Fraction, Decimal & Percentage Policy

Life in all its fullness!

Images taken from:

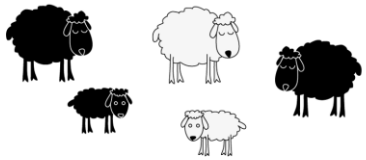
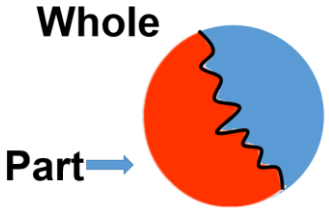
- NCETM
- White Rose

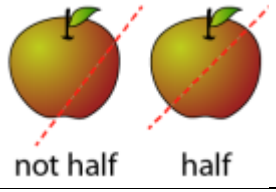
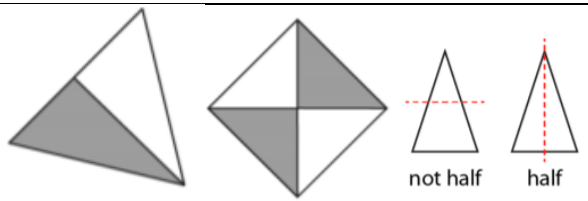
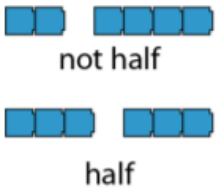
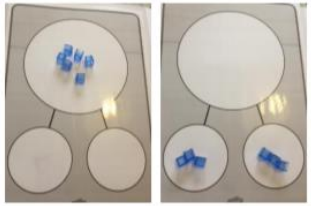
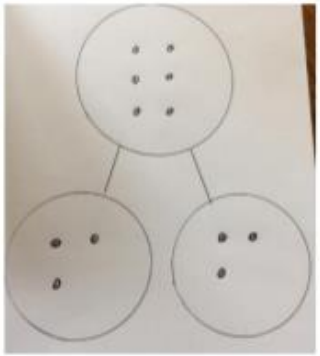
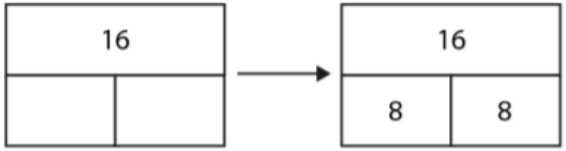
(UPDATED 23/10/2020)

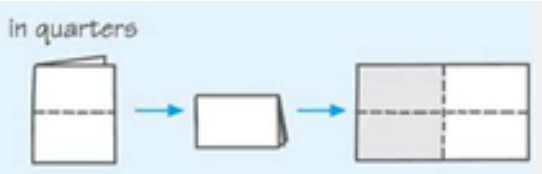
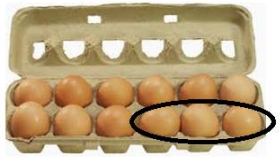
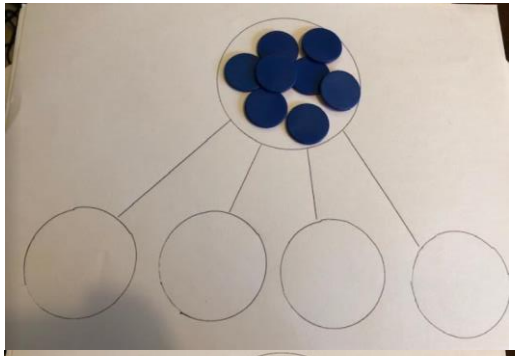
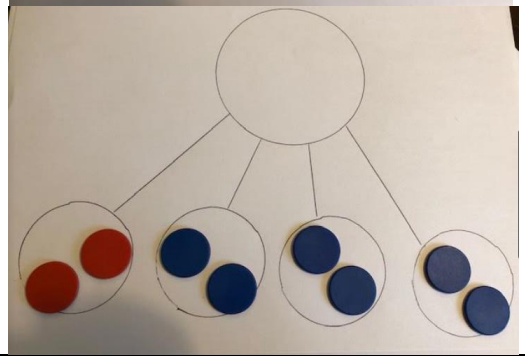
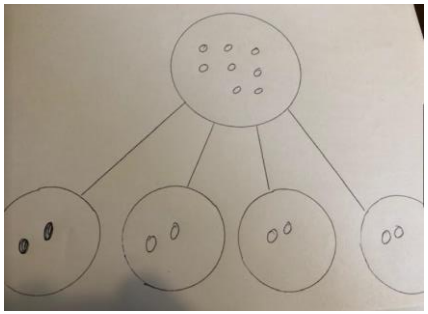
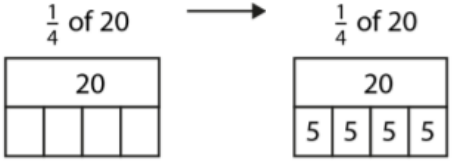
YEAR 1

National Curriculum Objectives
• recognise, find and name a half as one of two equal parts of an object, shape or quantity • recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

Vocabulary **(*new vocabulary for year in bold/italic*)**	**Stem Sentences** **(*new stem sentence for year in bold/italic*)**
one half, halves, one quarter, quarters, equal, two, four, parts, equal parts, divide into 2, split, share, whole. fraction	***The whole is split equally into _____parts and _____parts are shaded.*** ***Half of ____ is _____*** ***Quarter of ____ is _____***

Small step	**Concrete**	**Pictorial**	**Abstract**
Part-whole relationship	Use small toys  *If the car is the whole, the wheel is one part of the whole*	 *If the herd is the whole, the black sheep are one part of the whole*  If the circle is the whole, this(red part) is one part of the whole.	

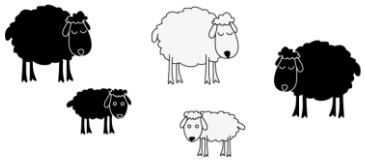
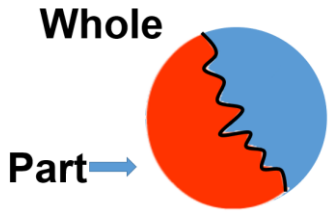
Small step	Concrete	Pictorial	Abstract
Find ½ of an object	Share objects equally between two. 	Use pictures to represent the things e.g. circles to represent the apples. 	
Find ½ of a shape	Fold a piece of paper into halves. 		
Find ½ of a quantity	Share objects into 2 equal groups. Build a tower half of the size of the first. Create a pattern with ½ of the objects one colour/shape and the rest different.  	 (Or use bar model with dots)	
Find ¼ of a object	Share objects equally between four. 	Use pictures to represent the things e.g. squares to represent toast 	

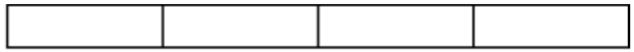
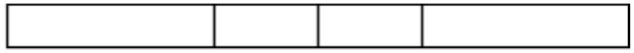
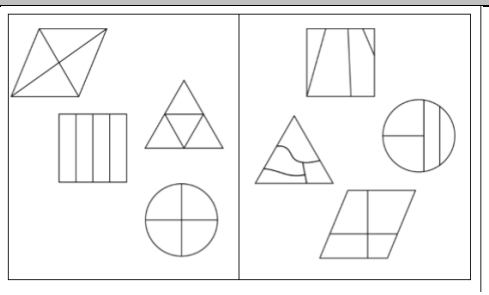
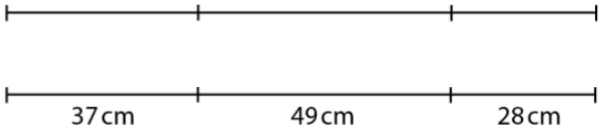
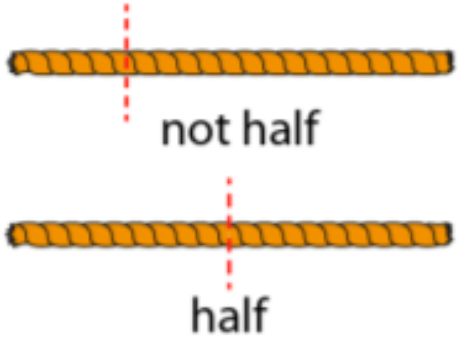
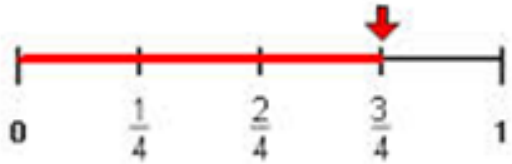
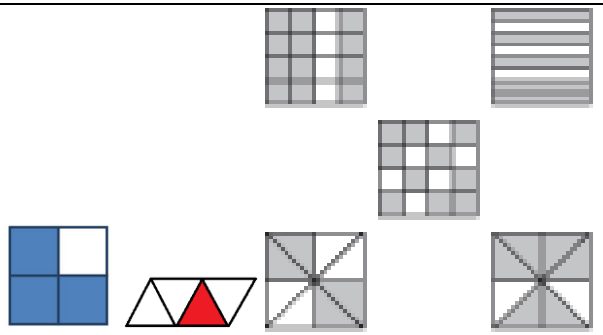
Small step	Concrete	Pictorial	Abstract
Find ¼ of a shape	Fold a piece of paper into quarters. 		
Find ¼ of a quantity	Share objects into 4 equal groups. Build a tower quarter of the size of the first. Create a pattern with ¼ of the objects one colour/shape and the rest different. Using part-whole model with counters   	Part whole model or bar model with dots 	Using part-whole model or bars 

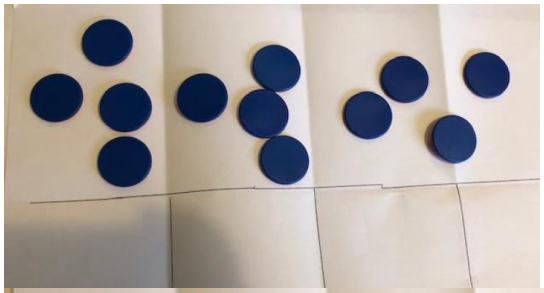
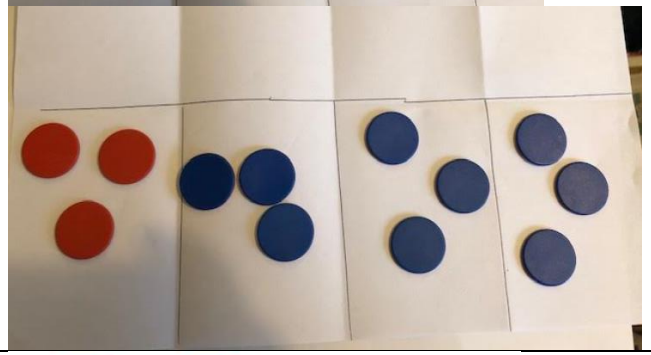
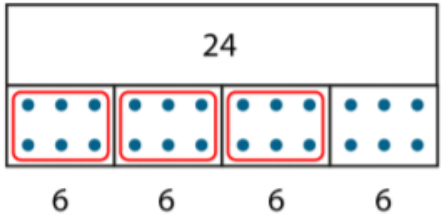
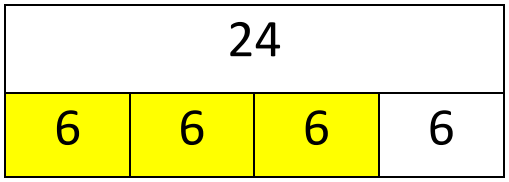
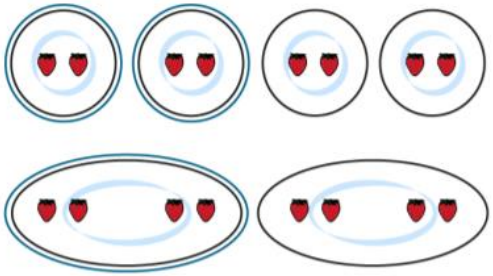
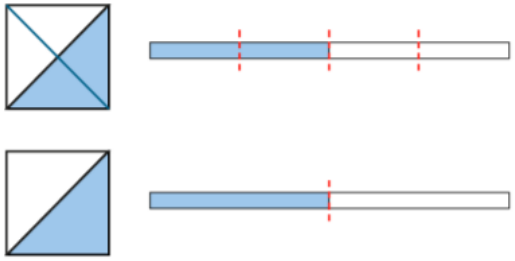
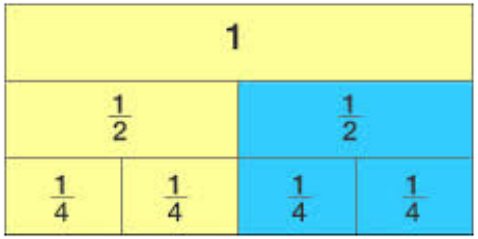
YEAR 2

National Curriculum Objectives
• recognise, find, name and write fractions 1/2, ¼, 1/3, ¾ of a length, shape, set of objects or quantity • write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and 1/2 .

Vocabulary **(*new vocabulary for year in bold/italic*)**	**Stem Sentences** **(*new stem sentence for year in bold/italic*)**
one half, halves, one quarter, quarters, equal, two, four, parts, equal parts, divide into 2, split, share, whole, fraction ***numerator (tells you the 'number' of), denominator (nominates or names the fraction), three quarters, equivalent, balance, multiply, divide, division, multiplication***	*The whole is split equally into _____parts and _____parts are shaded.* Half of ____ is _____ Quarter of ____ is _____ ***If a quarter is _____ then the whole is _____*** ***The numerator is _____ and the denominator is _____.*** ***_____ is equivalent to _____***

Small step	**Concrete**	**Pictorial**	**Abstract**
Part-whole relationship	Using small toys  *If the children are the whole, the boys are one part of the whole*	 *If the herd is the whole, the black sheep are one part of the whole*  If the circle is the whole, this(red part) is one part of the whole.	

Small step	Concrete	Pictorial	Abstract
Equal/ unequal parts	Provide children with various shapes – cut shapes into equal/ unequal shapes Folding paper:  • *'I have folded my whole length of paper into four equal parts.'*  • *'I have folded my whole length of paper into four unequal parts.'*	 *'Are the parts of equal size?'*  	
Find 1/2, ¼, 1/3, ¾ of a length	 	 	*<u>1/2 of 6cm is 3m</u>* *6÷2 = 3*
Find 1/2, ¼, 1/3, ¾ of a shape	Folding shapes/ pieces of paper into equal parts. Breaking chocolate bars		

Small step	Concrete	Pictorial	Abstract
Find 1/2, ¼, 1/3, ¾ of a set Find 1/2, ¼, 1/3, ¾ of a quantity	Using cubes or objects with part-whole or Singapore bar model  	*Drawing dots to calculate $\frac{3}{4}$ of 24:* 	 ¾ of 24 is 18
Equivalence of 2/4 and 1/2			

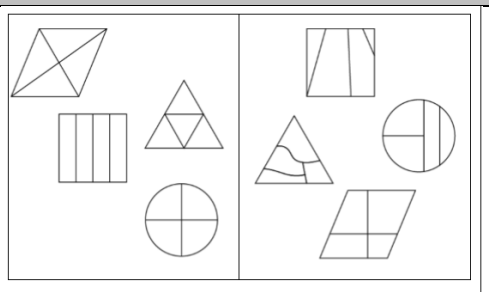
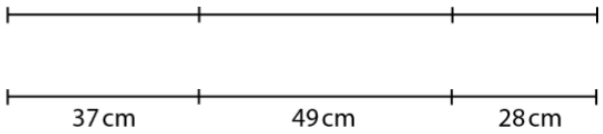
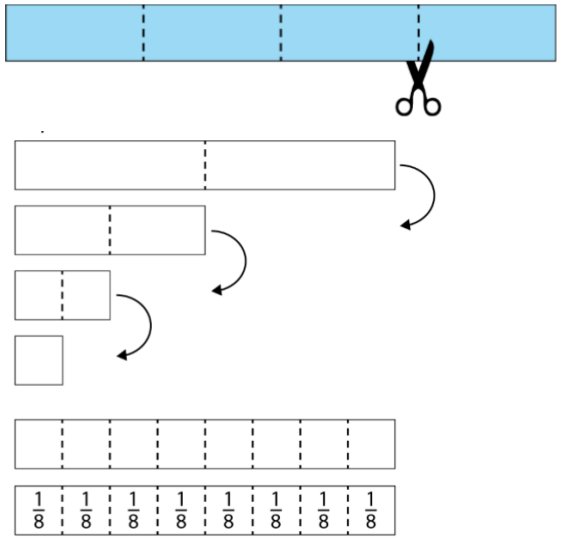
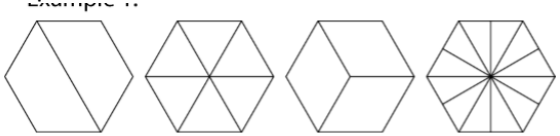
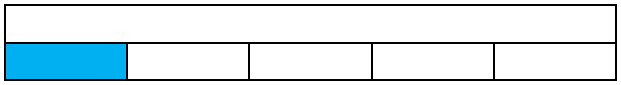
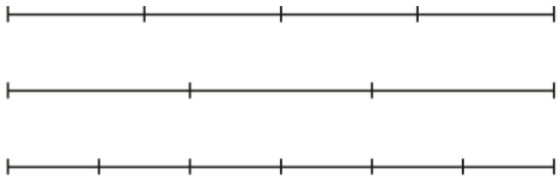
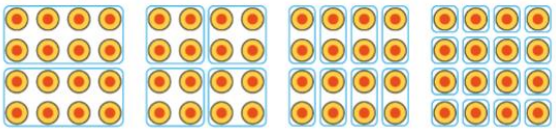
YEAR 3

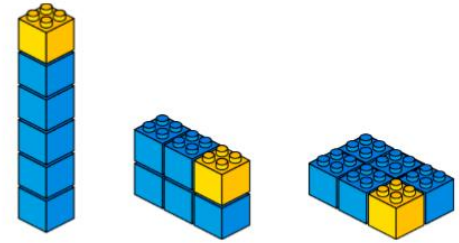
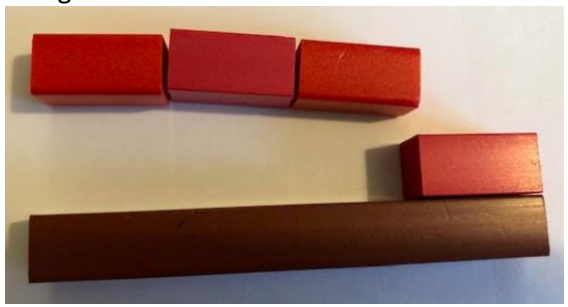
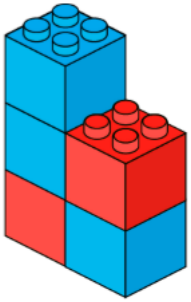
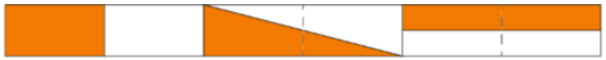
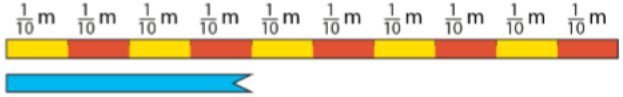
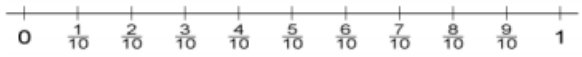
National Curriculum Objectives

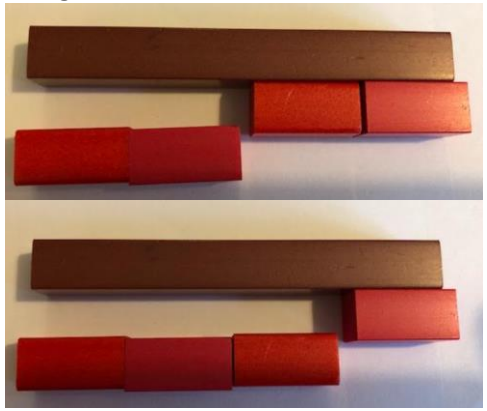
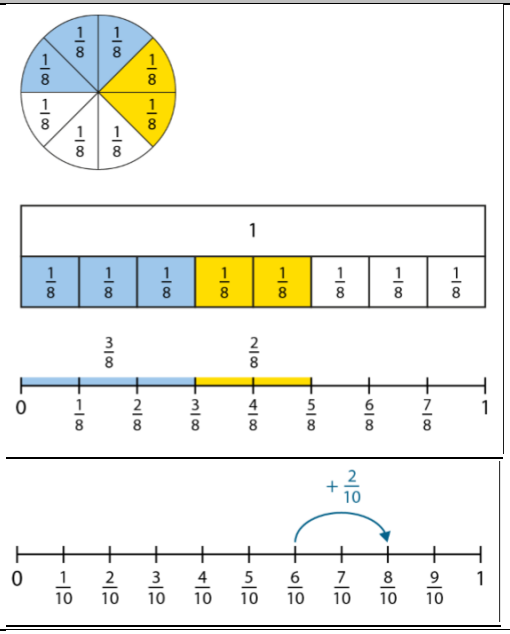
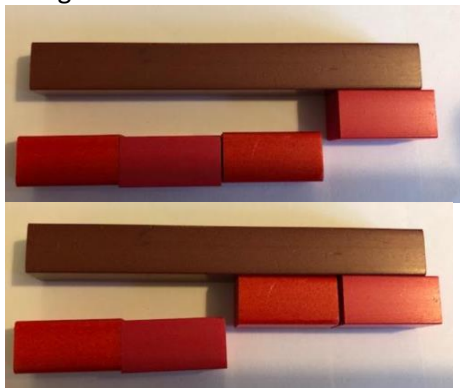
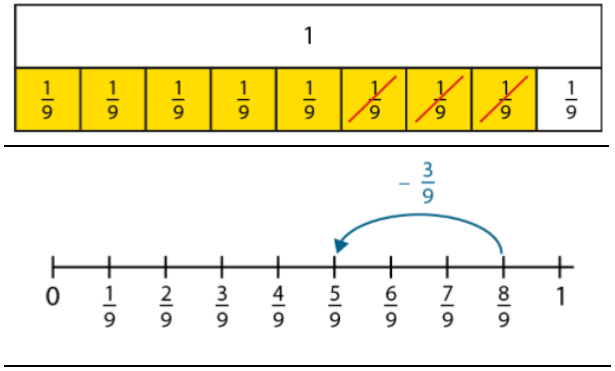
- count up and down in tenths
- recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example, 5/7 + 1/7 = 6/7]
- compare and order unit fractions, and fractions with the same denominators
- solve problems that involve all of the above.

Vocabulary **(*new vocabulary for year in bold/italic*)**	**Stem Sentences** **(*new stem sentence for year in bold/italic*)**
one half, halves, one quarter, quarters, equal, two, four, parts, equal parts, divide into 2, split, share, whole, fraction numerator (tells you the 'number' of), denominator (nominates or names the fraction), three quarters, equivalent, balance, multiply, divide, division, multiplication ***fifths, tenths, unit-fraction, non-unit fraction***	The whole is split equally into _____parts and _____parts are shaded. Half of ____ is _____ Quarter of ____ is _____ The numerator is _____ and the denominator is _____. _____ is equivalent to _____ If a quarter is _____ then the whole is _____ ***The value of the _____ is _____ tenths.*** ***If the _____ is the whole, the ___ is one part of the whole***

Small step	**Concrete**	**Pictorial**	**Abstract**
Part-whole relationship		 *'If Europe is the whole, then the United Kingdom is part of the whole.'*	Part–whole relationship – cardinal context (time): Mon Tue Wed Thu Fri Sat Sun *'If the week is the whole, then Tuesday is part of the whole.'*

Small step	Concrete	Pictorial	Abstract
Equal/ unequal parts	Provide children with various shapes – cut shapes into equal/ unequal shapes Folding paper:  • *'I have folded my whole length of paper into four equal parts.'*  • *'I have folded my whole length of paper into four unequal parts.'*	 *'Are the parts of equal size?'*  37 cm 49 cm 28 cm	
Unit fractions: identifying, representing and comparing	Folding shapes – cutting out a piece  $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ $\frac{1}{8}$ Using Cuisinere rods 	Shapes:   Linear:  Cardinal: 	

Small step	Concrete	Pictorial	Abstract
	Set of object/ Flip counters 		
Non-unit fractions	Folding shapes – cut out parts Using cuisinere rods  Set of objects/ Flip counters 	   	
Tenths – understand and count	Folding paper $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$	$\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ $\frac{1}{10}$ Using a bar  Numberline	

Small step	Concrete	Pictorial	Abstract
Adding within one whole	Using cuisinere rods  2/4 + ¼ = 3/4		$\frac{3}{9} + \frac{4}{9} = \frac{7}{9}$
Subtracting within one whole	Using cuisinere rods  ¾ - ¼ = 2/4		$\frac{8}{9} - \frac{3}{9} = \frac{5}{9}$

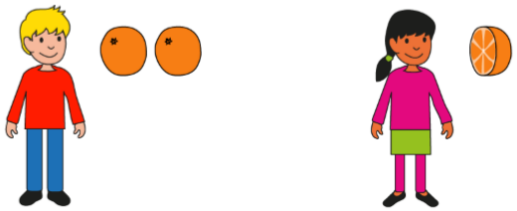
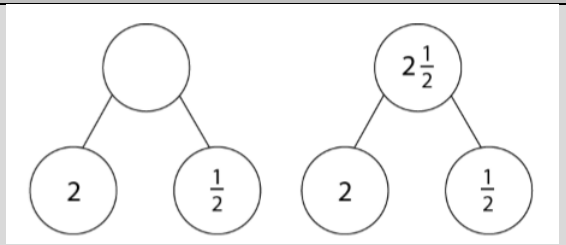
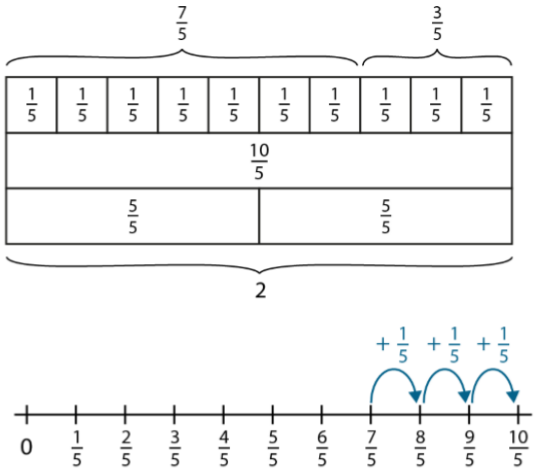
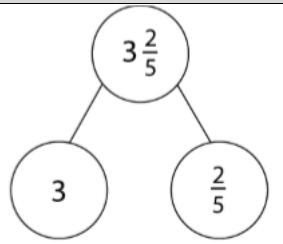
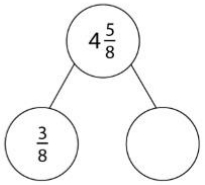
YEAR 4

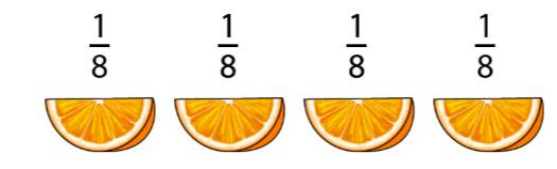
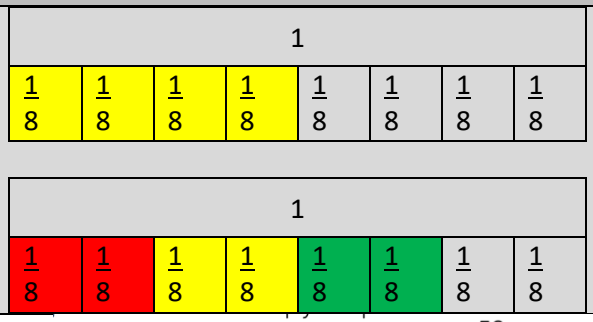
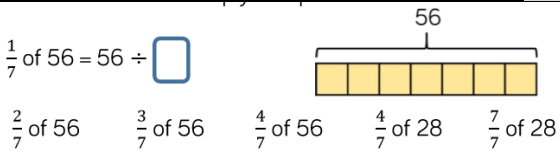
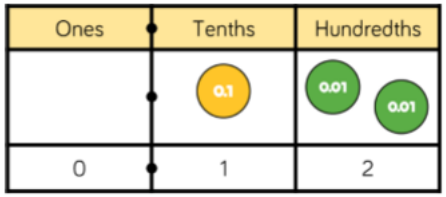
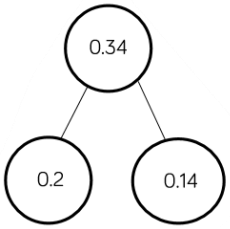
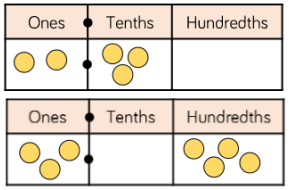
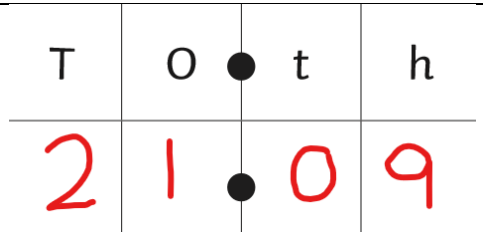
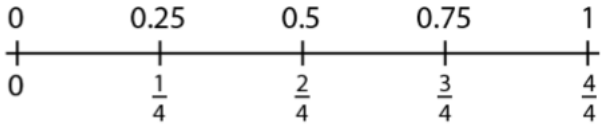
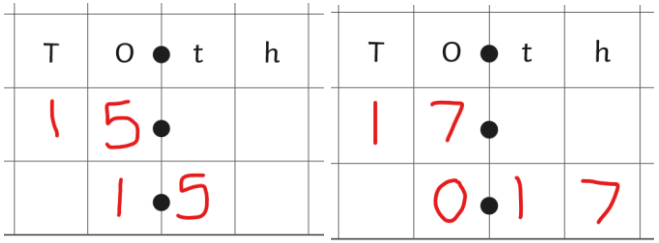
National Curriculum Objectives

- recognise and show, using diagrams, families of common equivalent fractions
- count up and down in hundredths
- recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- 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
- add and subtract fractions with the same denominator
- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise and write decimal equivalents to 4 1 , 2 1 , 4 3
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- solve simple measure and money problems involving fractions and decimals to two decimal places.

Vocabulary **(*new vocabulary for year in bold/italic)***	**Stem Sentences** **(*new stem sentence for year in bold/italic)***
one half, halves, one quarter, quarters, equal, two, four, parts, equal parts, divide into 2, split, share, whole, fraction numerator (tells you the 'number' of), denominator (nominates or names the fraction), three quarters, equivalent, balance, multiply, divide, division, multiplication fifths, tenths, unit-fraction, non-unit fraction ***hundredths, decimal, 'three point six', 'three point seven five)***	The whole is split equally into _____parts and _____parts are shaded. Half of ____ is _____ Quarter of ____ is _____ The numerator is _____ and the denominator is _____. _____ is equivalent to _____ If a quarter is _____ then the whole is _____ If the _____ is the whole, the ___ is one part of the whole ***The value of the _____ is _____ tenths/hundredths.***

GREY – NCETM ADDITIONAL STEPS

Small step	Concrete	Pictorial	Abstract
Improper / mixed fractions	*'How many oranges do Jonny and Ellen have altogether?'* 		
Add fractions with same denominator		$\frac{7}{5}+\frac{3}{5}=\frac{10}{5}=2$ 	 $3\frac{2}{5}=3+\frac{2}{5}$ $3\frac{2}{5}=\frac{2}{5}+3$ $3+\frac{2}{5}=3\frac{2}{5}$ $\frac{2}{5}+3=3\frac{2}{5}$ $3\frac{2}{5}-3=\frac{2}{5}$ $\frac{2}{5}=3\frac{2}{5}-3$ $3=3\frac{2}{5}-\frac{2}{5}$ $3\frac{2}{5}-\frac{2}{5}=3$
Subtract fractions with same denominator		 	

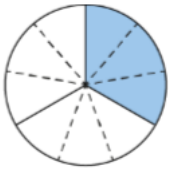
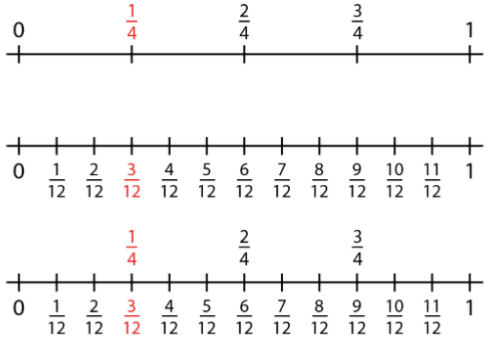
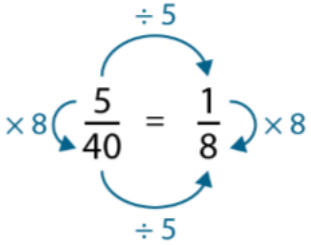
Small step	Concrete	Pictorial	Abstract
Multiplying whole numbers and fractions			$4 \times \frac{1}{8}$ $\frac{1}{8} \times 4$ $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=4\times\frac{1}{8}=\frac{1}{8}\times 4$
Calculate fractions of a quantity			
decimal equivalents of any number of tenths or hundredths	Using place value counters 	Part-whole model  Place Value Grid with circles 	 *0.34 = 0.2 + 0.14*
recognise and write decimal equivalents to ¼ , ½ . ¾		Numberline  *(see NCETM Y6)*	
Divide by 10 or 100	Place Value Slider or use Place Value Grid with post-its 	Place Value Grid 	*15 ÷ 10 = 1.5* *17 ÷ 100 = 0.17*

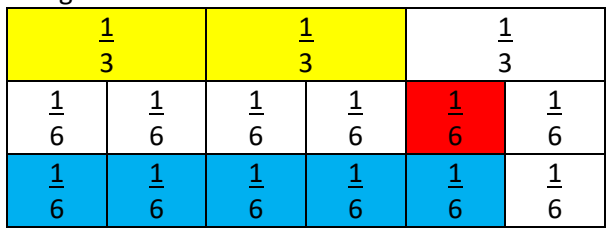
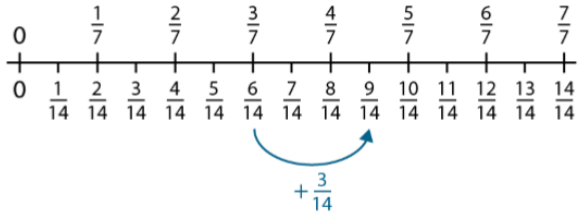
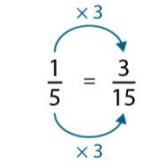
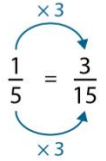
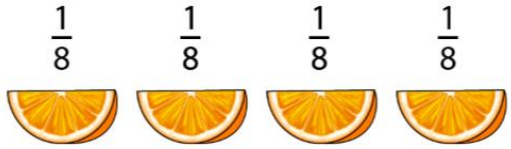
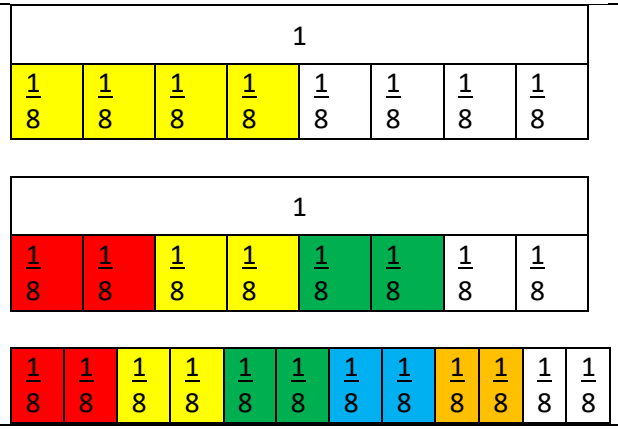
YEAR 5

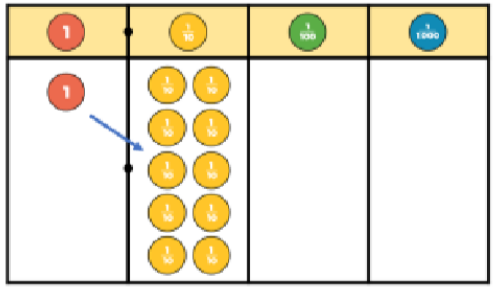
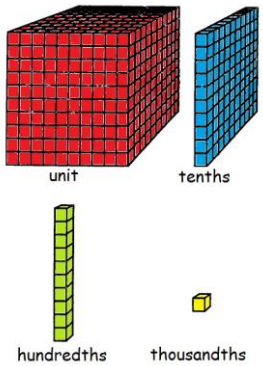
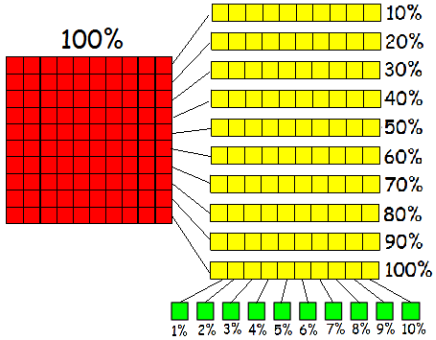
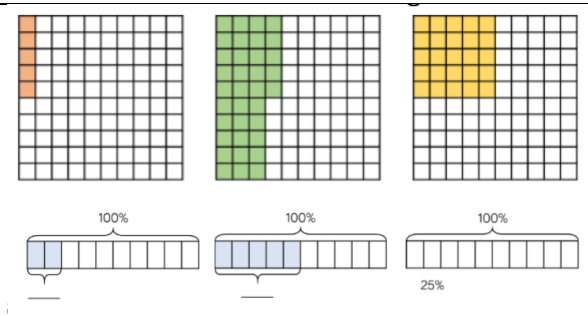
National Curriculum Objectives

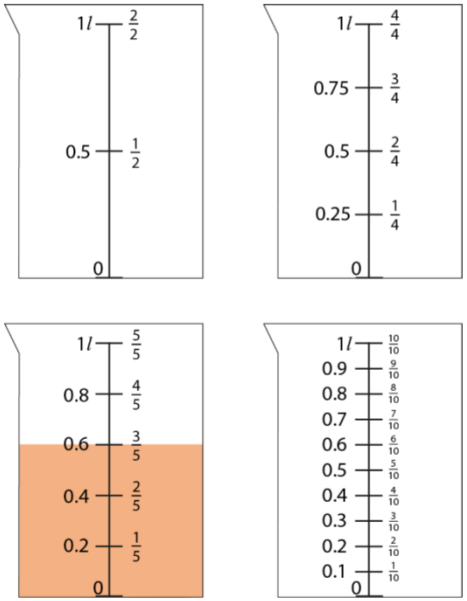
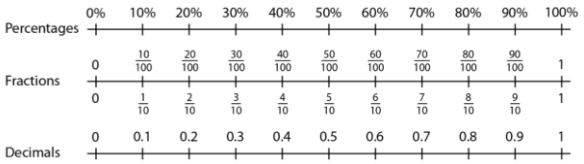
- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, 2/5 + 4/5 = 6/5 = 1 1/5]
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, 0.71 = 71/100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1/2 , 1/4 , 1/5 , 2/5 , 4/5 and those fractions with a denominator of a multiple of 10 or 25

Vocabulary **(*new vocabulary for year in bold/italic)***	**Stem Sentences** **(*new stem sentence for year in bold/italic)***
one half, halves, one quarter, quarters, equal, two, four, parts, equal parts, divide into 2, split, share, whole, fraction numerator (tells you the 'number' of), denominator (nominates or names the fraction), three quarters, equivalent, balance, multiply, divide, division, multiplication fifths, tenths, unit-fraction, non-unit fraction hundredths, decimal, 'three point six', 'three point seven five) ***percent, percentage, mixed number, improper***	The whole is split equally into _____parts and _____parts are shaded. Half of ____ is _____ Quarter of ____ is _____ If a quarter is _____ then the whole is _____ The numerator is _____ and the denominator is _____. _____ is equivalent to _____ If the _____ is the whole, the ___ is one part of the whole The value of the _____ is _____ tenths**/**hundredths**.**

Small step	Concrete	Pictorial	Abstract
Equivalent and simplifying	Using Cuisenaire Rods or fraction wall 	Bar model:  Shapes:  $\frac{1}{3} = \square$ Numberline: 	Equivalent:  Simplifying: 

Small step	Concrete	Pictorial	Abstract
Add and subtract with common denominators		Using bar model:  Using a numberline:  	 $\frac{1}{5} + \frac{1}{15} =$  $\frac{3}{15} + \frac{1}{15} = \frac{4}{15}$
Multiplying whole numbers and fractions *(see NCETM Y4)*	 	 	$4 \times \frac{1}{8}$ $\frac{1}{8} \times 4$ $\frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = 4 \times \frac{1}{8} = \frac{1}{8} \times 4$

Small step	Concrete	Pictorial	Abstract
Tenths/ hundredths/ thousandths	Using place value counters  Using dienes:  	Place value grid with circles	0.394 = 3 tenths, 9 hundredths and 4 thousandths $= \frac{3}{10} + \frac{9}{100} + \frac{4}{1000}$ $= 0.3 + 0.09 + 0.004$
Percentages	Use Dienes to represent percentages, e.g. 1 flat = 100% and so on.  	 	

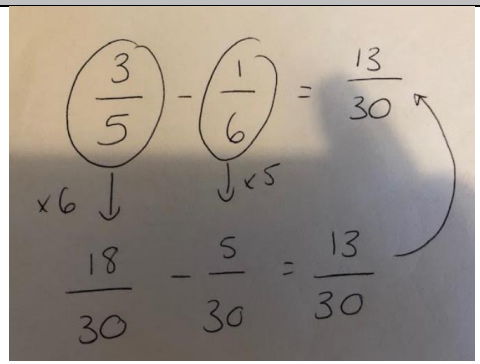
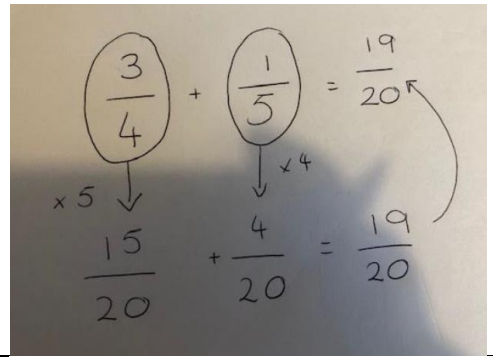
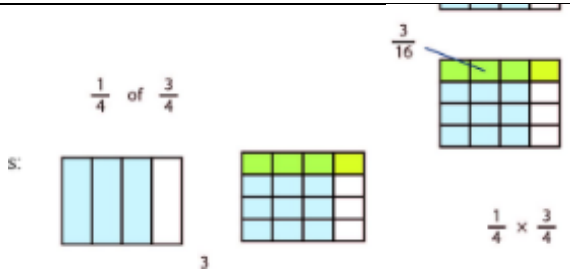
Small step	Concrete	Pictorial	Abstract
percentage and decimal equivalents of 1/2 , 1/4 , 1/5 , 2/5 , 4/5 and those fractions with a denominator of a multiple of 10 or 25		Numberline 	e.g. *½ = 0.5 = 50%* *¼ = 0.25 = 25%* *¾ = 0.75 = 75%* *1/5 = 0.2 = 20%* *2/5 = 0.4 = 40% and so on …*

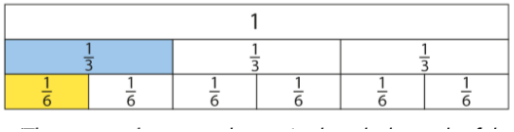
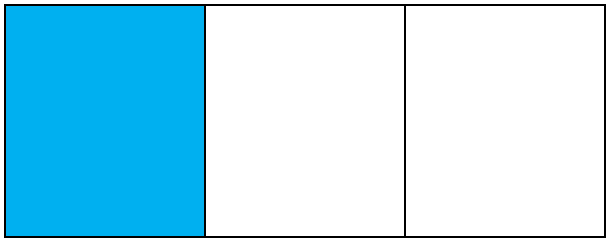
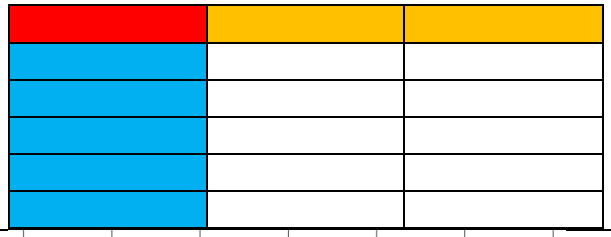
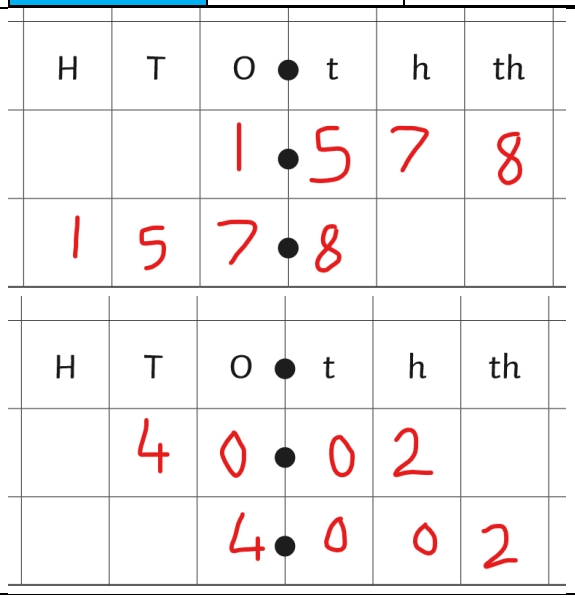
YEAR 6

National Curriculum Objectives

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- compare and order fractions, including fractions > 1
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, 4 1 × 2 1 = 8 1]
- divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6]
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8]
- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
- multiply one-digit numbers with up to two decimal places by whole numbers
- use written division methods in cases where the answer has up to two decimal places
- solve problems which require answers to be rounded to specified degrees of accuracy
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.
- RATIO OBJECTIVE: solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison

Vocabulary **(*new vocabulary for year in bold/italic)***	**Stem Sentences** **(*new stem sentence for year in bold/italic)***
one half, halves, one quarter, quarters, equal, two, four, parts, equal parts, divide into 2, split, share, whole, fraction numerator (tells you the 'number' of), denominator (nominates or names the fraction), three quarters, equivalent, balance, multiply, divide, division, multiplication fifths, tenths, unit-fraction, non-unit fraction hundredths, decimal, 'three point six', 'three point seven five) percent, percentage, mixed number, improper	The whole is split equally into _____parts and _____parts are shaded. Half of ____ is _____ Quarter of ____ is _____ If a quarter is _____ then the whole is _____ The numerator is _____ and the denominator is _____. _____ is equivalent to _____ If the _____ is the whole, the ___ is one part of the whole The value of the _____ is _____ tenths**/**hundredths**.**

Small step	Concrete	Pictorial	Abstract
Add / subtract with different denominators			 
Multiply pairs of proper fractions			$\frac{1}{2}\times\frac{1}{4}=\frac{1}{8}$ $\frac{1}{4}\times\frac{1}{2}=\frac{1}{8}$ $\frac{1}{2}\times\frac{1}{3}=\frac{1}{6}$ $\frac{1}{3}\times\frac{1}{2}=\frac{1}{6}$ $\frac{1}{2}\times\frac{1}{6}=\frac{1}{12}$ $\frac{1}{6}\times\frac{1}{2}=\frac{1}{12}$ $\frac{1}{3}\times\frac{1}{5}=\frac{1}{15}$ $\frac{1}{5}\times\frac{1}{3}=\frac{1}{15}$

Small step	Concrete	Pictorial	Abstract
Divide proper fractions by whole numbers		 OR  	$\frac{1}{2} \div 3 = \frac{1}{6} \longrightarrow \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$
Multiply and divide by powers of 10	Place Value Slider or use Place Value Grid with post-its		*1.578 x 100 = 157.8* *40.02 ÷ 10 = 4.002*

<table>
<tr><th>Small step</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>Percentages of amounts</td>
<td></td>
<td>
Bar model
<table>
<tr><td colspan="10">400</td></tr>
<tr><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td><td>40</td></tr>
</table>
30% of 400 = 40 + 40 + 40 = 120
</td>
<td>
<u>30% of 400 = 120</u>
10% of 400 = 40
30% = 3 x 40 = 120

NCETM:
• 40% of 15
<table>
<tr><th>100%</th><th>15</th></tr>
<tr><td>10%</td><td></td></tr>
<tr><td>40%</td><td></td></tr>
</table>
• 25% of 680
<table>
<tr><th>100%</th><th>680</th></tr>
<tr><td>50%</td><td></td></tr>
<tr><td>25%</td><td></td></tr>
</table>
• 5% of 1,400
<table>
<tr><th>100%</th><th>1,400</th></tr>
<tr><td>10%</td><td></td></tr>
<tr><td>5%</td><td></td></tr>
</table>
• 75% of 240
<table>
<tr><th>100%</th><th>240</th></tr>
<tr><td>50%</td><td></td></tr>
<tr><td>25%</td><td></td></tr>
<tr><td>75%</td><td></td></tr>
</table>
</td>
</tr>
</table>