

Progression in Calculation: Fractions, Decimals and Percentages

Vocabulary : The vocabulary listed for each year group is intended as a guide to what pupils should know but is not exhaustive . It is expected that key vocabulary is displayed on ‘ Maths Walls’ at appropriate times during the year, and is promoted through mathematical talk in lessons and included in powerpoints



Primary Progression – Fractions, Decimals, Percentages

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions: Calculations		write simple fractions for example, $\frac{1}{2}$ of 6 = 3	add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]	add and subtract fractions with the same denominator	- 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	- 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, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$] - divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$]
		Spring 4	Summer 1	Spring 3	Spring 3	Autumn 3

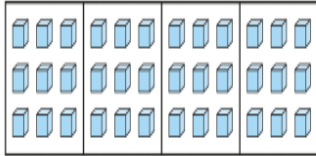
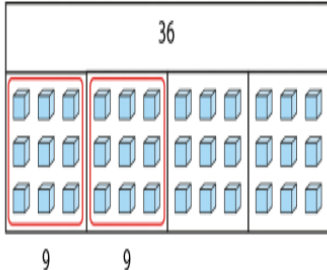
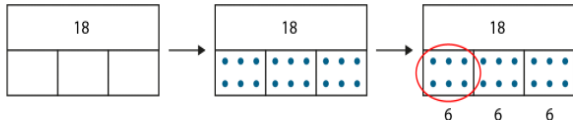
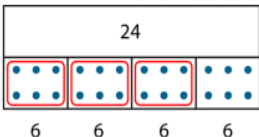
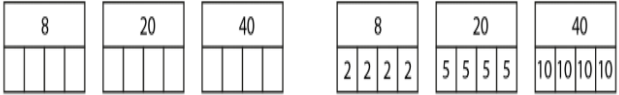
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Decimals: Calculations & Problems				find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths Spring 4	solve problems involving number up to three decimal places Summer 1	- 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 Spring 1

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions, Decimals and Percentages				solve simple measure and money problems involving fractions and decimals to two decimal places Spring 3 Spring 4 Summer 1	- 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 $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25 Spring 3	- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] - recall and use equivalences between simple fractions, decimals and percentages, including in different contexts Spring 1 Spring 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Fractions, Decimals and Percentages				solve simple measure and money problems involving fractions and decimals to two decimal places Spring 3 Spring 4 Summer 1	- 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 $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25 Spring 3	- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] - recall and use equivalences between simple fractions, decimals and percentages, including in different contexts Spring 1 Spring 2

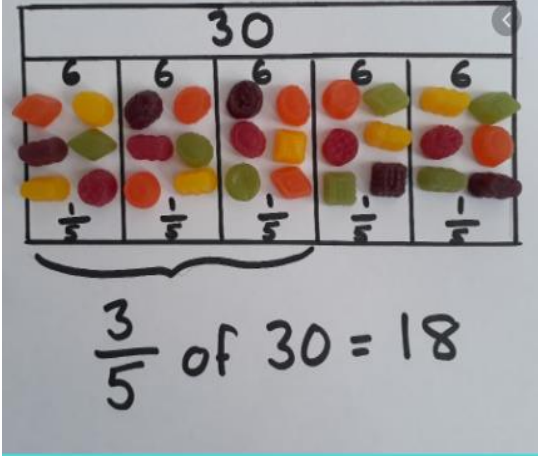
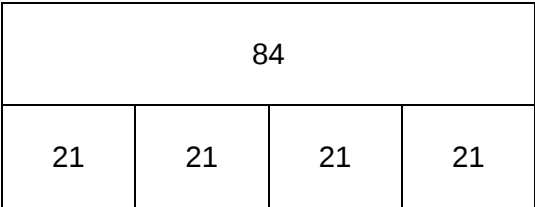
Year 2: National Curriculum: Fractions Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity **write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.**

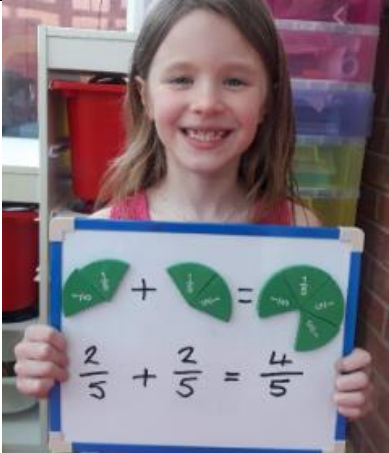
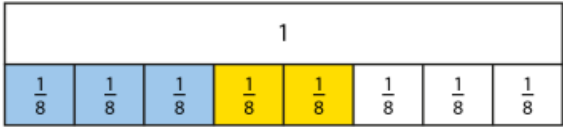
Key vocabulary : Whole, equal parts, one half, two halves, one third, two thirds, a quarter, two quarters, three quarters, equivalence, equivalent

Objective and Strategies	Concrete	Pictorial	Abstract
Year 2 Write simple fractions of amounts	Using cubes to calculate $\frac{1}{4}$ of 36:  Using cubes to calculate $\frac{2}{4}$ of 36: 	Drawing dots to find $\frac{1}{3}$ of 18:  Draw a bar model, divided into 3 equal parts. Share out 18, by drawing dots. Write the number of dots you have in each part. Then, circle the number of parts you need. Drawing dots to calculate $\frac{3}{4}$ of 24:  $\frac{1}{4}$ of 8 $\frac{1}{4}$ of 20 $\frac{1}{4}$ of 40 → $\frac{1}{4}$ of 8 $\frac{1}{4}$ of 20 $\frac{1}{4}$ of 40 	$\frac{1}{2}$ of 90 = 45

Year 3: National Curriculum: Fractions 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, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]** ♣ compare and order unit fractions, and fractions with the same denominators ♣ **solve problems that involve all of the above.**

Key vocabulary : numerator, denominator, unit fraction, non-unit fraction, compare and order, halves, thirds, quarters, fifths, sixths, eighths, tenths

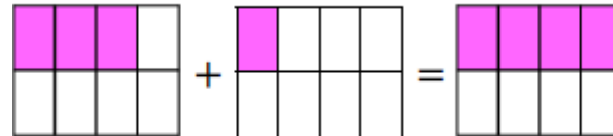
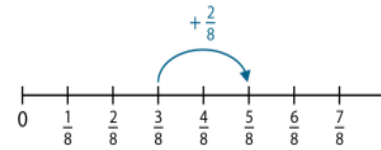
Objective and Strategies	Concrete	Pictorial	Abstract
Y3 Fractions of amounts	 Use a bar model and place value counters to find e.g. one quarter of 84 (tens and ones counters)		$\frac{1}{4}$ of 84 = 21

	$\frac{1}{4}$ of 24 = 6  $\frac{1}{3}$ of 72 = 24  $\frac{2}{5}$ of 40 = 16 	
Y3 Adding fractions with the same denominator within one whole	 Using fraction circles	   1 ← Numerator (1 for a unit fraction) One of the parts of the whole 2 ← Denominator The number of equal parts in the whole Adding fractions: • '$\frac{6}{10}$ is six lots of $\frac{1}{10}$.' • '$\frac{2}{10}$ is two lots of $\frac{1}{10}$.' • 'I know that $6 + 2 = 8$.' • '...so, I know that $\frac{6}{10} + \frac{2}{10} = \frac{8}{10}$.'



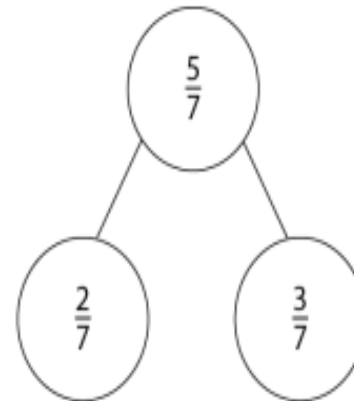
Using numicon

Number line:



We can use this model to calculate $\frac{3}{8} + \frac{1}{8} = \frac{4}{8}$

Part-part-whole model:



$$\frac{1}{8} + \frac{1}{8} + \frac{3}{8} = \frac{\boxed{}}{\boxed{}}$$

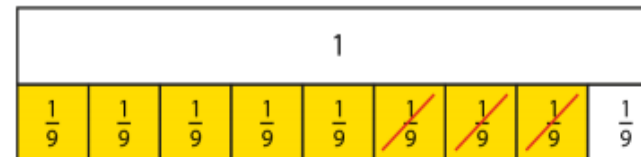
$$\frac{1}{8} + \frac{3}{8} + \frac{1}{8} = \frac{\boxed{}}{\boxed{}}$$

$$\frac{3}{16} + \frac{\boxed{}}{16} = \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16}$$

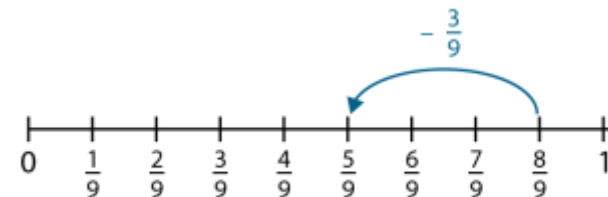
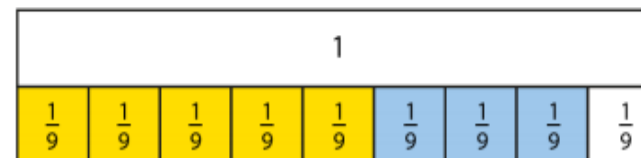
Y3

**Subtracting
fractions with the
same denominator
within one whole**

$$\frac{8}{9} - \frac{3}{9} = \frac{5}{9}$$



or



$$\frac{8}{9} - \frac{3}{9} = \frac{5}{9}$$

$$\frac{8}{10} - \frac{2}{10} = \frac{6}{10}$$

$$\frac{4}{17} + \frac{9}{17} - \frac{6}{17} = \frac{\boxed{}}{\boxed{}}$$

Remind children that we say that addition and subtraction are the *inverse* of each other. This applies to addition and subtraction of fractions in the same way it applies to whole number calculations.

$$3 + 4 = 7$$

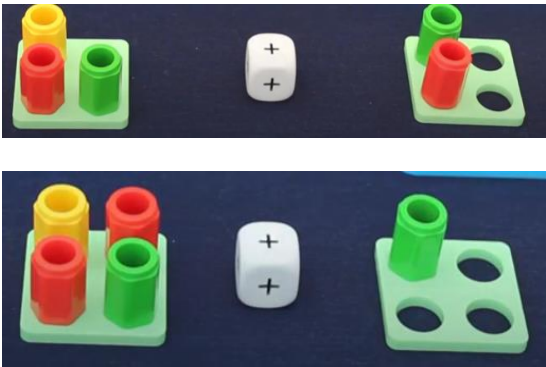
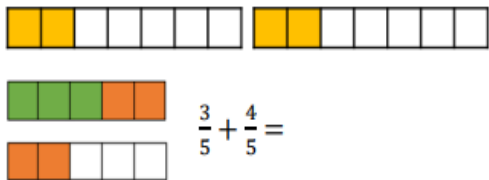
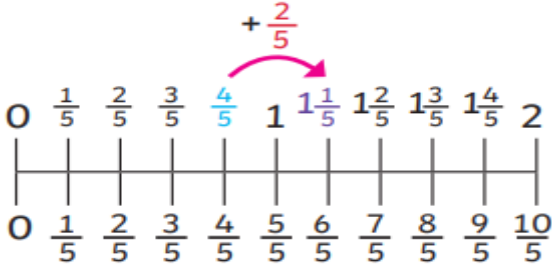
$$7 - 4 = 3$$

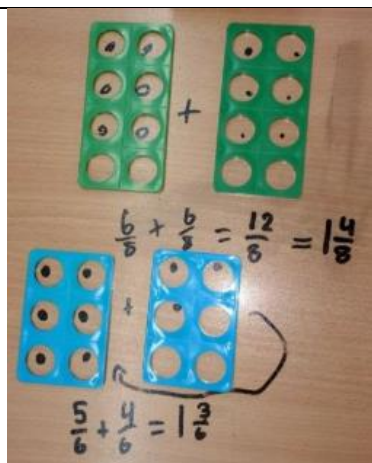
$$\frac{3}{10} + \frac{4}{10} = \frac{7}{10}$$

$$\frac{7}{10} - \frac{4}{10} = \frac{3}{10}$$

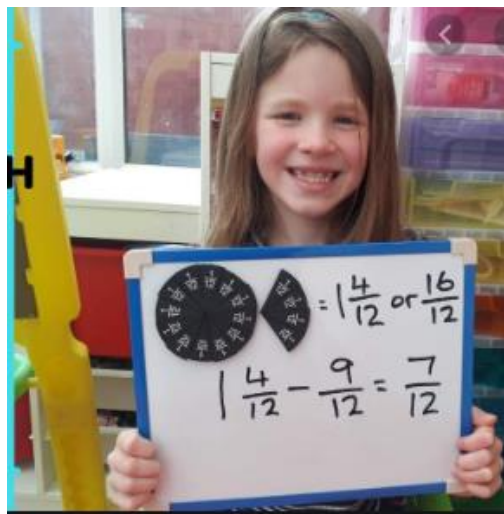
Year 4: National Curriculum: Fractions Recognise and show, using diagrams, families of common equivalent fractions. Count up and down in hundredths: recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten, **solve problems involving increasingly harder fractions 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**.

Key vocabulary : mixed numbers, improper fractions numerator, denominator, unit fraction, non-unit fraction, compare and order, halves, thirds, quarters, fifths, sixths, sevenths, eighths, ninths, tenths, elevenths, twelfths, quantities, equivalent

Objective and Strategies	Concrete	Pictorial	Abstract
Y4 Add and subtract fractions with the same denominator	Using numicon and pegs $\frac{3}{4} + \frac{2}{4} = \frac{5}{4} = 1 \frac{1}{4}$ 	Use the models to add the fractions:  $\frac{2}{7} + \frac{2}{7} =$ $\frac{3}{5} + \frac{4}{5} =$ Use a fraction number line 	$\frac{2}{8} + \frac{4}{8} + \frac{1}{8} = \frac{7}{8}$ $\frac{4}{5} + \frac{2}{5} = \frac{6}{5} \text{ or } 1\frac{1}{5}$



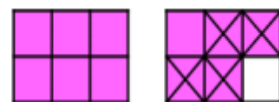
Using fraction circles



Use the bar models to subtract the fractions.



$$\frac{6}{7} - \frac{2}{7} =$$

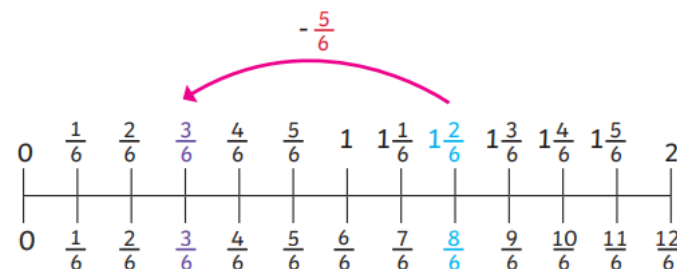


$$\frac{11}{6} - \frac{5}{6} = \frac{6}{6}$$



$$\frac{13}{5} - \frac{6}{5} = \frac{7}{5}$$

Use a fraction number line

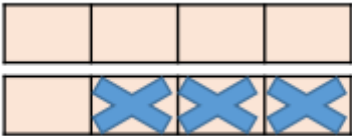
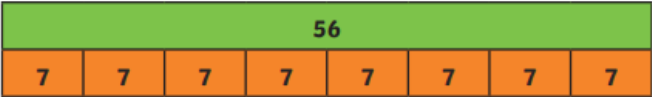


subtract fractions from a whole amount

$$2 - \frac{3}{4} =$$

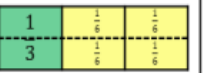
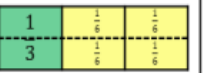
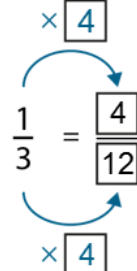
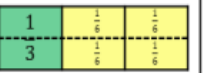
$$\frac{8}{4} - \frac{3}{4} = \frac{5}{4}$$

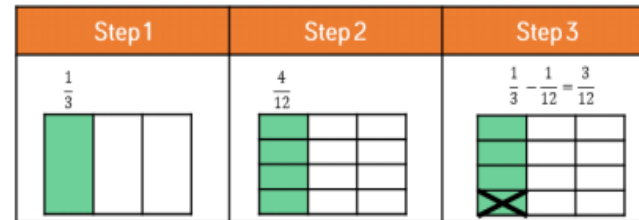
$$1 \frac{1}{4}$$

		 $2 - \frac{3}{4} =$	
Fractions of amounts		To find eighths of 56: 	To find a fraction of a number, divide by the numerator and multiply by the denominator $\frac{1}{8} \text{ of } 56 = 7 \quad \frac{2}{8} \text{ of } 56 = 14 \quad \frac{3}{8} \text{ of } 56 = 21 \quad \frac{4}{8} \text{ of } 56 = 28$ $\frac{5}{8} \text{ of } 56 = 35 \quad \frac{6}{8} \text{ of } 56 = 42 \quad \frac{7}{8} \text{ of } 56 = 49 \quad \frac{8}{8} \text{ of } 56 = 56$

Year 5 : National Curriculum: Fractions 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, $5 \frac{2}{4} + 5 \frac{4}{4} = 5 \frac{6}{4} = 1 \frac{5}{4}$] ♣ 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

Key vocabulary : Proper fractions, mixed numbers, improper fractions common numerator, common denominator, unit fraction, non-unit fraction, simplest form,

	Concrete	Pictorial	Abstract						
Y5 Add and subtract fractions with the same denominator and denominators that are multiples of the same number	Using a fraction wall/ tiles $2/3 + 1/4 = 11/12$ 	<table><tr><th>Step1</th><th>Step2</th><th>Step3</th></tr><tr><td></td><td></td><td></td></tr></table> $\frac{1}{3} + \frac{5}{6} + \frac{5}{12} = 1\frac{7}{12}$ Explain each step of the calculation. Use this method to help you add the fractions.	Step1	Step2	Step3				$\frac{1}{3} + \frac{1}{12} = \frac{5}{12}$  $\frac{4}{12} + \frac{1}{12} = \frac{5}{12}$
Step1	Step2	Step3							
									



Explain each step of the calculation.



$$1\frac{3}{4} - \frac{5}{8} = 1\frac{1}{8}$$

$$\frac{1}{3} - \frac{1}{15} =$$

$\downarrow$

$\times 5$

$$\frac{1}{3} = \frac{5}{15}$$

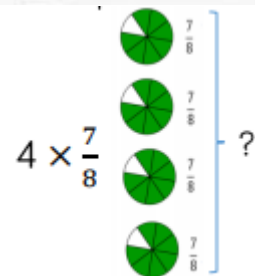
$\times 5$

$$\frac{5}{15} - \frac{1}{15} = \frac{4}{15}$$

Y5

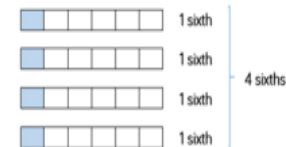
Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams

Using fraction circles

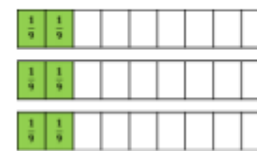


Work out $\frac{1}{6} \times 4$ by counting in sixths.

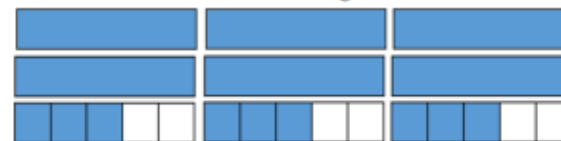
$$\frac{1}{6} \times 4 = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$$



Count the number of ninths to work $3 \times \frac{2}{9}$



$$2 \frac{3}{5} \times 3$$



$$\frac{1}{6} \times 4 = \frac{4}{6} = \frac{2}{3}$$

calculate $2 \frac{3}{5} \times 3$

$$\begin{aligned} 2 \times 3 &= 6 \\ \frac{3}{5} \times 3 &= \frac{9}{5} = 1 \frac{4}{5} \\ 6 + 1 \frac{4}{5} &= 7 \frac{4}{5} \end{aligned}$$

Year 6 : National Curriculum: Fractions ♣ use common factors to simplify fractions; use common multiples to express fractions in the same denominator ♣ 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, $4\frac{1}{2} \times 2\frac{1}{2} = 8\frac{1}{2}$] ♣ divide proper fractions by whole numbers [for example, $3\frac{1}{2} \div 2 = 1\frac{3}{4}$]

Key vocabulary : Proper fractions, mixed numbers, improper fractions common numerator, common denominator, unit fraction, non-unit fraction, simplest form, lowest terms, reduced, lowest common denominator

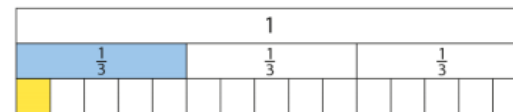
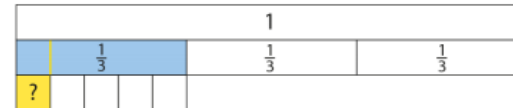
Objective and Strategies	Concrete	Pictorial	Abstract
Y6 How to teach: Add and subtract fractions with different denominators and mixed numbers			$\frac{5}{8} + \frac{3}{16}$ LCM of 8 and 16 is 16 $\frac{5}{8} = \frac{10}{16}$ $\frac{10}{16} + \frac{3}{16} = \frac{13}{16}$

Y6

Multiply simple pairs of proper fractions

$$\frac{1}{5} \times \frac{1}{3} = \frac{1}{15}$$

Is the same as $\frac{1}{5}$ of $\frac{1}{3}$



You may now choose to introduce the following generalisation: *'To multiply fractions, we can multiply the numerators and multiply the denominators.'*

$$\frac{1}{5} \times \frac{1}{3} = \frac{1}{15}$$

Y6

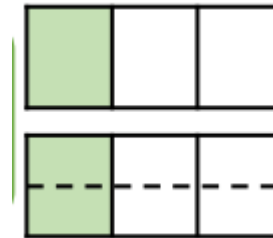
Divide proper fractions by whole numbers

Use a fraction wall



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

$$\frac{1}{3} \div 2 = \frac{1}{6}$$



To divide a fraction by a whole number, we can change it to an equivalent multiplication. To divide by 5 we can multiply by $\frac{1}{5}$

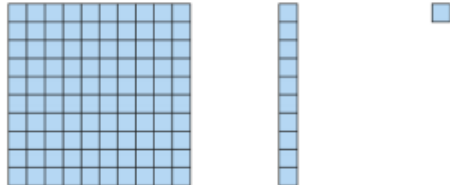
$$\frac{1}{3} \div 5 = \frac{1}{15} \rightarrow \frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$$

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

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

Year 4 : National Curriculum: Decimals **Recognise and write decimal equivalents of any number of tenths or hundredths. Recognise and write decimal equivalents to $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$.** 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. **Find the effect of dividing a one or two digit number by 10 or 100. Identifying the value of the digits in the answer as ones, tenths and hundredths.** Solve simple measure and money problems involving fractions and decimals to two decimal places

Key vocabulary : place value, rounding, decimal point, part-whole model, decimal equivalences, decimal tenths, tenths,.

Objective and Strategies	Concrete	Pictorial	Abstract																																																															
Recognise and write decimal equivalents of any number of tenths and hundredths	1 one 1 tenth 1 hundredth  Write the decimal represented in each place value grid. Ones Tenths  Ones Tenths  There are ones and tenths. The decimal represented is	We can partition 56 hundredths into tenths and hundredths. 56 100 5 10 6 100 Partition: • 65 hundredths • 31 hundredths • 82 hundredths <table><tr><td>1,000</td><td>2,000</td><td>3,000</td><td>4,000</td><td>5,000</td><td>6,000</td><td>7,000</td><td>8,000</td><td>9,000</td></tr><tr><td>100</td><td>200</td><td>300</td><td>400</td><td>500</td><td>600</td><td>700</td><td>800</td><td>900</td></tr><tr><td>10</td><td>20</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>90</td></tr><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td><td>0.9</td></tr><tr><td>0.01</td><td>0.02</td><td>0.03</td><td>0.04</td><td>0.05</td><td>0.06</td><td>0.07</td><td>0.08</td><td>0.09</td></tr></table>	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	100	200	300	400	500	600	700	800	900	10	20	30	40	50	60	70	80	90	1	2	3	4	5	6	7	8	9	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	<table><tr><th>Fraction notation</th><th>Decimal notation</th><th>Name</th></tr><tr><td>$\frac{1}{10}$</td><td>0.1</td><td>one-tenth</td></tr><tr><td>$\frac{1}{100}$</td><td>0.01</td><td>one-hundredth</td></tr></table>	Fraction notation	Decimal notation	Name	$\frac{1}{10}$	0.1	one-tenth	$\frac{1}{100}$	0.01	one-hundredth
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Write the decimal represented in each place value grid.



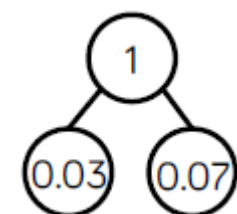
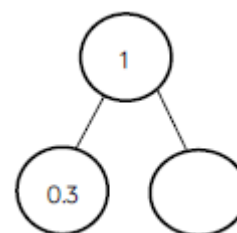
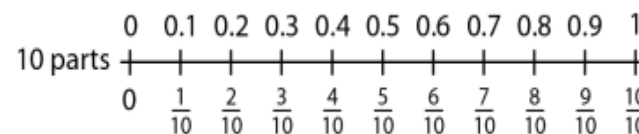
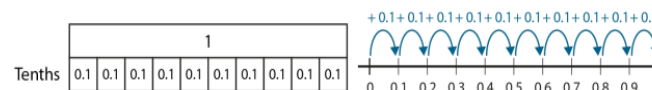
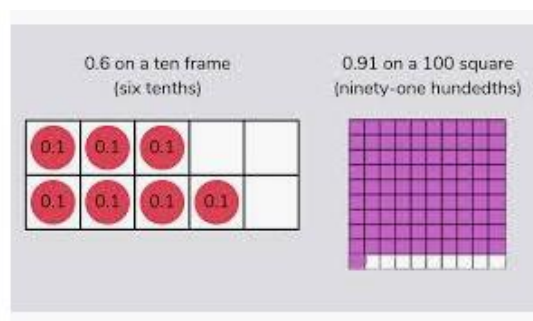
There are ____ tenths.

There are ____ hundredths.



The decimal represented is ____

Tens frame and place value counters



Use the following stem sentences:

'____ is equivalent to ____.'

'We know that $\frac{\square}{\square} < \frac{\square}{\square}$, so

____ < ____.'

or

'____ is equivalent to ____.'

'We know that ____ < ____.

so ____ < ____.'

Recognise and write decimal equivalents to $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$.

Front

Back

$$\frac{1}{4}$$

0.25

$$\frac{1}{2}$$

0.5

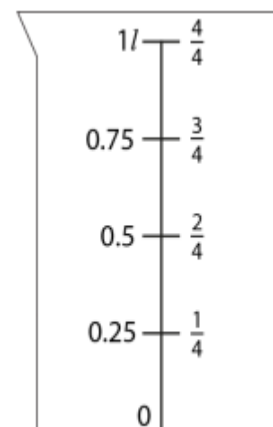
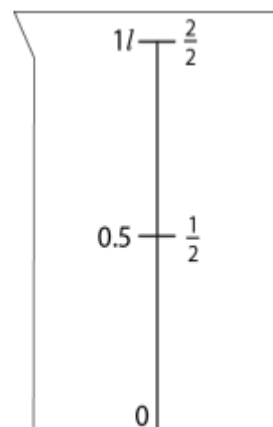
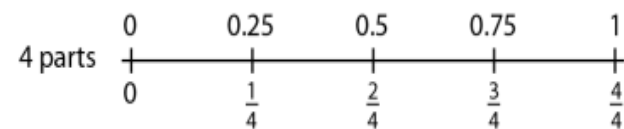
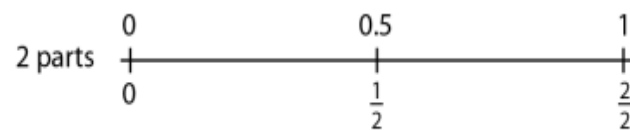
$$\frac{1}{5}$$

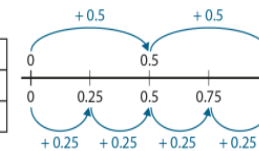
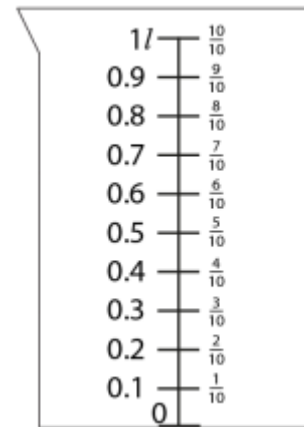
0.2

$$\frac{1}{10}$$

0.1

Matching pair cards





Find the effect of dividing a one or two digit number by 10 or 100. Identifying the value of the digits in the answer as ones, tenths and hundredths.



To divide the number by 10, we move the counters one column to the right.
What is the value of the counters now?

Tim uses counters to make a 2-digit number.



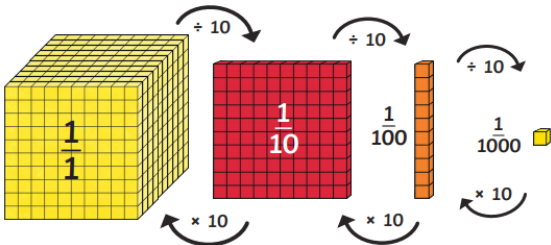
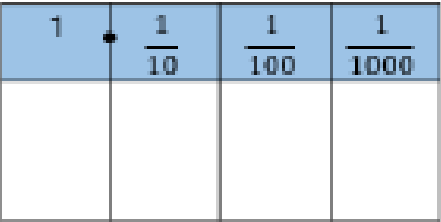
To divide the number by 10, we move the counters one column to the right.
What is the value of the counters now?

Choose a digit card from 1 – 9 and place a counter over the top of that number on the Gattegno chart.

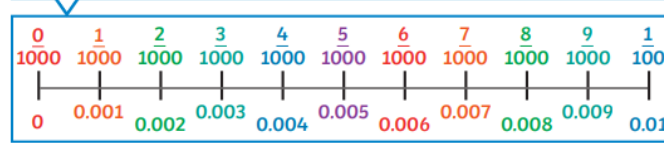
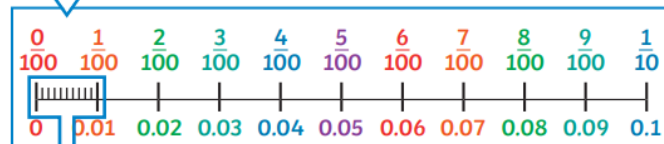
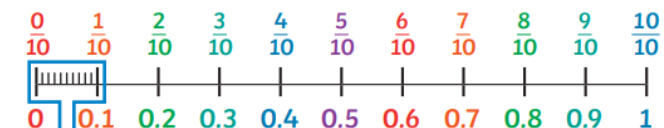
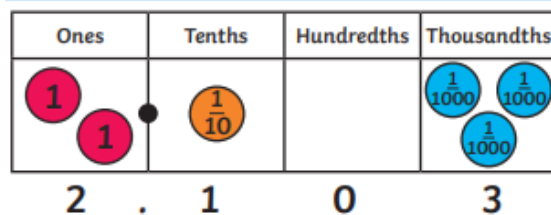
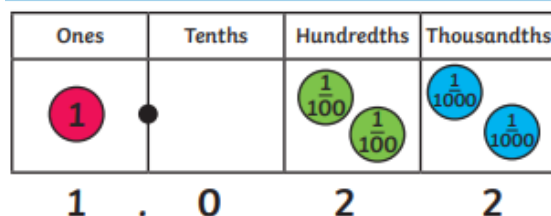
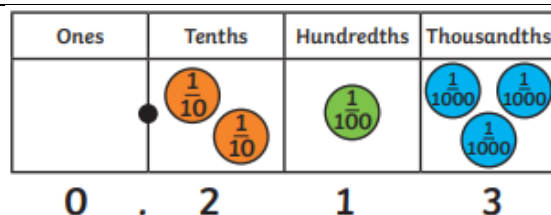
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

Year 5 : National Curriculum: Decimals ♣ read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$] ♣ 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 diagrams ♣ 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 $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25.

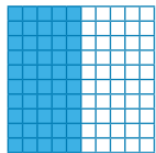
Key vocabulary : place value, rounding, decimal point, part-whole model, decimal equivalences, decimal tenths, decimal hundredths, tenths, hundredths.

Objective and Strategies	Concrete	Pictorial	Abstract
Read and write decimal numbers as fractions			$0.71 = \frac{71}{100} = \frac{7}{10} + \frac{1}{100}$ $0.37 = \frac{37}{100} = \frac{3}{10} + \frac{7}{100}$

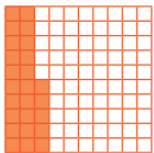
Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.



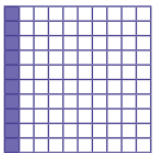
Write % as a fraction
with denominator 100,
and as a decimal



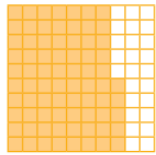
$$\frac{50}{100} = \frac{1}{2} = 0.5 = 50\%$$



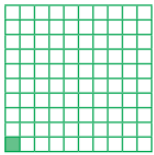
$$\frac{25}{100} = \frac{1}{4} = 0.25 = 25\%$$



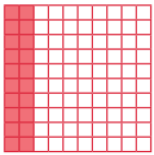
$$\frac{10}{100} = \frac{1}{10} = 0.1 = 10\%$$



$$\frac{75}{100} = \frac{3}{4} = 0.75 = 75\%$$



$$\frac{1}{100} = 0.01 = 1\%$$



$$\frac{20}{100} = \frac{2}{10} = 0.2 = 20\%$$

$$\frac{50}{100} = \frac{1}{2} = 0.5 = 50\%$$

$$\frac{25}{100} = \frac{1}{4} = 0.25 = 25\%$$

$$\frac{10}{100} = \frac{1}{10} = 0.1 = 10\%$$

$$\frac{75}{100} = \frac{3}{4} = 0.75 = 75\%$$

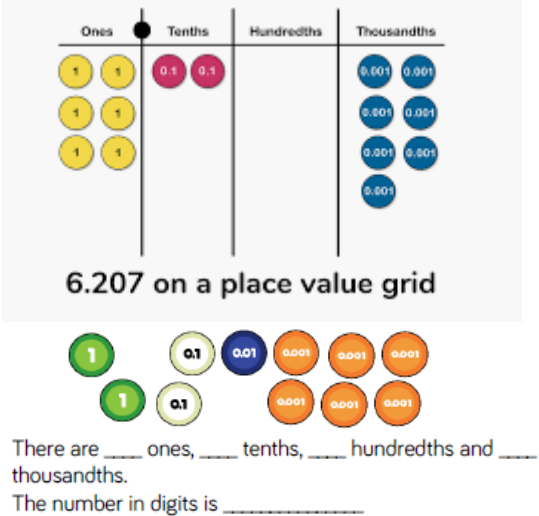
$$\frac{1}{100} = 0.01 = 1\%$$

$$\frac{20}{100} = \frac{2}{10} = 0.2 = 20\%$$

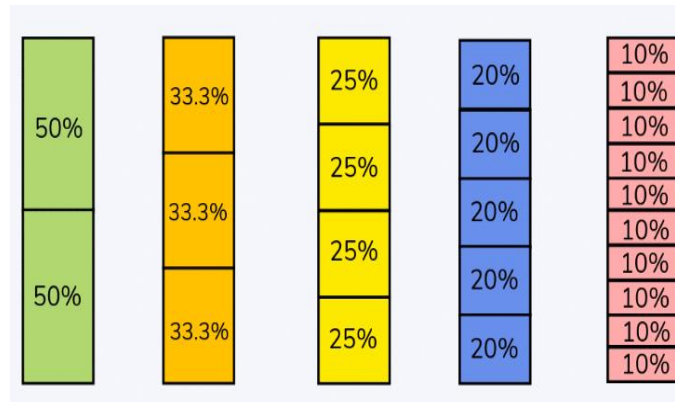
Year 6 : National Curriculum: Decimals & Percentages

- ♣ associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$]
- ♣ 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.

Key vocabulary: decimal place, decimal fraction, recurring decimal, equivalent fraction, tenth, sharing, partitioning, exchanging, rounding to 3d.p, hundredth, thousandth, equal to, remainder, grouping

Objective and Strategies	Concrete	Pictorial	Abstract
Identify the value of each digit in numbers given to three decimal places.	 6.207 on a place value grid There are ____ ones, ____ tenths, ____ hundredths and ____ thousandths. The number in digits is _____		

Objective and Strategies	Concrete	Pictorial	Abstract																																																																												
Associate a fraction with division and calculate decimal fraction equivalents. Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.		<table><thead><tr><th>Percentage</th><th>Fraction</th><th>Hundred square</th><th>Number line</th></tr></thead><tbody><tr><td>80%</td><td>$\frac{\square}{100}$</td><td></td><td></td></tr><tr><td>45%</td><td>$\frac{\square}{100}$</td><td></td><td></td></tr><tr><td>31%</td><td>$\frac{\square}{100}$</td><td></td><td></td></tr><tr><td>9%</td><td>$\frac{\square}{100}$</td><td></td><td></td></tr></tbody></table> <table><tbody><tr><td>Percentages</td><td>0%</td><td>10%</td><td>20%</td><td>30%</td><td>40%</td><td>50%</td><td>60%</td><td>70%</td><td>80%</td><td>90%</td><td>100%</td></tr><tr><td>Fractions</td><td>0</td><td>$\frac{10}{100}$</td><td>$\frac{20}{100}$</td><td>$\frac{30}{100}$</td><td>$\frac{40}{100}$</td><td>$\frac{50}{100}$</td><td>$\frac{60}{100}$</td><td>$\frac{70}{100}$</td><td>$\frac{80}{100}$</td><td>$\frac{90}{100}$</td><td>1</td></tr><tr><td>Decimals</td><td>0</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6</td><td>0.7</td><td>0.8</td><td>0.9</td><td>1</td></tr></tbody></table>	Percentage	Fraction	Hundred square	Number line	80%	$\frac{\square}{100}$			45%	$\frac{\square}{100}$			31%	$\frac{\square}{100}$			9%	$\frac{\square}{100}$			Percentages	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Fractions	0	$\frac{10}{100}$	$\frac{20}{100}$	$\frac{30}{100}$	$\frac{40}{100}$	$\frac{50}{100}$	$\frac{60}{100}$	$\frac{70}{100}$	$\frac{80}{100}$	$\frac{90}{100}$	1	Decimals	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	<table><thead><tr><th>Fraction</th><th>Decimal</th></tr></thead><tbody><tr><td>$\frac{1}{2}$</td><td>0.5</td></tr><tr><td>$\frac{1}{3}$</td><td>0.33333...</td></tr><tr><td>$\frac{1}{4}$</td><td>0.25</td></tr><tr><td>$\frac{1}{5}$</td><td>0.2</td></tr><tr><td>$\frac{1}{6}$</td><td>0.1666...</td></tr><tr><td>$\frac{1}{7}$</td><td>0.14285714...</td></tr><tr><td>$\frac{1}{8}$</td><td>0.125</td></tr><tr><td>$\frac{1}{9}$</td><td>0.111...</td></tr><tr><td>$\frac{1}{10}$</td><td>0.1</td></tr></tbody></table> Highlight $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$ and $\frac{1}{10}$ (two parts, four parts, five parts and ten parts, respectively). These are most common divisions used in graphs and measures. As such, they will be the focus of our learning. Because these fraction-decimal equivalents are so important and frequently used, it is necessary to learn them off by heart. $\frac{1}{8}$ is not as commonly used as the other fractions, but it is a fraction that can also be useful to know the decimal equivalent of.	Fraction	Decimal	$\frac{1}{2}$	0.5	$\frac{1}{3}$	0.33333...	$\frac{1}{4}$	0.25	$\frac{1}{5}$	0.2	$\frac{1}{6}$	0.1666...	$\frac{1}{7}$	0.14285714...	$\frac{1}{8}$	0.125	$\frac{1}{9}$	0.111...	$\frac{1}{10}$	0.1
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$$12\% = \frac{\square}{25}$$

$$12\% = \frac{\square}{100} = \frac{\square}{25}$$

$$12\% = \frac{12}{100} = \frac{3}{25}$$

$\div 4$ (above the arrow from 12 to 3)
 $\div 4$ (below the arrow from 100 to 25)

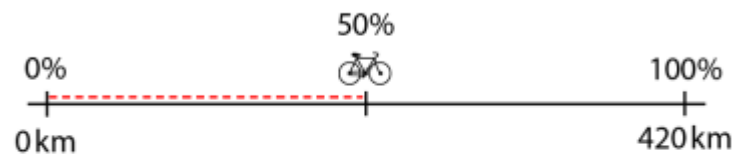
Reach the generalisation that: '***In order to convert a percentage to a fraction, first convert it to a fraction with a denominator of 100.***'

$$80\% = \frac{\square}{100} = \frac{\square}{5}$$

$$45\% = \frac{\square}{100} = \frac{\square}{20}$$

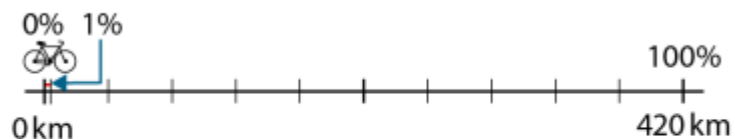
Find percentages of amounts

'Zara is doing a 420 km charity bike ride. So far, she has completed 50% of the route. How far has she cycled?'



- '100% of 420 km is 420 km.'
- '50% of 420 km is $\frac{1}{2}$ of 420 km.'
- 'Zara has cycled 210 km.'

'James has completed 1% of the same bike ride. How far has he cycled?'

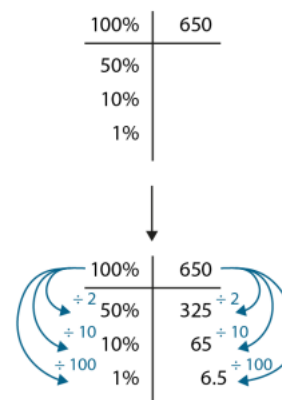


- '100% of 420 km is 420 km.'
- '1% of 420 km is $\frac{1}{100}$ of 420 km.'
- 'James has cycled 4.2 km.'

Work towards the following generalisation: **'To find 50% of a number, halve it.'**

Work towards the following generalisation: **'To find 10% of a number, divide it by ten.'**

Work towards the following generalisation: **'To find 1% of a number, divide it by one hundred.'**



100%	420km
50%	210km
25%	105km
75%	315km

Finding 75% of 420:

Method 1

$$\begin{aligned} 75\% \text{ of } 420 &= 210 + 105 \\ &= 315 \end{aligned}$$

Method 2

$$\begin{aligned} 75\% \text{ of } 420 &= 105 \times 3 \\ &= 315 \end{aligned}$$

Method 3

$$\begin{aligned} 75\% \text{ of } 420 &= 420 - 105 \\ &= 315 \end{aligned}$$

'Find 45% of 64.'

100%	64
50%	32
10%	6.4
5%	3.2

Method 1:

$$\begin{aligned} 45\% \text{ of } 64 &= 32 - 3.2 \\ &= 28.8 \end{aligned}$$

Method 2:

$$\begin{aligned} 45\% \text{ of } 64 &= 4 \times 6.4 + 3.2 \\ &= 25.6 + 3.2 \\ &= 28.8 \end{aligned}$$

Calculate the whole
amount from the part %

Bar model:

