

# **Knowledge Organisers**

Year 11

### Year 11 Term1Maths Knowledge Organiser [F unit 18 - Fractions, Indices&Standard Form]

CORE	GOOD TO KNOW		HO	<b>w</b> то	TKAT	
<ul> <li>Mixed Number - A number consisting of a whole number and a proper fraction.</li> <li>Improper Fraction - A fraction whose numerator is larger than the denominator.</li> <li>Mixed Numbers Calculations</li> <li>When multiplying or dividing mixed numbers change to an improper (top heavy) fraction first</li> </ul>	Laws of $a^m \times a^n$ $a^m \div a^n$ $(a^m)^n$	indices $= a^{m+n}$ $= a^{m-n}$ $= a^{m \times n}$	Write the following in $32\ 000\ 000$ $=\ 3.2 \times 10\ 000\ 000$ $=\ 3.2 \times 10^7$	standard index $0.000\ 005\ 74$ $= 5.74 \times 0.00$ $= 5.74 \times 10^{-1}$	form: 4 00 001 6	
<ul> <li>Indices <ul> <li>2 x 2 x 2 x 2 can be written 2<sup>4</sup></li> <li>When multiplying powers add the powers e.g. 6<sup>4</sup> x 6<sup>7</sup> = 6<sup>11</sup> OR a<sup>3</sup> x a<sup>5</sup> = a<sup>8</sup></li> </ul> </li> <li>When dividing powers subtract the powers e.g. 6<sup>8</sup> ÷ 6<sup>5</sup> = 6<sup>3</sup> OR a<sup>9</sup> ÷ a<sup>5</sup> = a<sup>4</sup></li> <li>When in brackets multiply the powers e.g. (8<sup>4</sup>)<sup>3</sup> = 8<sup>12</sup> OR (x<sup>5</sup>)<sup>2</sup> = x<sup>10</sup></li> <li>Any number to the power of zero is 1</li> <li>The reciprocal of any number is 1 divided by the number eg: the reciprocal of 3 is 1⁄3</li> </ul>	$10^{3} = 1000$ $10^{2} = 100$ $10^{1} = 10$ $10^{0} = 1$ $10^{-1} = 0.1$ $10^{-2} = 0.01$ $10^{-3} = 0.001$		Write the following as $8.35 \times 10^{-3}$ = $8.35 \times 0.001$ = 0.008 35	ordinary number $2.9 \times 10^{6}$ $= 2.9 \times 1000$ = 2900000	ers: 0 000	
<ul> <li>The reciprocal of a number is found by raising the number to the power of -1</li> <li>To find a negative power, find the reciprocal and raise to the positive power</li> <li>Standard Form -is used to write very large of very small numbers</li> </ul>	Examples Work out the value of (6.4 Give your answer in standard	$a \times 10^{n}$ $(2 \times 10^{-3})$ d index form.	$\sum_{x=1}^{+} \frac{3}{4} = \frac{(4 \times 2)}{4}$ Mixed Number	$\frac{+3}{-} = \frac{8+3}{4}$	$\frac{1}{4} = \frac{11}{4}$	
$a \times 1 \vee$ Where $1 \le a < 10$ and n is an integer.	$= 6.4 \times 2 \times 10^7 \times 10^{-3}$ La	aw of				

#### Year 11 Term 1 Maths Knowledge Organiser [H unit 18 - Vectors and Geometric Proof]



## Year 11 Term 1 Maths Knowledge Organiser[F unit 19 - Congruence, similarity and vectors]

CORE	GOOD TO KNOW	ном то ТКАТ
Vector arithmetic: $\begin{pmatrix} 3\\4 \end{pmatrix}$ Where <b>a</b> is the vector $\begin{pmatrix} 3\\4 \end{pmatrix}$ $2\mathbf{a} = \begin{pmatrix} 6\\8 \end{pmatrix}$ $3\mathbf{a} = \begin{pmatrix} 9\\12 \end{pmatrix}$ $5\mathbf{a} = \begin{pmatrix} 15\\20 \end{pmatrix}$ We can add vectors by adding the two x components and adding the two y components together. $\mathbf{a} = \begin{pmatrix} 3\\4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 2\\7 \end{pmatrix}$ $\mathbf{a} + \mathbf{b} = \begin{pmatrix} 3+2\\4+7 \end{pmatrix} = \begin{pmatrix} 5\\11 \end{pmatrix}$ Keywords	Vectors can be represented as: <u>Straight Lines</u> Direction Magnitude $ \begin{array}{c} Column Vectors \\                                    $	In the figure, given that the two triangles are similar, what is the scale factor that would take you from the larger triangle to the smaller triangle? $ \begin{array}{ccccccccccccccccccccccccccccccccccc$
<ul> <li>Similarity - Two shapes are Similar when one can become the other after an enlargement, reflection, translation or rotation.</li> <li>Enlargement - A type of transformation where we change the size of the original shape to make it bigger or smaller.</li> <li>Scale Factor - The ratio between the scale of a given original object and a new object, which is its representation but of a different size (bigger or smaller).</li> <li>Congruent - Two shapes are congruent if they have the same shape and size, or when one shape can be rotated or reflected to fit exactly on the other.</li> <li>Vector - A vector is a quantity that has both a magnitude and a direction</li> </ul>	Congruent shapes have all sides and angles equal.  Similar shapes have all angles equal but one is an enlargement of the other.	These two rectangles are similar. Find the missing length $x$ in the smaller rectangle. 5 cm 2 cm 4 cm ratio of lengths: $\frac{x}{5}$ ratio of widths: $\frac{2}{4} = \frac{1}{2}$ Write the ratio $\frac{\text{small}}{\text{large}}$ for the lengths and the widths. $\frac{\text{small}}{\text{large}} = \frac{1}{2} = \frac{x}{5}$ 2 $x = 5$ Write an equation to solve for $x$ . $x = \frac{5}{2} = 2.5$ cm
		$x - \frac{1}{2} - 2.500$

#### [H unit 19 - Proportions and graphs]



#### [F unit 20 - More algebra]



#### CORE **GOOD TO KNOW... HOW TO....** A linear graph is a straight line a Make $\alpha$ the subject of the formula $v^2 = u^2 + 2\alpha s$ **Types of Graphs b** Make *x* the subject of the formula $y = \frac{ax+b}{a}$ Quadratic, cubic and reciprocal graphs are curved Linear A guadratic equation contains a term in $x^2$ but no $b \quad y = \frac{ax + b}{c}$ $a v^2 = u^2 + 2as$ higher power. It can also have x and number terms. Quadratic A cubic contains a term in $x^3$ but no higher power. Subtract $u^2$ from both sides. $v^2 - u^2 = 2.85$ Multiply both sides by c. cy = ax + bIt can also have terms in $x^2$ and x and number Cubic terms. v<sup>2</sup> – u<sup>2</sup> Divide both sides by 2s. cy - b = axSubtract b from both sides Reciprocal 29 Simultaneous equations are equations that are true for cy – b both variables (letters) Re-write in the form a = ...Divide both sides by a. 2= \_\_\_\_= X To solve a simultaneous equation graphically, look at the point where both straight lines intersect (cross) Re-write in the form xand write down that coordinate. When rearranging formulae: To solve a simultaneous equation by the elimination method, add or subtract the equations to eliminate either the x or y terms. A term is a number, letter, or a number and a letter Simultaneous Equations multiplied together i.e. x. 3a, $7y^2$ are all terms By elimination method An expression contains letter and/ or number terms but no Same algebra rules apply: equal sign. Two linear equations Keep equals sign in line An equation has an equals sign, letter terms and numbers. Example 2x + y = 5 Use inverse operations Solve (i) You can solve it to find the value of the letter. Keep the equation balanced x - y = 1Eliminate v by adding the equations An identity is true for all values of letters ()0. 3x= 6A formula has an equals sign and letters to represent = 2х different quantities. The letters are variables as their values x - y = 1Putting value back into 2<sup>nd</sup> equation can vary.

### Year 11 Term 3 Maths Knowledge Organiser [Foundation Revision]

CORE	GOOD TO KNOW	ном то ТКАТ				
Perimeter - Calculated by adding up the length of each of the sides.	$\frac{Pythagoras theorem}{a^2 + b^2 = c^2}$	<b>Expand</b> 3(x + 4) Multiply what's inside by 3 3x +12				
Circumference of circle - $\pi d$ Area - Square/Rectangle = length x width - Triangle = $\frac{1}{2}$ x base x height - Trapezium = $\frac{1}{2}$ x a + b x height - Circle - $\pi r^2$ - Measure in squared units, e.g. cm <sup>2</sup> Volume	C C C C Centre Chord Diameter Segme	Factorise 5x - 20 Find HCF and put in brackets 5(x + 4) Solve $3x + 4 = 40$ Use inverse operations to find value of x -4 3x = 36 $\div 3$ x = 12				
<ul> <li>Prism = area of cross section (front face) x length</li> <li>Cylinder = area of circle (front face) x length</li> <li>Measure in cubic units, e.g. cm<sup>3</sup>.</li> </ul>		$\frac{\text{Percent Change}}{\text{Percent Change}} = \frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100\%$				
Right Angle - 90° Angle Angles on a straight line = 180° Angles around a point = 360° Angles in a triangle = 180°	D T Speed Time Distance	If the result is positive, it is an increase. If the result is negative, it is a decrease. Therease $f_{50}$ by $60\%$				
Exterior angles in a polygon = 360° 1m 100cm	Density = Mass Volume	$160\% \times £50 = 1.6 \times £50$ = £80				
1 metre squared = 10,000 centimetre squared	Volume = Mass Density Mass = Density x Volume	Increase £86 by 7%. 107% × £86 = 1.07 × £86 = £92.02				

#### Year 11 Term 3 Maths Knowledge Organiser

#### [Higher Revision]

