What is the same and what's different?

Half of 14 is 7 and  $\frac{1}{2}$  of 14 = 7

Both are finding half. One uses the word 'half' and the other uses the symbol  $\frac{1}{2}$ .

Both 'is' and '=' tell you there are 7 in one part when 14 is split equally into two parts.

Pupils find halves of amounts.

For example:

- Half of 64
- $30 \div 2 = \square$
- What is 96 shared into two groups?
- What is  $\frac{1}{2}$  of 84?

For each one, pupils record the answer using  $\frac{1}{2}$  of  $\square = \square$ .



Y1 - Step six

Finding a quarter of an amount

Have a tower of 8 cubes.



Quarters means 4 equal groups so I could share them between 4 groups.

How could we find  $\frac{1}{4}$  of this tower?

I could halve the tower and then halve it again to make 4 towers the same length.

Model both of these ideas practically.



Clarify that both of these provide the same answer:  $\frac{1}{4}$  of 8 = 2.

Provide pupils with a pile of cubes.



How could we find  $\frac{1}{4}$  of this pile?

As with finding a half, discuss possible ways but agree that sharing into four groups is an efficient way.

Model this practically using handout\_1LS32\_step4\_finding\_quarters\_of\_an\_amount.

12 cubes			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
3 cubes	3 cubes	3 cubes	3 cubes

I shared out the 12 cubes, putting one at a time into each group.

I have four equal groups so I have quarters.

One quarter of 12 cubes is 3 cubes.  
 $\frac{1}{4}$  of 12 = 3

Provide pupils with piles of 4, 8, 16 or 20 cubes to quarter. Pupils use handout\_1LS32\_step4\_finding\_quarters\_of\_an\_amount to support the sharing.

Encourage them to record the bar model and  $\frac{1}{4}$  of  $\square = \square$ .

Y2 - Step six

Finding  $\frac{1}{3}$  and  $\frac{1}{4}$  of amounts linked to sharing

Initially model finding  $\frac{1}{4}$  using the same model as in Y1 – Step 6

Use 12 cubes to model finding  $\frac{1}{3}$ .

Ensure pupils understand  $\frac{1}{3}$  means that the whole is split into three equal parts. If the numerator is 1, we are finding one part.



How do we find  $\frac{1}{3}$  of 12?

Use the bar model to show the relationship between the whole amount and the parts as fractions. Sharing can be used to calculate the parts.

The whole is 12.

When finding thirds, the whole is shared into three equal parts.

The whole, 12, can be shared between 3 parts. There are 4 in each part.

When finding  $\frac{1}{3}$ , you will have one of the 3 parts.

$\frac{1}{3}$  of 12 = 4

The whole is 12		
$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
4	4	4

Provide pupils with amounts to find  $\frac{1}{3}$  of.

For example:

- What is a third of 60?
- $\frac{1}{3}$  of 15 =  $\square$
- Calculate  $\frac{1}{3}$  of 21.

For each one, pupils record the answer using  $\frac{1}{3}$  of  $\square = \square$ .

Also provide opportunity for pupils to find  $\frac{1}{4}$  of an amount recording the answer:  $\frac{1}{4}$  of  $\square = \square$ .

Activities for exploring ideas at greater depth

Can you find  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  of 20 strawberries?



Prove it.



## Y1 - Step seven

### Finding halves and quarters of amounts in context

Adalia and Peter were playing shops and they decided to halve the toys between their two shops.



Handout\_1LS32\_step5\_toy\_shop\_share could be used but more ideally, provide pupils with collections of toys to halve. Pupils halve the toys practically and record their results in a similar way to step 3.

Tell pupils that two more children have come to play and they too want to set up toy shops. Therefore, the toys will need to be quartered.

Can all of the toys be quartered so that all of the children's toy shops have an equal amount?

Provide pupils with more opportunities to halve and quarter amounts in context such as:

The cake shop has a  $\frac{1}{2}$  price sale.  
A box of 12 cupcakes was £6.  
How much do they cost now?



Now  $\frac{1}{2}$  price!  
Was £6

Four children share 12 strawberries.



How many do they get each?  
What fraction of the strawberries do they get?

### Activities for exploring ideas at greater depth

Four children share two packets of 10 grapes equally. How many do they get each?



## Y2 - Step seven

### Finding $\frac{3}{4}$ of an amount

Use 8 cubes.



How could we find  $\frac{3}{4}$  of 8?









I know that  $\frac{3}{4}$  means 3 parts out of the whole, which is four parts.

I think that finding  $\frac{1}{4}$  will help me work out three quarters.

Clarify that to find  $\frac{3}{4}$ , the whole needs to be shared into four equal parts as the bottom number (the denominator) is 4. This will find one part,  $\frac{1}{4}$ . Three parts will need to be added together to find  $\frac{3}{4}$  of the whole.

When finding quarters, the whole is shared into four equal parts.

The whole is 8.

The whole is 8			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
 	 	 	 
2	2	2	2

The whole, 8, can be shared between 4 equal parts. There are 2 cubes in each part.

When finding  $\frac{3}{4}$ , you will have three equal parts.

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$$

$$2 + 2 + 2 = 6$$

$$\frac{3}{4} \text{ of } 8 = 6$$

Use handout\_2LS30\_step2\_speaking\_frame to support.  
Ask pupils to find  $\frac{3}{4}$  of varied amounts. For example:

- What is three quarters of 20?
- $\frac{3}{4}$  of 16 =  $\square$
- Calculate  $\frac{3}{4}$  of 44.

For each, pupils record the answer as:  
 $\frac{3}{4}$  of  $\square = \square$

### Speaking Frame – Finding $\frac{3}{4}$ of an Amount

$$\frac{3}{4} \text{ of } \square = \square$$

The whole is  $\square$ .  
To find quarters, the whole is shared into 4 equal parts.  
One part is  $\square$ . This is  $\frac{1}{4}$  of the whole.  
To work out  $\frac{3}{4}$ , I need 3 parts.  
 $\square + \square + \square = \square$   
Therefore:  
 $\frac{3}{4}$  of  $\square = \square$

The whole is $\square$			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
$\square$	$\square$	$\square$	$\square$
$\square$	$\square$	$\square$	$\square$

### Activities for exploring ideas at greater depth

Does  $\frac{1}{2} = \frac{2}{4}$ ? Discuss the handout\_2LS31\_step5\_conversation\_cartoon.  
Now solve these problems:

- Natalia and Robert had some cars. Two quarters of Robert's cars were red. He had 6 red cars. Four of Natalia's cars were red. She said, "Half of my cars are red, too." Can this be true?
- Would you prefer two quarters of £34 or  $\frac{1}{2}$  of thirty five pounds? Explain your thinking.



## Y1 - Step eight

### Identifying whether a shape has been halved or not

Provide pupils with a square piece of paper and ask them to fold it in half. Check pupils remember that a half is a whole split into two equal pieces.

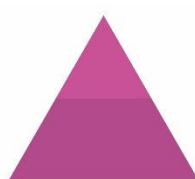
I have folded the whole square down the middle to make two identical rectangles.



I have folded the whole square into two triangles that are the same size.

Provide pupils with a variety of shapes for them to fold in half. Some pupils may fold the shapes so they are not in half.

For example:



Can you prove that you have split the whole shape into two equal parts?

Model proving that they are the same by folding them to show that they match exactly. Alternatively, by cutting the shape into two pieces and overlaying to prove they are the same.

Pupils then prove that they have created halves or explain why they have not.



My octagon is in halves because when I cut it into two pieces they are the same. They are equal.



My triangle is not in halves because when I cut it into two pieces they are not the same. They are unequal.

Using the shapes they have folded or the shapes on [handout\\_1LS33\\_step1\\_a\\_half\\_or\\_not\\_a\\_half](#), pupils identify which shapes have been halved (split into two equal shapes) or not. Use [handout\\_1LS33\\_step1\\_speaking frame](#) to support reasoning.

## Y2 - Step eight

### Recognising shapes split equally into halves, quarters and thirds

Provide all pupils with a square piece of paper.

Fold the square in half.



How can you prove it is in half?

I know it is in half because the two parts are the same size.

Establish that for the square to be in halves both parts must be equal.

Fold the square again so it is in quarters.



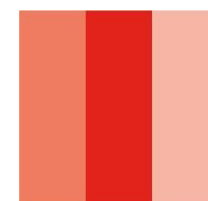
I know if I fold it in half the other way it makes quarters.

I know it is now in quarters because there are four equal parts.

At this point remind pupils that  $\frac{1}{2}$  is the same as  $\frac{2}{4}$  as discovered in step 3. Use the folded shapes to prove that this is true using the different context of shapes rather than the number line.

Using [handout\\_2LS31\\_step1\\_equivalence\\_in\\_shapes](#), pupils can practise identifying and proving that  $\frac{1}{2} = \frac{2}{4}$ .

Ask pupils to refold their square so it is in thirds.



Why is it harder to fold a square into thirds?

You have to estimate where a third is.

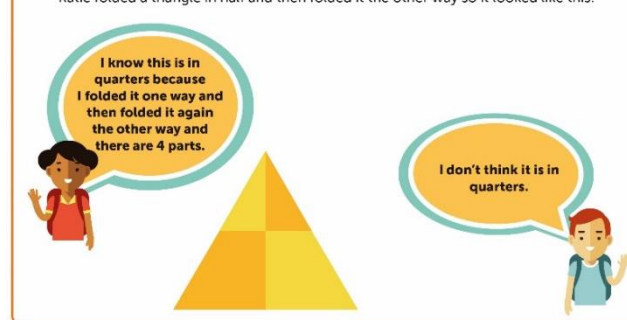
It is harder to fold into thirds because you can't match edges together.

Display an equilateral triangle and fold it in half.



Show [handout\\_2LS29\\_step1\\_conversation\\_cartoon](#). Discuss.

Katie folded a triangle in half and then folded it the other way so it looked like this:



Check that the pupils recognise the misconception and understand that all parts must be equal in size for a shape to be split into a fraction.

Use the shapes on [handout\\_2LS29\\_step1\\_shapes](#). Sort them using [handout\\_2LS29\\_step1\\_shape\\_sort](#) (printed on A3).



Y1 - Step nine

Identifying whether a shape has been quartered or not

As in Step 1, provide pupils with a square piece of paper but this time ask them to fold it into quarters. Check pupils remember that quarters are found when a whole is split into four equal pieces.

I made quarters by folding the square in half and then folding it in half again. It has made four little squares.

I made quarters by folding it diagonally one way and then opening it up and folding it diagonally the other way. I have made four equal triangles.

Provide pupils with a selection of other shapes to fold into quarters. Before they fold, ask them to predict which shapes they think can be folded into quarters and those that they think cannot.  
For example:

Provide pupils with time to explore. Then ask pupils to prove that a shape can, or cannot, be quartered by cutting it up and checking the pieces are the same size.

My pentagon is not in quarters because when I cut it into four pieces they are not the same. They are not equal.

My rectangle is in quarters because when I cut it into four pieces they are the same. They are equal.

Using the shapes folded or the shapes on handout\_1LS33\_step2\_a\_quarter\_or\_not\_a\_quarter, pupils identify which shapes have been halved or not. Use handout\_1LS33\_step2\_speaking\_frame to support reasoning.

Y2 - Step nine

Finding  $\frac{1}{2}$ ,  $\frac{1}{4}$  and  $\frac{1}{3}$  of 2-D shapes

Display a selection of 2-D shapes.  
Discuss how they could be split into quarters and  $\frac{1}{4}$  be represented.

As all the shapes are split into 4 equal parts one of the four parts coloured in would show  $\frac{1}{4}$ .

Provide pupils with a selection of outlines of 2-D shapes like those in handout\_2LS29\_step2\_2D\_shapes. Use a die that has been changed so that  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{3}$  each show on two faces.  
Pupils roll the die and then select a shape they will use to represent the fraction.  
Encourage pupils to show a range of representations for  $\frac{1}{2}$ ,  $\frac{1}{4}$  or  $\frac{1}{3}$ .

Activities for exploring ideas at greater depth

Shade one half of each of these shapes differently.

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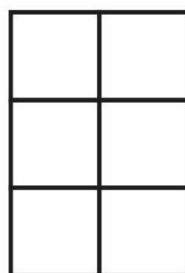
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## Y1 - Step ten

### Identifying and finding halves of an amount in the context of shapes

Show pupils a rectangle made up of 6 squares.

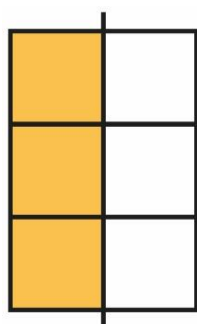


How could we colour in half of the rectangle?

We could split it down the middle and there would be 3 squares on each side.

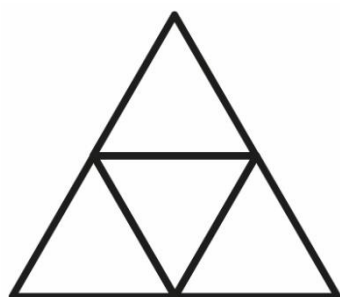
I know there are 6 squares and I know that 3 is half of 6, so I need to colour in 3 squares.

Model both of these approaches.



Ensure pupils understand that both shapes have one half shaded.

Provide pupils with another shape made up of a number of identical shapes and colour half. For example:

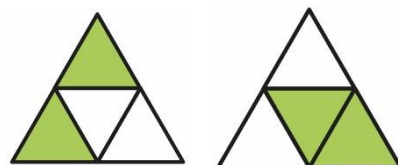


Agree that this shape cannot be cut in half with one cut to find out how many of the triangles are needed in one half. This would mean that some triangles would be cut in half. The total number of small triangles will need to be found and then halved. Some pupils may have shaded in half of each small triangle. If so, these could be cut up and overlaid to show the similarity.

I know within the big triangle that there are 4 little triangles and I know that half of 4 is 2. So I need to colour in 2 triangles.

Clarify that it doesn't matter which two of the four smaller triangles are coloured in, half would still be shaded.

Use handout\_1LS33\_step3\_colour\_half.



### Activities for exploring ideas at greater depth

Pick one of the shapes from handout\_1LS33\_step3\_colour\_half.

Find at least four different ways of shading half.



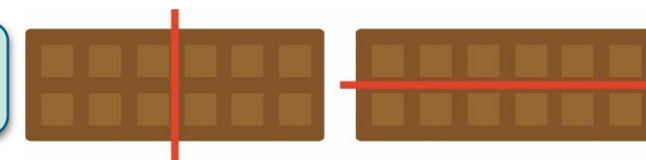
## Y2 - Step ten

### Finding fractions of amounts within the context of shapes and identifying equivalence

Show a chocolate bar with 12 pieces of chocolate.



How could we work out half of the chocolate bar?



Pupils could split the bar horizontally or vertically and spot the two equal groups without knowing exactly how many are in each group.

They could also compare the two halves and then count how many are in each group.

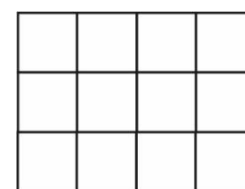
Alternatively, they could identify the whole bar as 12 pieces and calculate  $\frac{1}{2}$  of 12 =  $\square$

Whole = 12 pieces

$\frac{1}{2}$

$\frac{1}{2}$

Display a rectangle made up of a 3 x 4 array. Ask pupils to shade  $\frac{1}{3}$ .

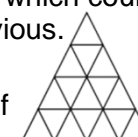


I can see there are three equal rows. To find  $\frac{1}{3}$ , I can colour in one row and count how many squares in the row.

I can see the whole is 12 squares. So I can calculate  $\frac{1}{3}$  of 12 = 4, then colour in 4 squares.

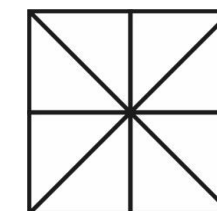
Both strategies would result in the correct number of squares shaded. However, if the shape provided was not organised into an array, which could be split equally horizontally or vertically in a simple way, the first strategy might not always be obvious.

For example, find  $\frac{1}{3}$  of



Remind pupils that in steps 3 and 4 they discovered that  $\frac{1}{2}$  is the same as  $\frac{2}{4}$  in the context of a number line.

Ask pupils to work out how many triangles would need to be coloured in to colour half of the square. Then repeat for  $\frac{2}{4}$ . Pupils can find  $\frac{2}{4}$  by either using the knowledge that half is equivalent to  $\frac{2}{4}$  or they can find one quarter and then add another quarter. Either way the answer to both will be 4 triangles.



Play 'Colour It, To Win It'.

Equipment: handout\_2LS31\_step4\_colour\_it\_to\_win\_it and a die with two sides each marked  $\frac{1}{2}$ ,  $\frac{1}{4}$  and  $\frac{1}{3}$ .

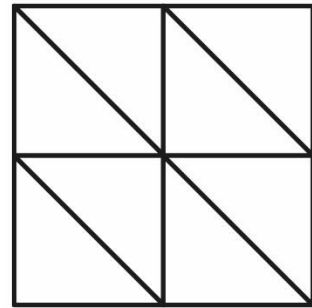
- The aim is to shade in the amount of the shape needed to win it.
- Two pupils take turns to roll the die.
- Pupils pick a shape to shade in the fraction rolled.
- The player who shades the identified fraction wins the shape.
- The player who wins the most shapes is the winner.

This game will provide the opportunity for pupils to practise finding fractions of amounts in the context of shapes and prove that  $\frac{1}{2}$  is equal to  $\frac{2}{4}$ .

## Y1 - Step eleven

### Identifying and finding quarters of an amount in the context of shapes

Show pupils a shape made up of 8 identical shapes.

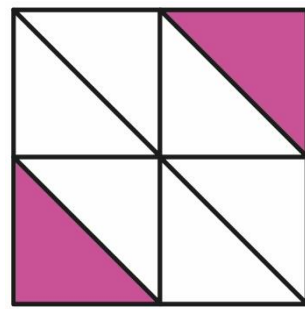
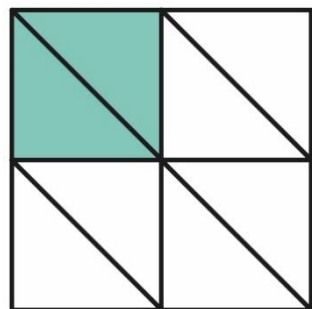


How could we colour in a quarter of the square?

If I folded the whole in half one way and then the other, it would make four squares. I can see that each square is made up of two triangles. So a quarter of the shape is 2 triangles.

I know there are 8 triangles and I know that if I share 8 between 4 groups there will be 2 in each group. So I need to colour in 2 triangles.

Model both of these approaches.

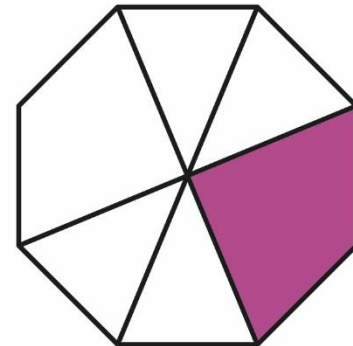
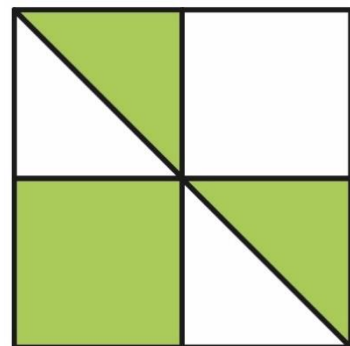


Ensure pupils understand that both have one quarter shaded and it does not matter which two are shaded. They both represent one quarter.

Provide pupils with a range of other shapes made up of a number of identical shapes and colour one quarter (handout\_1LS33\_step4\_colour\_a\_quarter).

### Activities for exploring ideas at greater depth

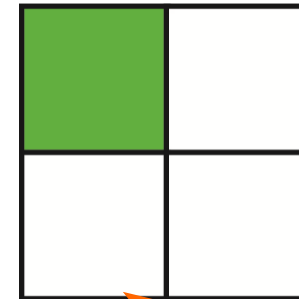
What fraction of these shapes are shaded?



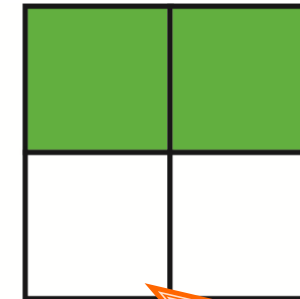
## Y2 - Step eleven

### Identifying $\frac{3}{4}$ of a shape and finding $\frac{3}{4}$ in the context of shapes

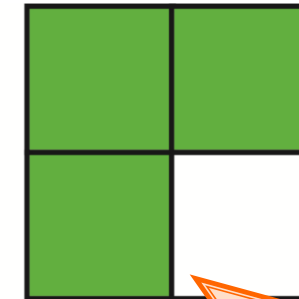
Display square split into quarters. Colour a quarter at a time until the complete square is shaded.



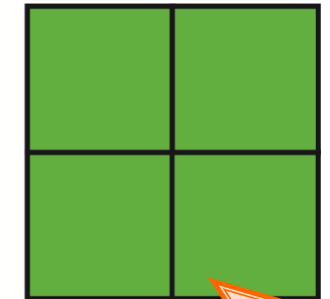
$\frac{1}{4}$  is shaded because it is 1 part of the whole.



I can see that half or two quarters are shaded. I know these are equivalent.



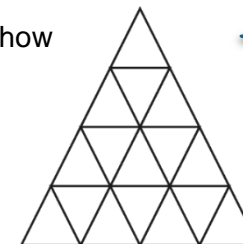
3 parts are shaded. So that is three quarters. I think it is written as  $\frac{3}{4}$ .



The whole is shaded because all 4 parts are green.

Pupils use a selection of 2-D shapes (handout\_2LS30\_step1\_2D\_shapes). They select a shape and identify whether it can be split into quarters. If it can, pupils then shade  $\frac{3}{4}$  of it.






Now show



How could I shade in  $\frac{3}{4}$  of this shape?

I could calculate  $\frac{3}{4}$  of 16, then shade in that many triangles.

I can't see how it could be split into quarters but I can count 16 small triangles within the big triangle.

The whole is 16 			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
			
4	4	4	4
$4 + 4 + 4 = 12$			

Model using the bar, part whole model to solve a problem that appears, on the surface, to be a shape problem but actually involves finding a fraction of an amount.

Ask pupils to find  $\frac{3}{4}$  of other shapes made up of multiple smaller shapes (for example, use handout\_2LS30\_step3\_fractions\_of\_amounts\_in\_shapes).

Y1 - Step twelve

Fractions in the context of capacity

Show pupils four glasses: one empty and the others one quarter, one half and one full of water.

How much water is in each glass?

This is empty.

This is less than half full.

This is a quarter full.

This is about half way.

This is full.

Check pupils can recall, and correctly use, the comparative language for capacity from 1LS25.

Use the full and empty glasses.

How would I know when I have poured half of the water into the empty glass?

When both glasses have water up to the same level, half the water will be in each glass.

Model this.

How could we share the water equally between four people?

Share it equally between 4 cups.

What fraction of the water would be in each cup?

There will be four cups with an equal amount in, so each cup will have a quarter of the water.

Provide pupils with opportunities to share water within different containers between 2 or 4 cups and identify whether they have shared the water into halves or quarters.

Y2 - Step twelve

Fractions in the context of capacity

This cup is full of water. How else could I say how much is in the cup using 'halves', 'thirds' and 'quarters'?

The full cup is 1 and  $\frac{3}{3} = 1$ .

A full cup is equal to two half full cups.

4 quarters = 1 whole

Pose a range of questions (handout\_2LS32\_step4\_fractions\_of\_capacity) for pupils to answer.

These could be explored practically.

For example:

Shade  $\frac{1}{4}$  of the first measuring cylinder.

Shade  $\frac{2}{3}$  of the second measuring cylinder.

Shade  $\frac{2}{2}$  of the third measuring cylinder.

Activities for exploring ideas at greater depth

If I share two full cartons of juice between six children, what fraction of a carton would they each receive?

ORANGE JUICE

ORANGE JUICE

0

1

2

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Y1 - Step thirteen

Fractions in the context of length

Display a piece of border roll 1 metre long. Zero marked at one end and 1m at the other.



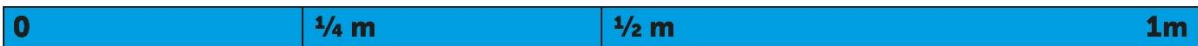
Fold the border roll in half.



What label do you think we should use here?

It is halfway so  $\frac{1}{2}$  a metre.

Fold the first half in half.

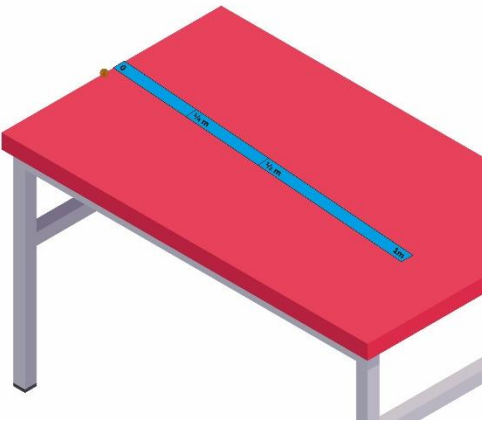


What label do you think we should use here?

It is half of a  $\frac{1}{2}$ . I know when you half something twice you get four equal parts. So this is  $\frac{1}{4}$  m.

Pupils play 'Shove a Penny'.

- Stick the border roll 'tape measure' to a table so 0 is right on the edge.
- Pupils take a coin (2p works best) and place it next to the end of the 'tape measure' so it is half on the table.
- Using the heel of your hand shove the coin across the table.
- Use the vocabulary cards to describe how far the coin has been pushed (handout\_1LS34\_step3\_vocabulary cards). For example, more than  $\frac{1}{2}$  metre.



Pupils could record a 'tape measure' in their books marked with  $\frac{1}{4}$ m,  $\frac{1}{2}$ m and 1m and mark on some of their coins' finishing positions. They annotate with a description of where the coins ended up.

Y2 - Step thirteen

Fractions in the context of length

Use a ramp set up with a car placed one metre from the end of the ramp.

Use a strip of border roll to show the distance.



Introduce the problem. Explain that before the lesson, a number of cars were rolled down the ramp. How far they rolled was measured. Unfortunately, the cars have been moved. Explain that the cars need to be put back in their correct finishing places.

Display a copy of handout\_2LS32\_step3\_distance\_rolled.

Car		Distance rolled
	Green	1m
	Yellow	$1\frac{3}{4}$ m
	Red	$\frac{2}{4}$ m
	Blue	Half as far as the red car
	Black	$\frac{3}{4}$ m
	Orange	$\frac{3}{3}$ m
	White	$\frac{1}{3}$ m

Pupils use a selection of cars to correctly place on the track at their finishing distances. Encourage them to explain why they have chosen to place them there.

Handout\_2LS32\_step3\_cars\_down\_the\_ramp could be used to support pupils to show where they would position the cars.

Activities for exploring ideas at greater depth

If the green car rolled 24cm instead of 1m, can you calculate how far all of the other cars rolled?

Here is an example:

The white car rolled  $\frac{1}{3}$  as far as the green car.

So it rolled  $\frac{1}{3}$  of 24cm, which is ...cm.

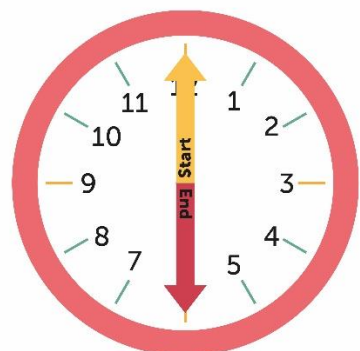




## Y1 - Step fourteen

### Fractions of a turn in the context of a clock face

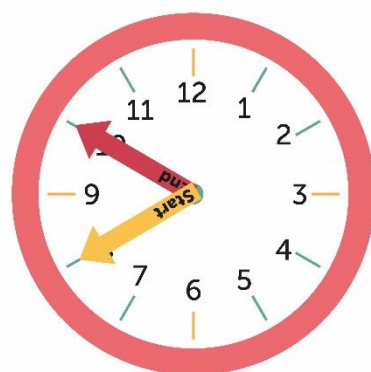
Display a clock face and two, minute hands in different colours.  
Use [handout\\_1LS34\\_step4\\_clock\\_face\\_and\\_minute\\_hands](#).  
Place both hands pointing to 12 and then turn the 'end' hand to 6.



How far have has the 'end' hand turned?

It has gone halfway around the clock face.

It has done  $\frac{1}{2}$  a turn.



- Roll two dotty dice and total the dots to generate a number.  
For example, and would total 8.
- Place both the start and end hands pointing to 8.
- Then roll the dice again to generate an end number.  
For example, and would total 10.
- Move the end hand to the number generated.

Then use the vocabulary ([handout\\_1LS34\\_step4\\_vocabulary\\_cards](#)) to help describe the turn.

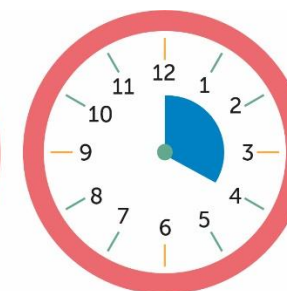
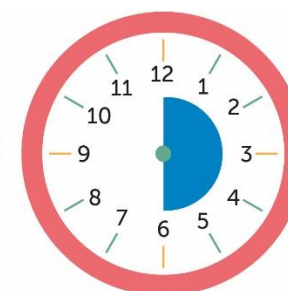
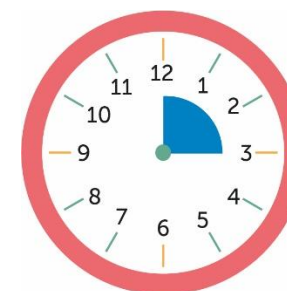
The end hand has moved less than  $\frac{1}{4}$  of a turn.

Pupils continue to roll two dice: one to generate their starting number and one to generate the number they are going to turn the 'end' hand to. After moving the hands, they then describe the turn.

## Y2 - Step fourteen

### Fractions of time

Display images of clocks with a fraction of the clock face covered. For example:



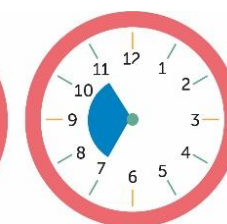
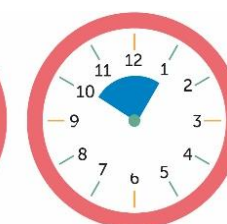
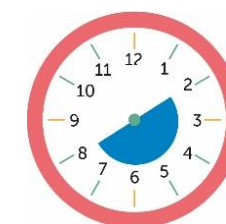
What fraction of the clock faces are shaded?  
How many minutes is this and how do you know?

$\frac{1}{4}$  is shaded.  
 $\frac{1}{4}$  hour = 15 minutes

$\frac{1}{2}$  is shaded.  
 $\frac{1}{2}$  hour = 30 minutes

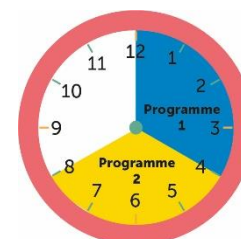
$\frac{1}{3}$  is shaded.  
 $\frac{1}{3}$  hour = 20 minutes

Provide pupils with other clock faces.  
Each with a fraction shaded to practice.



Explain that fractional language is used when telling the time. For example, "half past 3", "quarter to 7".  
Explain that fractions of times can be counted when solving problems. For example:

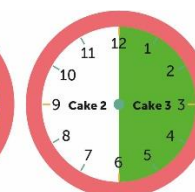
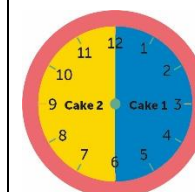
Victor watches two TV programmes one after another. Each programme lasts one third of an hour.  
How long has he watched TV for?



Two,  $\frac{1}{3}$  hour programmes would cover  $\frac{2}{3}$  of the clock face.

$\frac{2}{3}$  of the clock face is  $\frac{2}{3}$  of an hour. That is 40 minutes.

Ursula bakes 3 cakes. Each cake takes half an hour and she cooks them separately. When she takes the first cake out, she puts the next cake straight in the oven and she does the same with the third cake.  
How long do they take to cook?



I know two, half one hours make one hour. Then half an hour more would be  $1\frac{1}{2}$  hours altogether.

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### Activities for exploring ideas at greater depth

If Fred started a race at



and he took one third of an hour to complete it, at what time would he finish?

