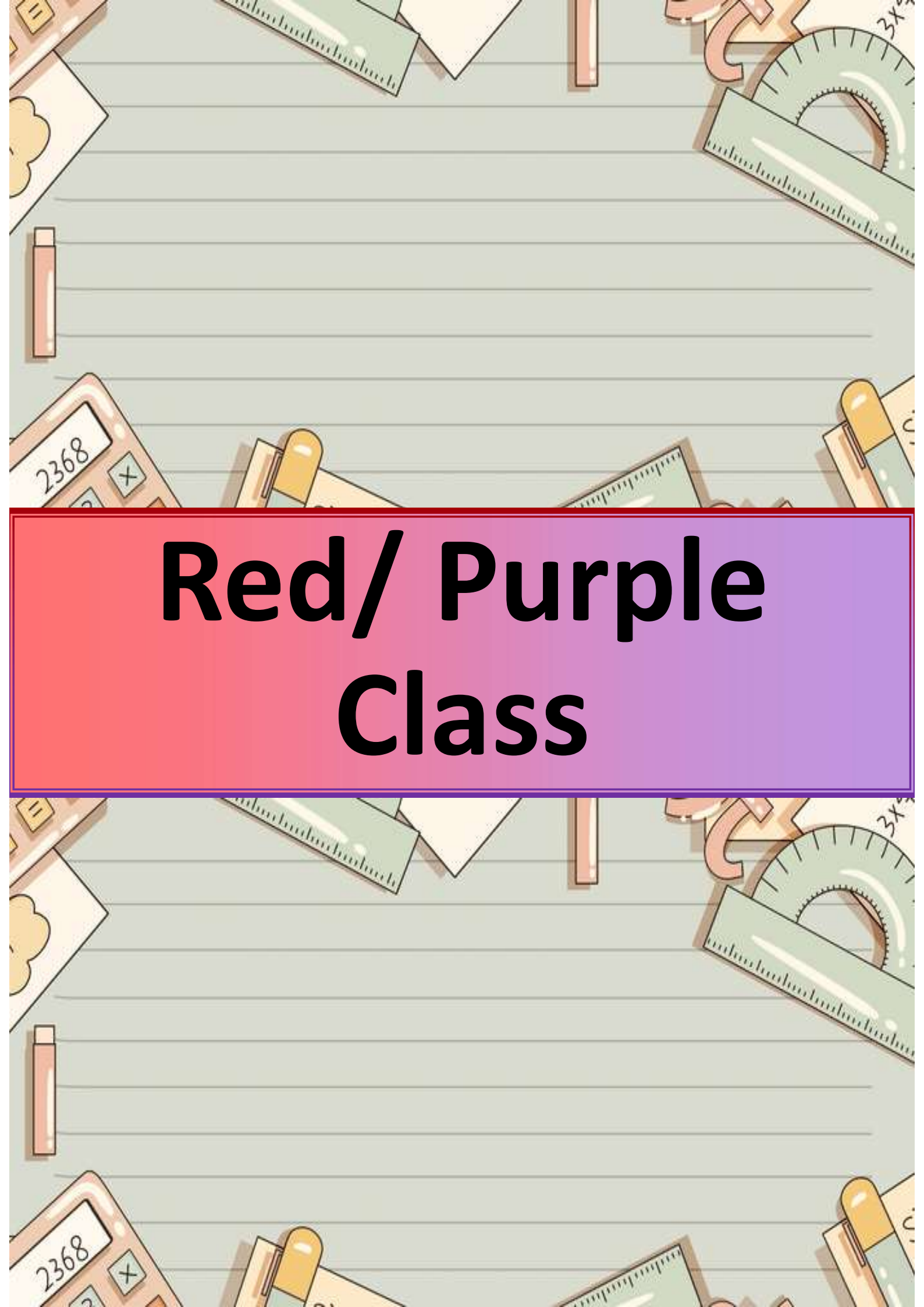


The background of the entire page is a light gray surface with horizontal white lines, resembling a notebook. Scattered around the edges are various colorful school supplies: a green ruler, a protractor, a yellow pencil, a pink eraser, a yellow paper clip, a pink calculator, and a yellow notepad with a cloud drawing. The central text is enclosed in a rectangular box with a red-to-purple gradient background and a thin black border.

Red/ Purple Class

Addition and Subtraction: Stage 5

Addition and Subtraction		Knowledge Organiser																				
Key Vocabulary	Addition	Subtraction																				
Add	Place Value Grid: $3274 + 5601 = 8875$	Place Value Grid: $35\ 727 - 6313 = 29\ 414$																				
Total	<table><tr><td rowspan="2">Th</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	Th									<table><tr><td>TTh</td><td></td><td></td><td></td></tr></table>	TTh				2 ten thousands left						
Th																						
																						
TTh																						
Make		<table><tr><td rowspan="2">Th</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>	Th											5 thousands – 6 thousands cannot be done. Exchange ten thousand for ten thousands becoming 15 thousands – 6 thousands = 9 thousands								
Th																						
																						
Plus		<table><tr><td rowspan="2">H</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	H									<table><tr><td rowspan="2">H</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	H									7 hundreds – 3 hundreds = 4 hundreds
H																						
																						
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Sum		<table><tr><td rowspan="2">T</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	T									<table><tr><td rowspan="2">T</td><td></td><td></td><td></td><td></td></tr></table>	T					2 tens – 1 ten = 1 ten				
T																						
																						
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	More		<table><tr><td rowspan="2">O</td><td></td><td></td><td></td><td></td><td></td></tr></table>	O						<table><tr><td rowspan="2">O</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>	O									7 ones – 3 ones = 4 ones		
O																						
	O																					
																						
Altogether	Column Method Starting with the ones, add each column in turn. Regroup tens, hundreds, thousands, ten thousands and/or as required.	Column Method Starting with the ones, subtract each column in turn. Exchange tens, hundreds, thousands and/or ten thousands as required.																				
Difference	$\begin{array}{r} 45864 \\ +23497 \\ \hline 69361 \\ 111 \end{array}$	$\begin{array}{r} 35727 \\ - 6313 \\ \hline 29414 \end{array}$																				
Subtract																						
Less																						
Minus																						
Take away																						
Column addition																						
Column subtraction																						
Estimate																						
Inverse operation																						
Number facts																						
Place value																						
Complex																						



Addition and Subtraction

Knowledge Organiser

Estimate and Approximate

Rounding to Estimate

$$41\ 635 + 7386 = 49\ 021$$

Round to ten:

$$41\ 630 + 7380 = 49\ 010$$

$$41\ 630 + 7390 = 49\ 020$$

$$41\ 640 + 7390 = 49\ 030$$

Rounding is not as accurate when both numbers are rounded up. A better estimate comes from "rounding" one down and one up.

Estimating on a Number Line

A horizontal number line with tick marks at 10 000 and 50 000. A yellow arrow points down to a position between the two marks, approximately three-quarters of the way from 10 000 to 50 000.

The arrow is about $\frac{3}{4}$ of the way across the line so it is 40 000.

A cartoon illustration of a young boy with dark hair, wearing an orange t-shirt. He is looking upwards and to the left, with his right hand resting on his chin in a thinking pose.

Inverse Operations

Use the inverse to check:

53 476

To check $53\ 476 - 32\ 732 = 20\ 744$

32 732

20 744

use $32\ 732 + 20\ 744 = 53\ 476$

Start with a number, subtract 409 and double. I end with 6264. To find the starting number use the inverse: halve, then add 409. Half of 6264 = 3132. $3132 + 409 = 3541$. The starting number was 3541.

Multistep Problems

Using a Bar Model

The sum of two numbers is 25 567.

The difference is 1875.

A bar model consisting of two horizontal bars. The top bar is orange and the bottom bar is blue. They are aligned to the left. A bracket on the right side of the bars indicates a total of 25 567. A double-headed arrow between the right ends of the two bars indicates a difference of 1875.

Subtract 1875 from 25 567 = 23 692.

Halve 23 692 to find smaller number = 11 846.

Add 1875 to find larger number = 13 721.

£20	£20 is used to buy 2 books costing
£3.75	£8.49
£12.24	£7.76

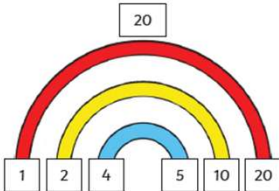
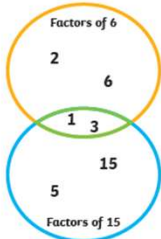
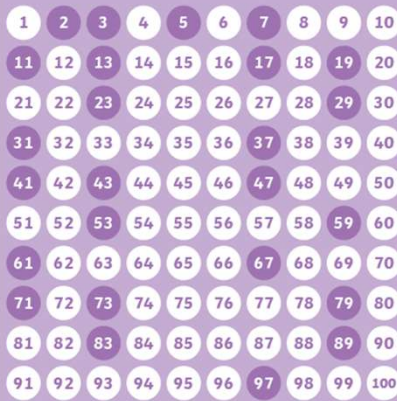
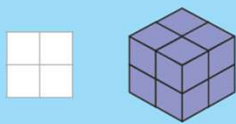
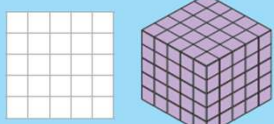
How much change is given?

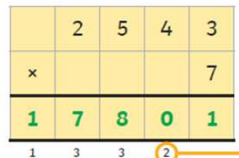
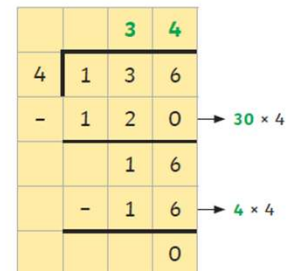
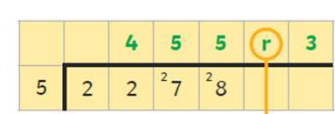
$$£3.75 + £8.49 = £12.24$$

$$£20.00 - £12.24 = £7.76$$

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Multiplication and Division: Stage 5

Multiplication and Division		Knowledge Organiser
Key Vocabulary	Factors	Prime Numbers
multiply	A factor is a number that divides into another number exactly, without leaving a remainder.  The factors of 20 are 1, 2, 4, 5, 10 and 20. The factor pairs are: 1 and 20 2 and 10 4 and 5 A common factor is a factor of 2 or more numbers. 	
groups of		
lots of		
times		
divide		
share		
remainder		
factor	Squared ² and Cubed ³ Numbers	Related Calculations
multiple	 $2^2 = 4$ $2 \times 2 = 4$ $2^3 = 8$ $2 \times 2 \times 2 = 8$  $5^2 = 25$ $5 \times 5 = 25$ $5^3 = 125$ $5 \times 5 \times 5 = 125$	$8 \times 9 = 72$ $80 \times 9 = 720$ $9 \times 8 = 72$ $90 \times 8 = 720$
product		$72 \div 9 = 8$ $720 \div 9 = 80$ $72 \div 8 = 9$ $720 \div 8 = 90$
		

Multiplication and Division		Knowledge Organiser
Short Multiplication		Long Multiplication
$2543 \times 7 = 17\ 801$  Remember to move any regrouped digits into the next column. After the next multiplication, add the regrouped number to the answer.		$2543 \times 67 = 170\ 381$  Before multiplying by the number in the tens column, remember to use zero as a placeholder because the 6 in 67 is 6 tens (60).
Division		Short Division
$136 \div 4 = 34$ 		 $15 \div 4 = 3$ remainder 3 Remember to regroup any remainders and move them into the next column.  $28 \div 5 = 5$ remainder 3 If your calculation has a remainder, remember to record it in the answer using the letter r.

Four Operations:

Stage 6

Four Operations

Knowledge Organiser

Key Vocabulary

Add
Total
Make
Plus
Sum
More
Altogether
Difference
Leave
Subtract
Difference between
Less
Minus
Take away
Mentally, Orally
Column Addition
Column Subtraction
Estimate
Inverse operation
Solve problems
Number facts
Place Value
Complex

Add and Subtract Whole Numbers

Column Method

	4	5	8	6	4
+	2	3	4	9	7
	6	9	3	6	1
		1	1	1	

Starting with the ones, add each column in turn. Regroup tens, hundreds, thousands, ten thousands as required.

	3	5	~~7~~	~~13~~	~~12~~
-		3	4	7	6
	3	2	2	6	6

Starting with the ones, subtract each column in turn. Exchange tens, hundreds, thousands and/or ten thousands as required.

Multiply up to 4-digit by 2-digit

1	~~8~~	~~2~~	
	1	5	4
×		2	6
	9	2	4
3	0	8	0
4	0	0	4
1	1		

Start with the ones.
 $154 \times 6 = 924$
 $154 \times 20 = 3080$
 $3080 + 924 = 4004$

Order of Operations

B	Brackets	$10 \times (4 + 2) = 10 \times 6 = 60$
O	Order	$5 + 2^2 = 5 + 4 = 9$
D	Division	$10 + 6 \div 2 = 10 + 3 = 13$
M	Multiplication	$10 - 4 \times 2 = 10 - 8 = 2$
A	Addition	$10 \times 4 + 7 = 40 + 7 = 47$
S	Subtraction	$10 \div 2 - 3 = 5 - 3 = 2$

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Four Operations

Short Division

Start from the left.

		4	4	0	5
12	5	2	8	6	0

$5 \div 12 = 0 \text{ r}5$
 $52 \div 12 = 4 \text{ r}4$
 $48 \div 12 = 4$
 $6 \div 12 = 0 \text{ r}6$

Long Division

		1	2	0	r	3
14	1	6	8	3		
	1	4	0	0		
		2	8	3		
		2	8	0		
				3		

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Knowledge Organiser

Common Factors

Factors of 48

1	2	3	4	6	8	12	16	24	48
---	---	---	---	---	---	----	----	----	----

Factors of 30

1	2	3	5	6	10	15	30
---	---	---	---	---	----	----	----

Common factors: 1, 2, 3, 6

Primes

A prime number has only 1 and itself as factors: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43

A composite number has factors other than 1 and itself.

Mental Calculations and Estimation

Order of calculations:

$50 \times 34 \times 2 = 50 \times 2 \times 34 = 100 \times 34 = 3400$

Money: £8.99 + £3.49 = £12.48

Use £9 + £3.50 = £12.50 and subtract 2p

Estimate on a number line

Subdivide line to estimate: 17

Common Multiples

Multiples of 3

3	...	18	21	24	...	39	42
---	-----	----	----	----	-----	----	----

Multiples of 7

7	14	21	28	35	42
---	----	----	----	----	----

Common multiples: 21, 42...

Squares and Cubes

Square numbers result from a number being multiplied by itself (e.g. $5 \times 5 = 25$):

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Cube numbers result from a number being multiplied by itself twice ($2 \times 2 \times 2 = 8$):

1, 8, 27, 64, 125

Reason from Known Facts

$90 \div 10 = 9$ so $90 \div 20 = 4.5$ and $90 \div 5 = 18$

$16 \times 9 = 144$ so $1.6 \times 9 = 14.4$

$4352 \div 17 = 256$

so $256 \times 18 = 4352 + 256 = 4608$

$3786 + 2850 = 6636$

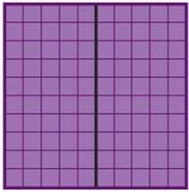
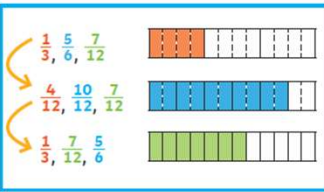
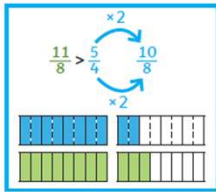
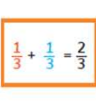
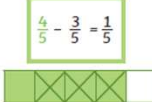
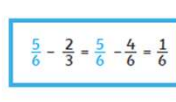
so $4786 + 2850 = 7636$

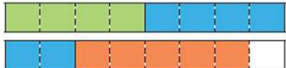
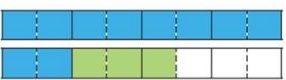
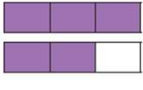
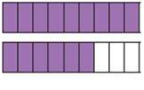
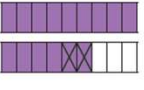
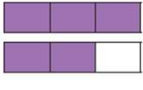
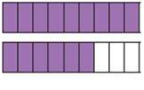
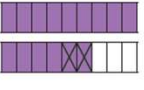
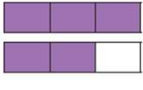
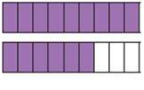
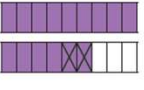
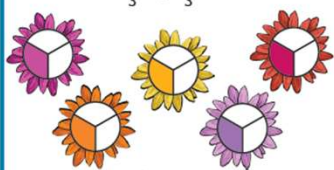
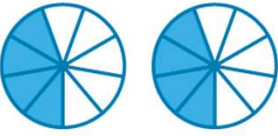
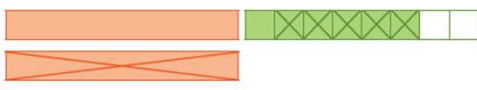
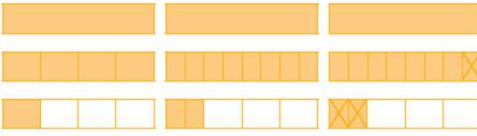
and $2786 + 3850 = 6636$

and $8636 - 3786 = 4850$

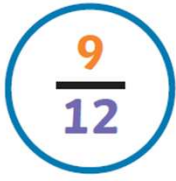
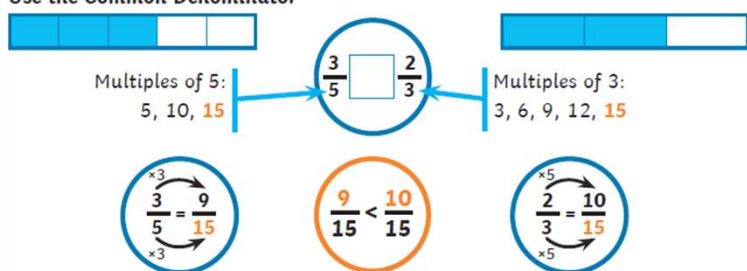
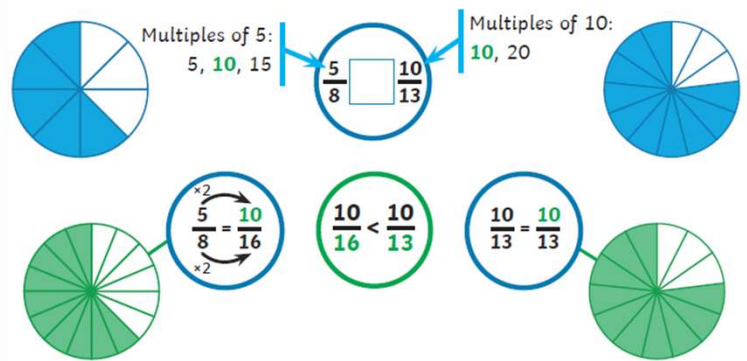
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Fractions: Stage 5

Fractions		Knowledge Organiser
Key Vocabulary	Equivalent Fractions	Compare and Order Fractions
numerator	To find equivalent fractions, we multiply or divide the numerator and denominator by the same number.  $\frac{1}{2} \xrightarrow{\times 5} \frac{5}{10} \xrightarrow{\times 10} \frac{50}{100}$ $\frac{50}{100} \xrightarrow{\div 10} \frac{5}{10} \xrightarrow{\div 5} \frac{1}{2}$	We can compare and order fractions by using common denominators.  
denominator		
unit fraction		
non-unit fraction		
whole		
equivalent	Mixed Numbers	Improper Fractions
mixed number	Mixed numbers contain a whole number and a fraction. 	An improper fraction has a numerator which is greater than or equal to the denominator. $\frac{5}{3}$
improper fraction	Convert an Improper Fraction to a Mixed Number	Convert a Mixed Number to an Improper Fraction
simplest form	$\frac{9}{4}$ $9 \div 4 = 2r1$ Divide the numerator by the denominator. This shows you the whole number and the fraction. $2\frac{1}{4}$	Multiply the whole by the denominator to make an improper fraction. $2\frac{5}{6} = \frac{12}{6} + \frac{5}{6} = \frac{17}{6}$ Add the fractions together.
multiple	Adding and Subtracting Fractions	
common denominator	To add or subtract fractions with denominators that are multiples of the same number, we must change one fraction to have the same denominator.	
common numerator	   	

Fractions		Knowledge Organiser						
Add Fractions Where the Total is Greater Than 1		Subtract from a Mixed Number						
$\frac{1}{2} + \frac{3}{4} + \frac{5}{8} = \frac{4}{8} + \frac{6}{8} + \frac{5}{8} = \frac{15}{8} = 1\frac{7}{8}$ 		$1\frac{2}{3} - \frac{2}{9} = 1\frac{6}{9} - \frac{2}{9} = 1\frac{4}{9}$						
Add Mixed Numbers								
$1\frac{1}{4} + \frac{3}{8} = 1\frac{2}{8} + \frac{3}{8} = 1\frac{5}{8}$ $1\frac{1}{4} + \frac{3}{8} = \frac{5}{4} + \frac{3}{8} = \frac{10}{8} + \frac{3}{8} = \frac{13}{8} = 1\frac{5}{8}$ 		<table border="1"> <thead> <tr> <th>starting number</th><th>find the equivalent fraction</th><th>subtract</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td></tr> </tbody> </table>	starting number	find the equivalent fraction	subtract			
starting number	find the equivalent fraction	subtract						
								
Multiply Unit Fractions by an Integer	Multiply Non-Unit Fractions by an Integer	Subtract Two Mixed Numbers						
$\frac{1}{3} \times 5 = \frac{5}{3}$ 	$2 \times \frac{4}{9} = \frac{8}{9}$ 	$2\frac{3}{4} - 1\frac{5}{8} = 1\frac{1}{8}$  $2 - 1 = 1$ $\frac{3}{4} - \frac{5}{8} = \frac{1}{8}$						
Multiply Mixed Numbers by Integers		Subtract from a Mixed Number - Breaking the Whole						
Convert to an improper fraction and multiply the numerator by the integer. $2\frac{1}{4} \times 2 = \frac{9}{4} \times 2 = \frac{18}{4} = 4\frac{2}{4} = 4\frac{1}{2}$ Use repeated addition. $2\frac{1}{4} \times 2 = 2\frac{1}{4} + 2\frac{1}{4} = 4\frac{2}{4} = 4\frac{1}{2}$		$2\frac{1}{4} - \frac{3}{8} = 2\frac{2}{8} - \frac{3}{8} = 1\frac{10}{8} - \frac{3}{8} = 1\frac{7}{8}$ 						

Fractions: Stage 6

Fractions		Knowledge Organiser
Key Vocabulary	Simplify Fractions	Compare and Order Fractions
numerator	 Factors of 9: 1, 3, 9 Factors of 12: 1, 2, 3, 4, 6, 12 $\frac{9}{12} = \frac{3}{4}$ 	Use the Common Denominator  Multiples of 5: 5, 10, 15 Multiples of 3: 3, 6, 9, 12, 15 $\frac{3}{5} = \frac{6}{15}$ $\frac{2}{3} = \frac{4}{6}$ $\frac{9}{15} < \frac{10}{15}$ 
denominator		Use the Common Numerator  Multiples of 5: 5, 10, 15 Multiples of 10: 10, 20 $\frac{5}{8} = \frac{10}{16}$ $\frac{10}{16} < \frac{10}{13}$ $\frac{10}{13} = \frac{10}{13}$ 
proper fraction		
improper fraction		
factor		
highest common multiple		
lowest common multiple		
equivalents		
common numerator		
common denominator		
decimal equivalent		
simplify		
simplest form		
mixed number		
whole number		
mixed number		

Fractions		Knowledge Organiser
Adding and Subtracting Proper Fractions		Adding and Subtracting Mixed Numbers
Same Denominators $\frac{4}{7} + \frac{2}{7} = \frac{6}{7}$ $\frac{8}{11} - \frac{3}{11} = \frac{5}{11}$ Different Denominators $\frac{2}{7} + \frac{3}{5}$ Multiples of 7: 7, 14, 21, 28, 35 Multiples of 5: 5, 10, 15, 20, 25, 30, 35 $\frac{2}{7} = \frac{10}{35}$, $\frac{3}{5} = \frac{21}{35}$ $\frac{10}{35} + \frac{21}{35} = \frac{31}{35}$ $\frac{9}{10} - \frac{1}{4}$ Multiples of 10: 10, 20 Multiples of 4: 4, 8, 12, 16, 20 $\frac{9}{10} = \frac{18}{20}$, $\frac{1}{4} = \frac{5}{20}$ $\frac{18}{20} - \frac{5}{20} = \frac{13}{20}$		Add or subtract the whole numbers and fractions separately. $2\frac{2}{5} + 1\frac{3}{10}$ $2 + 1 = 3$ $\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$ $3 + \frac{7}{10} = 3\frac{7}{10}$ $2\frac{1}{2} - 1\frac{1}{4}$ $2 - 1 = 1$ $\frac{1}{2} - \frac{1}{4} = \frac{2}{4} - \frac{1}{4} = \frac{1}{4}$ $1 + \frac{1}{4} = 1\frac{1}{4}$ Convert the mixed numbers to improper fractions. $2\frac{2}{5} + 1\frac{3}{10}$ $2\frac{1}{2} - 1\frac{1}{4}$ $2\frac{2}{5} = \frac{12}{5}$, $1\frac{3}{10} = \frac{13}{10}$ $2\frac{1}{2} = \frac{5}{2}$, $1\frac{1}{4} = \frac{5}{4}$ $\frac{12}{5} + \frac{13}{10} = \frac{24}{10} + \frac{13}{10} = \frac{37}{10}$ $\frac{37}{10} = 3\frac{7}{10}$ $\frac{5}{2} - \frac{5}{4} = \frac{10}{4} - \frac{5}{4} = \frac{5}{4}$ $\frac{5}{4} = 1\frac{1}{4}$
Multiplying Proper Fractions Multiplying Fractions by Fractions $\frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$ Multiplying Fractions by Whole Numbers $\frac{2}{5} \times 3 = \frac{2 \times 3}{5} = \frac{6}{5} = 1\frac{1}{5}$		Dividing Fractions by Whole Numbers $\frac{2}{5} \div 2 = \frac{1}{5}$ Multiplication and division are the inverse of one another so: $\div 2$ is the same as $\times \frac{1}{2}$ $\frac{2}{5} \times \frac{1}{2} = \frac{2}{10}$

Decimals: Stage 5

Decimals		Knowledge Organiser								
Key Vocabulary	Tenths, Hundredths and Thousandths	Order and Compare Numbers with Three Decimal Places								
tenths		<table border="1"> <tr> <th>Ones</th> <th>Tenths</th> <th>Hundredths</th> <th>Thousandths</th> </tr> <tr> <td></td> <td>$\frac{1}{10}$</td> <td>$\frac{1}{100}$</td> <td>$\frac{1}{1000}$</td> </tr> </table>	Ones	Tenths	Hundredths	Thousandths		$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
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decimal tenths		<table border="1"> <tr> <th>Ones</th> <th>Tenths</th> <th>Hundredths</th> <th>Thousandths</th> </tr> <tr> <td></td> <td>$\frac{1}{10}$</td> <td>$\frac{1}{100}$</td> <td>$\frac{1}{1000}$</td> </tr> </table>	Ones	Tenths	Hundredths	Thousandths		$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
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part-whole model		<table border="1"> <tr> <th>Ones</th> <th>Tenths</th> <th>Hundredths</th> <th>Thousandths</th> </tr> <tr> <td></td> <td>$\frac{1}{10}$</td> <td>$\frac{1}{100}$</td> <td>$\frac{1}{1000}$</td> </tr> </table>	Ones	Tenths	Hundredths	Thousandths		$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
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rounding		<table border="1"> <tr> <th>Ones</th> <th>Tenths</th> <th>Hundredths</th> <th>Thousandths</th> </tr> <tr> <td></td> <td>$\frac{1}{10}$</td> <td>$\frac{1}{100}$</td> <td>$\frac{1}{1000}$</td> </tr> </table>	Ones	Tenths	Hundredths	Thousandths		$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
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		Decimal Numbers as Fractions $0.71 = \frac{71}{100} = \frac{7}{10} + \frac{1}{100}$ $0.37 = \frac{37}{100} = \frac{3}{10} + \frac{7}{100}$								

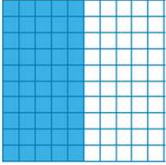
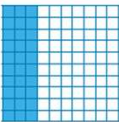
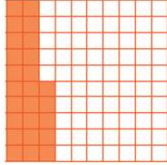
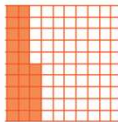
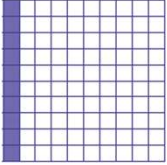
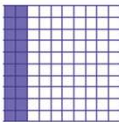
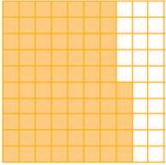
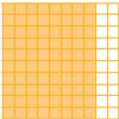
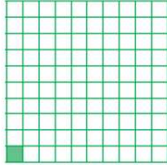
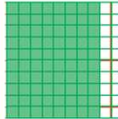
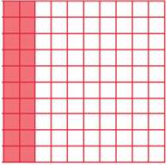
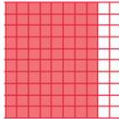
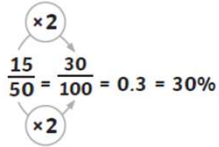
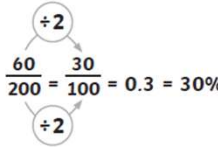
Decimals		Knowledge Organiser																																					
Multiplying and Dividing by 10, 100 and 1000	Rounding Decimals																																						
<table border="1"> <tr> <th>Tens</th> <th>Ones</th> <th>Tenths</th> <th>Hundredths</th> <th>Thousandths</th> </tr> <tr> <td>3</td> <td>8</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>8</td> <td></td> <td></td> <td></td> </tr> </table>	Tens	Ones	Tenths	Hundredths	Thousandths	3	8				3	8				<table border="1"> <tr> <td>1</td> <td>1.1</td> <td>1.2</td> <td>1.3</td> <td>1.4</td> <td>1.5</td> <td>1.6</td> <td>1.7</td> <td>1.8</td> <td>1.9</td> <td>2</td> </tr> <tr> <td colspan="5">If the tenths digit is 1, 2, 3 or 4, we round down to the nearest whole number.</td> <td colspan="6">If the tenths digit is 5, 6, 7, 8 or 9, we round up to the nearest whole number.</td> </tr> </table>		1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2	If the tenths digit is 1, 2, 3 or 4, we round down to the nearest whole number.					If the tenths digit is 5, 6, 7, 8 or 9, we round up to the nearest whole number.					
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$0.8 + 0.001 = 0.801$ $1.031 - 0.23 = 0.801$ $0.4005 + 0.4005 = 0.801$	<table border="1"> <tr> <td>0.82 + 0.63 = 1.45</td> <td>20% = $\frac{20}{100} = \frac{1}{5} = 0.2$</td> <td>1% = $\frac{1}{100} = 0.01$</td> <td>70% = $\frac{70}{100} = \frac{7}{10} = 0.7$</td> </tr> </table>		0.82 + 0.63 = 1.45	20% = $\frac{20}{100} = \frac{1}{5} = 0.2$	1% = $\frac{1}{100} = 0.01$	70% = $\frac{70}{100} = \frac{7}{10} = 0.7$																																	
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Decimals: Stage 6

Decimals		Knowledge Organiser																																																													
Key Vocabulary	Place Value	Fractions to Decimals																																																													
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Percentages: Stage 6

Percentages		Knowledge Organiser
Key Vocabulary	Equivalent Fractions, Decimals and Percentages	Order Fractions, Decimals and Percentages
per cent (%) = 'out of 100'	 $\frac{50}{100} = \frac{1}{2} = 0.5 = 50\%$	$\frac{3}{10} > 25\% > 0.2$  $\frac{30}{100} = 30\%$
percentage	 $\frac{25}{100} = \frac{1}{4} = 0.25 = 25\%$	 $\frac{25}{100} = 25\%$
discount	 $\frac{10}{100} = \frac{1}{10} = 0.1 = 10\%$	 $\frac{20}{100} = 20\%$
equivalent fraction	 $\frac{75}{100} = \frac{3}{4} = 0.75 = 75\%$	$80\% = 0.8 = \frac{4}{5}$ 
equivalent decimal	 $\frac{1}{100} = 0.01 = 1\%$	 $\frac{80}{100} = 80\%$
convert	 $\frac{20}{100} = \frac{2}{10} = 0.2 = 20\%$	 $\frac{80}{100} = 80\%$
compare		
order		
the whole		
Fractions to Percentages  $\frac{15}{50} = \frac{30}{100} = 0.3 = 30\%$  $\frac{60}{200} = \frac{30}{100} = 0.3 = 30\%$		

Percentages

Knowledge Organiser

Finding a Percentage of an Amount

$$50\% = \frac{1}{2} \text{ so we can divide by 2}$$

$$10\% = \frac{1}{10} \text{ so we can divide by 10}$$

$$25\% = \frac{1}{4} \text{ so we can divide by 4}$$

$$1\% = \frac{1}{100} \text{ so we can divide by 100}$$

A horizontal bar model representing 100%. The bar is divided into 10 equal segments, each representing 10%. The total value is 200. The first segment, representing 10%, is highlighted in orange. Below the bar, a bracket indicates that 10% of 200 is 20.

10% = 20

A horizontal bar model representing 100%. The bar is divided into 10 equal segments, each representing 10%. The total value is 200. The first two segments, representing 20%, are highlighted in orange. Below the bar, a bracket indicates that 20% of 200 is 40.

20% = 40

A flowchart showing the steps to find 35% of 200:

- Start with 10% of 200: $200 \div 10 = 20$
- Calculate 30%: $20 \times 3 = 60$
- Calculate 5%: $20 \div 2 = 10$
- Add 30% and 5%: $60 + 10 = 70$
- Conclusion: $35\% \text{ of } 200 = 70$

A diagram showing the relationships between percentages and their corresponding values:

- 100% = 200 (Central node)
- 50% = 100 (Divide by 2)
- 25% = 50 (Divide by 4)
- 10% = 20 (Divide by 10)
- 5% = 10 (Divide by 20)
- 1% = 2 (Divide by 100)

Percentages – Missing Values

Whole value (100%) of bar model = ?

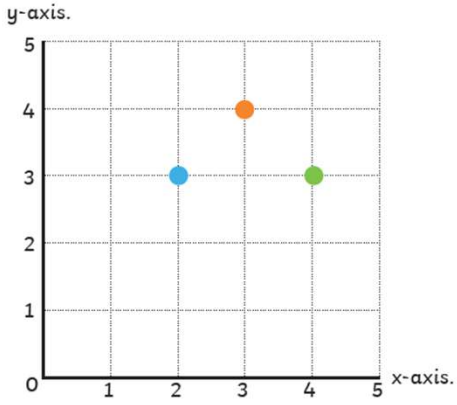
A horizontal bar model representing 100%. The bar is divided into 10 equal segments, each representing 10%. The total value is 150. The first segment, representing 10%, is highlighted in red. Below the bar, a bracket indicates that 10% of 150 is 15.

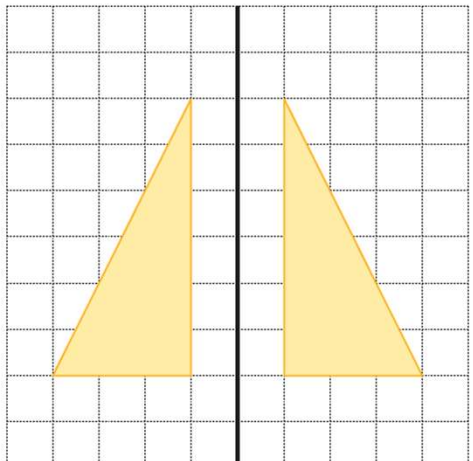
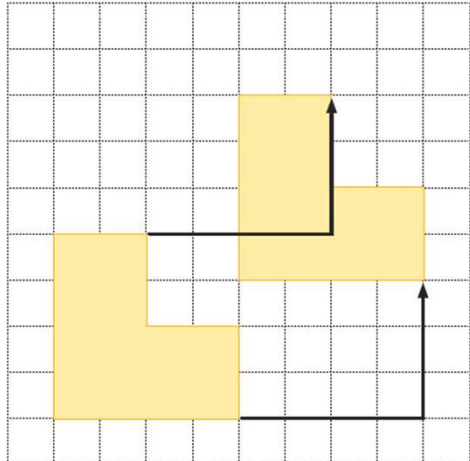
10% = 15

We know 10% = 15 10% $\times$ 10 = 100% (the whole) so 15 $\times$ 10 = 150

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Position and Direction: Stage 5

Position and Direction	Knowledge Organiser
Key Vocabulary coordinate quadrant x-axis y-axis reflection mirror line translation horizontal vertical  visit twinkl.com	Coordinates are a useful way to locate a position on a map or grid. The numbers across the horizontal line of the grid are on the x-axis. The numbers on the vertical line of the grid are on the y-axis. We always read or write the number on the x-axis before the y-axis. The x and y position are written in brackets with a comma. The coordinate of the orange spot is (3, 4).  To help you remember which point to read or write first, simply remember to move 'along the corridor and up the stairs'. In other words, move on the x-axis and then move on the y-axis. 

Position and Direction	Knowledge Organiser
Reflection A shape is reflected when it is flipped over a mirror line. The reflected image is congruent to the original. This means that the measurements of the sides and angles have not changed. Each point of the reflected shape is the same distance from the mirror line as the original shape.   visit twinkl.com	Translation In maths, translation means moving an object on a grid. The object is moved without changing the size, turning or reflecting it. When translating an object on a grid, it can move up or down, left or right. 

Position and Direction: Stage 6

Position and Direction

Knowledge Organiser

Key Vocabulary

translate

translation

reflect

reflection

up

down

right

left

coordinates

quadrant

x-axis

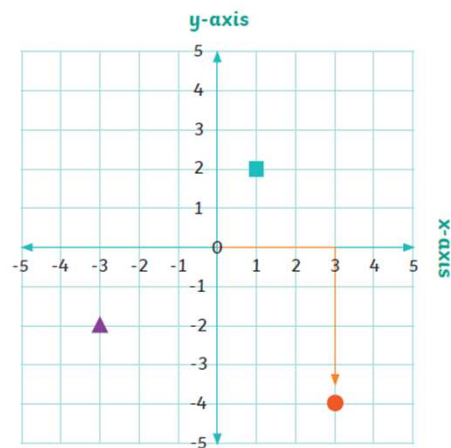
y-axis

horizontal

vertical

Four Quadrants

Coordinates can use positive and negative numbers. Whether positive or negative, the x-axis coordinate is written first, followed by the y-axis coordinate.



● (3,-4) ■ (1,2) ▲ (-3,-2)

Look at the circle. It is 3 units along the x-axis and 4 down the y-axis. Its coordinates are (3,-4).

Completing Shapes

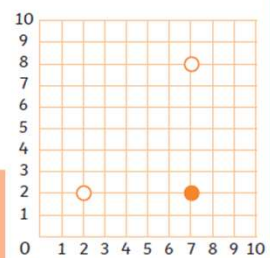
Using the properties of a shape, a polygon can be completed on a grid.

To make a square, think of the square's properties.



All of a square's sides are the same length. If the completed sides are 2 units in length, the missing point must complete two more sides of 2 units.

To make a right-angled triangle, think of the triangle's properties.



A right-angled triangle should have three sides with one 90° angle.

Position and Direction

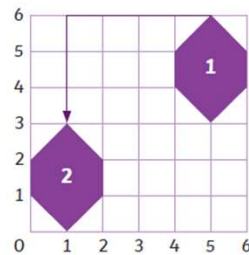
Knowledge Organiser

Translation

A shape is translated when it is moved without being rotated or resized. Every point of the shape moves the same distance and in the same direction.

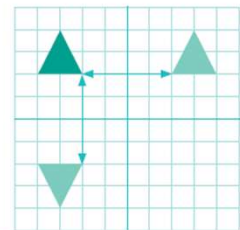


Shape 1 has been translated 4 units left and 3 units down.



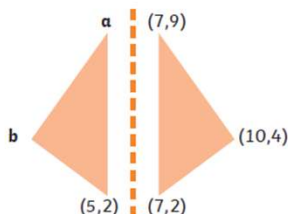
Reflections

A shape is reflected when it is flipped over a line which acts as a mirror. Every point on the original shape is the same distance from the mirror line as the same point on the reflected shape. The original triangle has been reflected in the x-axis and in the y-axis.



Missing Coordinates

Shapes can be shown on unmarked grids.



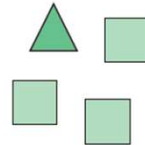
Point a is in the same position along the x-axis as (5,2) and in the same position on the y-axis as (7,9).

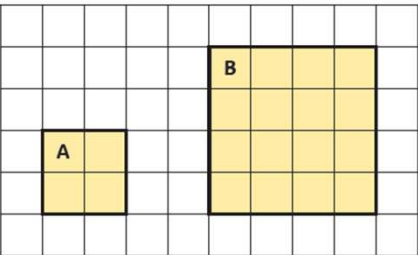
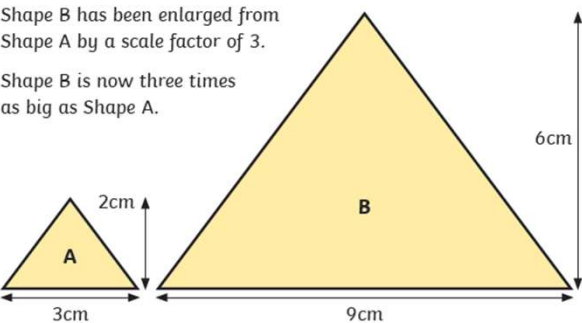
Point a (5,9)

Point b is in the same position on the y-axis as (10,4). Both triangles will have the same width. The width of the right-hand triangle is 3. This means that the width of the left-hand triangle is also 3.

Point b (2,4)

Ratio and Proportion: Stage 6

Ratio		Knowledge Organiser
Key Vocabulary	Ratio Language	The Ratio Symbol
ratio	For every 1 circle, there are 2 triangles. 	 The ratio of footballs to rugby balls: 1:4 The ratio of rugby balls to footballs: 4:1
proportion	For every 2 bananas, there are 3 apples. 	
"for every... there are..."		
part		
whole	For every 1 football, there are 3 rugby balls. 	 The ratio of circles to triangles: 2:3 The ratio of triangles to circles: 3:2
scale factor		
enlargement	Ratio and Fractions	
similar shapes	 For every 1 rugby ball, there are 2 footballs. Ratio of rugby balls to footballs: 1:2 $\frac{1}{2}$ of the balls are rugby balls.	 The ratio of apples to bananas: 1:2 The ratio of bananas to oranges: 2:3 The ratio of apples to bananas to oranges: 1:2:3 The ratio of oranges to bananas to apples: 3:2:1
length		
width		
perimeter	 For every 1 triangle, there are 3 squares. Ratio of triangles to squares: 1:3 $\frac{1}{4}$ of the shapes are triangles.	
		

Ratio	Knowledge Organiser
Ratio and Proportion Problem-Solving	Scale Factors
To use the ingredients for 1 person, you divide all the quantities by 10 ($\div 10$). Ingredients for Fruit Smoothie (serves 10 people) 800g of bananas 500g of strawberries 200g of raspberries 700ml of milk 300ml of natural yogurt To use the ingredients for 5 people, you halve all the quantities ($\div 2$). To use the ingredients for 20 people, you double all the quantities ($\times 2$). In a bag of 15 sweets, there is 1 smiley face sweet for every 4 love heart sweets. Therefore, there will be 3 smiley face sweets and 12 love heart sweets in the bag.   	 Shape A has been enlarged by a scale factor of 2 to make Shape B. Shape B is now two times as big as Shape A.  Shape B has been enlarged from Shape A by a scale factor of 3. Shape B is now three times as big as Shape A.

Statistics: Stage 5

Statistics

Knowledge Organiser

Key Vocabulary

axis

continuous data

horizontal

data

interpret

label

line graph

maximum value

minimum value

pattern

predict

relationship

represent

scale

survey

table

tally

timetable

vertical

x-axis

y-axis

Reading and Understanding Tables

A table to show ticket prices at a local cinema.

Ticket Type	Weekday Price	Weekend Price
Adult	£6	£7.50
Child	£4	£4.50
Student	£5.50	£6

In order to understand the data presented in a table, you must read the table's title and the headings.

Remember to always look at the heading that each piece of information falls under.

Completing Tables

Here is a table showing the favourite drink flavours of some children.

	Boys	Girls	Total
Orange	8		18
Blackcurrant		6	
Total	15		

To find how many boys voted for blackcurrant, look at the total number of boys who voted and subtract the number of votes for orange.

To find how many girls voted for orange, look at the total number of votes for orange and subtract the number of votes from boys.

To find the total number of votes for blackcurrant, the total number of girls or the total number of voters, simply add up the values from the appropriate row or column.

Timetables

Here is a bus timetable:

Three different buses

Bus stop locations	Mill Road	High Street	Pitsmoor Road	Fulwood
	0726	0729	0759	0845
		0803	0833	0919
				0946

The bus starts at this time and location.

The bus does not stop here.

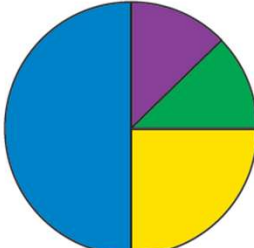
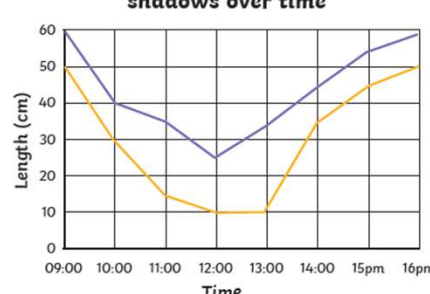
The bus terminates at this time and location.

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Statistics		Knowledge Organiser																		
Read and Interpret Line Graphs	Draw Line Graphs																			
Here is a line graph showing the average temperature for each month. The y-axis shows temperature in intervals of 2°C on a scale of 0°C to 16°C. The points show the average temperature for each month. The x-axis shows the months of the year.	Here is a table showing the number of different types of fruit sold each day. <table> <tr> <th></th><th>Bananas</th><th>Apples</th></tr> <tr> <td>Mon</td><td>2</td><td>3</td></tr> <tr> <td>Tues</td><td>4</td><td>5</td></tr> <tr> <td>Wed</td><td>6</td><td>2</td></tr> <tr> <td>Thurs</td><td>5</td><td>4</td></tr> <tr> <td>Fri</td><td>8</td><td>1</td></tr> </table> This graph can be used to represent the data from the table.		Bananas	Apples	Mon	2	3	Tues	4	5	Wed	6	2	Thurs	5	4	Fri	8	1	
	Bananas	Apples																		
Mon	2	3																		
Tues	4	5																		
Wed	6	2																		
Thurs	5	4																		
Fri	8	1																		
Use Line Graphs to Solve Problems																				
To find the average temperature in May, follow the arrow up from May and across to the temperature. As this is halfway between 10°C and 12°C, the average temperature in May is 11°C. To find the difference between the average temperatures in August and in November, find the temperature for each month and calculate the difference between the two. The shape of the line graph can show how the temperature changed. The average temperature falls 9°C from August to November.																				
		Mark each point for the number of bananas sold each day and join each point with a line. Mark each point for the number of apples sold each day and join each point with a line.																		

Statistics: Stage 6

Statistics		Knowledge Organiser
Key Vocabulary	Interpreting Data	Pie Charts
bar chart	Information can be show in tables, charts or graphs.	Pie charts represent discrete data.
pictogram	Interpreting data simply means understanding or working out what is being shown by a table, graph or chart and being able to answer questions about that information.	A circle is divided into segments, where each segment represents a data category. The size of each segment matches its proportion of the total amount.
frequency table		
tally chart		
pie chart	Line Graph	A pie chart to show children's favourite sports
discrete data	Line graphs are used to show changes to a measurement over time.	 Key - swimming - netball - football - gymnastics
continuous data	Data shown in a line graph is continuous.	
line graph	Sets of points are joined together to make the line.	
sum		
difference		
comparison		
interpret		
mean average		
	A line graph to show the length of shadows over time  Length (cm) Time April May	24 children were asked in total. Swimming = $\frac{1}{2}$ so $\frac{1}{2}$ of 24 = 12 children Netball = $\frac{1}{4}$ so $\frac{1}{4}$ of 24 = 6 children Football = $\frac{1}{8}$ so $\frac{1}{8}$ of 24 = 3 children Gymnastics = $\frac{1}{8}$ so $\frac{1}{8}$ of 24 = 3 children

Statistics

Knowledge Organiser

Bar Chart

A bar chart has a horizontal axis and a vertical axis. Bars show the data value of each category. There must be a gap between each bar. The scale of the bar chart is chosen based on the data range.

A Bar Chart to Show the Temperature at Lunchtimes

Day	Temperature (°C)
Monday	6
Tuesday	9
Wednesday	11
Thursday	7
Friday	4

Pictogram

This graph uses pictures or symbols to represent the data. The pictogram uses one picture or symbol to represent a value.

Class 10's Pets

□ = 4 Children

Pet	Number of Pictures	Number of Children
Dog	4	16
Cat	4	16
Fish	2	8
Rabbit	2	8
Hamster	2	8

Frequency Table

Eye Colour	Tally	Frequency
brown	I	6
blue		8
green		3
grey		4
hazel		5

Tally marks are used to help count things. Each vertical line represents one unit. The fifth tally mark goes down across the first four to make it easier to count.

The frequency column is completed after all the data has been collected.

Mean Average

The mean is the average of a set of data.

To find the mean or average, add up all of the values to find the total. Divide the total by the number of values that you added together. This will give you the mean.

12	15	10	8	15
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$$12 + 15 + 10 + 8 + 15 = 60$$

$$60 \div 5 = 12$$

The mean of this data is 12.

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