
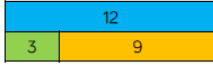
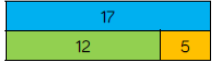

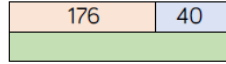
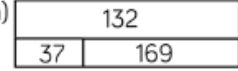
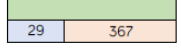
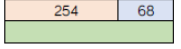
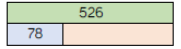
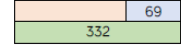


Bar Model Progression

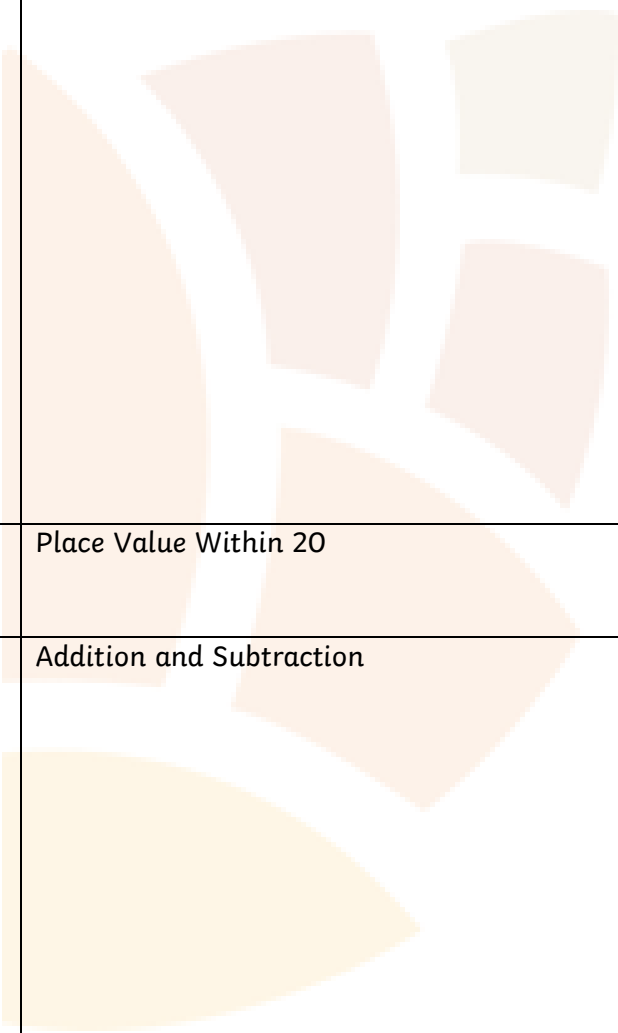

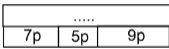
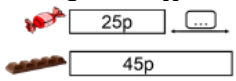
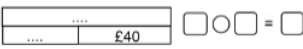
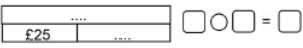
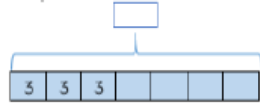
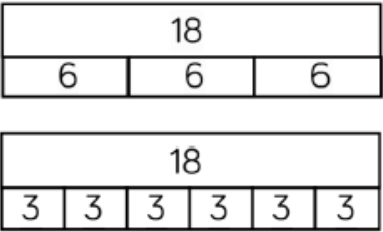
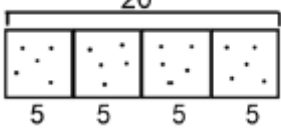

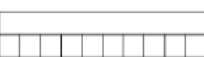
In each area of the White Rose scheme or work the children should understand and be able to draw models as a method for each area stated below. The bar models are used within the end of unit assessments so children need to be aware of these to access them.


When doing anything with word problems please model this using bar model where possible, as it is assumed that children can do this in White Rose and KS2 SATs maths problems are lending themselves to the use of bar model.

Useful website for modelling the bar model: <https://www.mathplayground.com/thinkingblocks.html>

	Year 1	Year 2	Year 3
Au Blk 1	Place Value	Place Value	Place Value
Au Block 2	<p>Addition and Subtraction</p> <p>Fact Families</p> <p>Complete the number sentences.</p>  <p> $\square + \square = 7$ $7 = \square + \square$ $\square + \square = 7$ $7 = \square + \square$ </p>	<p>Addition and Subtraction</p> <p>Fact Families</p>  <p>Using the inverse</p> <p>Can you use the inverse operation to check $5 + 12 = 17$?</p>  <p>How many possible inverse calculations are there?</p> <p>Comparing number sentences</p> <p>How can we use the following representation to prove $5 + 3 = 4 + 4$?</p> 	<p>Addition and subtraction</p> <p>Adding 3 digit numbers and tens</p> <p>Complete the bar model</p>  <p>Two digit and three digit numbers</p> <p>a)</p>     

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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Au Block 3</p>	<p>Geometry</p> 	<p>Measurement: Money Counting money</p> <p>Complete the bar models.</p>   <p>Finding the difference</p>  <p>Two step problems</p> <p>Rachel has £33 in her money bank, and gets £40 more. Fill in the bar model to show her total.</p>  <p>$\square \circ \square = \square$</p> <p>She then buys a top for £25. Complete the bar model to show how much she has left.</p>  <p>$\square \circ \square = \square$</p>	<p>Multiplication and division Multiplying by 3, 4 and 8</p> <p>There are 7 tricycles in the playground. How many wheels are there altogether? Complete the bar model to find the answer.</p>  <p>Dividing by 3, 4 and 8 Which bar model matches the problem?</p> 
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Au Blk 4</p>	<p>Place Value Within 20</p>	<p>Multiplication and Division</p>	<p>Multiplication and Division</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Spr Block 1</p>	<p>Addition and Subtraction</p>	<p>Multiplication and Division Making equal groups</p>  <p>Dividing by 10</p> <p>Apples can be sold in packs of 10 How many packs can be made below?</p>  <p>$\square \div \square = \square$</p> <p>When 30 apples are sold in packs of 10, ___ packs of apples can be made. Can you show this in a bar model?</p> 	<p>Multiplication and Division</p> <p style="text-align: center;">ACHIEVING TOGETHER</p> <p style="text-align: center;">primary.derby.sch.uk</p>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Spr Block 2</p>	<p>Place Value to 50</p>	<p>Statistics</p>	<p>Measurement: Money Adding money Represent the bar model with a calculation and solve it.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center; background-color: #e0f7fa; padding: 2px;">?</p> <p style="background-color: #e0e0e0; padding: 2px;">£2 and 35 p</p>  </div> <p>Giving Change Sam goes to the shop with £4 He buys a book for £1 and 20 p and a pencil that costs £1 and 45 p. How much change does he get? Which bar model represents the problem?</p> <div style="margin: 10px 0;"> <p style="text-align: center;">£4</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> £1 and 20 p £1 and 45 p ? </div> </div> <div style="margin: 10px 0;"> <p style="text-align: center;">?</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> £4 £1 and 20 p £1 and 45 p </div> </div>
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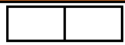

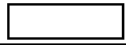
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Weight and Volume

Fractions

Unit and non-unit fractions

Complete the missing information.

Fraction	Bar Model	Words
$\frac{1}{2}$		
		
		One quarter

Equivalence of $\frac{1}{2}$ and $\frac{1}{4}$

Using two identical strips of paper, explore what happens when you fold the strips into two equal pieces and four equal pieces. Compare one of the two equal pieces with two of the four equal pieces.



Count in fractions



Length and perimeter

LEARNING, GROWING & ACHIEVING TOGETHER

Spr
Block 5

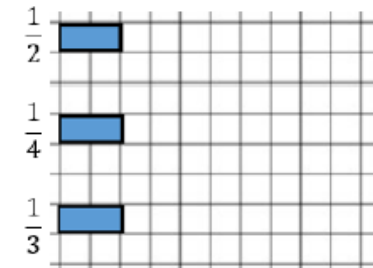
Length and Height

Fractions

Making the whole

Here are four fractions of four different bars.

Can you draw the whole bar for each?



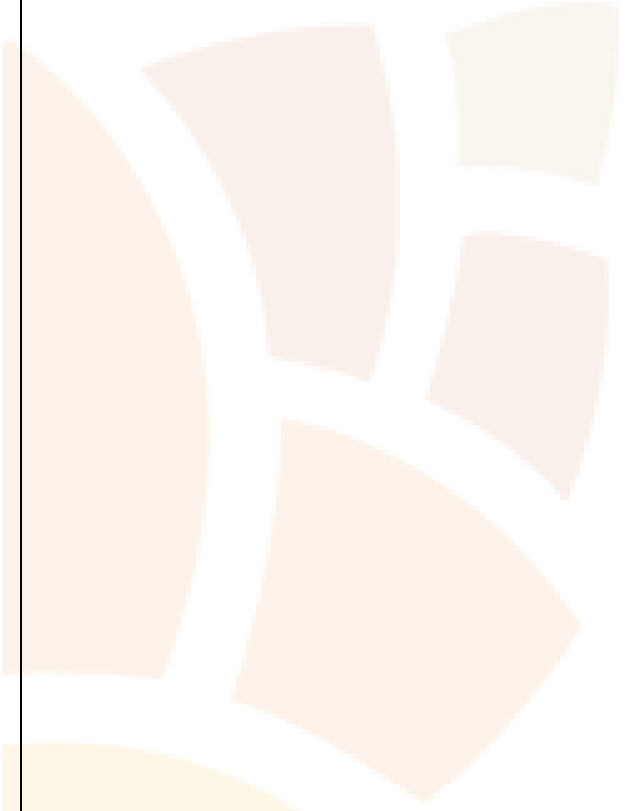



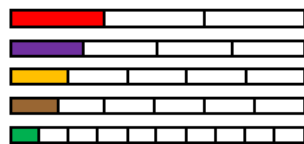

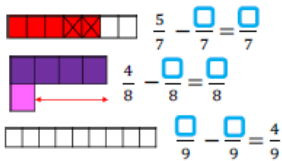
Tenths as decimals

Write the fractions and decimals shown.



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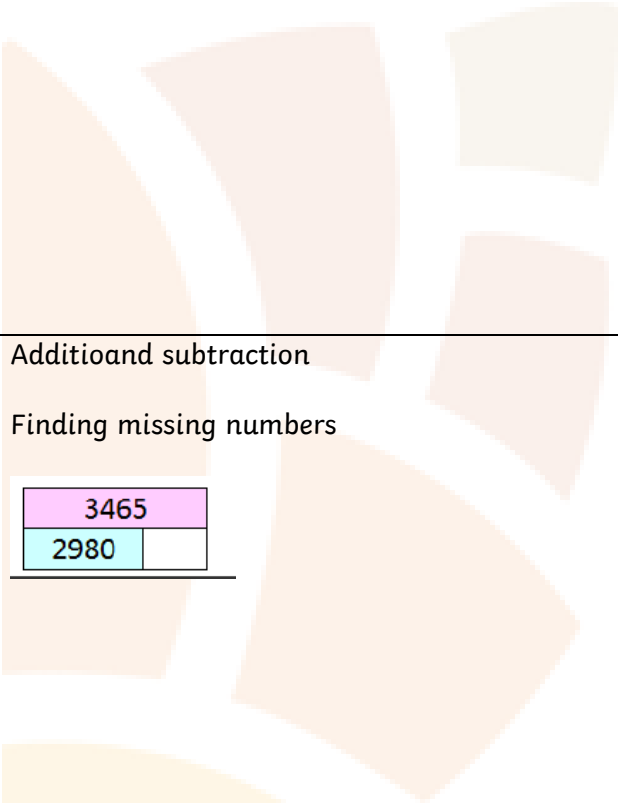
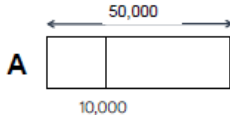

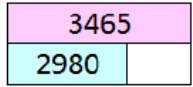
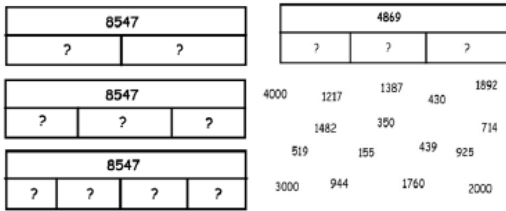
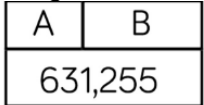
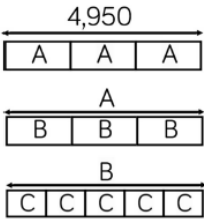

Su Blk 1	<p>Multiplication and Division</p> 	Position and Direction	<p>Fractions</p> <p>Equivalent Fractions</p> <p> Lucas makes this fraction: </p> <p> Jermaine says he can make an equivalent fraction with a denominator of 9</p> <p>Comparing fractions</p> <p>Using the fraction strips below, use the >, < or = symbol to compare the fractions.</p>  <p>Ordering Fractions</p> <p>Split strips of paper into halves, thirds, quarters, fifths and sixths and colour in one part of each strip.</p> <p>Now order the strips from <u>smallest</u> to <u>largest</u>.</p>  <p>When the numerators are the same, the _____ the denominator, the _____ the fraction.</p> <p>Subtracting fractions</p> 
Su Blk 2	Fractions	LEARNING, GROWING & ACHIEVING TOGETHER	Time
Su Blk 3	Position and Direction	Time	Properties of shapes
Su Blk 4	Place Value	Mass, capacity and temperature	Mass and capacity

Su Blk 5	Money		
Su Blk 6	Time		



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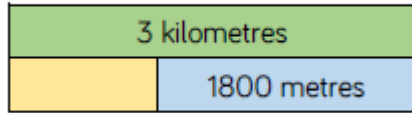
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	Year 4	Year 5	Year 6
Au Block 1	Place Value 	Place Value	Place Value Comparing and ordering numbers Kayleigh draws bar model A. Her teacher asks her to draw another where the total is 30,000  
Au Block 2	Addition and subtraction Finding missing numbers 	Addition and Subtraction Multi-step Problems 	Four Operations Adding and subtracting integers  Short Division  Reason from known facts 

LEARNING, GROWING & ACHIEVING TOGETHER

Measurement

Converting kilometres and metres
Complete the bar model.

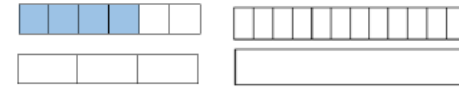


Statistics

Fractions

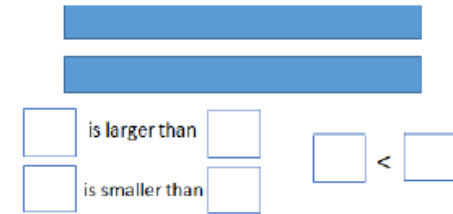
Simplifying fractions

Use the bar models to simplify the fractions.
Make sure your bar model has fewer equal parts than the original fraction.



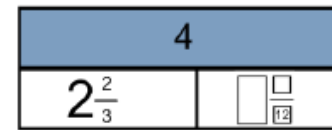
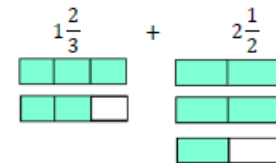
Comparing and ordering fractions

Use the bar models to show $\frac{1}{4}$ and $\frac{2}{3}$ then complete the sentences.

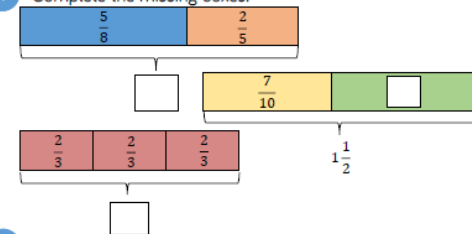


Adding and subtracting fractions

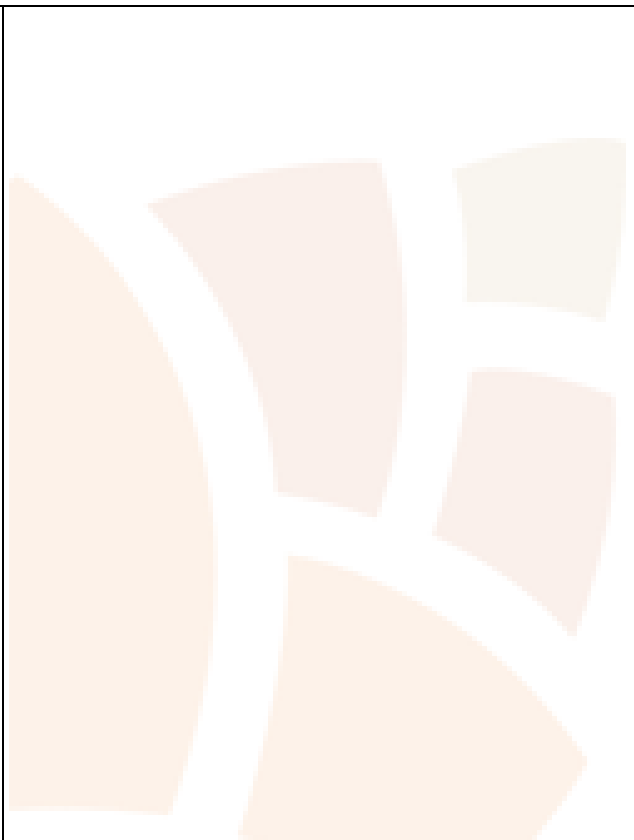




Can you split the bar models so each fraction has the same denominator?

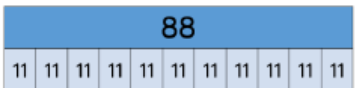



1 Complete the missing boxes.



LEARNING, GROWING & ...

			<p>Multiplying fractions by integers</p>  <p>Dividing fractions by integers</p> <p>Lee has $\frac{2}{5}$ of a chocolate bar. He shares it with his friend. How much chocolate do they get each?</p>  <p>Fractions of amount</p> <p>48 kg</p>  <p>Finding the whole</p> <p>Sam has spent $\frac{2}{3}$ of his money. He spent £60, how much did he have to start with?</p> 
Au Blk 4	Multiplication and Division	Multiplication and Division	Position and Direction
Au Blk 5		Perimeter and Area	<p>LEARNING, GROWING & ACHIEVING TOGETHER</p>

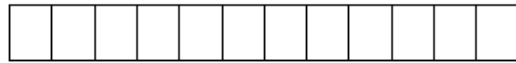
Spr Block 1	<p>Multiplication and Division 11 and 12 times table</p> <p>Sarah used a bar model to show $88 \div 11$. Explain Sarah's mistake.</p> <div style="text-align: center;">  </div> <p>Can you represent $88 \div 11$ using a bar model correctly?</p>	<p>Multiplication and Division</p>	<p>Decimals Division to solve problems</p> <p>A box of chocolates costs 4 times as much as a chocolate bar.</p> <p>Together they cost £7.55</p> <div style="text-align: center;">  </div>
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Fractions Equivalent Fractions

Using the diagram, complete the fractions.



$$\frac{1}{4} = \frac{\square}{12} \quad \frac{1}{6} = \frac{3}{\square} \quad \frac{3}{4} = \frac{\square}{8} \quad \frac{5}{12} = \frac{\square}{24}$$

Adding fractions

Use the models to add the fractions:



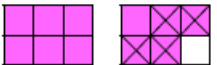
$$\frac{3}{5} + \frac{4}{5}$$

Subtracting fractions

Use the bar models to subtract the fractions.



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

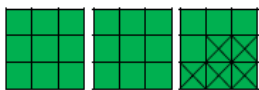


$$\frac{11}{6} - \frac{\square}{6} = \frac{\square}{6}$$



$$\frac{13}{5} - \frac{\square}{5} = \frac{\square}{5}$$

Use cubes to build a model to show $3 - \frac{5}{9} = 2\frac{4}{9}$



Could you build the cubes in a tower to subtract?

Fractions of a quantity

Use a bar model to help you represent and find:



$$\frac{1}{7} \text{ of } 56 = 56 \div \square$$

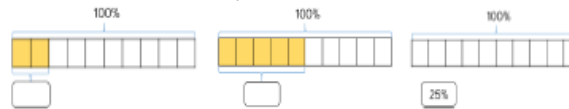
- a. $\frac{2}{7}$ of 56 b. $\frac{3}{7}$ of 56 c. $\frac{4}{7}$ of 56 d. $\frac{4}{7}$ of 28

Calculate Quantities

Decimals and Percentages

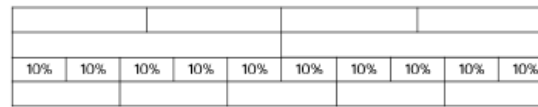
Understanding percentages

Record the percentages shown.



Equivalent fraction, decimal and percentages

Use the bar models to convert the fractions into a percentage and a decimal.



$\frac{1}{2}$ is equivalent to ___ & ___ $\frac{1}{4}$ is equivalent to ___ & ___

$\frac{3}{10}$ is equivalent to ___ & ___ $\frac{1}{5}$ is equivalent to ___ & ___

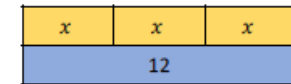
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Algebra

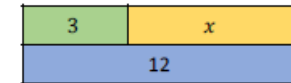
One step equations

Match each equation to the correct bar model then solve.

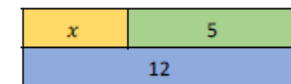
$$x + 5 = 12$$



$$3x = 12$$



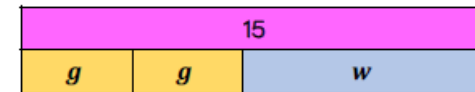
$$12 = 3 + x$$


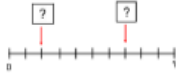


Enumerate possibilities

$$2g + w = 15$$

Write down all the possible values for g and w , show each of them in a bar model.



	<p>Use the counters and bar models to calculate the whole:</p>  <p>There are ____ counters in one part. $\frac{1}{4}$ = ____ counters $\frac{2}{4}$ = ____ counters $\frac{3}{4}$ = ____ counters $\frac{4}{4}$ or 1 whole = ____ counters</p>  <p>There are 7 counters in one part. $\frac{1}{4}$ = ____ counters $\frac{2}{4}$ = ____ counters $\frac{3}{4}$ = ____ counters $\frac{4}{4}$ or 1 whole = ____ counters</p>		
<p>Spr Block 3</p>	<p>Decimals Tenths as decimals Write the numbers shown as fractions and decimals.</p>  		<p>Converting Units</p>

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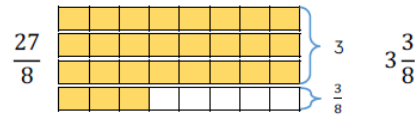
Area



Fractions

Converting between mixed numbers

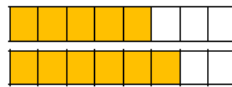
Steve converts the improper fraction $\frac{27}{8}$ into a mixed number using bar models.



Use Steve's method to convert $\frac{38}{8}$, $\frac{27}{6}$, $\frac{47}{7}$ and $\frac{32}{4}$

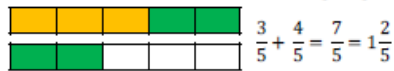
Compare and order

Use bar models to compare $\frac{5}{8}$ and $\frac{3}{4}$

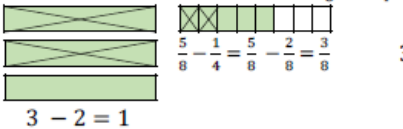


Add and subtract fractions

Here is a bar model to calculate $\frac{3}{5} + \frac{4}{5}$

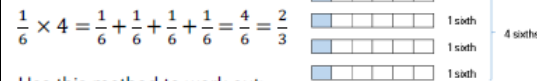


Here is a bar model to calculate $3\frac{5}{8} - 2\frac{1}{4}$



Multiplying by an integer

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

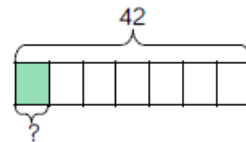


Use this method to work out:

$\frac{1}{3} \times 2$ $\frac{1}{5} \times 3$ $\frac{1}{10} \times 6$

Fraction of amount

Find $\frac{1}{7}$ of 42

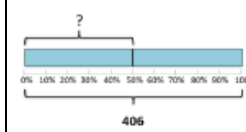


Percentages

Percentage of amount

Find 50% of 406

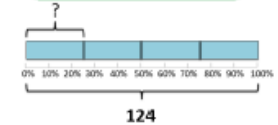
50% is equal to a half so we can divide by 2 to find 50%



Calculations
 $50\% = \frac{1}{2}$
 $406 \div 2 = 203$

Use this to find 25% of 124

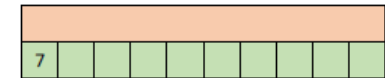
Which fraction is 124 equivalent to?



Missing values

If 7 is 10% of a number, what is the number?

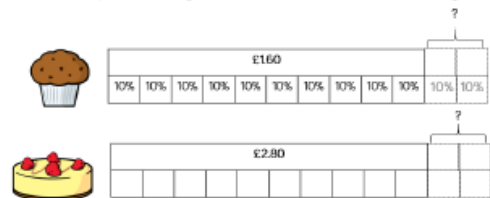
Use the bar model to help you.



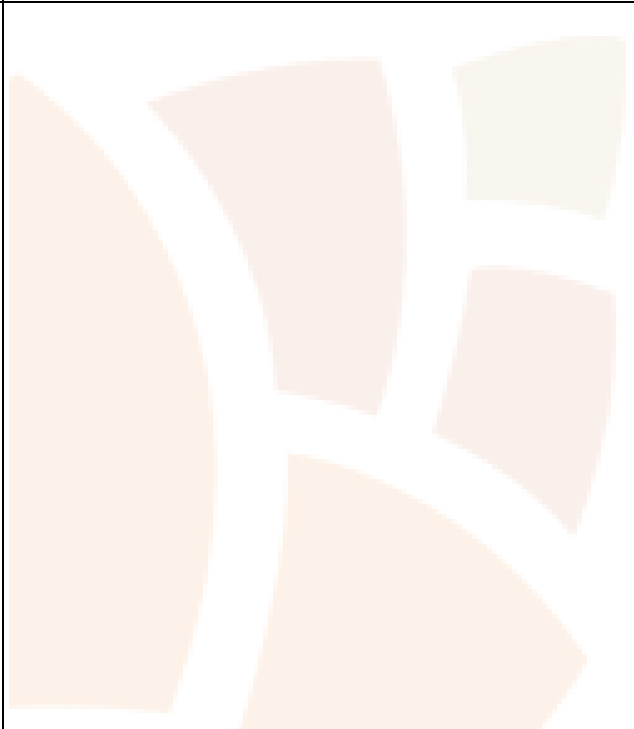


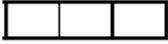

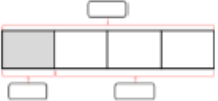
Increase and decrease

Janet is increasing the prices in her café by 20%

Calculate the percentage increase for the following items:



ACHIEVING TOGETHER

Spr Blk 5			Perimeter, area and volume
Spr Blk 6			<p>Ratio Calculating ratio Emily has a packet of sweets. For every 3 red sweets there are 5 purple sweets. If there are 32 sweets in the packet in total, how many of each colour are there? You can use a bar model to help you.</p> <p>Red  } Purple  } 32 sweets</p> <p>Ratio and proportion problems A smoothie contains three times as many strawberries as raspberries. The combined weight of the strawberries and raspberries is 840 g. What weight of strawberries is needed?</p> <p>Strawberries  } Raspberries  } 840 g</p>
Su Blk 1	Decimals	Decimals	Properties of shape
Su Blk 2	<p>Money Four operations Emma has £48. She spends one quarter of her money. How much does she have left? Use the bar model to help.</p> 	<p>Properties of shape</p> <p>LEARNING, GROWING & ACHIEVING TOGETHER</p>	<p>www.firsprimary.derby.sch.uk</p>

Su Blk 3	Time	Position and Direction	<p>Statistics Interpreting pie charts</p> <p>96 people took part in this survey.</p> <p>Our favourite pets</p> <p> ■ Dogs ■ Cats ■ Hamsters ■ Horses </p> <p>How many people voted for cats? $\frac{3}{8}$ of the people who voted for dogs were male. How many females voted for dogs? What other information can you gather from the pie chart?</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f0ff;"> <p>Answers: $\frac{1}{2}$ of 96 = 48, $\frac{1}{4}$ of 96 = 24, $\frac{1}{8}$ of 96 = 12 12 people voted cats.</p> <p>48 people voted dogs. $\frac{1}{8}$ of 48 = 6 $6 \times 5 = 30$. 30 females voted.</p> </div>
Su Blk 4	Statistics	Converting Units	
Su Blk 5	Properties of shape	Volume	
Su Blk 6	Position and Direction		

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