

## Year 11 Mathematics Foundation HT 1

Fra	Fractions				
1.	Improper fraction	A fraction where the numerator is larger than the denominator.e.g. $\frac{4}{3}$			
2.	Mixed number	A number made from integer and fraction parts. e.g. $2\frac{2}{3}$			
3.	Unit fraction	A fraction that has a numerator of 1			
	Designed and	The reciprocal of a number is 1 divided by the number.e.g. the reciprocal of 3 is $\frac{1}{3}$			
7.	Recipioca	Dividing by a number is the same e.g. $\times$ by $\frac{1}{3}$ is the same as $\div$ by 3 as multiplying by its reciprocal			
5.	Convert improper fractions to mixed numbers	<ul> <li>Divide the numerator by the denominator</li> <li>The answer gives the whole number part.</li> <li>The remainder becomes the numerator of the fraction part with the same denominator.</li> </ul>			
6.	Convert mixed numbers to improper fractions	<ul> <li>Multiply the denominator by the whole number part.</li> <li>Add the numerator to this.</li> <li>Put the answer to this back over the denominator</li> </ul>			
7.	Adding and subtracting mixed numbers	<ul> <li>Convert mixed numbers to improper fractions</li> <li>Transform both fractions so they have the same denominator</li> <li>Add or subtract the numerators Convert back to mixed number if applicable</li> </ul>			
8.	Multiplying mixed numbers	<ul> <li>Convert mixed numbers to improper fractions</li> <li>Multiply numerators and multiply the denominators Convert back to mixed number if applicable</li> </ul>			
9.	Dividing mixed numbers	<ul> <li>Convert mixed numbers to improper fractions</li> <li>Flip the second fraction (find the reciprocal)</li> <li>Change the divide sign to a multiply</li> <li>Multiply the fractions Convert back to mixed number if applicable</li> </ul>			
Ind	Index laws				
10.	Index	A small number to the upper right of a base number that shows how many times the base number is multiplied by itself.			
11.	Power	Another word for an index.			
12.	Indices	The plural of index.			

13.	Index form	A number written to the power of an index.		
14.	Multiplying	Add the powers	$x^7 \times x^6 = x^{13}$	
15.	Dividing	Subtract the powers	$x^5 \div x^6 = x^{-1}$	
16.	Brackets	Multiply the powers	$(x^2)^3 = x^6$	
17.	Power of O	Always = 1	$x^{0} = 1$	
18.	Negative	Means "1 over"	$x^{-n} = \frac{1}{x^n}$	
19.	Unit Fraction	Means root	$x^{\frac{1}{n}} = \sqrt[n]{x}$	
20.	Fractional	Means root and bracket	$x^{\frac{a}{n}} = (\sqrt[n]{x})^a$	
Sta	ndard form			
21.	Standard form	A number written in the form: $A \times 1$	$10^n$ , where A is between 1 and 10.	
22.	Scientific notation	Another name for standard form		
23.	Convert a small number to standard form	<ul> <li>Count the number of zero's in front of the first significant figure (including the one in front of the decimal point).</li> <li>The power of ten is negative followed by this number.</li> </ul>	e.g. $0.0000037$ = $3.7 \times 10^{-7}$	
24.	Convert a large number into standard form	<ul> <li>Count the number of place value position there are after the first significant figure.</li> <li>The power of ten is positive followed by this number.</li> </ul>	e.g. 147 100 000 000 $= 1.47 \times 10^{11}$	
25.	Converting to a small ordinary number	<ul> <li>Look at the digit after the negative in the power of 10.</li> <li>Write this may zero's in front of the first sig. fig.</li> <li>Reposition the decimal place between the first and second zero.</li> </ul>	e.g. $2.4 \times 10^{-6}$ = 0.0000024	
26.	Adding or subtracting numbers in standard form	<ul> <li>Convert the numbers to ordinary numbers.</li> <li>Add.</li> <li>Convert the sum to standard form.</li> </ul>	e.g. $(2.3 \times 10^4) + (6.4 \times 10^3)$ = 23000 + 6400 = 29400 = 2.94 × 10 <sup>4</sup>	

27.	Multiplying numbers in standard form	<ul> <li>Multiply the numbers between one and 10 at the front.</li> <li>Use index law for multiplication for the powers of 10.</li> <li>If precessory increase the power of</li> </ul>	e.g. $(4.5 \times 10^3) \times (3 \times 10^5)$ = 13.5 × 10 <sup>3+5</sup> = 13.5 × 10 <sup>8</sup>
		ten by one to ensure the initial number is between 1 and 10.	$= 1.35 \times 10^9$
28.	Dividing numbers in	<ul> <li>Divide the numbers between one and 10 at the front.</li> <li>Use index law for division for the powers of 10.</li> </ul>	e.g. $(2.5 \times 10^{11}) \div (5 \times 10^{13})$ = $0.5 \times 10^{-2}$
	standard form	• If necessary, decrease the power of ten by one to ensure the initial number is between 1 and 10.	$= 5 \times 10^{-3}$

Similarity and Congruence in 2D				
1.	Congruent	Exactly the same shape and size		
2.	Similar	Two shapes where one is an enlargement of another		
	Similar	Corresponding angles are equal	Corresponding sides are in the same ratio	
3.	Scale factor	The proportion by which the dimensions of	an object will increase or decrease by	
4.	Linear scale factor (LSF)	The scale factor/ratio of sides of two similar shapes	$LSF = rac{length from large shape}{length from small shape}$	
5.	Area scale factor (ASF)	The scale factor ratio of areas/surface areas of two similar shapes	$ASF = \frac{Area \ of \ large \ shape}{lArea \ of \ small \ shape}$	
6.	Volume scale factor (VSF)	The scale factor/ratio of volumes of two similar shapes	$VSF = \frac{volume \ of \ large \ shape}{volume \ of \ small \ shape}$	
Two ti	riangles are a	congruent if		
7.	SSS	All 3 sides are equal		
8.	SAS	2 sides and the included angle are equal	≅	
9.	ASA	2 angles and the corresponding side are equal		
10.	RHS	The right angle, hypotenuse and one other side are equal		
Vectors				
11.	Magnitude	Size		

12.	Scalar	A quantity has a magnitude		
13.	Vector	A quantity that has direction and magnitude		
14	Column	x denotes the horizontal movement	$\begin{pmatrix} x \end{pmatrix}$	- <b>→</b> +
14.	vector	y denotes the vertical movement	$\left( y \right)$	Į_
15.	Written vectors	Can be written in bold <b>a</b> or with underlinin	ng <u>a</u>	
16.	Vector between two points	A vector between any two given points	e.g. vector between written as $\rightarrow_{AB}$	A and B could be
17.		Column vectors can be represented on grids	a = ( <sup>4</sup> <sub>2</sub> ) b =	(2) c = (-4) c = (-4)
18.	Adding vectors	$\binom{2}{3} + \binom{1}{-4} = \binom{3}{-1}$		
19.	Subtracting vectors	$\binom{2}{3} - \binom{1}{-4} = \binom{1}{7}$		
20.	Multiplying a vector by a scalar quantity	$\mathbf{p} = \begin{pmatrix} 2\\ 3 \end{pmatrix}. \text{ Then } 2\mathbf{p} = 2 \times \begin{pmatrix} 2\\ 3 \end{pmatrix} = \begin{pmatrix} 4\\ 6 \end{pmatrix}.$		/2p
21.	Magnitude of a vector	b 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	$b \begin{pmatrix} 3 \\ 4 \end{pmatrix} \qquad b = b^2$	$= 3^{2} + 4^{2}$ $= \sqrt{3^{2} + 4^{2}}$ $b = 5$
22.	Unit vector	Has a magnitude of 1		



## **Year 11 Mathematics** Foundation **HT 2**

Algeb	ra definitions		
1.	Equation	A mathematical statement containing an equals sign (=) to show that two expressions are equal	
2.	Formula	A rule describing the relationship between different variables	
3.	Formulae	The plural of formula	
4.	Function	A relation involving one or more variables	
_	Roots	Solutions to an equation	
5.		In graphs, the values of x where the graph crosses the x axis	
6.	Identity	An equation that is true for any value of x	Denoted using $\equiv$
7.	Substitute	Replace a variable with a number	
8.	Subject	The variable on its own on one side of the equals sign is said to be the 'subject' of a formula	
9.	Rearrange	Change positons of terms using inverse operations	
Changing the subject of a formula (rearranging)			

Always use inverse operations to isolate the term you have been asked to make the subject

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10.	Make $u$ the subject: v = u + at (-at) v - at = u So	Make u the subject: $v^2 = u^2 + 2as$ (-2as) $v^2 - 2as = u^2$ $(\sqrt{)}$ $\sqrt{v^2 - 2as} = u$
	u = v - at	So
		$u = \sqrt{v^2 - 2as}$

## Types of graphs/functions

		Represented by a straight line	y = 2x + 4	
		Usually represented by $y = mx + c$		6-4
11.	Linear	Can also be given as $ax + by + c = 0$		

		General form of $ax^2 + bx + c = 0$	Equation $y = 2x^2 + 6x$ Graph Table of Values $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
12.	Quadratic	A positive x² will give a '∪' shape		
		A negative x² will give a '∩' shape		
13.	Cubic	General form of $ax^3 + bx^2 + cx + d = 0$	(1,4) $(3,27)$	
		Can have 1, 2 or 3 roots	Graph of $f(x) = 2x^3 - 3x^2 + 5$ . $b^2 - 3ac = 9$ Graph of $f(x) = -8(x - 3)^3 + 27$ . $b^2 - 3ac = 0$	
14.	Asymptote	A line a graph will get very close to but wi	ll not touch	
15.	Reciprocal	General form of $y = \frac{k}{x}$ where k is a number	$y = \frac{k}{x}$ (positive) $y = \frac{k}{x}$ (negative)	
		Has two asymptotes		
Simultaneous equations				
16.	Simultaneous equations	Two equations where there are two unknown which have the same value in each		
Solving	simultaneous	equations		
		Add or subtract one equation from anothe	er to eliminate a variable	
17.	Elimination	If the matching coeefieicents have the same sign then subtract the equations	If the matching coefficients have different signs then add the equations	
		✓ Same	✓ Different	
		✓ Subtract	✓ Add	
		✓ Substitute	✓ Substitute	
18.	Substitution	Rearrange so the subject of one equation is a single variable		
		Substitute this into the second equation		
19.	Graphically	The points of intersection of two graphs are the solutions to the simultaneous equations	y = 2x  y = x + 1	