Progression in the teaching of fractions Year 1-6

Some images have been copied from NCETM PD materials

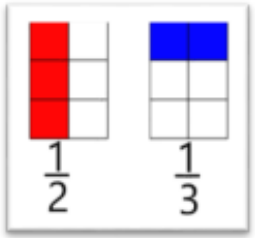
Y1-6

FRACTIONS

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

These include:

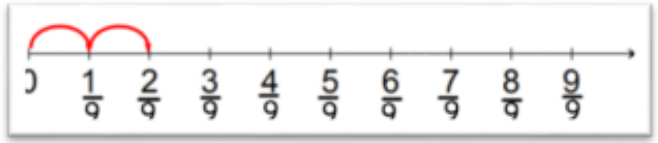
Area models



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

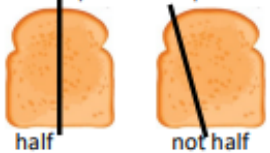
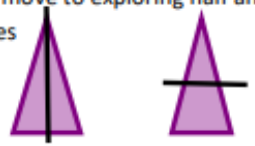
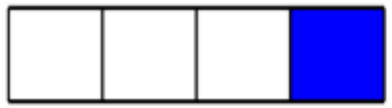
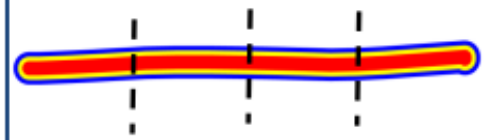
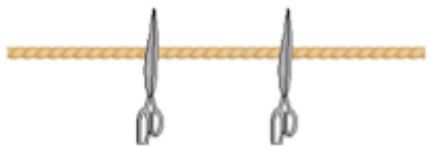
Discrete models

Linear models

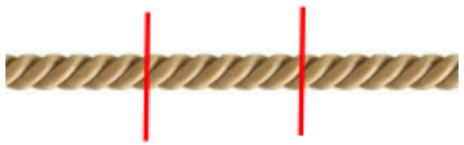


Where possible, links are made to real life and measures

Y1 FRACTIONS

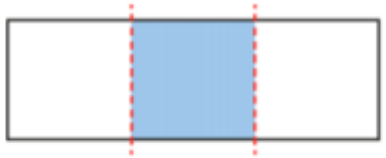
Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Name the fractions one-half, one-quarter and one-third in relation to a length, shape or set of objects.	Children explore the concept of something being less than 1 but more than zero. They begin with real objects exploring whether two parts are equal or not.  half not half They move to exploring half and not half of shapes  half not half *It has been split in half because there are two equal parts.*	Now children explore this same concept using small sets of objects.  half  not half	And finally using linear objects such as string or ribbon.  half  not half
	Once children have explored one half, they are then introduced to one-quarter as being one of four equal parts and similarly one-third as being one of three equal parts.  	 	 

Y2 FRACTIONS

Objective, Strategy & Key Vocabulary	Concrete/pictorial	Name	Written notation
Read and write the fraction notation $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ And relate these to a fraction of a length, shape or set of objects. Each fraction should be explored using area, discrete and linear models.		One-half	$\frac{1}{2}$
		One-quarter	$\frac{1}{4}$
		One-third	$\frac{1}{3}$

Fraction notation—taken from NCETM PD materials

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

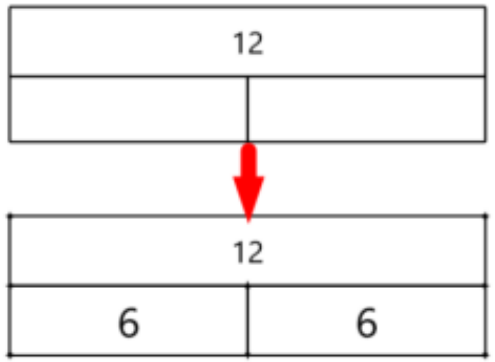
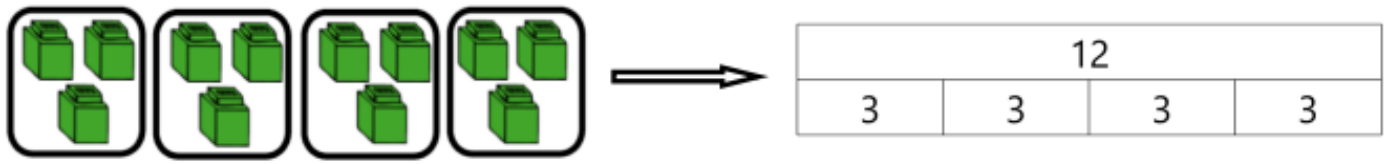
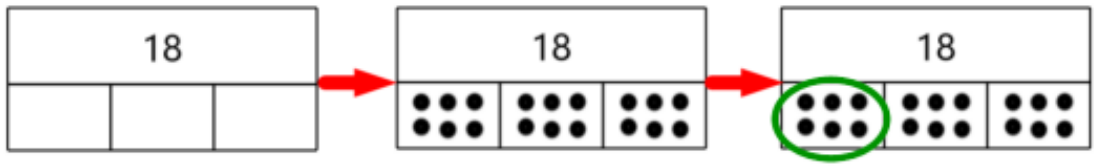
Model	Say	Write	Notation
 one-third	*'The rectangle has been divided…'*	Write the division bar.	$\frac{1}{3}$
	'…into 3 equal parts…'	Write '3' as the denominator.	
	'…and 1 of the parts is shaded.'	Write '1' as the numerator.	

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

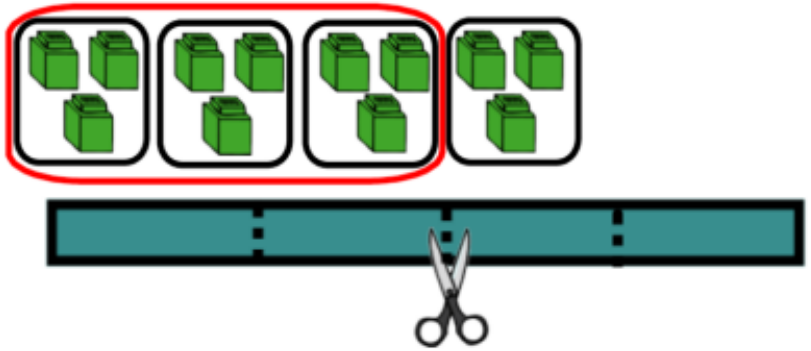
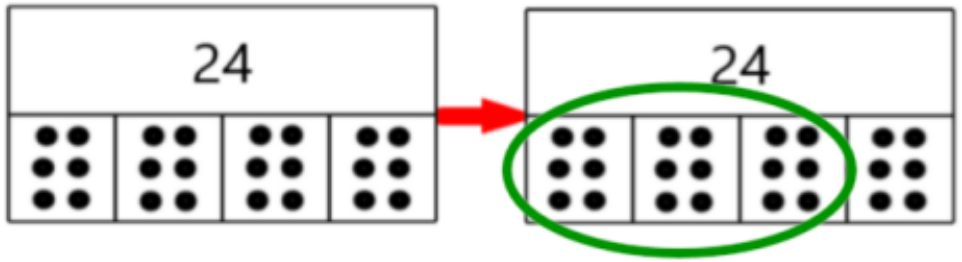
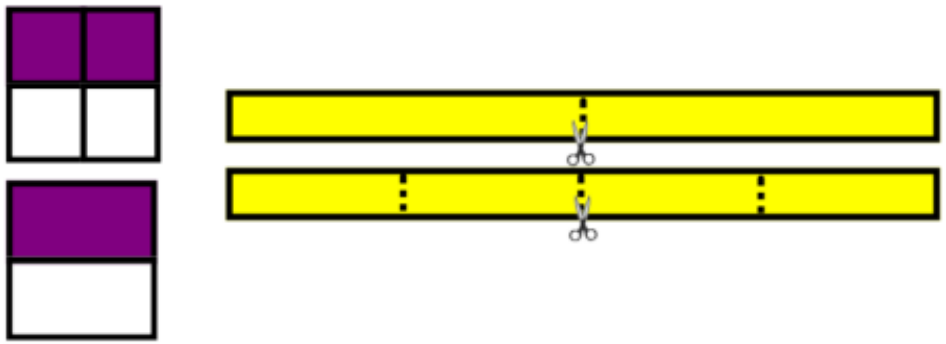
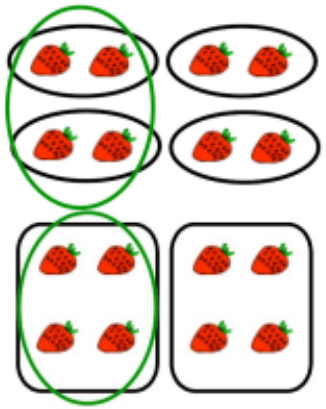
Y2

FRACTIONS

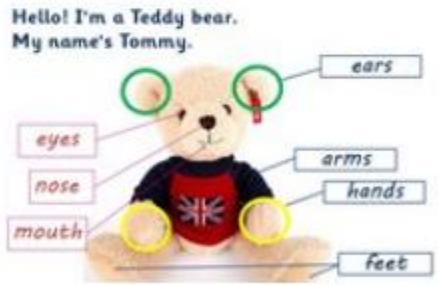
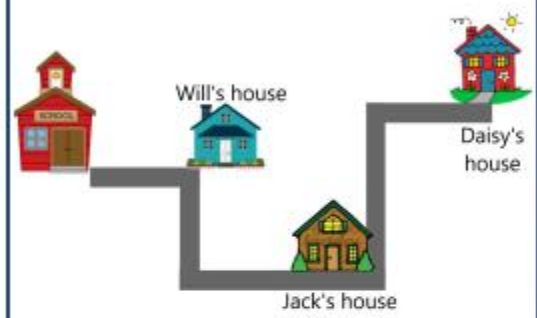
Y2 FRACTIONS

Objective, Strategy & Key Vocabulary	
Find half of numbers.	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. 
Find $\frac{1}{4}$ or $\frac{1}{3}$ of a number	Children in KS1 do not learn to divide by 3 or 4, therefore when finding ¼ and ⅓ of numbers, focus is given to the learning they have made dividing bar models and shapes in to 3 or 4 equal parts. **Find ¼ of 12** Children begin by using cubes to find quarters of numbers. This is then represented using the bar model.  Children follow this same sequence when finding ⅓ of numbers. Once pupils are confident, they use the bar model, drawing dots to find ¼ and⅓ of numbers 

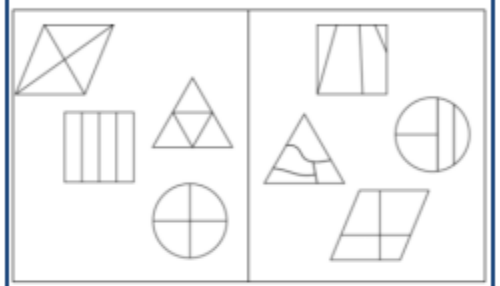
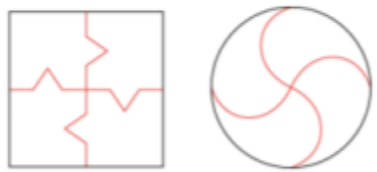
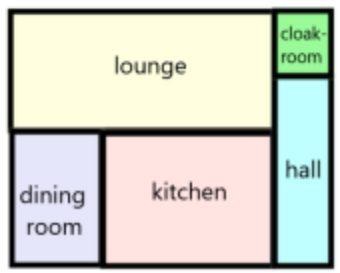
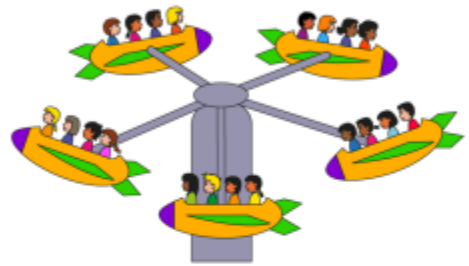
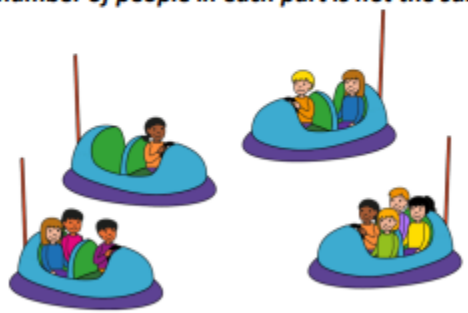
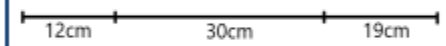
Y2 FRACTIONS

Objective, Strategy & Key Vocabulary	
Find $\frac{2}{4}, \frac{3}{4}$ of a number.	Children should be confident in finding $\frac{1}{4}$ of numbers before moving on to find $\frac{2}{4}, \frac{3}{4}$. They begin by using cubes.   ***The whole has been divided into 4 equal pieces and we have ___ of them.***
	Children move to a bar model representation of this. ***Find ¼ of 24*** 
Recognise the equivalence of $\frac{2}{4}$ $\frac{1}{2}$	Children begin by practical exploration using real objects and paper folding.  

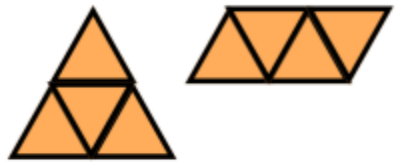
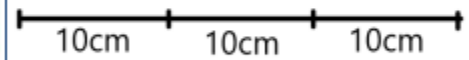
Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Understanding the relationship between the part and the whole NCETM 3.1 TP1	The story of the blind man and the elephant enables pupils to discover the relationship between the whole and the part.  Message behind the story: Each of the blind men cannot identify the animal because each has only felt a part not the whole of the elephant.  If Yorkshire is the whole, then Goole is part of the whole.	Children progress to understanding that several parts can make up the whole.  When the family is the whole, the children are part of the whole. If 5 cakes are the whole then two pink cakes are part of the whole.   If the teddy is the whole, then the ears are part of the whole.	Using a journey, children can talk about a whole journey and part of this journey.  *If the journey from Daisy's house to school is the whole, then the journey from Will's house to school is part of the whole.*

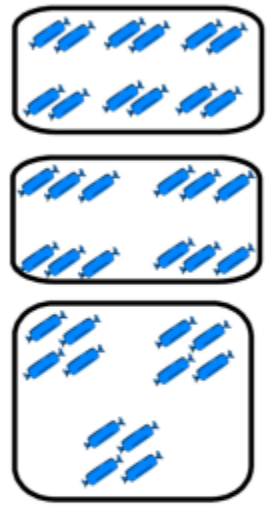
Y3 FRACTIONS

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

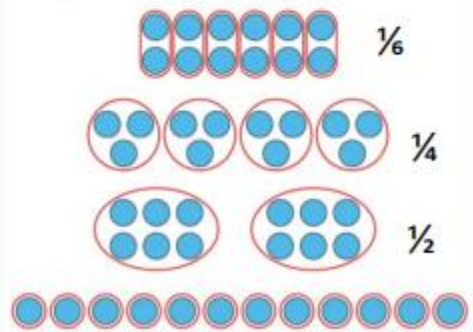
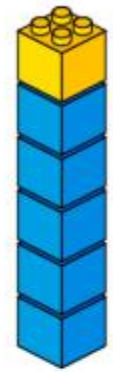
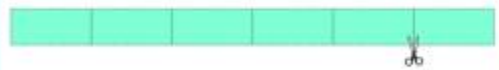
Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Recreate the whole from one part. NCETM 3.1 TP4	Children are given one part and told the number of parts. They recreate the whole. *This is one part or 4 equal parts. What could the whole look like?*  Answers could include:  *Opportunities for greater depth could include children finding all possibilities.*	*This is one part. There are 3 equal parts.* *Recreate the whole.*  	*This in ¼ of a piece of ribbon. Draw the whole of the ribbon.*  
Recreate the whole given several parts NCETM 3.1 TP4	Once children are confident in constructing the whole given one part, they progress to recreating the whole given several parts of the whole. *Here are three parts of the whole. What could the whole look like?*  Answers may include: 	*8 sweets are two parts of the whole. What is the whole amount of sweets.*  8 sweets is 2 parts  4 sweets is 1 parts  16 sweets is 4 parts which is the whole	*Here are 3 parts of a line. What is the total length?* 

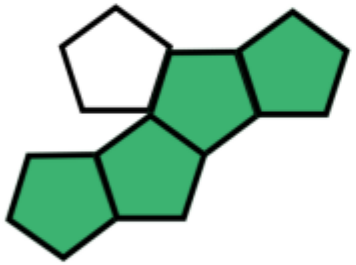
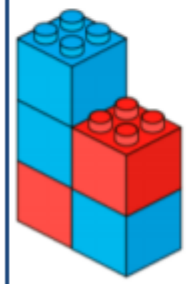
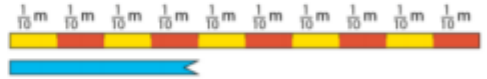
Y3 FRACTIONS

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

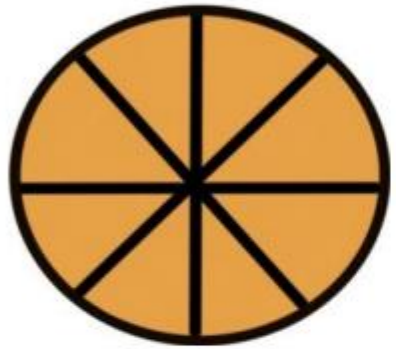
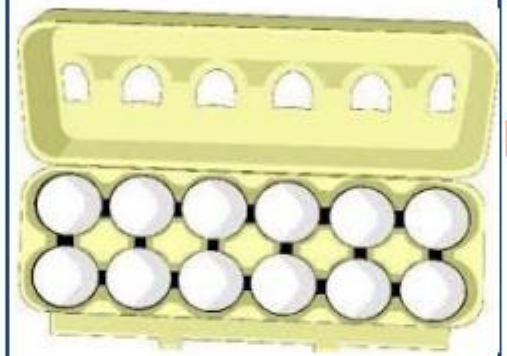
Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Recognise and write fractions of a discrete set of objects: unit fractions NCETM 3.2 TP2 , 3	Children have already been introduced to fraction notation in KS1. Now they revisit this understanding the role of the numerator and denominator. They begin by revisiting unit fractions of a shape and applying understanding of written notation: Fraction bar - We are dividing into equal parts $\frac{1}{2}$ Numerator- One part is shaded Denominator - There are two equal parts.  When writing fractions, the fraction bar is drawn first to draw attention to the concept that the whole is being divided into equal parts. Then the denominator is written to show how many parts the whole is divided into, followed by the numerator to show how many parts are shaded.	Children they apply this understanding to identifying fractions of discrete amounts.  *The whole has been divided into three equal parts. Each plate is one-third of the whole.* *Children may explore the different ways in which the whole can be divided into equal groups, saying and writing the fraction each time.* Dividing 12 counters into equal groups:  1/12	*The whole is divided into 6 equal parts.* *One of these parts is yellow.* *⅙ of the cubes is yellow.*  $\frac{1}{6}$  *The whole has been divided into 6 equal parts. Each part is one-sixth of the whole.* *One sixth of the whole has been cut off.*

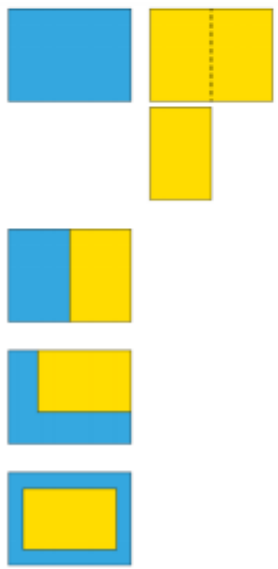
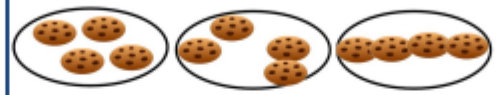
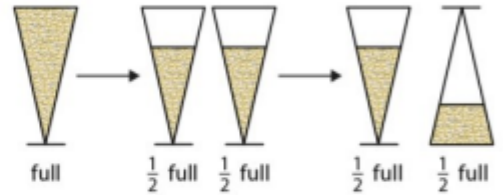
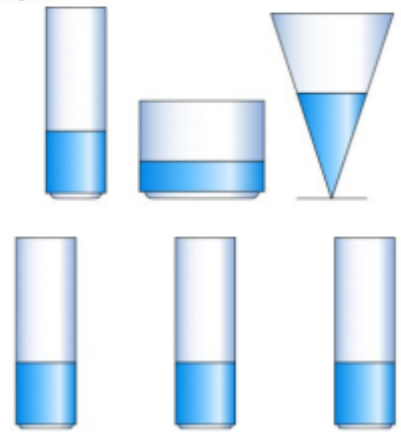
Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Recognise and write fractions of a discrete set of 0bjects: non-unit fractions NCETM 3.3 TP1, 2	Once children are confident in identifying, recognising and writing unit fractions they apply this understanding to non-unit fractions. *The whole is divided into 5 equal parts.* *4 of the parts are shaded* *4 one-eighths are shaded* *4/5 of the whole is shaded*   *The whole has been divided into __ parts.* *___ of the parts are blue.* *___ of the parts are red.* *☐/☐ of the whole is blue.* ☐/☐ of the whole is red.	Children begin by working with real objects to identify the equal parts and then using the stem sentence before arriving at the notation.  There are 5 equal parts. 2 parts are blue. 2/5 of the cakes are blue. What fraction are girls?  There are __ equal parts. ___ parts are girls. ___ parts are boys. Can you write the fractions?	*The whole is divided into 8 equal parts.* *3 of the parts are shaded* *3 one-eighths are shaded* *3/8 of the whole is shaded*  3/8 Where possible, links are made to real life and measures. *How many one-tenths of a metre does the ribbon measure?*  The plant measures 7 tenths of the whole metre. In height. 

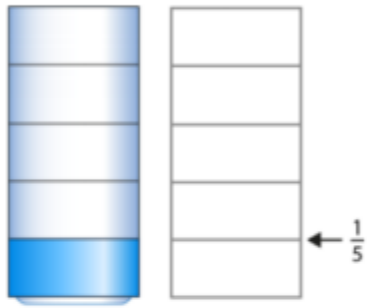
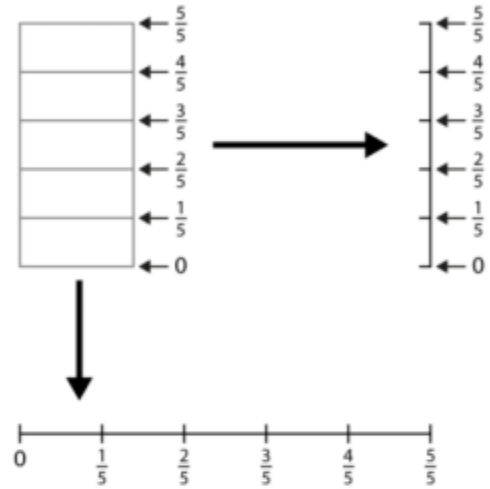
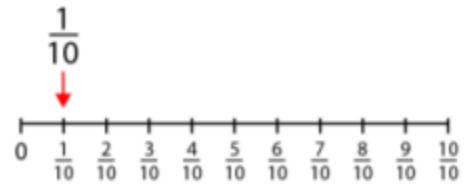
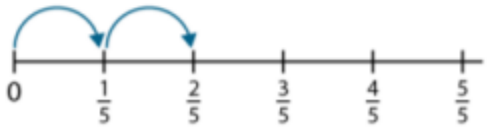
Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
If the numerator and the denominator are the same then this is equivalent to a whole. NCETM 3.3 TP 3, 6	*The whole is divided into 8 equal parts.* *All 8 parts are shaded* *8 One-eighths is the whole.*  $\frac{8}{8}$	*There are 12 equal parts.* *We have twelve twelfths. The whole egg box is full. This is one whole egg box full of eggs.*  $\frac{12}{12}$	*The whole has been divided into __ equal parts.* *We have __ of the fifths.* *This is equivalent to the whole.* $\frac{5}{5}$   *Children arrive at the conclusion that when the numerator and denominators are the same, this is equivalent to the whole.*

Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear/ Volume
Understand that equal fractional parts do not need to look the same. NCETM 3.2 TP4	Children are exposed to quarters shown in different ways. They may explore how they can be divided a shape into quarters through paper folding and shading.  Useful practical demonstrations may include 2 pieces of different coloured A4 paper, with one folded in half. 	*What is the same/ different about these plates of biscuits?* 	Where possible, connections are made to real life and measures. Here, practical investigation of volume using different containers can be useful. • Rice  • Liquid 

Y3 FRACTIONS

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

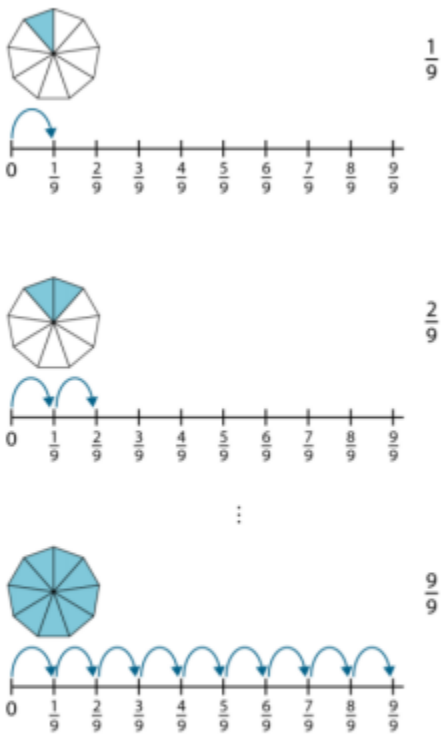
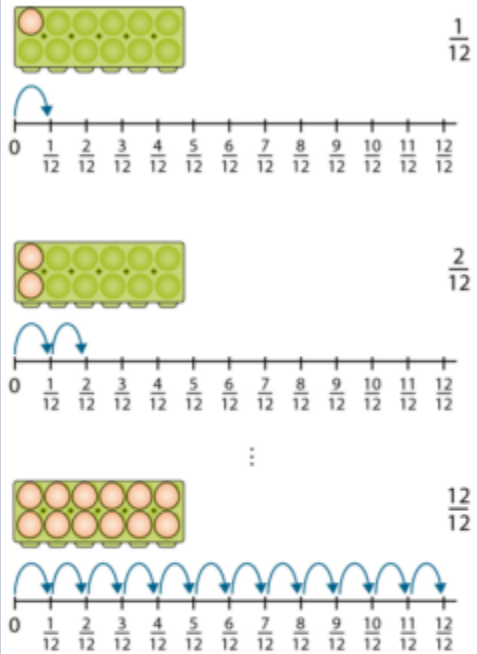
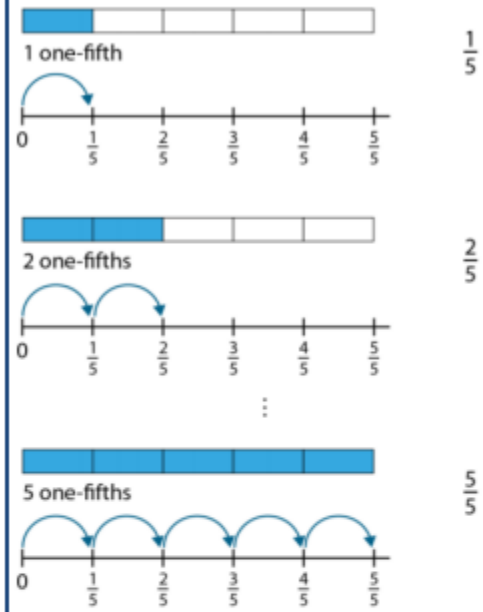
Y3 FRACTIONS

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

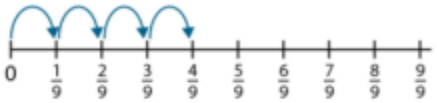
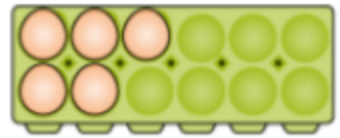
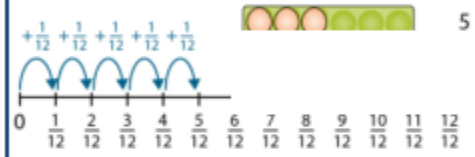
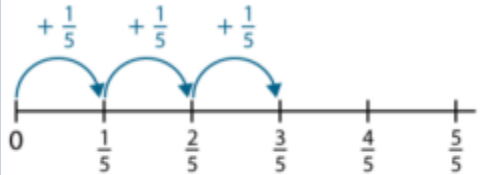
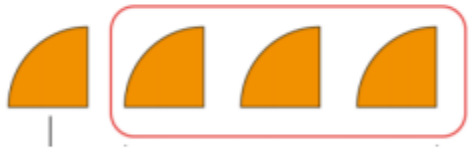
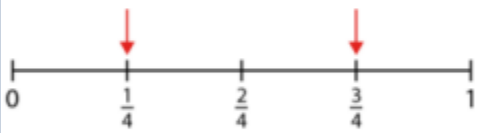
Y3 FRACTIONS

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

Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Adding & sub-tracting fractions with the same de-nominator within one whole. Repeated addition of a unit fraction results in a non-unit fraction—counting in unit fractions. NCETM 3.3 TP 5	*It is helpful to count in unit fractions:*  *One-ninth, two-ninths ….nine-ninths* also *One-ninth, two one-ninths …. nine one–ninths*	 *One-twelfth, two-twelfths ….twelve-twelfths* also *One-twelfth, two one-twelfths …. twelve one- twelfths*	 *One-fifth, two-fifths ….five-fifths* also *One-fifth, two one-fifths …. five one– fifths*

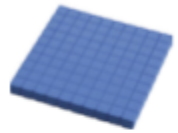
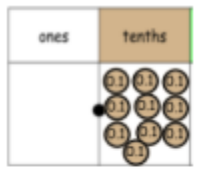
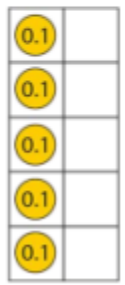
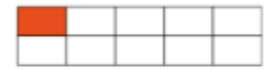
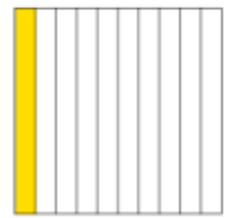
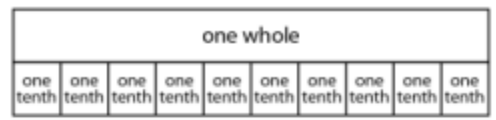
Y3 FRACTIONS

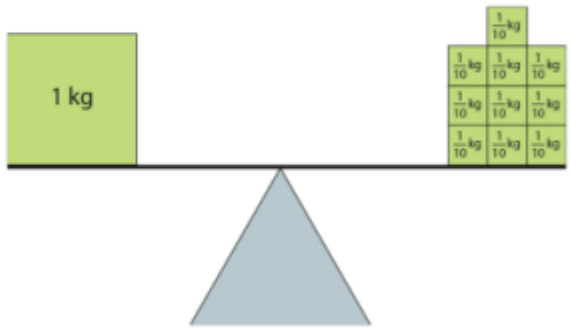
Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Adding & sub-tracting fractions with the same de-nominator within one whole. Repeated addition of a unit fraction results in a non-unit fraction—adding like unit fractions NCETM 3.4 TP 1, 2, 3, 4	 $\frac{1}{9}+\frac{1}{9}+\frac{1}{9}+\frac{1}{9}=\frac{4}{9}$ 	 $\frac{1}{12}+\frac{1}{12}+\frac{1}{12}+\frac{1}{12}+\frac{1}{12}=\frac{5}{12}$ 	 $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}=\frac{3}{5}$ 
Compare and order unit fractions with the same denomi-nator. NCETM 3.2 TP 5	 $\frac{1}{4}<\frac{3}{4}$	 $\frac{1}{4}<\frac{3}{4}$	 $\frac{1}{4}<\frac{3}{4}$

Verbal reasoning is used to show a fourth method for comparison.

'$\frac{1}{4}$ *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* $\frac{3}{4}$'

Y3 FRACTIONS

Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
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	 Represents 1  represents 1 tenth  0.7 *Children link back to decimals work and*   *Children use place value counters and grids and exchange 1 for ten 0.1 counters*  0.5 Children represent fractions and make decimal links using ten frames. $0.5 = \frac{5}{10}$	Shapes:     Bar model: 	$1\ tenth = \frac{1}{10}$ $2\ tenths = \frac{2}{10}$ $3\ tenths = \frac{3}{10}$ $4\ tenths = \frac{4}{10}$ $5\ tenths = \frac{5}{10}$ $6\ tenths = \frac{6}{10}$ $7\ tenths = \frac{7}{10}$ $8\ tenths = \frac{8}{10}$ $9\ tenths = \frac{9}{10}$ $10\ tenths = \frac{10}{10}$

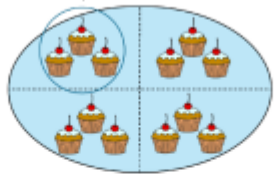
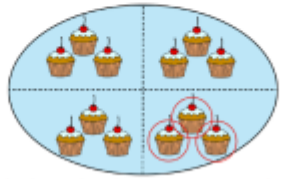
Objective, Strategy & Key Vocabulary	Measures
Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 **Links to measures are made including capacity, mass and length**	 *'The litre jug is divided into 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

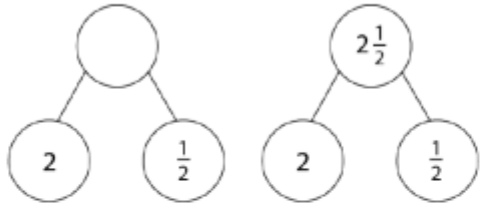
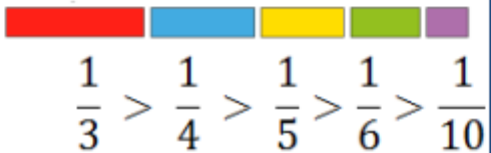
Y3

FRACTIONS

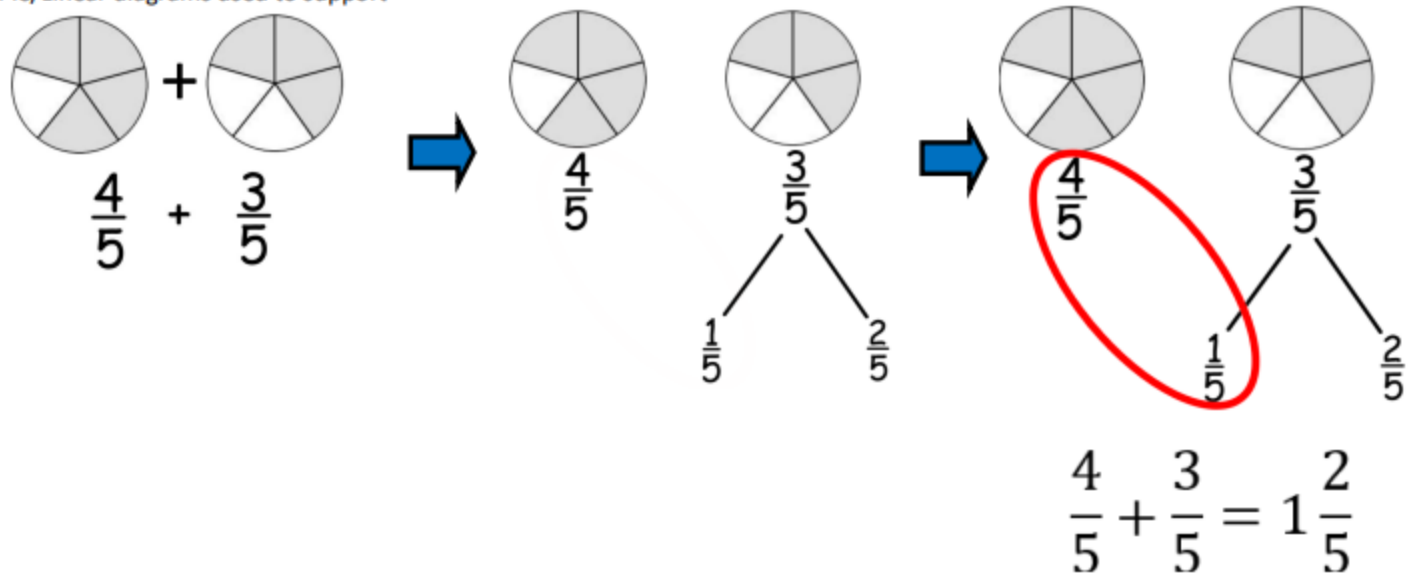
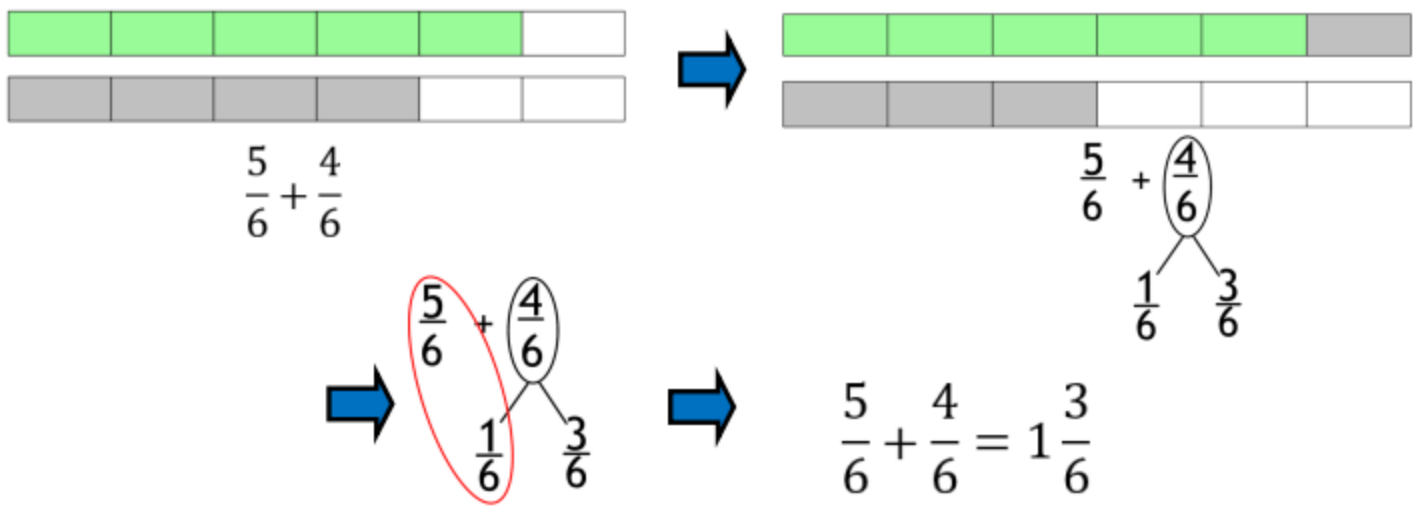
Y4 FRACTIONS

Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
Identify, name and write equivalent fractions of a given fraction, including tenths and hundredths NCETM 3.7 TP1	 *The whole is divided into 4 equal parts and one part is circled*  *The whole is divided into 12equal parts and three parts are circled*	  $\frac{1}{4} = \frac{3}{12}$  $\frac{1}{4} = \frac{3}{12}$	$\frac{1}{4} = \frac{3}{12}$
			$\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16}$

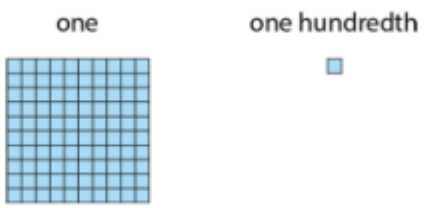
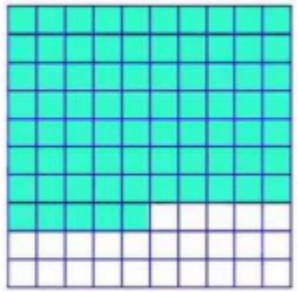
Y4 FRACTIONS

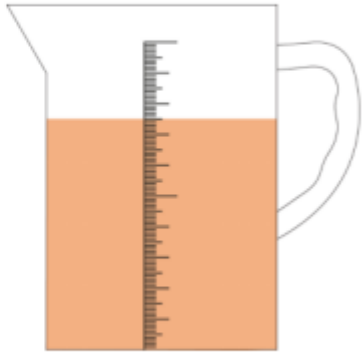
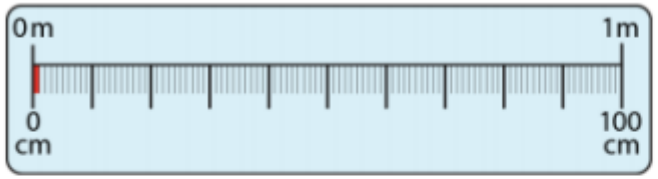
Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
Understand mixed numbers as parts and wholes NCETM 3.5 TP1	 *How many oranges?* *There are two whole oranges and one half orange. There are two and a half oranges altogether*		$1+\frac{1}{2}=1\frac{1}{2}$
Compare and order unit fractions . NCETM 3.2 TP 5 Important teaching point— ***When comparing fractions, the whole has to be the same.***	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. • *'Which coloured strip has the most equal parts?'* • *'Which coloured strip has the fewest equal parts?'* 	Move to diagrams of fraction walls  $\frac{1}{3}>\frac{1}{4}>\frac{1}{5}>\frac{1}{6}>\frac{1}{10}$	$\frac{1}{3}>\frac{1}{4}>\frac{1}{5}>\frac{1}{6}>\frac{1}{10}$

Y4 FRACTIONS

Objective, Strategy & Key Vocabulary	Area and Linear
Add and subtract fractions with the same denominator. (over 1 whole)	Pie/Linear diagrams used to support 
	

Y4 FRACTIONS

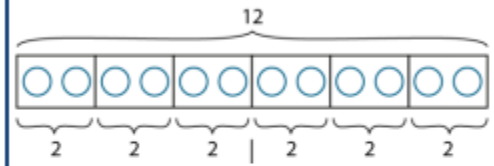
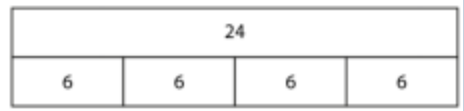
Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten	Children represent hundredths using Dienes  Children use ten frames to reprent 1 tenth and place value counters.  $\frac{10}{100} = \frac{1}{10}$	Link pictorial representation to fraction notation  $\frac{28}{100} = 0.28$	Link hundredths notation to tenth fraction notation and decimals. $1\ hundredths = \frac{1}{100}$ $2\ hundredths = \frac{2}{100}$ $3\ hundredths = \frac{3}{100}$ $4\ hundredths = \frac{4}{100}$ $5\ hundredths = \frac{5}{100}$ $6\ hundredths = \frac{6}{100}$ $7\ hundredths = \frac{7}{100}$ $8\ hundredths = \frac{8}{100}$ $9\ hundredths = \frac{9}{100}$

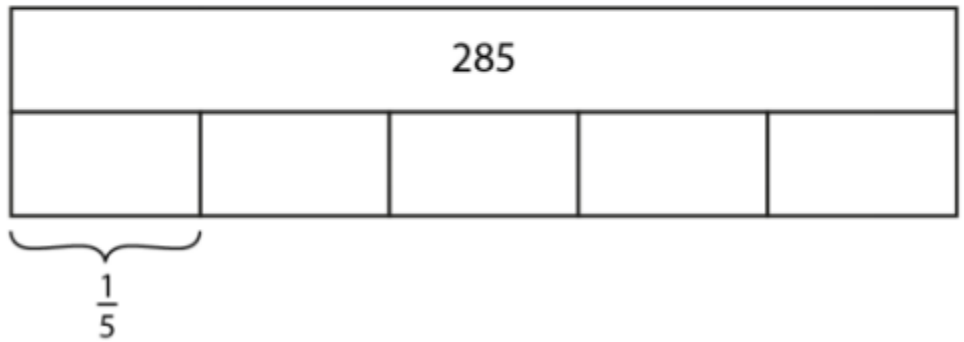
Objective, Strategy & Key Vocabulary	Measures
Count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten. Explore hundredths in measures including capacity and length.	Measures context:  *'The litre jug is divided into one hundred 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

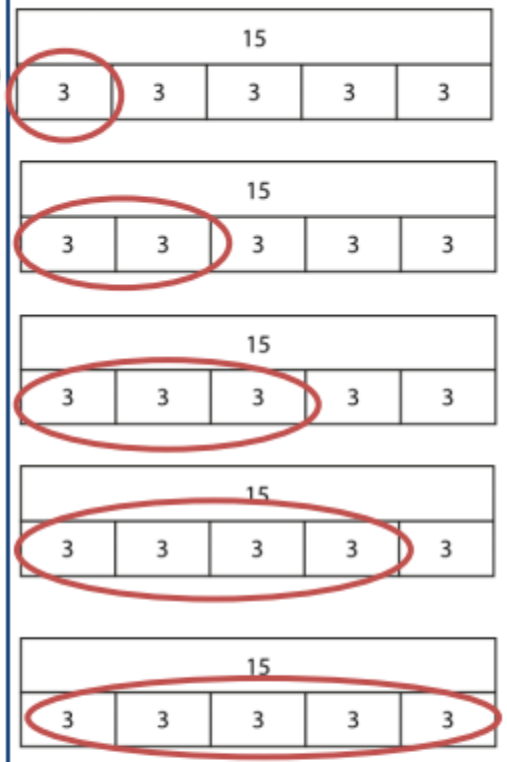
Y4 FRACTIONS

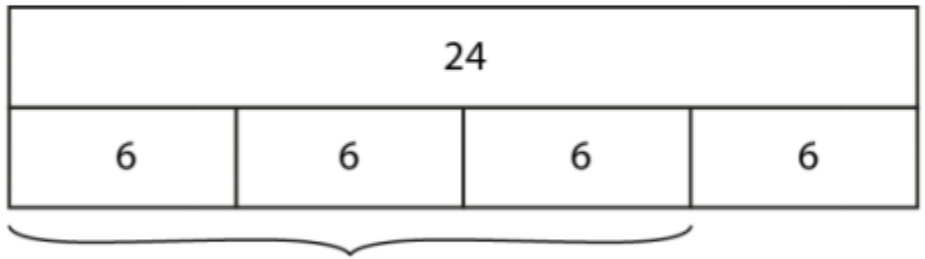
Objective, Strategy & Key Vocabulary	Area	Discrete	Linear
Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number Chn are now ready to make the link to finding a unit fraction of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

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	$\frac{1}{5}$ of 285 =  $5\overline{)285}$ = 057 285 ÷ 5 = 57

Y4 FRACTIONS

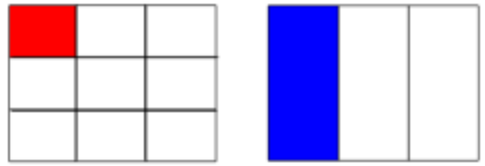
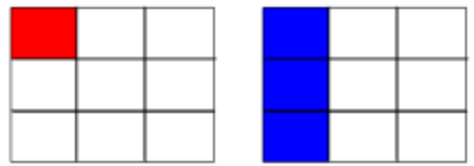
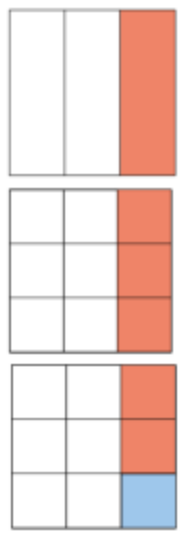
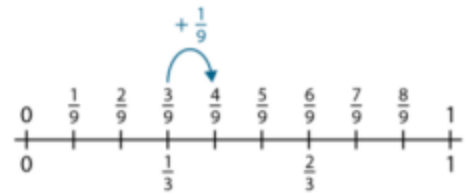
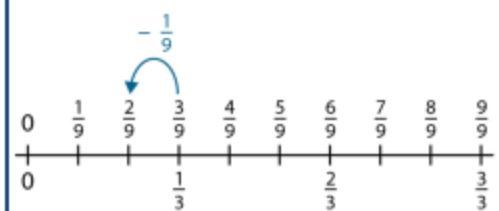
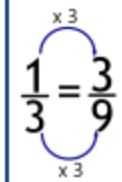
Y4 FRACTIONS

Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
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 Move to finding non-unit fractions of a quantity NCETM 3.6 TP 3, 4, 5	Representing counting in $\frac{1}{5}$ of 15 as equations: 🍎🍎🍎 🍎🍎🍎 🍎🍎🍎 🍎🍎🍎 🍎🍎🍎		$\frac{1}{5} \times 15 = 3$ $\frac{2}{5} \times 15 = 6$ $\frac{3}{5} \times 15 = 9$ $\frac{4}{5} \times 15 = 12$ $\frac{5}{5} \times 15 = 15$

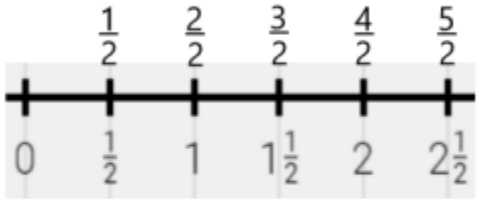
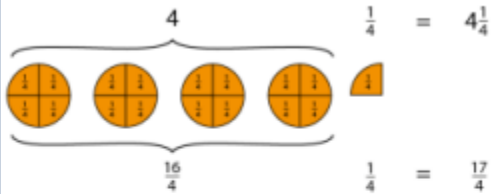
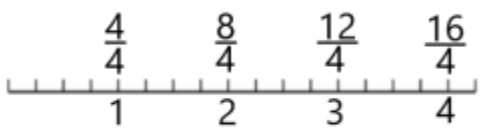
Objective, Strategy & Key Vocabulary	Methods supported by diagrams (if needed)
Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number Move to finding non-unit fractions of a quantity NCETM 3.6 TP 3,4,5	$\frac{3}{4} \times 24 =$  $24 \div 4 = 6$ $\frac{1}{4} \times 24 = 6$ $\frac{3}{4} \times 24 = 18$ *'To calculate $\frac{3}{4} \times 24$, find $\frac{1}{4}$ of 24 and then multiply by 3.'* It is vital that children solve questions which expose them further to the commutative rule. $24 \times \frac{2}{5}$ $\quad\quad$ $\frac{7}{8} \times 56$ $30 \times \frac{4}{6}$ $\quad\quad$ $\frac{2}{3} \times 13$

Y4 FRACTIONS

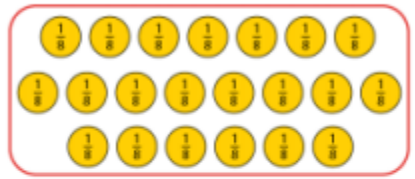
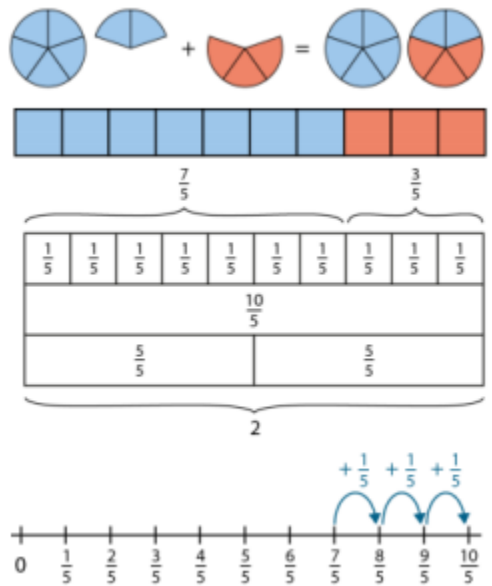
Y5 FRACTIONS

Objective, Strategy & Key Vocabulary	Area	Linear	Abstract
Add and subtract related fractions. NCETM 3.8 TP 1, 2, 3	 $\frac{1}{9} + \frac{1}{3}$  $\frac{1}{9} + \frac{3}{9}$  $\frac{1}{3} - \frac{1}{9}$ $\frac{1}{3} - \frac{1}{9}$ $\frac{1}{3} - \frac{1}{9}$	 	 $\frac{1}{3} = \frac{3}{9}$ $\frac{1}{9} + \frac{1}{3}$ $\frac{1}{9} + \frac{3}{9} = \frac{4}{9}$ $\frac{1}{3} - \frac{1}{9} =$ $\frac{1}{3} = \frac{3}{9}$ $\frac{3}{9} - \frac{1}{9} = \frac{2}{9}$

Y5 FRACTIONS

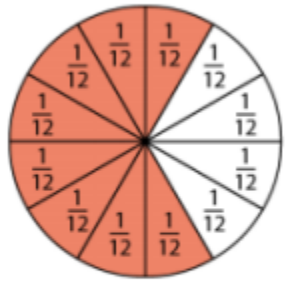
Objective, Strategy & Key Vocabulary	Real Life/Concrete	Linear	Abstract
Recognise mixed numbers and improper fractions and NCETM 3.5 TP4	*How many oranges altogether?*  — fraction bar $\frac{}{2}$ each whole orange splits into 2 parts $\frac{5}{2}$ 5 halves $\frac{}{2}$ each whole orange splits into 2 parts		$\frac{5}{2}$
Convert from mixed numbers to improper fractions NCETM 3.5 TP 5	 ***There are __ groups of four-quarters which is __-quarters and __ more quarters, so that is __-quarters.***		$4\frac{1}{4} = \frac{17}{4}$ Pupils work towards the generalisation: *We can:* • *Multiply the whole number by the denominator* • *Then add the numerator*

Y5 FRACTIONS

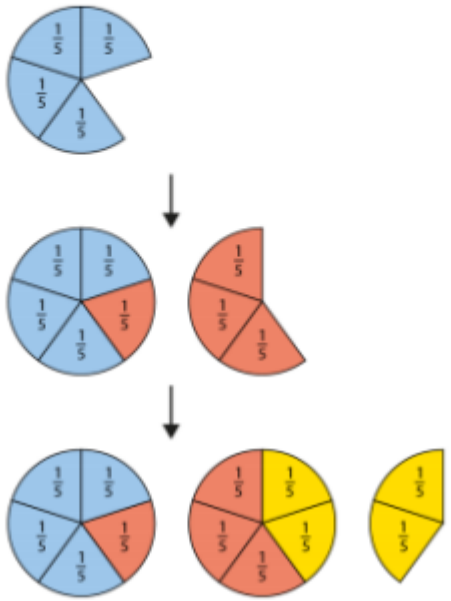
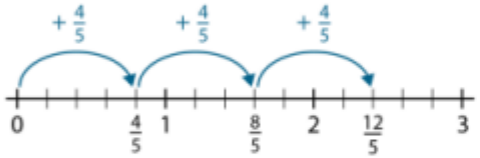
Objective, Strategy & Key Vocabulary	Pictorial	Abstract
Convert from Improper fractions to mixed numbers. NCETM 3.5 TP5	Counters can be marked with dry wipe pens to represent unit fractions.  $\frac{21}{8}$ *Our unit is eighths so we will be thinking about groups of eight.* *There are* $\frac{8}{8}$ *in one whole.*  1 1 $\frac{5}{8}$	See table below
Write mathematical statements >1 as a mixed number (e.g. 2/5 + 4/5 = 6/5 = 11/5) NCETM 3.5 TP3		$\frac{7}{5}+\frac{3}{5}=\frac{10}{5}=2$

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.)	$2\frac{5}{8}$

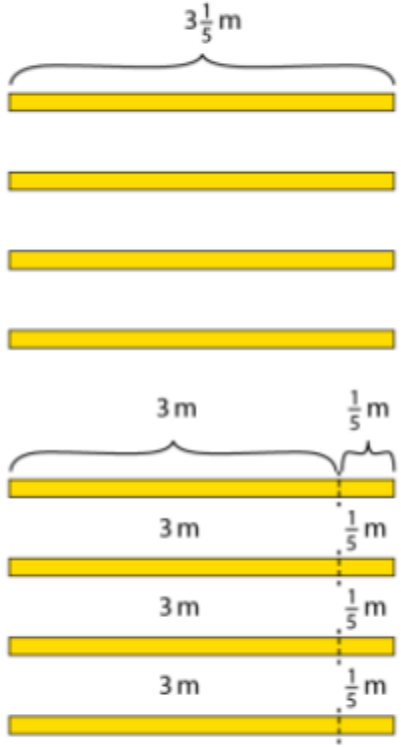
Y5 FRACTIONS

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

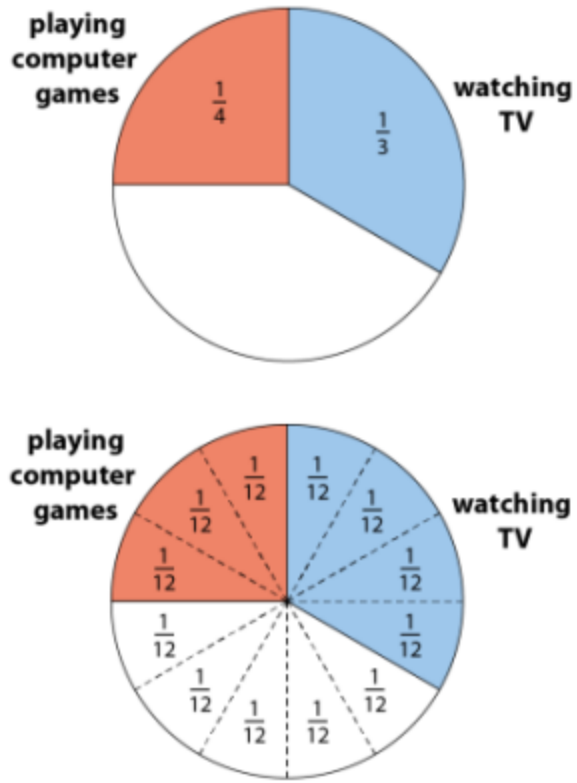
Y5 FRACTIONS

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

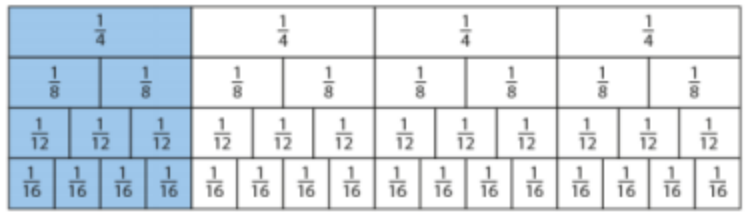
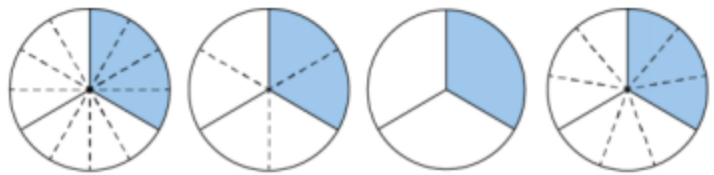
Y5 FRACTIONS

Objective, Strategy & Key Vocabulary	Real Life/Pictorial	Abstract
Multiply mixed numbers by whole numbers, supported by materials and diagrams. NCETM 3.5 TP 1 & 2	$3\frac{1}{5}$ *of ribbon is needed to decorate one wedding cake.* *How much is needed for 4 cakes?* 	$3\,m \times 4 = 12\,m$ $\frac{1}{5}\,m \times 4 = \frac{4}{5}\,m$ $12m + \frac{4}{5}m = 12\frac{4}{5}m$ Example 1: $3\frac{1}{5} \times 4 = \underbrace{3 \times 4}_{12} + \underbrace{\frac{1}{5} \times 4}_{\frac{4}{5}} = 12\frac{4}{5}$ Example 2: $3\frac{1}{5} \times 4 = 12\frac{4}{5}$ $3 \times 4 = 12$ $\frac{1}{5} \times 4 = \frac{4}{5}$ Example 3: $3\frac{1}{5} \times 4$ $\times 4$ $\quad$ $\times 4$ $12 \quad \frac{4}{5} = 12\frac{4}{5}$

Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Real Life/Pictorial	Abstract
Add and subtract non-related fractions NCETM 3.8 TP4	*How much time is spent watching TV and playing computer games in total?* 	Children are asked to think of a denominator that is a multiple of 4 **and** a multiple of 3. $\frac{1}{4} + \frac{1}{3}$ $\frac{1}{4} \times 3 = \frac{3}{12}$ $\quad \frac{1}{3} \times 4 = \frac{4}{12}$ Where appropriate, answers should be converted to mixed numbers. $\frac{2}{3} + \frac{3}{5} =$ $\frac{2}{3} \times 5 = \frac{10}{15}$ $\quad \frac{3}{5} \times 3 = \frac{9}{15}$ $\frac{10}{15} + \frac{9}{15} = \frac{19}{15}$ $= 1\frac{4}{15}$

Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Pictorial	Abstract
Use common factors to simplify fractions. Use common multiples to express fractions in the same denomination. NCETM 3.7 TP3	  	$\frac{1}{7} = \frac{2}{14} = \frac{3}{21} = \frac{4}{28} = \frac{5}{35} = \frac{6}{42} = \frac{7}{49}$ Children are asked to find the highest common factor of the numerator and denominator. Highest Common Factor is 4 $\frac{4}{12} \overset{\div 4}{=} \frac{1}{3}$ Progress to applying this principle when simplifying to mixed numbers. Method 1: $\frac{20}{12} \overset{\div 4}{=} \frac{5}{3} = 1\frac{2}{3}$ Method 2: $\frac{20}{12} = 1\frac{8}{12} \overset{\div 4}{=} 1\frac{2}{3}$

Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Abstract
Add and subtract mixed numbers, using the concept of equivalent fractions	

Method 1

$3\frac{1}{2} + 1\frac{1}{6}$

$\frac{3}{6}$ $\quad 3 + 1 = 4$

$\frac{3}{6} + \frac{1}{6} = \frac{4}{6}$

$4 + \frac{4}{6} = 4\frac{4}{6}$

Method 2

$3\frac{1}{2} + 1\frac{1}{6}$

$\frac{7}{2} + \frac{7}{6}$

$\frac{21}{6} + \frac{7}{6} = \frac{28}{6} = 4\frac{4}{6}$

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

$2\frac{1}{2} - 1\frac{2}{5}$

$2 - 1 = 1$

$\frac{1}{2} - \frac{2}{5}$

$\frac{5}{10} - \frac{4}{10} = \frac{1}{10}$

$1\frac{1}{10}$

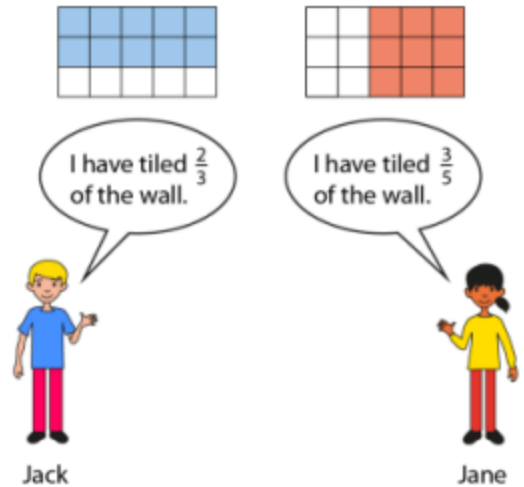
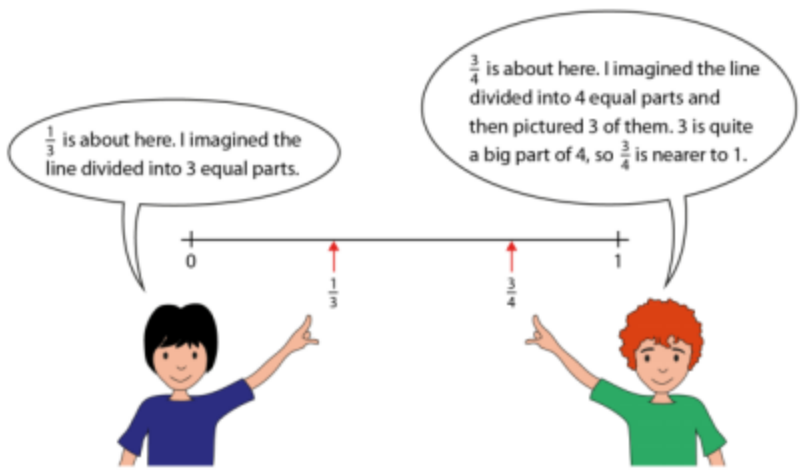
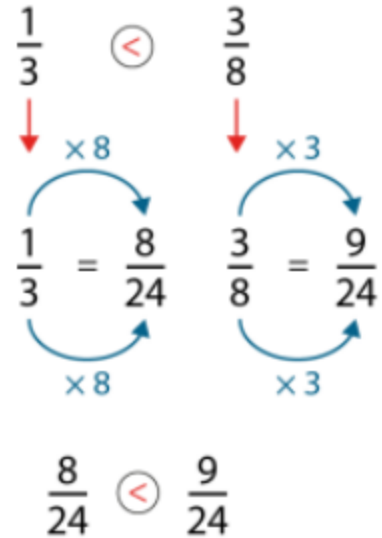
Method 2

$2\frac{1}{2} - 1\frac{2}{5}$

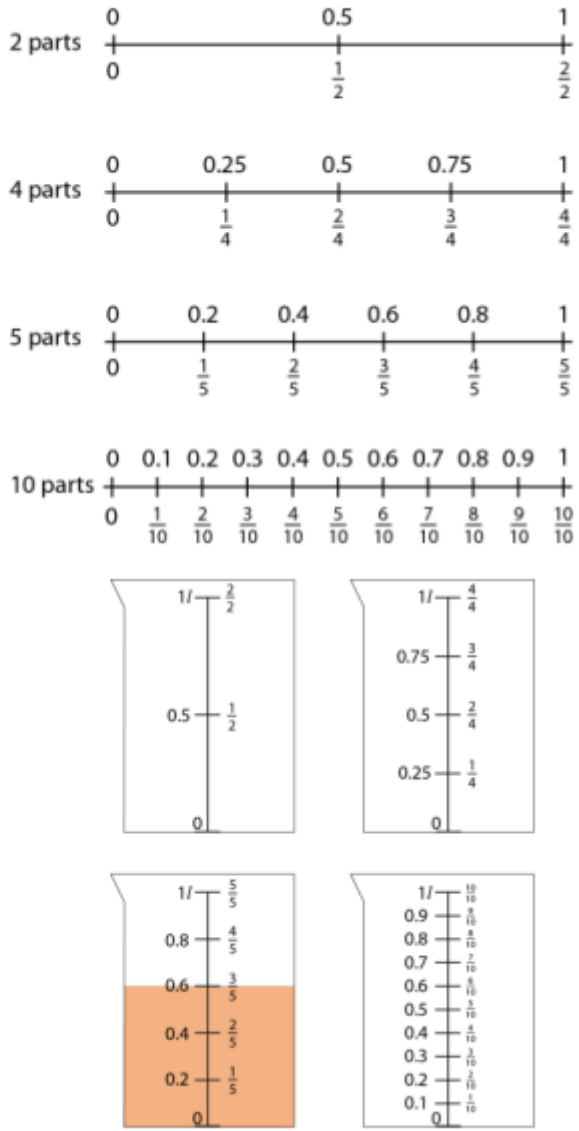
$\frac{5}{2} - \frac{7}{5}$

$\frac{25}{10} - \frac{14}{10} = \frac{11}{10} = 1\frac{1}{10}$

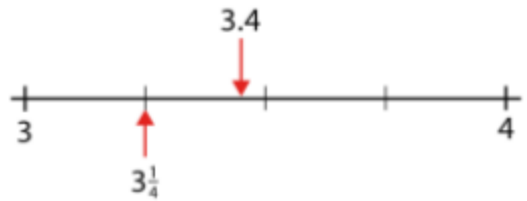
Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Pictorial	Abstract
Compare and order fractions, including fractions >1 Compare using common denominators NCETM 3.8 TP5	Jack has painted $\frac{2}{3}$ of his wall. Jane has painte $\frac{3}{5}$ of his wall. Who has painted a greater proportion of their wall?  Ask pupils to visualise where these fractions are on the number line. 	Children find a common denominator by looking for a denominator that is a multiple of both 3 and 8.  . $\frac{8}{24} < \frac{9}{24}$

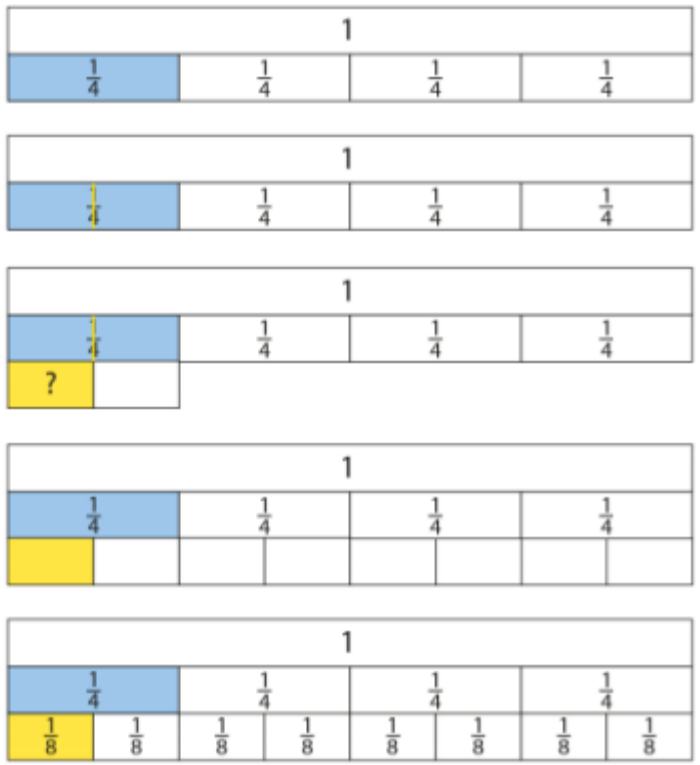
Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Linear/ Real Life	Abstract
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		Method 1—use PV knowledge to convert a decimal to a fraction, then simplify. $0.375 = \frac{375}{1000} = \frac{3}{8}$ (÷125 above, ÷125 below) Method 2—use short division to divide the numerator by the denominator, including adding zeros after the decimal point $\frac{3}{8} = 8\overline{)3.000}$ = 0.375

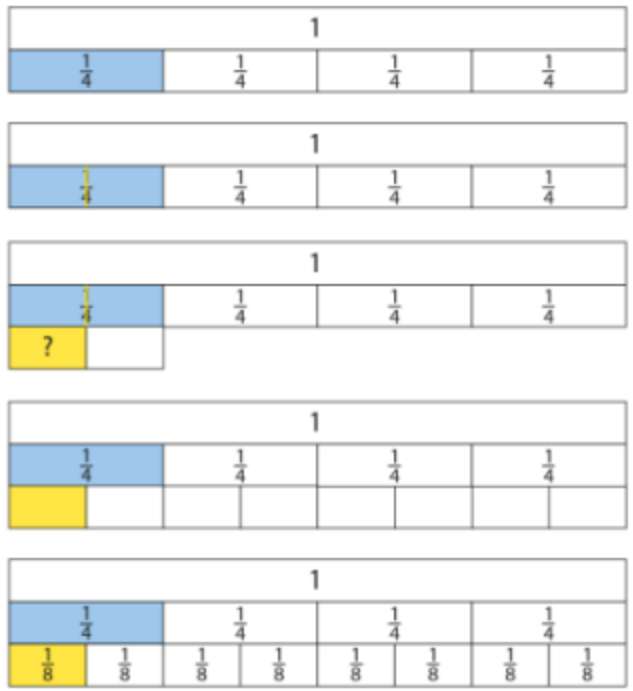
Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Linear	Abstract
Compare fractions and decimals by converting one to the other. NCETM 3.10	Method 3 – positioning on a number line:  	Method 1 – converting to decimals: $3\frac{1}{4}$ < 3.4 $3\frac{1}{4}$ = 3.25 3.25 < 3.4 Method 2 – converting to fractions with a common denominator: $3\frac{1}{4}$ < 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
Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. 1/4 × 1/2 = 1/8) NCETM 3.9 TP1 Refer back to key learning in year 4 when pupils have looked at the • 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 $20 \times \frac{1}{4}$	$\frac{1}{4} \times \frac{1}{2}$ 	Draw attention to conceptual meaning before moving to rule. $\frac{1}{2} of \frac{1}{4} = half\ of\ a\ quarter = \frac{1}{8}$ $\frac{1}{2} of \frac{1}{4} = \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ 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. Answers should be simplified where appropriate. Simplifying products: $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$ (can't be simplified) $\frac{3}{4} \times \frac{1}{3} = \frac{\cancel{3}^{1}}{\cancel{12}_{4}} = \frac{1}{4}$ $\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$ (can't be simplified)

Y6 FRACTIONS

Objective, Strategy & Key Vocabulary	Pictorial	Abstract
Divide proper fractions by whole numbers (e.g. 1/3 ÷ 2 = 1/6). NCETM 3.9 TP2	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: $\frac{1}{4} \div 2 = \frac{1}{8}$	$\frac{1}{4} \div 2 \longrightarrow \frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$ $\frac{1}{3} \div 4 = \frac{1}{12}$ $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

Objective, Strategy & Key Vocabulary	Pictorial	Abstract
Divide proper fractions by whole numbers (e.g. 1/3 ÷ 2 = 1/6). Continued…. NCETM 3.9 TP2	If the numerator is a factor of the whole number, a more efficient strategy is used: $\frac{6}{8} \div 2$  *'$\frac{6}{8}$ 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.'* ***'6 things divided between 2 , is 3 things'***	$\frac{6}{8} \div 2 = \frac{3}{8}$

Y6 FRACTIONS