




# 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		TTh		2 ten thousands left
Make		Th		5 thousands - 6 thousands cannot be done. Exchange ten thousand for ten thousands becoming 15 thousands - 6 thousands = 9 thousands
Plus		H		7 hundreds - 3 hundreds = 4 hundreds
Sum		T		2 tens - 1 ten = 1 ten
More		O		7 ones - 3 ones = 4 ones
Altogether		<b>Column Method</b> Starting with the ones, add each column in turn. Regroup tens, hundreds, thousands, ten thousands and/or as required.	<b>Column Method</b> Starting with the ones, subtract each column in turn. Exchange tens, hundreds, thousands and/or ten thousands as required.	
Difference				
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		Inverse Operations							
<b>Rounding to Estimate</b> $41\ 635 + 7386 = 49\ 021$ Round to ten: $41\ 630 + 7380 = 49\ 010$ $41\ 630 + 7390 = 49\ 020$ $41\ 640 + 7390 = 49\ 030$		Use the inverse to check: $53\ 476$ $32\ 732$ $20\ 744$ To check $53\ 476 - 32\ 732 = 20\ 744$ use $32\ 732 + 20\ 744 = 53\ 476$							
Rounding is not as accurate when both numbers are rounded up. A better estimate comes from "rounding" one down and one up. <b>Estimating on a Number Line</b> 		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.							
The arrow is about $\frac{3}{4}$ of the way across the line so it is 40 000.		<b>Multistep Problems</b> <b>Using a Bar Model</b> The sum of two numbers is 25 567. The difference is 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.							
		<table border="1"> <tr> <td>£20</td> <td>£20 is used to buy 2 books costing</td> </tr> <tr> <td>£3.75</td> <td>£8.49    ?    £3.75 and £8.49.</td> </tr> <tr> <td>£12.24</td> <td>£7.76    How much change is given?</td> </tr> </table>		£20	£20 is used to buy 2 books costing	£3.75	£8.49    ?    £3.75 and £8.49.	£12.24	£7.76    How much change is given?
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£3.75	£8.49    ?    £3.75 and £8.49.								
£12.24	£7.76    How much change is given?								
		$£3.75 + £8.49 = £12.24$ $£20.00 - £12.24 = £7.76$							

# Four Operations: Stage 6

Four Operations	Knowledge Organiser																																															
<b>Key Vocabulary</b> 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	<b>Add and Subtract Whole Numbers</b>																																															
	<b>Column Method</b>																																															
	<table border="1"> <tr><td></td><td>4</td><td>5</td><td>8</td><td>6</td><td>4</td></tr> <tr><td>+</td><td>2</td><td>3</td><td>4</td><td>9</td><td>7</td></tr> <tr><td></td><td>6</td><td>9</td><td>3</td><td>6</td><td>1</td></tr> <tr><td></td><td></td><td>1</td><td>1</td><td>1</td><td></td></tr> </table>		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.	<table border="1"> <tr><td></td><td>3</td><td>5</td><td><del>6</del>7</td><td><del>13</del>4</td><td><del>12</del></td></tr> <tr><td>-</td><td></td><td>3</td><td>4</td><td>7</td><td>6</td></tr> <tr><td></td><td>3</td><td>2</td><td>2</td><td>6</td><td>6</td></tr> </table>		3	5	<del>6</del> 7	<del>13</del> 4	<del>12</del>	-		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.		
		4	5	8	6	4																																										
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		3	2	2	6	6																																										
<b>Multiply up to 4-digit by 2-digit</b>		<b>Order of Operations</b>																																														
<table border="1"> <tr><td>1</td><td><del>2</del></td><td><del>2</del></td><td></td></tr> <tr><td></td><td>1</td><td>5</td><td>4</td></tr> <tr><td>x</td><td></td><td>2</td><td>6</td></tr> <tr><td></td><td>9</td><td>2</td><td>4</td></tr> <tr><td>3</td><td>0</td><td>8</td><td>0</td></tr> <tr><td>4</td><td>0</td><td>0</td><td>4</td></tr> <tr><td>1</td><td>1</td><td></td><td></td></tr> </table>	1	<del>2</del>	<del>2</del>			1	5	4	x		2	6		9	2	4	3	0	8	0	4	0	0	4	1	1			Start with the ones. $154 \times 6 = 924$ $154 \times 20 = 3080$ $3080 + 924 = 4004$	<table border="1"> <tr> <td><b>B</b></td> <td><b>Brackets</b></td> <td><math>10 \times (4 + 2) = 10 \times 6 = 60</math></td> </tr> <tr> <td><b>O</b></td> <td><b>Order</b></td> <td><math>5 + 2^2 = 5 + 4 = 9</math></td> </tr> <tr> <td><b>D</b></td> <td><b>Division</b></td> <td><math>10 + 6 \div 2 = 10 + 3 = 13</math></td> </tr> <tr> <td><b>M</b></td> <td><b>Multiplication</b></td> <td><math>10 - 4 \times 2 = 10 - 8 = 2</math></td> </tr> <tr> <td><b>A</b></td> <td><b>Addition</b></td> <td><math>10 \times 4 + 7 = 40 + 7 = 47</math></td> </tr> <tr> <td><b>S</b></td> <td><b>Subtraction</b></td> <td><math>10 \div 2 - 3 = 5 - 3 = 2</math></td> </tr> </table>	<b>B</b>	<b>Brackets</b>	$10 \times (4 + 2) = 10 \times 6 = 60$	<b>O</b>	<b>Order</b>	$5 + 2^2 = 5 + 4 = 9$	<b>D</b>	<b>Division</b>	$10 + 6 \div 2 = 10 + 3 = 13$	<b>M</b>	<b>Multiplication</b>	$10 - 4 \times 2 = 10 - 8 = 2$	<b>A</b>	<b>Addition</b>	$10 \times 4 + 7 = 40 + 7 = 47$	<b>S</b>	<b>Subtraction</b>	$10 \div 2 - 3 = 5 - 3 = 2$
1	<del>2</del>	<del>2</del>																																														
	1	5	4																																													
x		2	6																																													
	9	2	4																																													
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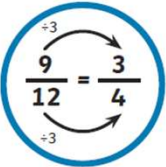

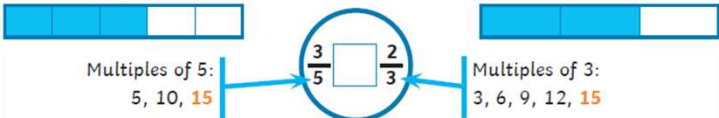


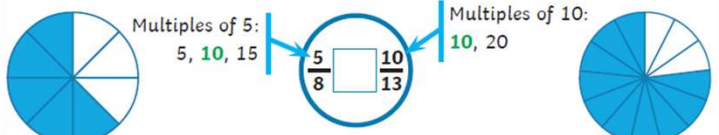
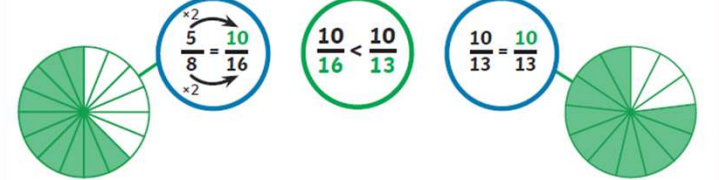

Four Operations	Knowledge Organiser																																												
<b>Short Division</b> Start from the left. <table border="1"> <tr><td></td><td>4</td><td>4</td><td>0</td><td>5</td></tr> <tr><td>12</td><td>5</td><td>2</td><td>8</td><td>6</td><td>0</td></tr> </table> $5 \div 12 = 0 \text{ r}5$ $52 \div 12 = 4 \text{ r}4$ $48 \div 12 = 4$ $6 \div 12 = 0 \text{ r}6$		4	4	0	5	12	5	2	8	6	0	<b>Common Factors</b> Factors of 48 <table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>6</td><td>8</td><td>12</td><td>16</td><td>24</td><td>48</td></tr> </table> Factors of 30 <table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>5</td><td>6</td><td>10</td><td>15</td><td>30</td></tr> </table> Common factors: 1, 2, 3, 6	1	2	3	4	6	8	12	16	24	48	1	2	3	5	6	10	15	30	<b>Common Multiples</b> Multiples of 3 <table border="1"> <tr><td>3</td><td>...</td><td>18</td><td>21</td><td>24</td><td>...</td><td>39</td><td>42</td></tr> </table> Multiples of 7 <table border="1"> <tr><td>7</td><td>14</td><td>21</td><td>28</td><td>35</td><td>42</td></tr> </table> Common multiples: 21, 42...	3	...	18	21	24	...	39	42	7	14	21	28	35	42
		4	4	0	5																																								
12	5	2	8	6	0																																								
1	2	3	4	6	8	12	16	24	48																																				
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3	...	18	21	24	...	39	42																																						
7	14	21	28	35	42																																								
<b>Long Division</b> <table border="1"> <tr><td></td><td></td><td>1</td><td>2</td><td>0</td><td>r</td><td>3</td></tr> <tr><td>14</td><td>1</td><td>6</td><td>8</td><td>3</td><td></td><td></td></tr> <tr><td></td><td>1</td><td>4</td><td>0</td><td>0</td><td></td><td></td></tr> <tr><td></td><td></td><td>2</td><td>8</td><td>3</td><td></td><td></td></tr> <tr><td></td><td></td><td>2</td><td>8</td><td>0</td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td>3</td><td></td><td></td></tr> </table>			1	2	0	r	3	14	1	6	8	3				1	4	0	0					2	8	3					2	8	0							3			<b>Primes</b> 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.	<b>Squares and Cubes</b> 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	
		1	2	0	r	3																																							
14	1	6	8	3																																									
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<b>Mental Calculations and Estimation</b> <b>Order of calculations:</b> $50 \times 34 \times 2 = 50 \times 2 \times 34 = 100 \times 34 = 3400$ Money: $\pounds 8.99 + \pounds 3.49 = \pounds 12.48$ Use $\pounds 9 + \pounds 3.50 = \pounds 12.50$ and subtract 2p Estimate on a number line <table border="1"> <tr><td>-8</td><td>0</td><td>8</td><td>16</td><td>20</td><td>24</td></tr> </table> Subdivide line to estimate: 17		-8	0	8	16	20	24	<b>Reason from Known Facts</b> $90 \div 10 = 9$ 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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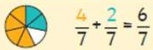
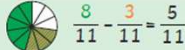
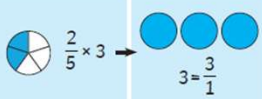
# Fractions: Stage 5

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

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

# Fractions: Stage 6

Fractions		Knowledge Organiser
<b>Key Vocabulary</b>	<b>Simplify Fractions</b>	<b>Compare and Order Fractions</b>
numerator	 <p><b>Factors of 9:</b> 1, 3, 9</p> <p><b>Factors of 12:</b> 1, 2, 3, 4, 6, 12</p>  	<b>Use the Common Denominator</b>  <p>Multiples of 5: 5, 10, 15</p> <p>Multiples of 3: 3, 6, 9, 12, 15</p>  
denominator		<b>Use the Common Numerator</b>  <p>Multiples of 5: 5, 10, 15</p> <p>Multiples of 10: 10, 20</p>  
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
<b>Adding and Subtracting Proper Fractions</b>	<b>Adding and Subtracting Mixed Numbers</b>	
<b>Same Denominators</b>  $\frac{4}{7} + \frac{2}{7} = \frac{6}{7}$  $\frac{8}{11} - \frac{3}{11} = \frac{5}{11}$	<b>Add or subtract the whole numbers and fractions separately.</b> $2\frac{2}{5} + 1\frac{3}{10}$ $2 + 1 = 3$ $\frac{2}{5} + \frac{3}{10} = \frac{4}{10} + \frac{3}{10} = \frac{7}{10}$ $3 + \frac{7}{10} = 3\frac{7}{10}$	
<b>Different Denominators</b> $\frac{2}{7} + \frac{3}{5}$ <p>Multiples of 7: 7, 14, 21, 28, 35</p> <p>Multiples of 5: 5, 10, 15, 20, 25, 30, 35</p> $\frac{2}{7} = \frac{10}{35}, \frac{3}{5} = \frac{21}{35}$ $\frac{10}{35} + \frac{21}{35} = \frac{31}{35}$	$2\frac{1}{2} - 1\frac{1}{4}$ $2 - 1 = 1$ $\frac{1}{2} - \frac{1}{4} = \frac{2}{4} - \frac{1}{4} = \frac{1}{4}$ $1 + \frac{1}{4} = 1\frac{1}{4}$	
<b>Multiplying Proper Fractions</b> <b>Multiplying Fractions by Fractions</b> $\frac{1}{2} \times \frac{1}{3} = \frac{1 \times 1}{2 \times 3} = \frac{1}{6}$	<b>Convert the mixed numbers to improper fractions.</b> $2\frac{2}{5} + 1\frac{3}{10}$ $2\frac{2}{5} = \frac{12}{5}$ $1\frac{3}{10} = \frac{13}{10}$ $2\frac{1}{2} = \frac{5}{2}$ $1\frac{1}{4} = \frac{5}{4}$	
<b>Multiplying Fractions by Whole Numbers</b>  $\frac{2}{5} \times 3 = \frac{6}{5} = 1\frac{1}{5}$	<b>Dividing Fractions by Whole Numbers</b> $\frac{2}{5} \div 2 = \frac{1}{5}$ <p>Multiplication and division are the inverse of one another so:</p> $\div 2 \text{ is the same as } \times \frac{1}{2}$ $\frac{2}{5} \times \frac{1}{2} = \frac{2}{10}$	

# Number and Place Value: Stage 5

Number and Place Value		Knowledge Organiser														
<b>Key Vocabulary</b>	<b>Compare and Order</b>															
millions	equals	greater than	less than													
thousands	$26 + 38 = 8 \times 8$	$23\ 873 > 8256$	$901\ 198 < 1\ 091\ 098$													
hundreds	Both calculations have the value 64.	The number on the left has 2 ten thousands and the number on the right has 0 ten thousands.	The number on the right has 1 million and the number on the left has 0 millions.													
tens																
ones																
zero																
place value	smallest	898	6735	6835												
greater than				7019												
less than				9002												
order				11 235												
round				greatest												
rounded	<b>Negative Numbers</b>															
negative number																
partition	<b>Counting in Powers of 10</b>															
digit	Counting in 10s	Counting in 100s														
interval	<table border="1"> <tr> <td>365</td> <td>375</td> <td>385</td> <td>395</td> <td>405</td> <td>415</td> </tr> </table> <p>The tens increase until 9 tens becomes one more hundred and 0 tens.</p>	365	375	385	395	405	415	<table border="1"> <tr> <td>2841</td> <td>2941</td> <td>3041</td> <td>3141</td> <td>3241</td> <td>3341</td> </tr> </table> <p>The hundreds increase until 9 hundreds becomes one more thousand and 0 hundreds.</p>			2841	2941	3041	3141	3241	3341
365	375	385	395	405	415											
2841	2941	3041	3141	3241	3341											
sequence	Counting in 10 000s	Counting in 100 000s														
linear sequence	<table border="1"> <tr> <td>276 109</td> <td>286 109</td> <td>296 109</td> <td>306 109</td> </tr> </table> <p>The ten thousands increase until 9 ten thousands become one more hundred thousand and 0 ten thousands.</p>	276 109	286 109	296 109	306 109	<table border="1"> <tr> <td>2 972 151</td> <td>3 072 151</td> <td>3 172 151</td> <td>3 272 151</td> </tr> </table> <p>The hundred thousands increase until 9 hundred thousands become one more million and 0 hundred thousands.</p>			2 972 151	3 072 151	3 172 151	3 272 151				
276 109	286 109	296 109	306 109													
2 972 151	3 072 151	3 172 151	3 272 151													
visit <a href="https://www.twinkl.com">twinkl.com</a>																

Number and Place Value		Knowledge Organiser																																																											
<b>Numbers to One Million</b>																																																													
<b>926 471</b>																																																													
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# Number and Place Value: Stage 6

Number and Place Value		Knowledge Organiser		
<b>Key Vocabulary</b>	<b>Compare and Order</b>			
ten million	equals	greater than	less than	
millions	$26 + 38 = 8 \times 8$	$223\ 873 > 98\ 256$	$901\ 198 < 1\ 091\ 098$	
thousands	Both calculations have the value 64.	The number on the left has 2 hundred thousands and the number on the right has 0 hundred thousands.	The number on the right has 1 million and the number on the left has 0 millions.	
hundreds	smallest	81 782	127 352	127 835
tens			137 019	200 002
ones				greatest
zero	<b>Negative Numbers</b>			
place value	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <math>3 - 8 = -5</math>  </div> <div style="text-align: center;"> <math>-6 + 11 = 5</math>  </div> </div>			
greater than				
less than				
order				
round				
rounded				
negative number				
partition				
digit				
interval				
sequence				
linear sequence				
visit <a href="https://www.twinkl.com">twinkl.com</a>				

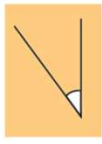
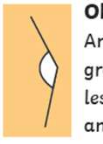
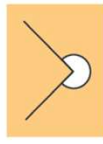
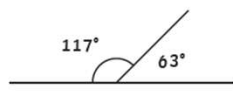
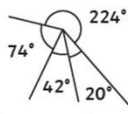
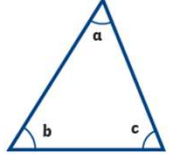
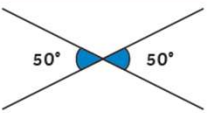
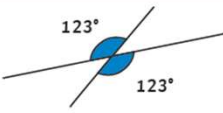
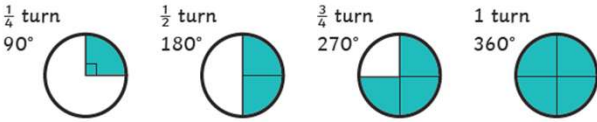
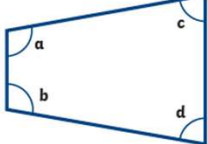

Number and Place Value		Knowledge Organiser		
<b>Numbers to Ten Million</b>				
<b>3 926 471</b>				
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds
3	9	2	6	4
				Tens
				7
				Ones
				1
three million, nine hundred and twenty-six thousand, four hundred and seventy-one				
<b>Round Any Number</b>				
Rounding to the nearest 1000		Rounding to the nearest 100 000		
2000 ← 2499	2500 → 3000	200 000 ← 249 999	250 000 → 300 000	
round down	round up	round down	round up	
Rounding to the nearest 10 000		Rounding to the nearest 1 000 000		
20 000 ← 24 999	25 000 → 30 000	2 000 000 ← 2 499 999	2 500 000 → 3 000 000	
round down	round up	round down	round up	
visit <a href="https://www.twinkl.com">twinkl.com</a>				

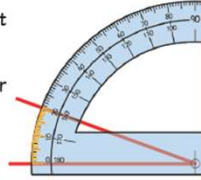


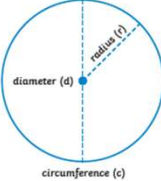










# Properties of Shape: Stage 5

Properties of Shape		Knowledge Organiser																																																																															
<p><b>Key Vocabulary</b></p> <p>angle</p> <p>right angle</p> <p>acute</p> <p>obtuse</p> <p>reflex</p> <p>protractor</p> <p>horizontal</p> <p>vertical</p> <p>parallel</p> <p>perpendicular</p> <p>polygon</p> <p>regular</p> <p>irregular</p> <p>two-dimensional</p> <p>three-dimensional</p> <p>flat face</p> <p>curved surface</p> <p>edge</p> <p>curved edge</p> <p>vertex</p> <p>apex</p>	<p><b>Regular and Irregular Polygons</b></p> <table border="1"> <thead> <tr> <th>Regular</th> <th>Irregular</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table> <p>A polygon is any two-dimensional shape formed with straight lines.</p> <p>In a regular polygon, all the sides and angles are equal.</p> <p>In an irregular polygon, the sides and angles are not equal.</p> <p><b>Representations</b></p> <p>Cube models can be drawn as 2D representations using different elevations.</p> <p>Plan Side Elevation Front Elevation</p> <p>Plan Side Elevation Front Elevation</p> <p>A shape net is a 2D drawing of an unfolded 3D shape. When you are drawing or reasoning about shape nets, think carefully about where the edges of the faces meet.</p> <p></p> <p>Shape net of a tetrahedron.</p>	Regular	Irregular			<p><b>Properties of 3D Shapes</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Name</th> <th colspan="2">Surfaces</th> <th colspan="2">Edges</th> <th rowspan="2">Vertices</th> <th rowspan="2">Picture</th> </tr> <tr> <th>Flat</th> <th>Curved</th> <th>Flat</th> <th>Curved</th> </tr> </thead> <tbody> <tr> <td>cube</td> <td>6</td> <td>0</td> <td>12</td> <td>0</td> <td>8</td> <td></td> </tr> <tr> <td>cuboid</td> <td>6</td> <td>0</td> <td>12</td> <td>0</td> <td>8</td> <td></td> </tr> <tr> <td>square-based pyramid</td> <td>5</td> <td>0</td> <td>8</td> <td>0</td> <td>5</td> <td></td> </tr> <tr> <td>tetrahedron</td> <td>4</td> <td>0</td> <td>6</td> <td>0</td> <td>4</td> <td></td> </tr> <tr> <td>triangular prism</td> <td>5</td> <td>0</td> <td>9</td> <td>0</td> <td>6</td> <td></td> </tr> <tr> <td>pentagonal prism</td> <td>7</td> <td>0</td> <td>15</td> <td>0</td> <td>10</td> <td></td> </tr> <tr> <td>hexagonal prism</td> <td>8</td> <td>0</td> <td>18</td> <td>0</td> <td>12</td> <td></td> </tr> <tr> <td>octagonal prism</td> <td>10</td> <td>0</td> <td>24</td> <td>0</td> <td>16</td> <td></td> </tr> <tr> <td>octahedron</td> <td>8</td> <td>0</td> <td>12</td> <td>0</td> <td>6</td> <td></td> </tr> </tbody> </table> <p>A cone has an apex. This is because a vertex is the point where two straight edges meet and a cone has no straight edges.</p>		Name	Surfaces		Edges		Vertices	Picture	Flat	Curved	Flat	Curved	cube	6	0	12	0	8		cuboid	6	0	12	0	8		square-based pyramid	5	0	8	0	5		tetrahedron	4	0	6	0	4		triangular prism	5	0	9	0	6		pentagonal prism	7	0	15	0	10		hexagonal prism	8	0	18	0	12		octagonal prism	10	0	24	0	16		octahedron	8	0	12	0	6	
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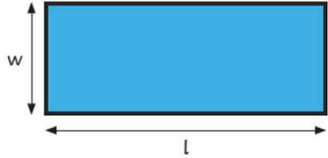
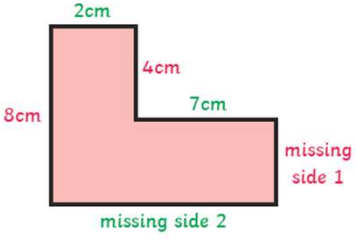
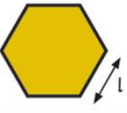
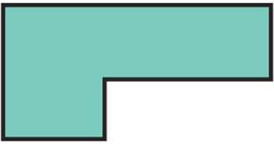
Properties of Shape		Knowledge Organiser	
<b>Identifying Angles</b>			
<p><b>Acute Angles</b></p> <p>Any angle that measures less than <math>90^\circ</math> is called an <b>acute</b> angle.</p> <p></p>	<p><b>Obtuse Angles</b></p> <p>Any angle that measures greater than <math>90^\circ</math> and less than <math>180^\circ</math> is called an <b>obtuse</b> angle.</p> <p></p>	<p><b>Reflex Angles</b></p> <p>Any angle that measures greater than <math>180^\circ</math> is called a <b>reflex</b> angle.</p> <p></p>	
<p></p> <p>Angles on a straight line always total <math>180^\circ</math>.</p>	<p></p> <p>Angles around a point always total <math>360^\circ</math>.</p>	<p><b>Measuring and Drawing Angles</b></p> <p>To measure angles, we use a protractor. Look carefully at how the numbers on the scale count from <math>0^\circ</math> to <math>180^\circ</math> in both directions.</p> <p></p>	
<p>Multiples of <math>90^\circ</math> can be used as descriptions of a turn.</p> <p></p> <p><math>\frac{1}{4}</math> turn - <math>90^\circ</math>    <math>\frac{1}{2}</math> turn - <math>180^\circ</math>    <math>\frac{3}{4}</math> turn - <math>270^\circ</math>    1 turn - <math>360^\circ</math></p>			
<b>Using Properties of Rectangles</b>			
<p></p> <p><math>6\text{cm} + 2\text{cm} = 8\text{cm}</math></p> <p><math>7\text{cm} + 6\text{cm} = 13\text{cm}</math></p>			

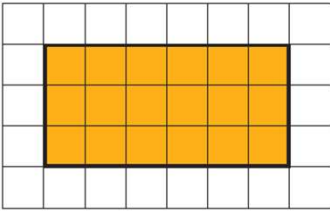

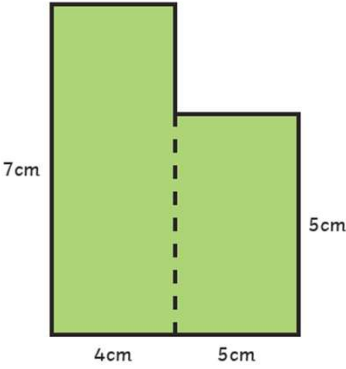
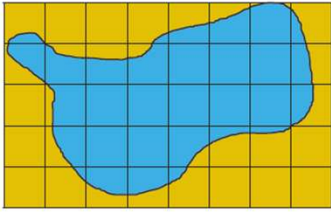
# Properties of Shape: Stage 6

Properties of Shapes		Knowledge Organiser		
<b>Key Vocabulary</b> angle right angle acute obtuse reflex protractor horizontal vertical parallel perpendicular polygon regular irregular two-dimensional three-dimensional flat face curved surface edge curved edge vertex vertices apex radius diameter circumference	<b>Angle Types</b>			
		<b>Acute Angles</b> Any angle that measures less than 90° is called an <b>acute angle</b> .		<b>Obtuse Angles</b> Any angle that measures greater than 90° and less than 180° is called an <b>obtuse angle</b> .
				<b>Reflex Angles</b> Any angle that measures greater than 180° is called a <b>reflex angle</b> .
	<b>Calculating Angles</b>		<b>Angles in a Triangle</b>	
		<b>Angles on a straight line always total 180°.</b>		<b>Angles in a Triangle</b>  <b>a + b + c = 180°</b>
		<b>Opposite angles that share a vertex are equal.</b>		
		<b>Multiples of 90° can be used as descriptions of a turn.</b>	<b>Angles in a Quadrilateral</b>	
			 <b>a + b + c + d = 360°</b>	
				

Properties of Shapes		Knowledge Organiser	
<b>Using a Protractor</b>		<b>Angles in Regular Polygons</b>	
<p>Place the cross or circle at the point of the angle you are measuring.</p> <p>Read from the zero on the outer scale of your protractor.</p> <p>Count the degree lines carefully.</p>		<p>As the number of sides of a polygon increases by one, the total of the interior angles increases by 180°. When n = number of sides, this formula can be used to find the size of each angle in a <b>regular polygon</b>:</p> <p><b>Sum of Interior Angles = (n - 2) × 180°</b>      <b>Each Angle = <math>\frac{(n - 2) \times 180^\circ}{n}</math></b></p>	
<b>Parts of Circles</b>			
<p>A circle is a 2D shape. The perimeter of a circle is called the <b>circumference</b> (c). The distance across the circle, passing through the centre, is called the <b>diameter</b> (d).</p> <p>The distance from the centre of the circle to the circumference is called the <b>radius</b> (r).</p> <p><math>r \times 2 = d</math>      <math>\frac{d}{2} = r</math></p>		<p><b>Pentagon</b> n = 5 <math>(5 - 2) \times 180^\circ = 540^\circ</math> <math>540^\circ \div 5 = 108^\circ</math></p>	<p><b>Hexagon</b> n = 6 <math>(6 - 2) \times 180^\circ = 720^\circ</math> <math>720^\circ \div 6 = 120^\circ</math></p>
<b>Properties of 3D Shapes</b>			
<p>3D shapes have three dimensions – <b>length, width and depth</b>.</p> <p>A <b>polyhedron</b> is a 3D shape with flat faces. Spheres, cylinders and cones are not polyhedrons as they have curved surfaces.</p>			
	<p><b>Cube</b> 6 square faces 12 edges 8 vertices</p>		<p><b>Tetrahedron</b> 4 triangular faces 6 edges 4 vertices</p>
	<p><b>Cuboid</b> 6 faces 12 edges 8 vertices</p>		<p><b>Octahedron</b> 8 faces 12 edges 6 vertices</p>
	<p><b>Square-based pyramid</b> 5 faces 8 edges 5 vertices</p>		<p><b>Cone</b> 1 circular face 1 curved surface 1 curved edge 1 apex</p>
	<p><b>Sphere</b> 1 curved surface 0 edges 0 vertices</p>		<p><b>Triangular prism</b> 5 faces 9 edges 6 vertices</p>
	<p><b>Cylinder</b> 2 circular faces 1 curved surface 2 curved edges 0 vertices</p>		
			

# Length and Perimeter: Stage 5

Perimeter and Area		Knowledge Organiser
Key Vocabulary	Measure Perimeter	Calculate Perimeter
metre	Measure the perimeter of a rectangle: 	Calculate the missing sides of this rectilinear shape to find the perimeter: 
kilometre		
perimeter	Measure the length (l) and width (w). $\text{Perimeter} = l + w + l + w$ or $(l + w) \times 2$	* This shape is not drawn to the dimensions specified.  $\text{Missing side 1} + 4\text{cm} = 8\text{cm}$ , so $\text{missing side 1} = 4\text{cm}$ .  $\text{Missing side 2} = 2\text{cm} + 7\text{cm} = 9\text{cm}$
length	Measure the perimeter of regular shapes:  Measure the length (l) and count the number of sides (s) on the shape. $\text{Perimeter} = l \times s$	
width	Measure the perimeter of irregular shapes: 	$\text{Perimeter} = \text{sum of all sides} =$ $2\text{cm} + 4\text{cm} + 7\text{cm} + 4\text{cm} + 9\text{cm} + 8\text{cm} = 34\text{cm}$
rectangle	Measure the length of each side and add them together.	
rectilinear		
dimensions		

Length and Perimeter		Knowledge Organiser
Area of Rectangles	Area of Compound Shapes	Area of Irregular Shapes
The area of a rectangle on a grid:  Multiply the length $\times$ width $= 6 \times 3 = 18$ squares. The area of a rectangle = length (l) $\times$ width (w). 	To find the area of a compound shape, divide the shape into rectangles with known dimensions:  $\text{Area} = 7\text{cm} \times 4\text{cm} + 5\text{cm} \times 5\text{cm}$ $= 28\text{cm}^2 + 25\text{cm}^2$ $= 53\text{cm}^2$	To find the area of an irregular shape, find the number of whole squares and part squares.  Whole squares = 10 Part squares = 22  Estimate of area = whole squares + half part squares $= 10\text{cm}^2 + 11\text{cm}^2 = 21\text{cm}^2$  *There are other ways to estimate the area of irregular shapes.