

Progress in Fractions

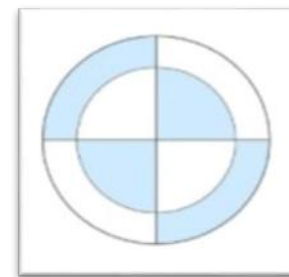
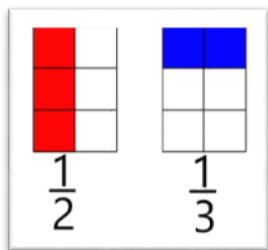
Some images have been copied from NCETM PD materials



Throughout the teaching of fractions, three key models are used in order to provide a wide and varied understanding of fractions.

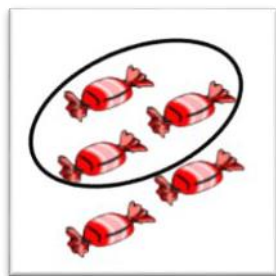
These include:

Area models

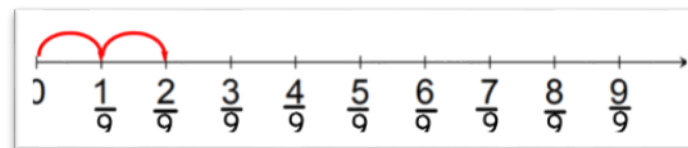


It is important to vary these images using representations that challenge pupils thinking and understanding.

Discrete models




Linear models

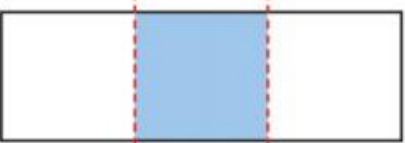


Where possible, links are made to real life and measures

Y1 FRACTIONS

Fraction notation—taken from NCETM PD materials

Model	Say	Write	Notation
 one-half	<i>'The apple has been divided...'</i>	Write the division bar.	$\frac{1}{2}$
	<i>'...into 2 equal parts...'</i>	Write '2' as the denominator.	
	<i>'...and we have 1 of the parts.'</i>	Write '1' as the numerator.	

Model	Say	Write	Notation
 one-third	<i>'The rectangle has been divided...'</i>	Write the division bar.	$\frac{1}{3}$
	<i>'...into 3 equal parts...'</i>	Write '3' as the denominator.	
	<i>'...and 1 of the parts is shaded.'</i>	Write '1' as the numerator.	

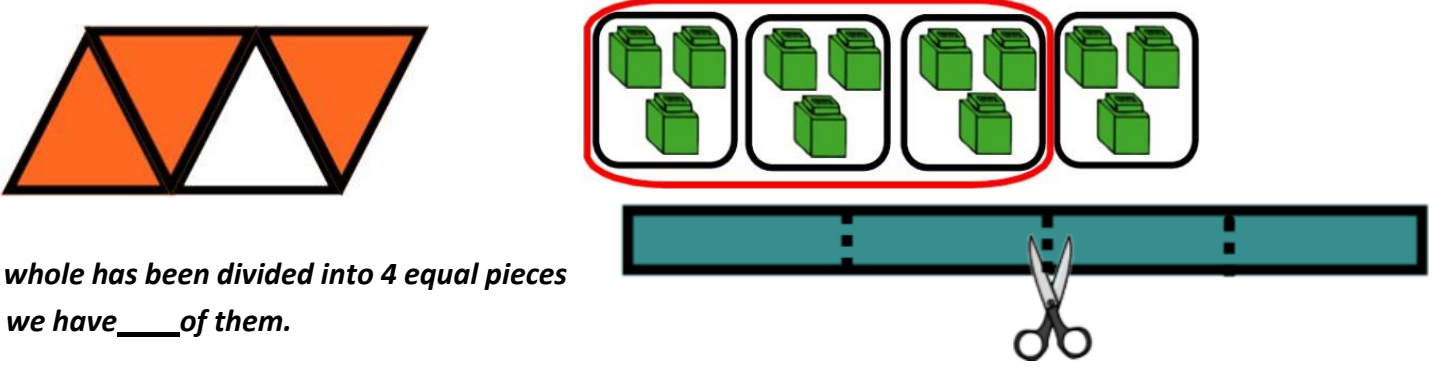
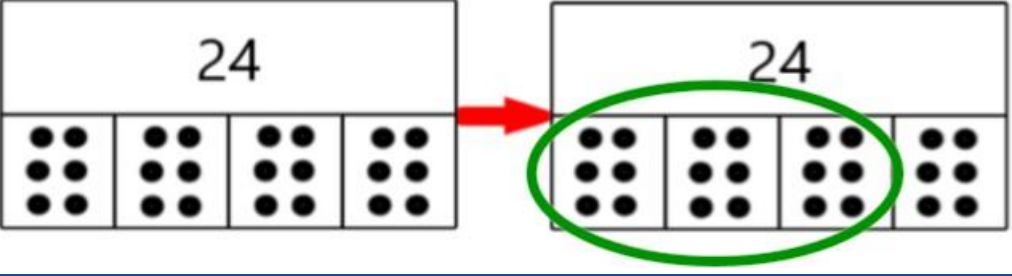
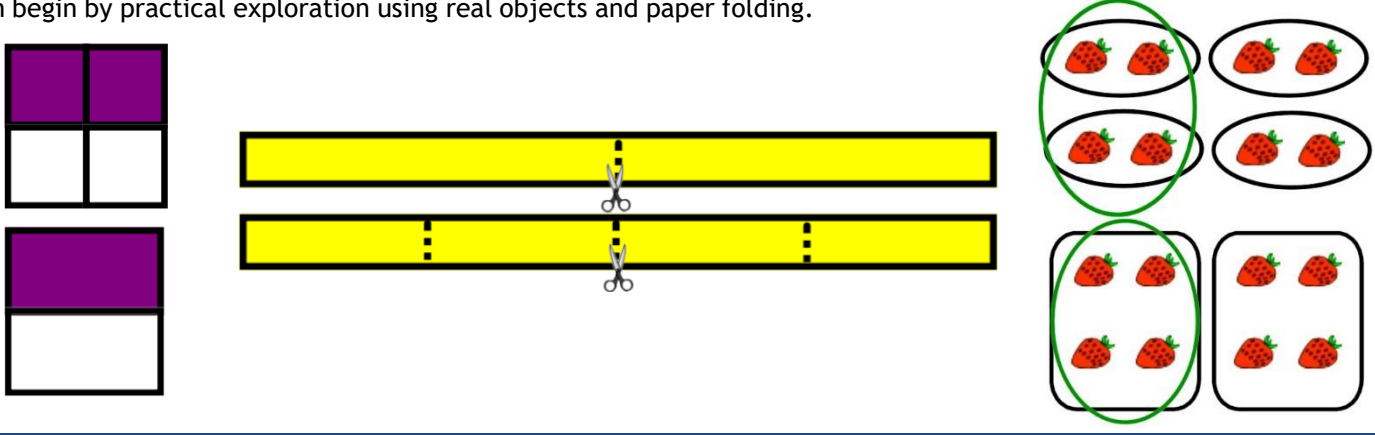
Model	Say	Write	Notation
 one-quarter	<i>'The strawberries have been divided...'</i>	Write the division bar.	$\frac{1}{4}$
	<i>'...into 4 equal parts...'</i>	Write '4' as the denominator.	
	<i>'...and 1 of the parts is circled.'</i>	Write '1' as the numerator.	

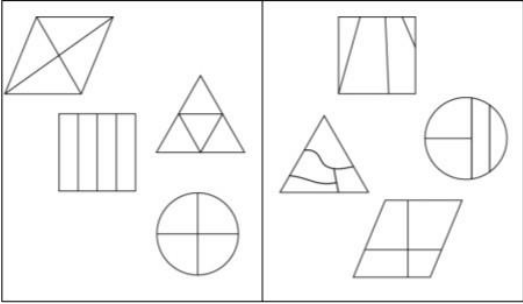
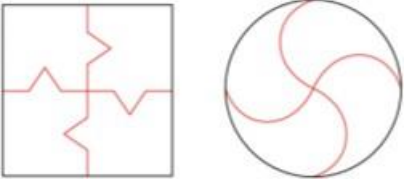
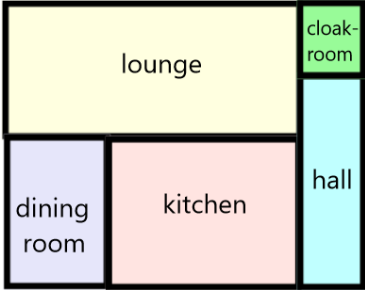
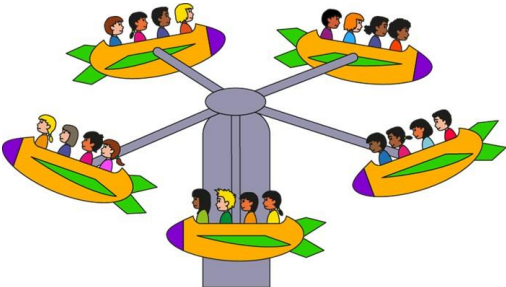
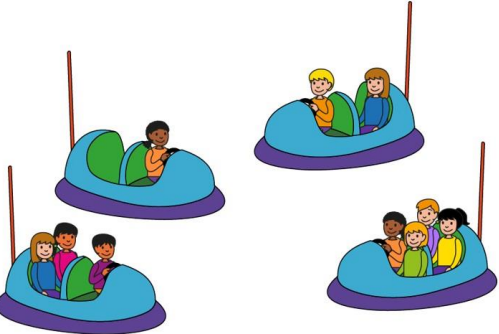

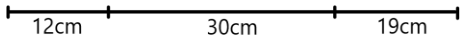

Y2

FRACCTIONS

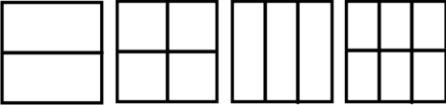
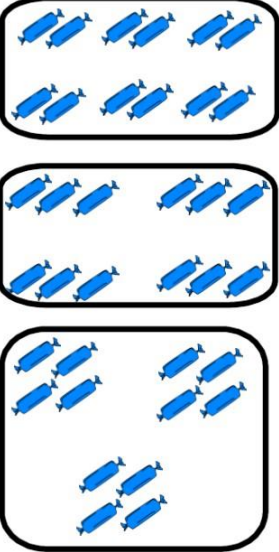

<p>Objective, Strategy & Key Vocabulary</p>	
<p>Find half of numbers.</p>	<p>Pupils learn to halve even numbers to 24 as part of their work in division. As a result, they should be familiar with the bar model representation of this.</p> <div style="text-align: center;"> </div>
<p>Find $\frac{1}{4}$ or $\frac{1}{3}$ of a number</p>	<p>Children in KS1 do not learn to divide by 3 or 4, therefore when finding $\frac{1}{4}$ and $\frac{1}{3}$ of numbers, focus is given to the learning they have made dividing bar models and shapes in to 3 or 4 equal parts.</p> <p style="text-align: center;">Find $\frac{1}{4}$ of 12</p> <p>Children begin by using cubes to find quarters of numbers. This is then represented using the bar model.</p> <div style="text-align: center;"> </div> <p>Children follow this same sequence when finding $\frac{1}{3}$ of numbers.</p> <p>Once pupils are confident, they use the bar model, drawing dots to find $\frac{1}{4}$ and $\frac{1}{3}$ of numbers</p> <div style="text-align: center;"> </div>

Y2 FRACTIONS

<p>Objective, Strategy & Key Vocabulary</p>	
<p>Find $\frac{2}{4}$ of a number.</p>	<p>Children should be confident in finding $\frac{1}{4}$ of numbers before moving on to find $\frac{2}{4}$. They begin by using cubes.</p>  <p><i>The whole has been divided into 4 equal pieces and we have ___ of them.</i></p>
	<p>Children move to a bar model representation of this.</p> <p style="text-align: center;"><i>Find $\frac{3}{4}$ of 24</i></p> 
<p>Recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$</p>	<p>Children begin by practical exploration using real objects and paper folding.</p> 

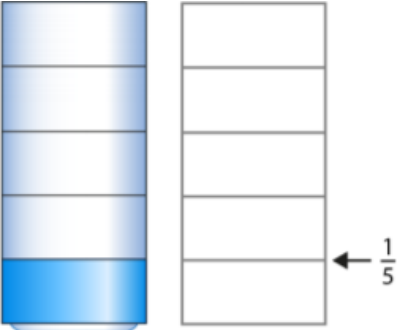
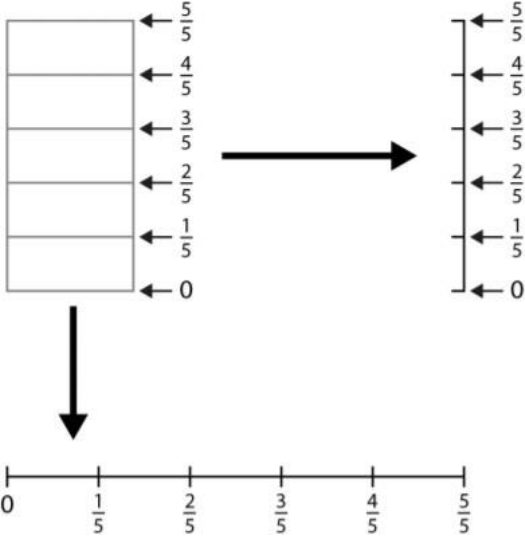


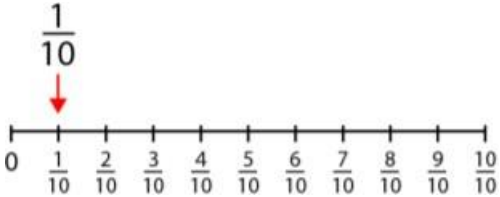



Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
<p>Recognise equal and unequal parts</p> <p>NCETM 3.1 TP2</p> <p>Children make links to learning they have made in multiplication where they have explored equal and unequal groups.</p> <p>Where relevant, links are made to measures and money and real life contexts.</p>	<p>Children explore and sort shapes split into equal and unequal parts.</p>  <p>This progresses to include shapes where the parts are equal but they do not appear to look the same due to reflection or rotation.</p>  <p><i>The house is divided into unequal rooms.</i></p> 	<p><i>The parts are equal, I know this because the number of people in each part is the same.</i></p>  <p><i>The parts are unequal, I know this because the number of people in each part is not the same.</i></p> 	<p><i>The parts are equal, I know this because the length of each part is the same.</i></p>  <p><i>The parts are unequal, I know this because the length of each part is different.</i></p>  <p><i>The parts are unequal, I know this because the amount of water in each glass is different.</i></p> 


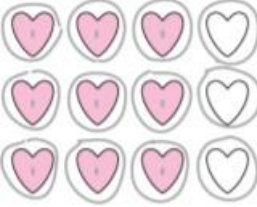
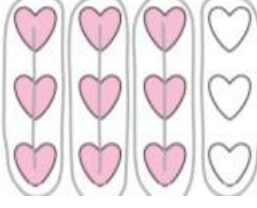
Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
<p>Understand that a whole can be divided into any number of equal parts.</p> <p>NCETM 3.2 TP1</p>	<p>Children begin by exploring using the same whole and dividing this into different numbers of equal parts</p> 	<p>They move to sharing a quantity into equal parts.</p> <p>12 sweets can be divided in to:</p> 	<p>Children look at practical examples of the same lengths divided into different numbers of equal parts.</p> 

Y3

FRACTIONS

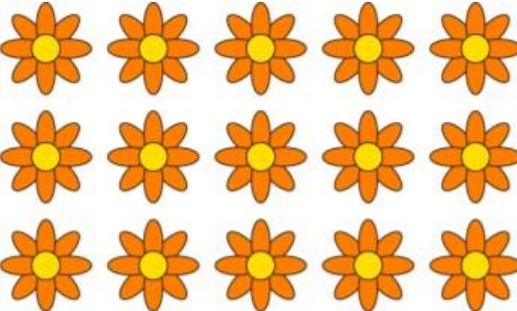

Objective, Strategy & Key Vocabulary	Area	Discrete	Abstract
<p>Each fraction has a place on a number line.</p> <p>NCETM 3.3 TP4</p>	<p>Links with measure are very useful in introducing children to the concept that each fraction has a place on a number line.</p> 		
<p>Recognise and use fractions as numbers:</p> <p>NCETM 3.3 TP4</p> <p>unit fractions</p>	<p>Children explore the same fraction in all three forms.</p> 		
<p>Recognise and use fractions as numbers:</p> <p>NCETM 3.3 TP4</p> <p>non-unit fractions</p>	 <p>2 one-fifths</p>	 <p>2 one-fifths is blue</p> <p>$\frac{2}{5}$</p>	




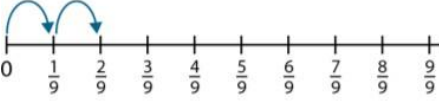

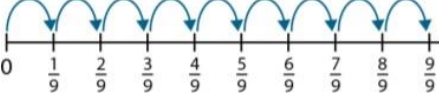

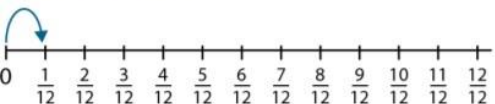

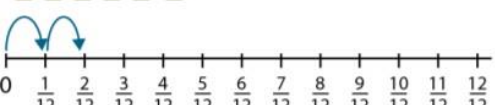

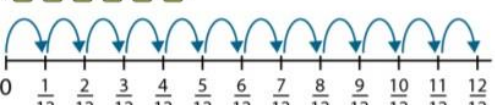

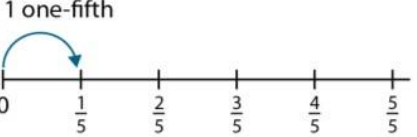

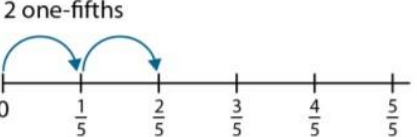


Objective, Strategy & Key Vocabulary	Notes	Pictorial	Stem sentences/ Abstract
<p>Recognise using diagrams that some fractions may be expressed in more than one way. (introducing equivalence)</p>	<p>When encountering equivalence in year 3, focus is given to raising an awareness that some representations may be expressed in more than one way.</p> <p>Children are not introduced to the idea of simplification or converting fractions at this stage.</p>	<p>What fraction is shaded?</p>   	<p><i>The whole is divided into twelve equal parts, and nine of them are shaded.</i></p> $\frac{9}{12}$ <p><i>The whole is divided into four equal parts, and three of them are shaded.</i></p> $\frac{3}{4}$ <p><i>Nine twelfths is equivalent to three quarters.</i></p> $\frac{9}{12} = \frac{3}{4}$

Y3

Y3


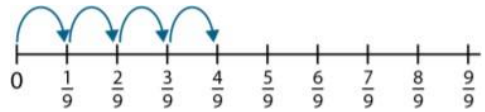
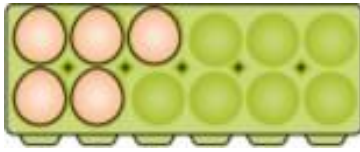
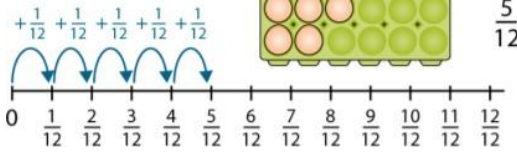
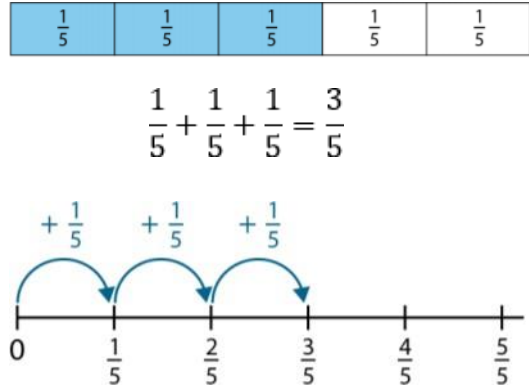
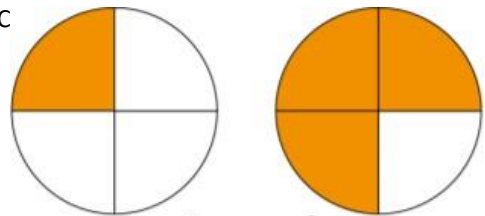
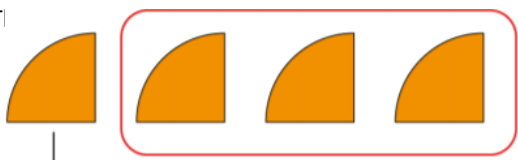
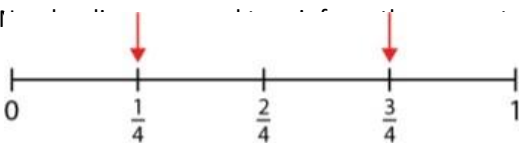
FRACTIONS

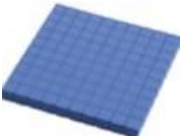

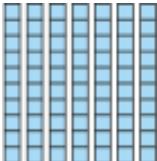

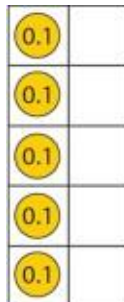
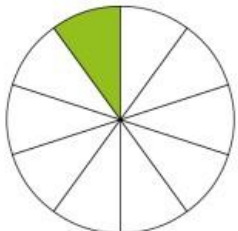
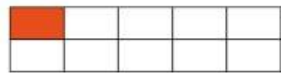
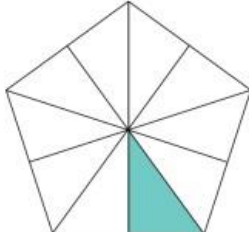
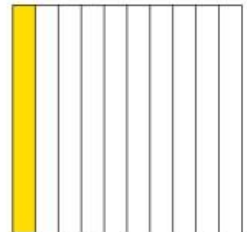
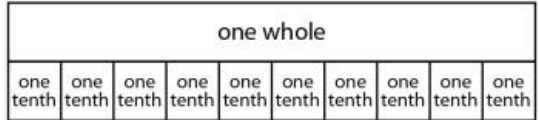
Objective, Strategy & Key Vocabulary	Notes	Discrete	Linear
<p>Show using diagrams that some fractions may be expressed in more than one way.</p> <p>(introducing equivalence)</p> <p>NC Recognise and show, using diagrams, equivalent fractions with small denominators.</p>	<p>Pupils work with examples to show how fractions may be expressed in more than one way.</p>	<p>Can you show $\frac{4}{5}$?</p>  <p>How else can you express this fraction?</p>	<p>What fraction of the line is shaded?</p> <p>Can you see more than one?</p> 

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
<p>Adding & subtracting fractions with the same denominator within one whole.</p> <p>Repeated addition of a unit fraction results in a non-unit fraction—counting in unit fractions.</p> <p>NCETM 3.3 TP 5</p>	<p><i>It is helpful to count in unit fractions:</i></p>     <p style="text-align: center;">⋮</p>   <p><i>One-ninth, two-ninths nine-ninths</i></p> <p>also</p> <p><i>One-ninth, two one-ninths nine one-ninths</i></p>	    <p style="text-align: center;">⋮</p>   <p><i>One-twelfth, two-twelfths twelve-twelfths</i></p> <p>also</p> <p><i>One-twelfth, two one-twelfths twelve one-twelfths</i></p>	    <p style="text-align: center;">⋮</p>   <p><i>One-fifth, two-fifths five-fifths</i></p> <p>also</p> <p><i>One-fifth, two one-fifths five one-fifths</i></p>

Y3 FRACTIONS

Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
<p>Adding & subtracting fractions with the same denominator within one whole.</p> <p>Repeated addition of a unit fraction results in a non-unit fraction—adding like unit fractions</p> <p>NCETM 3.4 TP 1, 2, 3, 4</p>	 $\frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9} = \frac{4}{9}$ 	 $\frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} = \frac{5}{12}$ 	 $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{3}{5}$
<p>Compare and order unit fractions with the same denominator.</p> <p>NCETM 3.2 TP 5</p>	<p>C</p>  $\frac{1}{4} < \frac{3}{4}$	<p>T</p>  $\frac{1}{4} < \frac{3}{4}$	<p>L</p>  $\frac{1}{4} < \frac{3}{4}$
<p>Verbal reasoning is used to show a fourth method for comparison.</p> <p>'$\frac{1}{4}$' is one lot of '$\frac{1}{4}$' '$\frac{3}{4}$' is three lots of '$\frac{1}{4}$' 'I know that <u>one</u> is less than <u>three</u>...' ...so '$\frac{1}{4}$' is less than '$\frac{3}{4}$'</p>			

Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10</p> <p><i>Children link back to decimals work and</i></p> <p><i>Children use place value counters and grids and exchange 1 for ten 0.1 counters</i></p>	<p>Represents 1</p>  <p>represents 1 tenth</p>  <p>0.7</p>  <p><i>Children use place value counters and grids and exchange 1 for ten 0.1 counters</i></p>  <p>Children represent fractions and make decimal links using ten frames.</p>  <p>0.5 = $\frac{5}{10}$</p> <p>0.5</p>	<p>Shapes:</p>     <p>Bar model:</p> 	<p>1 tenth = $\frac{1}{10}$</p> <p>2 tenths = $\frac{2}{10}$</p> <p>3 tenths = $\frac{3}{10}$</p> <p>4 tenths = $\frac{4}{10}$</p> <p>5 tenths = $\frac{5}{10}$</p> <p>6 tenths = $\frac{6}{10}$</p> <p>7 tenths = $\frac{7}{10}$</p> <p>8 tenths = $\frac{8}{10}$</p> <p>9 tenths = $\frac{9}{10}$</p> <p>10 tenths = $\frac{10}{10}$</p>

Y3 FRACTIONS

Objective, Strategy & Key Vocabulary

Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10

Links to measures are made including capacity, mass and length

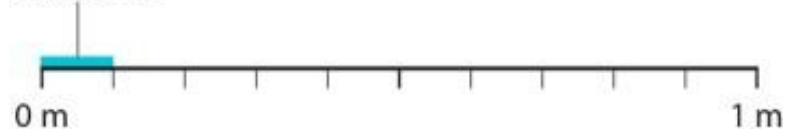
Measures



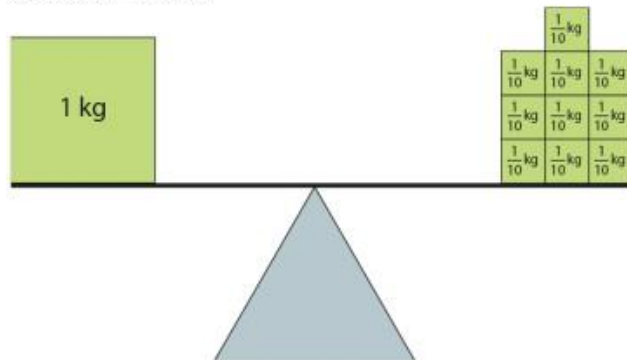
'The litre jug is divided into ten equal parts and there is water up to the seventh mark; this is seven tenths of a litre.'

Measures – length:

one tenth of a metre



Measures – mass:



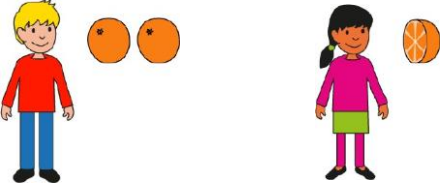
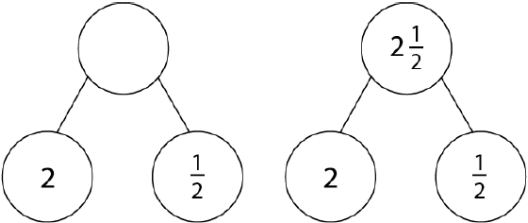
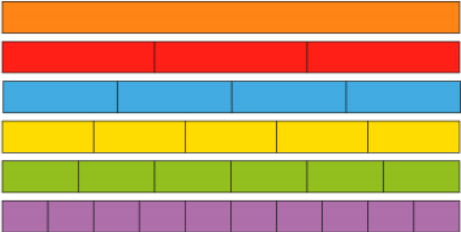

Y3

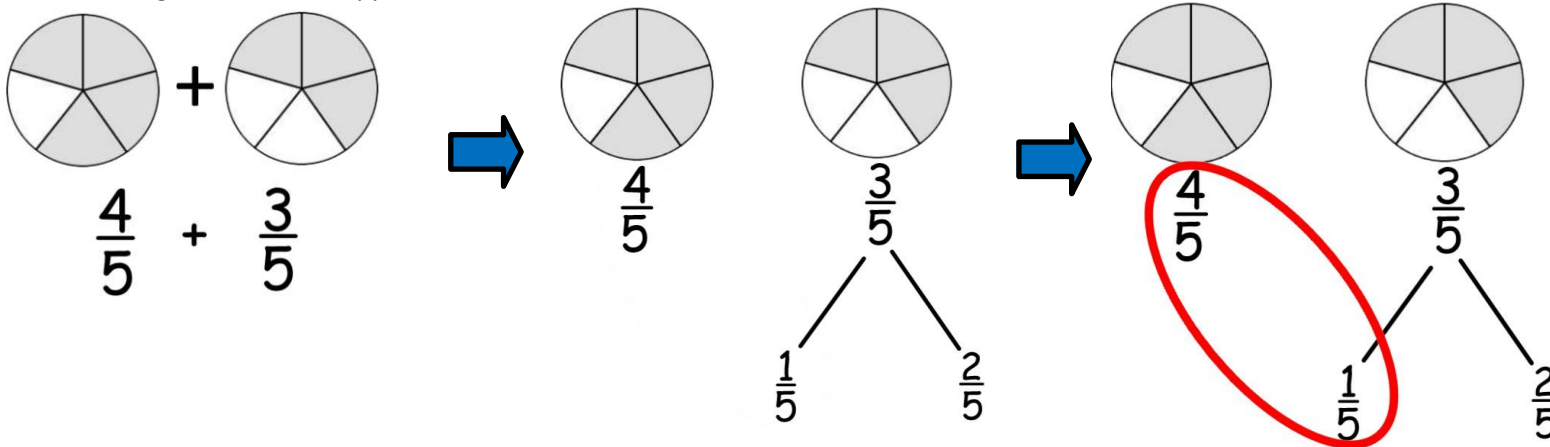
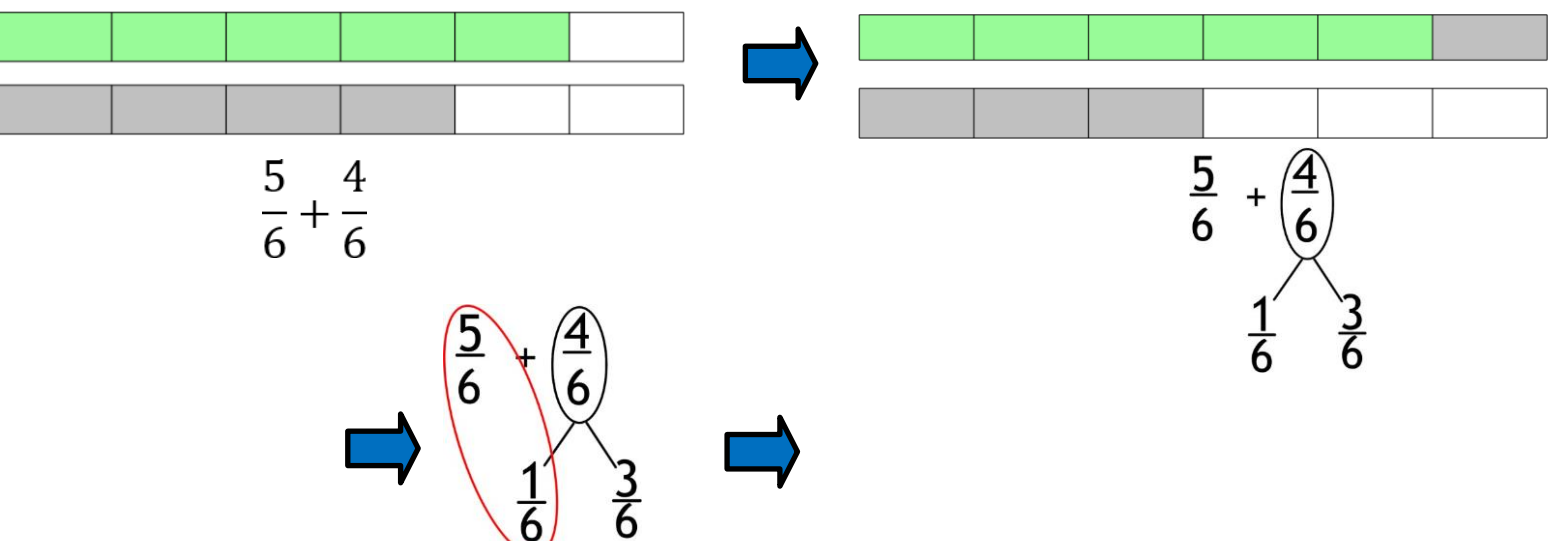
Y3

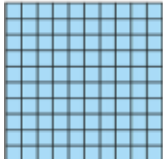

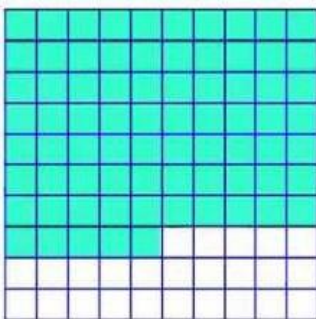
FRACTIONS

Y4

FRACTIONS

Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>Understand mixed numbers as parts and wholes</p> <p>NCETM 3.5 TP1</p>	 <p>How many oranges?</p> <p>There are two whole oranges and one half orange. There are two and a half oranges altogether</p>		$1 + \frac{1}{2} = 1\frac{1}{2}$
<p>Compare and order unit fractions .</p> <p>NCETM 3.2 TP 5</p> <p>Important teaching point—</p> <p><i>When comparing fractions, the whole has to be the same.</i></p>	<p>Using pieces of ribbon or paper strips, children create a fraction wall to investigate which lines have the fewest/most parts and then label compare unit fractions.</p> <ul style="list-style-type: none"> • Which coloured strip has the most equal parts? • Which coloured strip has the fewest equal parts? 	<p>Move to diagrams of fraction walls</p>  $\frac{1}{3} > \frac{1}{4} > \frac{1}{5} > \frac{1}{6} > \frac{1}{10}$	$\frac{1}{3} > \frac{1}{4} > \frac{1}{5} > \frac{1}{6} > \frac{1}{10}$

Objective, Strategy & Key Vocabulary	Area and Linear
<p>Add and subtract fractions with the same denominator. (over 1 whole)</p>	<p>Pie/Linear diagrams used to support</p>  <p>$\frac{4}{5} + \frac{3}{5} = 1\frac{2}{5}$</p>
	 <p>$\frac{5}{6} + \frac{4}{6} = 1\frac{1}{6}$</p>

Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract										
<p>Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten</p>	<p>Children represent hundredths using Dienes</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>one</p>  </div> <div style="text-align: center;"> <p>one hundredth</p>  </div> </div> <p>Children use ten frames to represent 1 tenth and place value counters.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 20px;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td>0.01</td><td>0.01</td></tr> <tr><td>0.01</td><td>0.01</td></tr> <tr><td>0.01</td><td>0.01</td></tr> <tr><td>0.01</td><td>0.01</td></tr> <tr><td>0.01</td><td>0.01</td></tr> </table> </div> <div style="text-align: center;"> $\frac{10}{100} = \frac{1}{10}$ </div> </div>	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	<p>Link pictorial representation to fraction notation</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> $\frac{28}{100} = 0.28$ </div> </div>	<p>Link hundredths notation to tenth fraction notation and decimals.</p> <p>1 hundredths = $\frac{1}{100}$</p> <p>2 hundredths = $\frac{2}{100}$</p> <p>3 hundredths = $\frac{3}{100}$</p> <p>4 hundredths = $\frac{4}{100}$</p> <p>5 hundredths = $\frac{5}{100}$</p> <p>6 hundredths = $\frac{6}{100}$</p> <p>7 hundredths = $\frac{7}{100}$</p> <p>8 hundredths = $\frac{8}{100}$</p> <p>9 hundredths = $\frac{9}{100}$</p>
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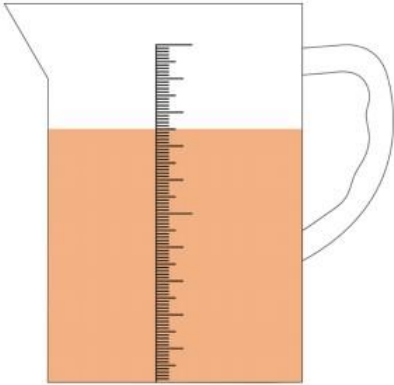
**Objective, Strategy
& Key Vocabulary**

Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten.

Explore hundredths in measures including capacity and length.

Measures

Measures context:




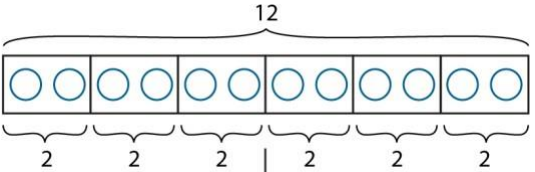
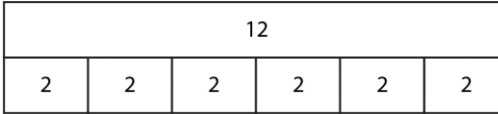
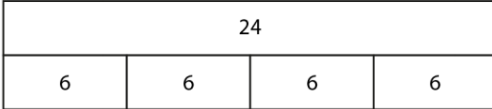
'The litre jug is divided into one hundred equal parts and there is water up to the seventy-fifth mark; this is seventy-five hundredths of a litre.'



'The whole is one metre. One metre is divided into one hundred centimetres. One centimetre is equal to one hundredth of a metre.'

Y4

FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
<p>Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</p> <p>Chn are now ready to make the link to finding a unit fraction of a quantity.</p> <p>NCETM 3.3 TP2</p>	<p style="text-align: center;">$\frac{1}{6}$ of 12</p>  <p>This use of x to replace 'of' is then introduced.</p> <p style="text-align: center;">$\frac{1}{6} \text{ of } 12 = \frac{1}{6} \times 12$</p>	 <p style="text-align: center;">12</p>	 <p>Each part is $\frac{1}{6}$ of the whole.</p> <p>$\frac{1}{6}$ of 12 is 2</p> <p>$\frac{1}{4} \times 24 =$</p>  <p>$24 \div 4 = 6$</p> <p>So,</p> <p>$\frac{1}{4} \times 24 = 6$</p> <p>Children are reminded of commutative rule.</p> <p style="text-align: center;">$\frac{1}{4} \times 24$ and $24 \times \frac{1}{4}$.</p>
			<p>The link with mental division is made in order to find unit fractions of a quantity without the use of short division.</p> <p>$\frac{1}{8}$ of 24 = 3 $\frac{1}{7}$ of 28 = 4</p>

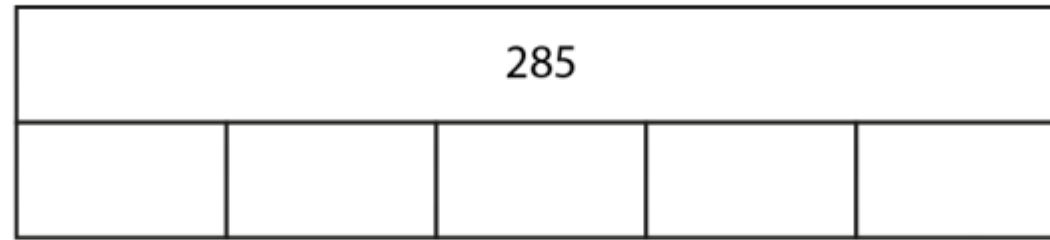
**Objective, Strategy
& Key Vocabulary**

Written methods, supported by diagrams

Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number

Children move to finding fraction of a quantity where a written method is needed for the calculation

$$\frac{1}{5} \text{ of } 285 =$$


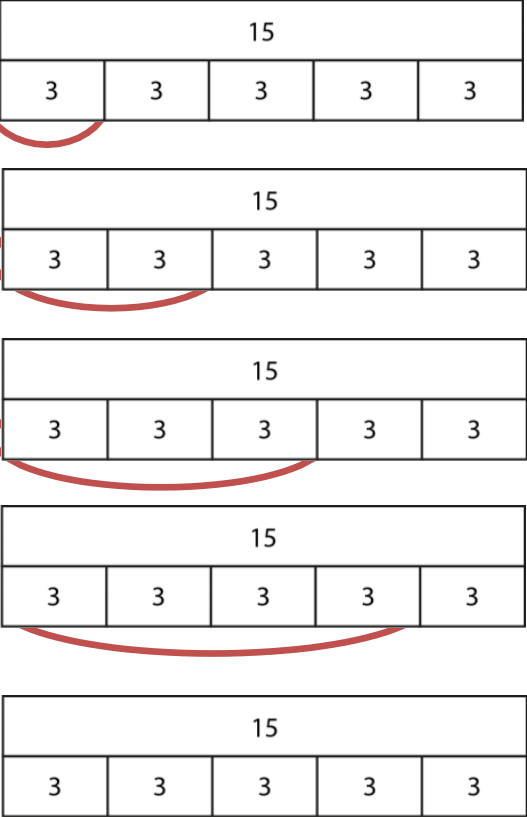


$$\begin{array}{r} 057 \\ 5 \overline{) 285} \end{array}$$

$$285 \div 5 = 57$$

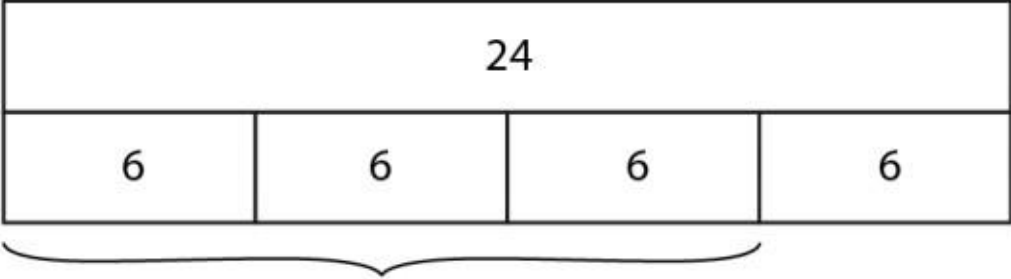
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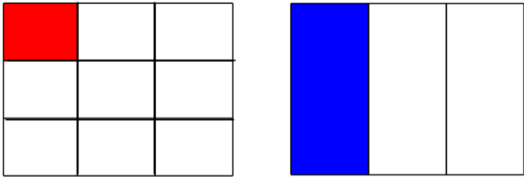
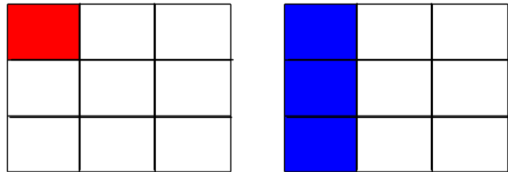
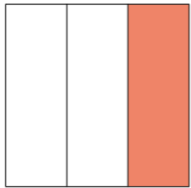
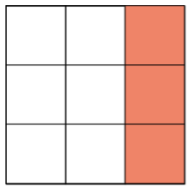
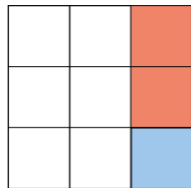
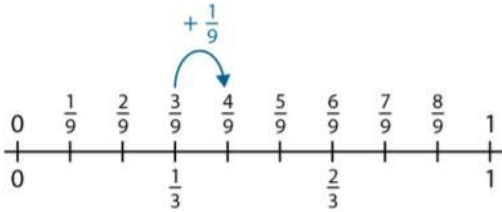
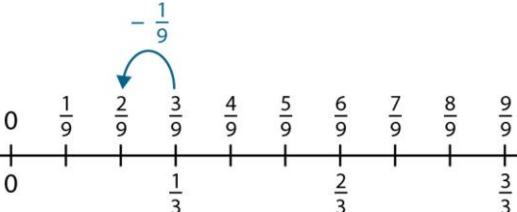
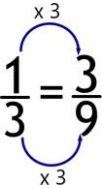
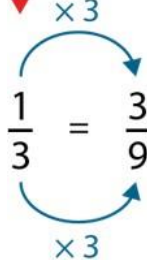
FRACTIONS

Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</p> <p>Move to finding non-unit fractions of a quantity</p> <p>NCETM 3.6 TP 3, 4, 5</p>	<p>Representing counting in $\frac{1}{5}$ of 15 as equations:</p> 		$\frac{1}{5} \times 15 = 3$ $\frac{2}{5} \times 15 = 6$ $\frac{3}{5} \times 15 = 9$ $\frac{4}{5} \times 15 = 12$ $\frac{5}{5} \times 15 = 15$

Y4

FRACTIONS

Objective, Strategy & Key Vocabulary	Methods supported by diagrams (if needed)
<p>Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</p> <p>Move to finding non-unit fractions of a quantity</p> <p>NCETM 3.6 TP 3,4,5</p>	<p>$\frac{3}{4} \times 24 =$</p>  <p>$24 \div 4 = 6$</p> <p>$\frac{1}{4} \times 24 = 6$</p> <p>$\frac{3}{4} \times 24 = 18$</p> <p><i>'To calculate $\frac{3}{4} \times 24$, find $\frac{1}{4}$ of 24 and then multiply by 3.'</i></p> <p>It is vital that children solve questions which expose them further to the commutative rule.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> $24 \times \frac{2}{5}$ $30 \times \frac{4}{6}$ </div> <div style="text-align: center;"> $\frac{7}{8} \times 56$ $\frac{2}{3} \times 13$ </div> </div>

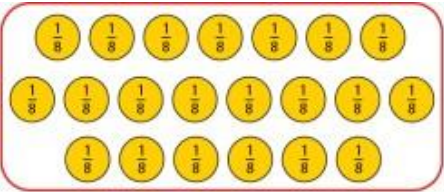
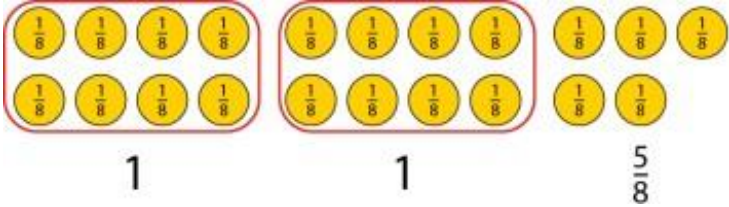
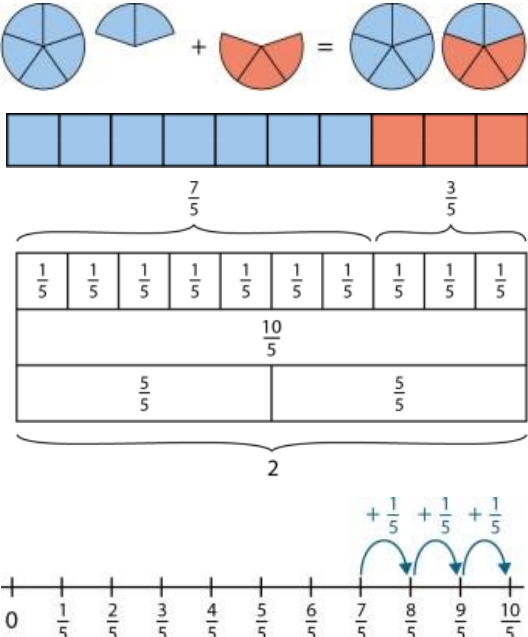
Objective, Strategy & Key Vocabulary	Area	Linear	Abstract
Add and subtract related fractions. NCETM 3.8 TP 1, 2, 3	<div style="display: flex; justify-content: space-around; align-items: center;">  </div> $\frac{1}{9} + \frac{1}{3}$ <div style="display: flex; justify-content: space-around; align-items: center;">  </div> $\frac{1}{9} + \frac{3}{9}$ <div style="display: flex; justify-content: space-around; align-items: center;">  </div> $\frac{1}{3} - \frac{1}{9}$ <div style="display: flex; justify-content: space-around; align-items: center;">  </div> $\frac{1}{3} - \frac{1}{9}$ <div style="display: flex; justify-content: space-around; align-items: center;">  </div> $\frac{1}{3} - \frac{1}{9}$	<div style="display: flex; justify-content: center; align-items: center;">  </div> <div style="display: flex; justify-content: center; align-items: center; margin-top: 20px;">  </div>	<div style="display: flex; justify-content: center; align-items: center; margin-bottom: 20px;">  </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 20px;"> $\frac{1}{9} + \frac{1}{3}$ </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 20px;"> $\frac{1}{9} + \frac{3}{9} = \frac{4}{9}$ </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 20px;"> $\frac{1}{3} - \frac{1}{9} =$ </div> <div style="display: flex; justify-content: center; align-items: center; margin-bottom: 20px;">  </div> <div style="display: flex; justify-content: center; align-items: center;"> $\frac{3}{9} - \frac{1}{9} = \frac{2}{9}$ </div>

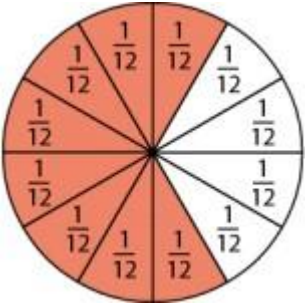

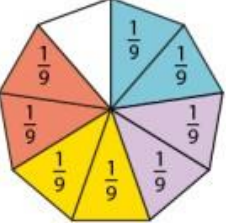

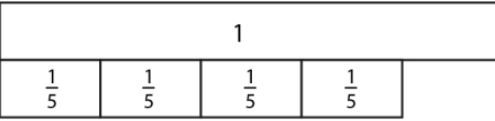

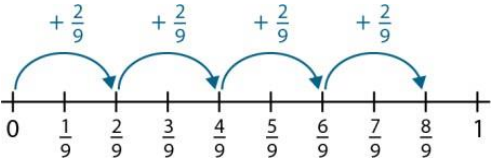
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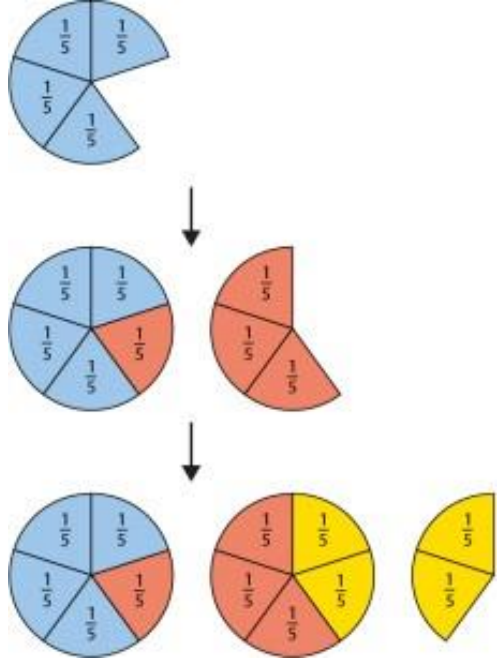
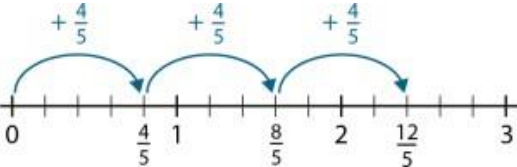
FRACTIONS

Y5 FRACTIONS

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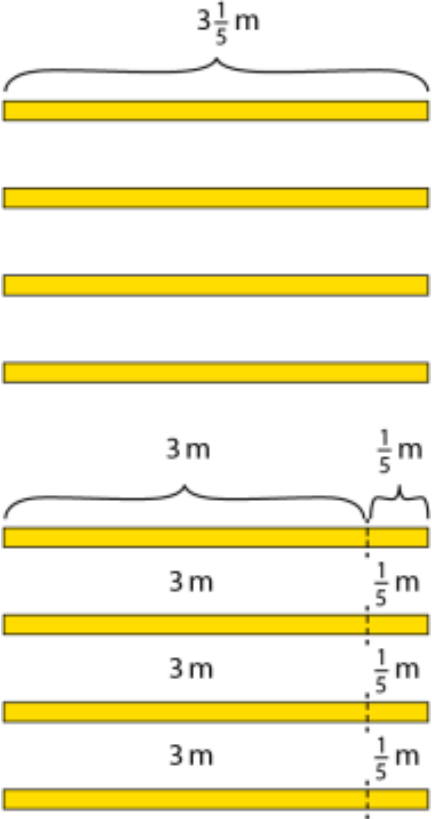
Objective, Strategy & Key Vocabulary	Pictorial	Abstract												
<p>Convert from Improper fractions to mixed numbers.</p> <p>NCETM 3.5 TP5</p>	<p>Counters can be marked with dry wipe pens to represent unit fractions.</p>  $\frac{21}{8}$ <p>Our unit is eighths so we will be thinking about groups of eight.</p> <p>There are $\frac{8}{8}$ in one whole.</p> 	<table border="1"> <thead> <tr> <th>Improper fraction</th> <th>Prompt question</th> <th>Mixed number</th> </tr> </thead> <tbody> <tr> <td>$\frac{21}{10}$</td> <td>How many groups of $\frac{10}{10}$ in $\frac{21}{10}$? (2 groups and 1 more tenth.)</td> <td>$2\frac{1}{10}$</td> </tr> <tr> <td>$\frac{21}{9}$</td> <td>How many groups of $\frac{9}{9}$ in $\frac{21}{9}$? (2 groups and 3 more ninths.)</td> <td>$2\frac{3}{9}$</td> </tr> <tr> <td>$\frac{21}{8}$</td> <td>How many groups of $\frac{8}{8}$ in $\frac{21}{8}$? (2 groups and 5 more eighths.)</td> <td>$2\frac{5}{8}$</td> </tr> </tbody> </table>	Improper fraction	Prompt question	Mixed number	$\frac{21}{10}$	How many groups of $\frac{10}{10}$ in $\frac{21}{10}$? (2 groups and 1 more tenth.)	$2\frac{1}{10}$	$\frac{21}{9}$	How many groups of $\frac{9}{9}$ in $\frac{21}{9}$? (2 groups and 3 more ninths.)	$2\frac{3}{9}$	$\frac{21}{8}$	How many groups of $\frac{8}{8}$ in $\frac{21}{8}$? (2 groups and 5 more eighths.)	$2\frac{5}{8}$
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$\frac{21}{8}$	How many groups of $\frac{8}{8}$ in $\frac{21}{8}$? (2 groups and 5 more eighths.)	$2\frac{5}{8}$												
<p>Write mathematical statements >1 as a mixed number (e.g. $2\frac{2}{5} + 4\frac{4}{5} = 6\frac{6}{5} = 11\frac{1}{5}$)</p> <p>NCETM 3.5 TP3</p>		$\frac{7}{5} + \frac{3}{5} = \frac{10}{5} = 2$												

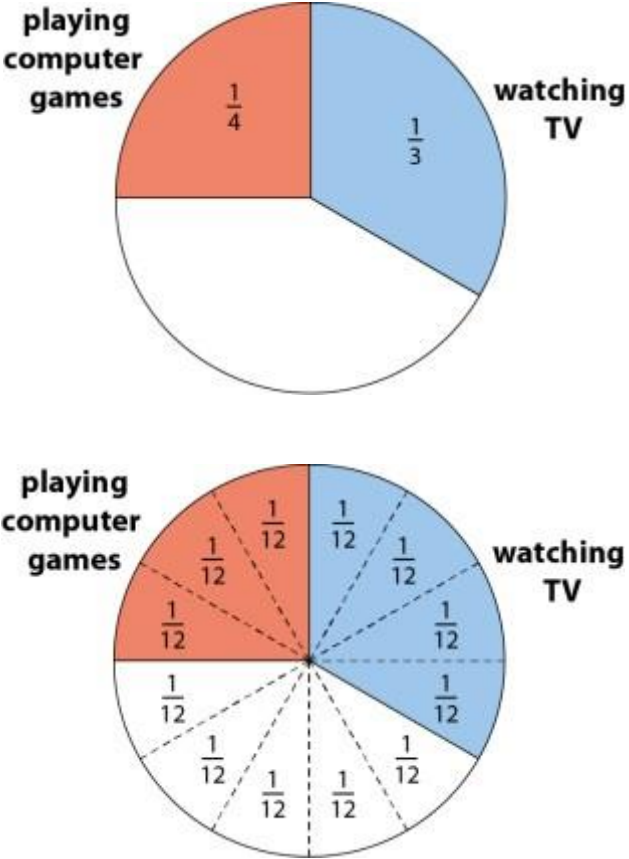
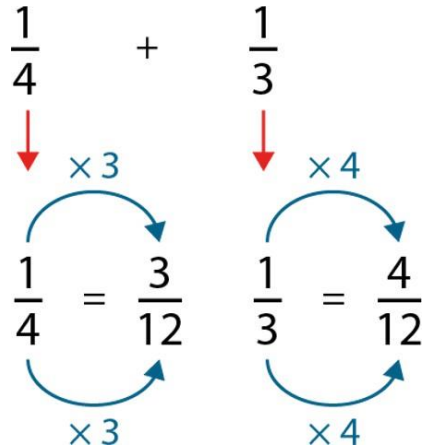
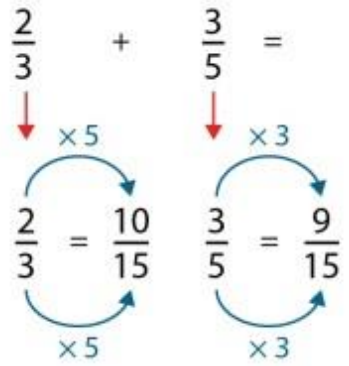
Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
<p>Multiply proper fractions by whole numbers, supported by materials and diagrams.</p> <p>NCETM 3.6 TP1</p> <p>Pupils have previously looked at finding fraction of a quantity and how 'of' can be replaced with x in year 4.</p>	<p>First investigate this with unit fractions</p>  $\frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} = 8 \times \frac{1}{12}$ $\frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} = \frac{1}{12} \times 8$ <p>Then move to non-unit fractions</p>  $\frac{3}{8} + \frac{3}{8} = \frac{3}{8} = 3 \times \frac{3}{8}$ $\frac{3}{8} + \frac{3}{8} = \frac{3}{8} = \frac{3}{8} \times 3$ 	<p>Children are reminded of the commutative aspect of multiplication which also applies to fractions.</p>  $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 4 \times \frac{1}{8}$ $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{1}{8} \times 4$	 $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = \frac{1}{5} \times 4$ $\frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} = 4 \times \frac{1}{5}$  $\frac{2}{10} + \frac{2}{10} + \frac{2}{10} = 3 \times \frac{2}{10}$ $\frac{2}{10} + \frac{2}{10} + \frac{2}{10} = \frac{2}{10} \times 3$  $\frac{2}{9} + \frac{2}{9} + \frac{2}{9} + \frac{2}{9} = \frac{8}{9}$ $4 \times \frac{2}{9} = \frac{8}{9}$ $\frac{2}{9} \times 4 = \frac{8}{9}$

Objective, Strategy & Key Vocabulary	Area	Linear	Abstract
<p>Multiply proper fractions by whole numbers, supported by materials and diagrams.</p> <p>Continued...</p>			$\frac{3}{5} \times 4 = \frac{12}{5} = 2\frac{2}{5}$ <p>Explore the commutative rule which also applies to fractions</p> $4 \times \frac{3}{5} = \frac{12}{5} = 2\frac{2}{5}$

Y5 FRACTIONS

Y5 FRACTIONS

Objective, Strategy & Key Vocabulary	Real Life/Pictorial	Abstract
<p>Multiply mixed numbers by whole numbers, supported by materials and diagrams.</p> <p>NCETM 3.5 TP 1 & 2</p>	<p>$3\frac{1}{5}$ of ribbon is needed to decorate one wedding cake.</p> <p>How much is needed for 4 cakes?</p> 	<p>$3\text{ m} \times 4 = 12\text{ m}$</p> <p>$\frac{1}{5}\text{ m} \times 4 = \frac{4}{5}\text{ m}$</p> <p>$12\text{ m} + \frac{4}{5}\text{ m} = 12\frac{4}{5}\text{ m}$</p> <p>Example 1:</p> $3\frac{1}{5} \times 4 = \underbrace{3 \times 4}_{12} + \underbrace{\frac{1}{5} \times 4}_{\frac{4}{5}} = 12\frac{4}{5}$ <p>Example 2:</p> $3\frac{1}{5} \times 4 = 12\frac{4}{5}$ <p style="text-align: center;"> $3 \times 4 = 12$ $\frac{1}{5} \times 4 = \frac{4}{5}$ </p> <p>Example 3:</p> $\begin{array}{r} 3\frac{1}{5} \times 4 \\ \times 4 \quad \times 4 \\ \hline 12 \quad \frac{4}{5} \end{array} = 12\frac{4}{5}$

Objective, Strategy & Key Vocabulary	Real Life/Pictorial	Abstract
<p>Add and subtract non-related fractions</p> <p>NCETM 3.8 TP4</p>	<p>How much time is spent watching TV and playing computer games in total?</p> 	<p>Children are asked to think of a denominator that is a multiple of 4 and a multiple of 3.</p> $\frac{1}{4} + \frac{1}{3}$  <p>Where appropriate, answers should be converted to mixed numbers.</p> $\frac{2}{3} + \frac{3}{5} =$  $\frac{10}{15} + \frac{9}{15} = \frac{19}{15}$ $= 1\frac{4}{15}$

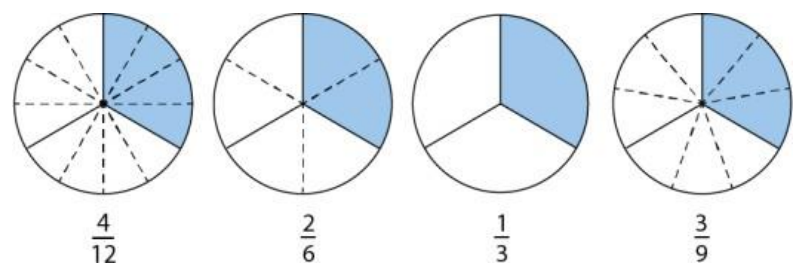
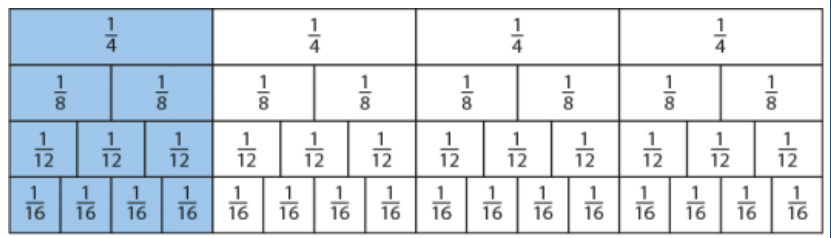
Objective, Strategy & Key Vocabulary

Use common factors to simplify fractions.

Use common multiples to express fractions in the same denomination.

NCETM 3.7 TP3

Pictorial



Abstract

$$\frac{1}{7} = \frac{2}{14} = \frac{3}{21} = \frac{4}{28} = \frac{5}{35} = \frac{6}{42} = \frac{7}{49}$$

Children are asked to find the highest common factor of the numerator and denominator.

Highest Common Factor is 4

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

$\div 4$

 $\div 4$

Progress to applying this principle when simplifying to mixed numbers. Method 1:

$$\frac{20}{12} = \frac{5}{3} = 1\frac{2}{3}$$

$\div 4$

 $\div 4$

Method 2:

$$\frac{20}{12} = 1\frac{8}{12} = 1\frac{2}{3}$$

$\div 4$

 $\div 4$

**Objective, Strategy
& Key Vocabulary**

Abstract

Add and subtract mixed numbers, using the concept of equivalent fractions

Method 1

$$\begin{array}{l} 3\frac{1}{2} + 1\frac{1}{6} \\ \downarrow \\ \frac{3}{6} \end{array} \quad \begin{array}{l} 3 + 1 = 4 \\ \frac{3}{6} + \frac{1}{6} = \frac{4}{6} \\ 4 + \frac{4}{6} = 4\frac{4}{6} \end{array}$$

Method 2

$$\begin{array}{l} 3\frac{1}{2} + 1\frac{1}{6} \\ \downarrow \\ \frac{7}{2} + \frac{7}{6} \\ \downarrow \\ \frac{21}{6} + \frac{7}{6} = \frac{28}{6} = 4\frac{4}{6} \end{array}$$

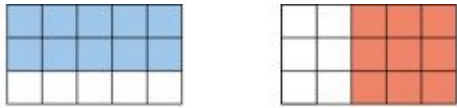

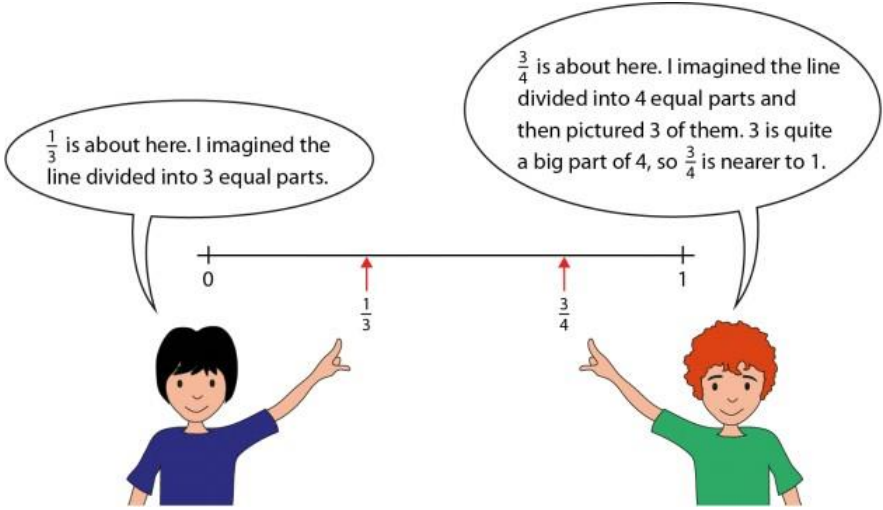
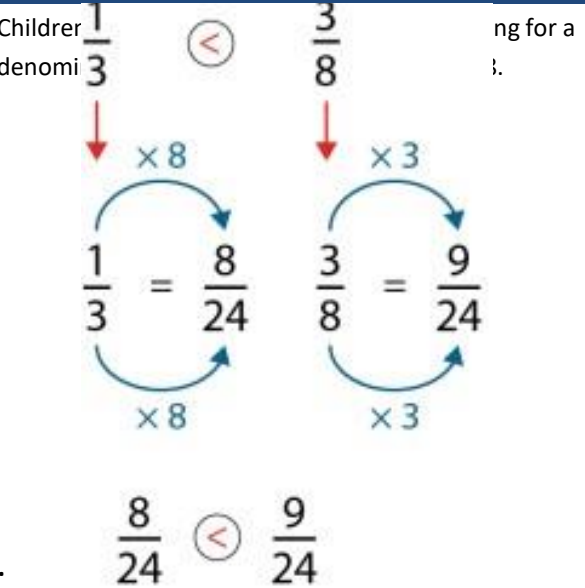
Method 1 (only effective when breaking the whole not needed)

$$\begin{array}{l} 2\frac{1}{2} - 1\frac{2}{5} \\ 2 - 1 = 1 \\ \frac{1}{2} - \frac{2}{5} \\ \downarrow \quad \downarrow \\ \frac{5}{10} - \frac{4}{10} = \frac{1}{10} \end{array} \rightarrow 1\frac{1}{10}$$

Method 2

$$\begin{array}{l} 2\frac{1}{2} - 1\frac{2}{5} \\ \downarrow \quad \downarrow \\ \frac{5}{2} - \frac{7}{5} \\ \downarrow \quad \downarrow \\ \frac{25}{10} - \frac{14}{10} = \frac{11}{10} = 1\frac{1}{10} \end{array}$$

Y6
FRACTIONS

Objective, Strategy & Key Vocabulary	Pictorial	Abstract
<p>Compare and order fractions, including fractions >1</p> <p>Compare using common denominators</p> <p>NCETM 3.8 TP5</p>	<p>Jack has painted $\frac{2}{3}$ of his wall. Jane has painted $\frac{3}{5}$ of his wall. Who has painted a greater proportion of their wall?</p>  <p>I have tiled $\frac{2}{3}$ of the wall.</p> <p>I have tiled $\frac{3}{5}$ of the wall.</p>  <p>Jack Jane</p> <p>Ask pupils to visualise where these fractions are on the number line.</p> 	<p>Childre denomi</p>  <p>$\frac{1}{3} = \frac{8}{24}$</p> <p>$\frac{3}{8} = \frac{9}{24}$</p> <p>$\frac{8}{24} < \frac{9}{24}$</p> <p>ng for a .</p>

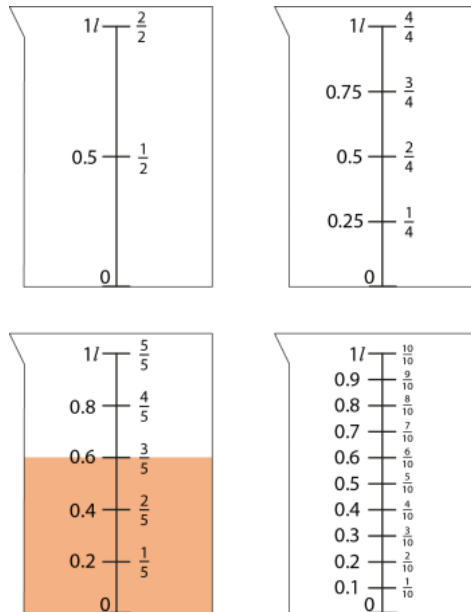
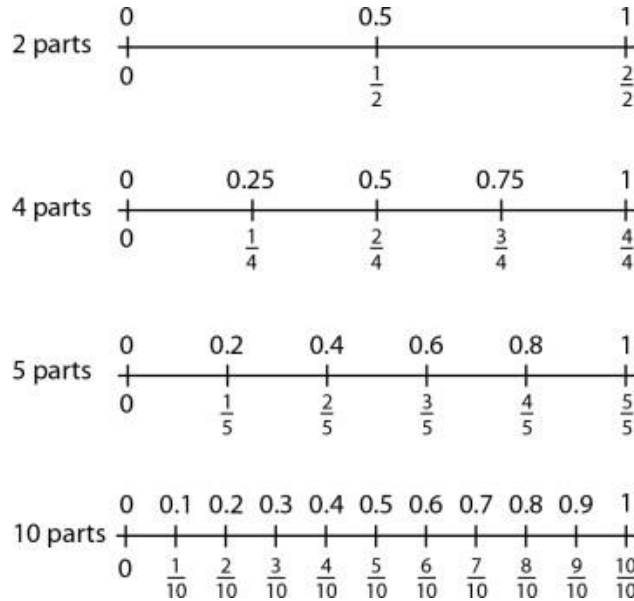
Y6 FRACTIONS

Objective, Strategy & Key Vocabulary

Associate a fraction with division to calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8)

NCETM 3.10 TP 1, 2

Linear/ Real Life



Abstract

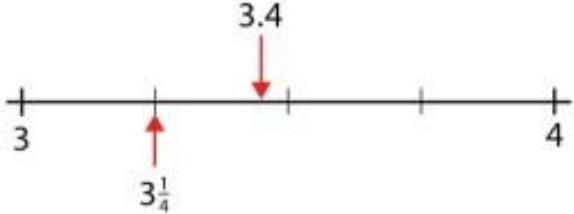
Method 1—use PV knowledge to convert a decimal to a fraction, then simplify.

$$0.375 = \frac{375}{1000} \xrightarrow{\div 125} \frac{3}{8}$$

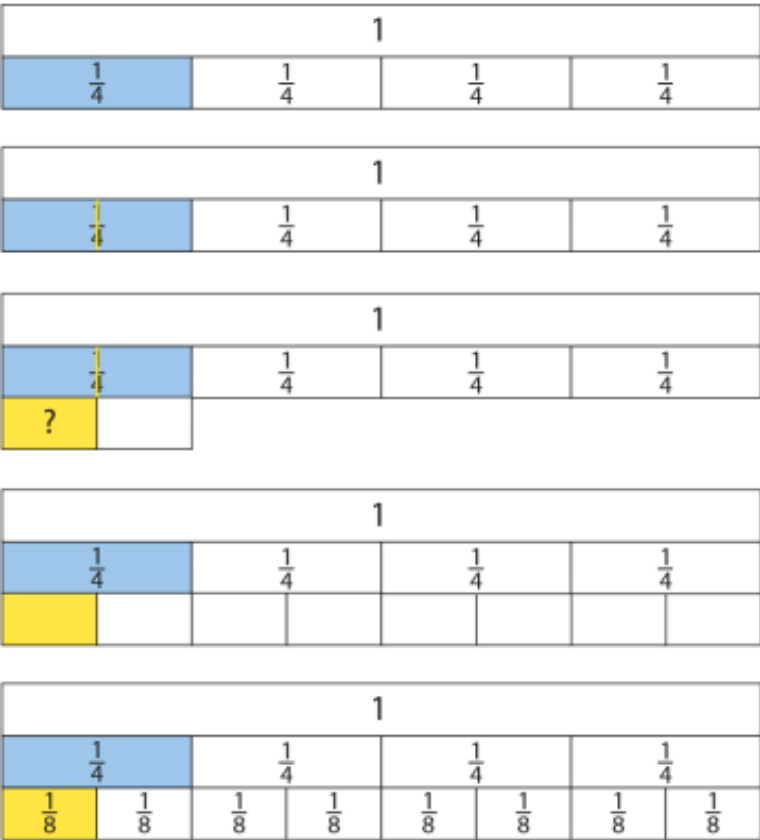
Method 2—use short division to divide the numerator by the denominator, including adding zeros after the decimal point

$$\frac{3}{8} = 0.375$$

Y6
FRACTIONS

Objective, Strategy & Key Vocabulary	Linear	Abstract
<p>Compare fractions and decimals by converting one to the other.</p> <p>NCETM 3.10</p>	<p>Method 3 – positioning on a number line:</p> 	<p>Method 1 – converting to decimals:</p> $3\frac{1}{4} \text{ } \textcircled{<} \text{ } 3.4$ $3\frac{1}{4} = 3.25$ $3.25 < 3.4$ <p>Method 2 – converting to fractions with a common denominator:</p> $3\frac{1}{4} \text{ } \textcircled{<} \text{ } 3.4$ $3.4 = 3\frac{4}{10} = 3\frac{16}{40}$ $3\frac{1}{4} = 3\frac{10}{40}$ $3\frac{10}{40} < 3\frac{16}{40}$

Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Linear	Abstract
<p>Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$)</p> <p>NCETM 3.9 TP1</p> <p>Refer back to key learning in year 4 when pupils have looked at the</p> <ul style="list-style-type: none"> to find $\frac{1}{4}$ of 20, for example, you need to divide 20 into four equal parts and then find one of those parts this can be expressed as both $\frac{1}{4} \times 20$ and $20 \times \frac{1}{4}$ 	<p style="text-align: center;">$\frac{1}{4} \times \frac{1}{2}$</p> 	<p>Draw attention to conceptual meaning before moving to rule.</p> <p>$\frac{1}{2}$ of $\frac{1}{4} = \text{half of a quarter} = \frac{1}{8}$</p> <p>$\frac{1}{2}$ of $\frac{1}{4} = \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$</p> <p>Children should understand that when we multiply a proper fraction by a proper fraction the product is always smaller than both the fractions being multiplied.</p> <p>Answers should be simplified where appropriate.</p> <p>Simplifying products:</p> <p>$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ (can't be simplified)</p> <p>$\frac{3}{4} \times \frac{1}{3} = \frac{\cancel{3}^1}{\cancel{12}_4} = \frac{1}{4}$</p> <p>$\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$ (can't be simplified)</p>

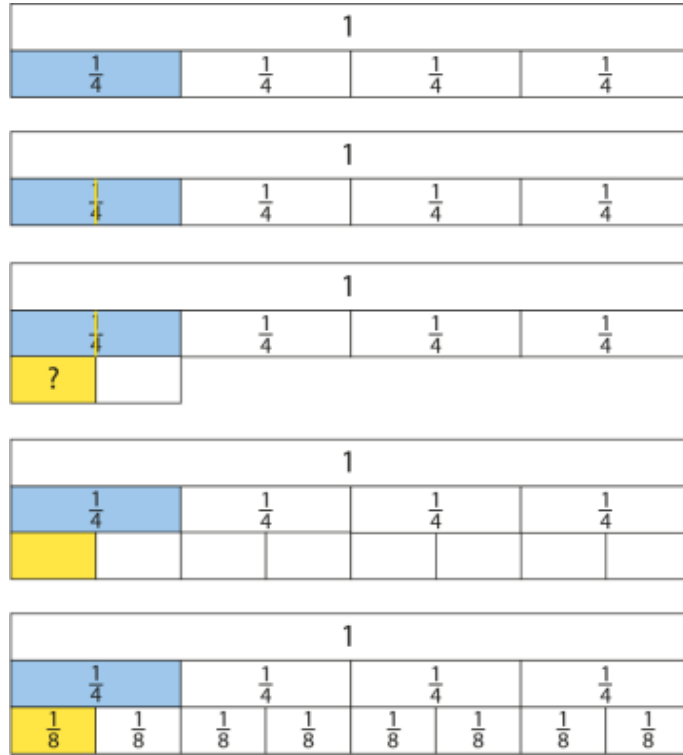
Objective, Strategy & Key Vocabulary

Divide proper fractions by whole numbers (e.g. $1/3 \div 2 = 1/6$).

NCETM 3.9 TP2

Pictorial

Draw attention to same image for $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$



Explore practically that this is the same as dividing a quarter between 2 and therefore can be written as:

$$\frac{1}{4} \div 2 = \frac{1}{8}$$

Abstract

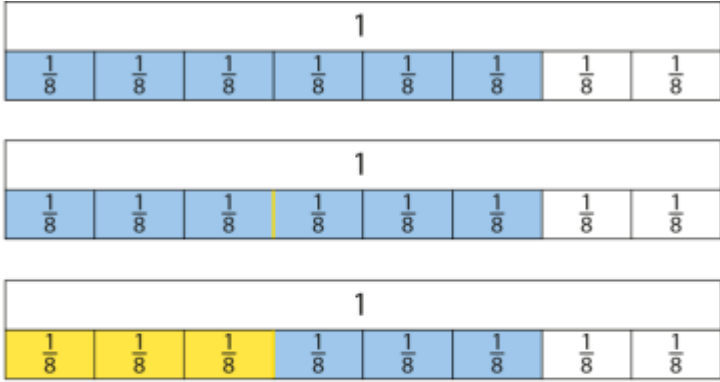
$$\frac{1}{4} \div 2 \longrightarrow \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$$

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

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

Y6

FRACTIONS

Objective, Strategy & Key Vocabulary	Pictorial	Abstract
<p>Divide proper fractions by whole numbers (e.g. $1/3 \div 2 = 1/6$).</p> <p>Continued....</p> <p>NCETM 3.9 TP2</p>	<p>If the numerator is a factor of the whole number, a more efficient strategy is used:</p> $\frac{6}{8} \div 2$  <p>$\frac{6}{8}$ is six one-eighths. If we divide six one-eighths into two equal groups then each of the groups has three one-eighths or $\frac{3}{8}$ in it.'</p> <p>'6 things divided between 2 , is 3 things'</p>	$\frac{6}{8} \div 2 = \frac{3}{8}$

Y6

FRACTIONS

