

<p>Algebra</p> $(a + b)^2 = a^2 + 2ab + b^2$ $(a - b)^2 = a^2 - 2ab + b^2$ $(a + b)(a - b) = a^2 - b^2$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $y = (x - h)^2 + k,$ <p>turning pt. (h, k)</p>	<p>Simultaneous Eqns:</p> <ul style="list-style-type: none"> Elimination Substitution Graphical Method <p>Factorisation Methods:</p> <ul style="list-style-type: none"> Grouping Cross Product <p>Table Method</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>										<p>Indices</p> $a^x \times a^y = a^{x+y} \quad a^x \div b^x = \left(\frac{a}{b}\right)^x$ $a^x \div a^y = a^{x-y} \quad a^0 = 1$ $(a^x)^y = a^{xy} \quad \sqrt[n]{a} = a^{1/n}$ $a^x \times b^x = (ab)^x \quad \frac{1}{a^n} = a^{-n}$ <p>If $a^x = a^y, x = y.$</p>	<p>Simple and Compound Interest</p> $I = \frac{PRT}{100}$ $A = P\left(1 + \frac{r}{100}\right)^n$ $A = P + I$ <p>Standard Form</p> $k \times 10^n, 1 \leq k < 10$	<p>Proportion</p> $y = kx, y = \frac{k}{x}$ <p>x increase by 100% = 2x</p> <p>Number Patterns</p> $T_n = an + b$ <p>a: Common Difference b: Term before 1st Term</p> <p>Quadratic: $an^2 + bn + c$ Other Seqs: $n^2: 1, 4, 9, \dots$ $n^3: 1, 8, 27, 64, \dots$</p>	<p>Congruency Tests</p> <p>SSS, SAS, ASA AAS, RHS</p> <p>Similarity Tests</p> <p>AA, SSS, SAS</p> <p>Map Scale</p> <ul style="list-style-type: none"> 1 : n Map v.s. Actual Area Scale: $(1)^2 : (n)^2$ <p>Conversion</p>	<p>Scale Factor</p> $k = \frac{\text{Length of Image}}{\text{Length of Object}}$ <p>$k > 1$: Enlargement, $k < 1$: Reduction</p> <p>Similar shapes/solids</p> $\frac{A_1}{A_2} = \left(\frac{l_1}{l_2}\right)^2$ $\frac{V_1}{V_2} = \left(\frac{l_1}{l_2}\right)^3$
<p>Percentage</p> $\text{Percentage Increase/Decrease} = \frac{\text{Increase/Decrease}}{\text{Original Value}} \times 100\%$ <ul style="list-style-type: none"> Tax Relief Commission Profit/Discount Income Tax/GST 	<p>Polygons</p> <p>Sum of Interior Angles = $(n - 2) \times 180^\circ$ Sum of Exterior Angles = 360°</p> <p>Pentagon (5 sides), Hexagon (6 sides), Heptagon (7 sides), Octagon (8 sides), Nonagon (9 sides), Decagon (10 sides)</p> <p>Inequalities</p> <p>$x < -2$ $x \geq 2$</p> <p>Simultaneous Inequalities:</p> <p>$a < \frac{bx+c}{d} < e$ $a < \frac{bx+c}{d} < e$</p>	<p>Statistics</p> <p>Mean = $\bar{x} = \frac{\sum fx}{\sum f}$, SD = $\sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$ I.Q Range = U.Q - L.Q Range = Max - Min</p> <p>Median: Middle Value: Even set: $\frac{x_1 + x_2}{2}$, Odd set: x</p> <p>Mode: Number with Highest frequency</p> <p>Pie Charts, Pictograms, Line Graphs, Histograms, Dot Diagrams, Box and Whiskers, Stem-and-Leaf Cumulative Frequency Diagrams</p>													
<p>Speed</p> $\frac{\text{Distance}}{\text{Time}}$ <p>Average Speed = $\frac{\text{Total Distance}}{\text{Total Time}}$</p> <p>Conversion of Units</p> $\frac{10 \text{ m}}{1 \text{ s}} = \frac{10 \div 1000}{1 \div 3600} = 36 \text{ km/h}$	<p>Linear Functions/Graphs</p> $y = mx + c$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $l = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$	<p>Graph Sketching</p> <ol style="list-style-type: none"> Find x-intercept (Sub $y = 0$) Find y-intercept (Sub $x = 0$) Find Turning Point (h,k) <p>M1: Complete the Square M2: $\frac{x_1 + x_2}{2}$, sub into y.</p> <p>4. Line of Symmetry: $x = h$</p>	<p>Matrices</p> $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \pm \begin{pmatrix} e & f \\ g & h \end{pmatrix} = \begin{pmatrix} a \pm e & b \pm f \\ c \pm g & d \pm h \end{pmatrix} \quad I = \begin{pmatrix} 1 & \dots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \dots & 1 \end{pmatrix}$ $k \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} ka & kb \\ kc & kd \end{pmatrix}$ $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \times \begin{pmatrix} e & f \\ g & h \end{pmatrix} = \begin{pmatrix} ae+bg & af+bh \\ ce+dg & cf+dh \end{pmatrix}$												
<p>TOA, CAH, SOH</p> $\sin x = \frac{\text{opp}}{\text{hyp}}$ $\cos x = \frac{\text{adj}}{\text{hyp}}$ $\tan x = \frac{\text{opp}}{\text{adj}}$ $\sin \theta = \frac{O}{H}, \cos \theta = \frac{A}{H}$	<p>Pythagoras' Theorem</p> $a^2 + b^2 = c^2$ <p>Arc Length/Sector Area</p> $s = r\theta$ $A = \frac{1}{2}r^2\theta$ $s = \frac{\theta}{360^\circ} \times 2\pi r$ $A = \frac{\theta}{360^\circ} \times \pi r^2$ $\pi \text{ rad} = 180^\circ$	<p>Area of Triangle</p> $A = \frac{1}{2}ab \sin C$ <p>Sine Rule</p> $\frac{\sin A}{a} = \frac{\sin B}{b}$ <p>Obtuse Angles: $\sin(180^\circ - \theta) = \sin \theta, \cos(180^\circ - \theta) = -\cos \theta$</p> <p>Bearings (in 3 digits) 3-Dimensional problems</p>	<p>Square</p> $A = l^2$ $P = 4l$ <p>Cube</p> $V = l^3$ $SA = 6l^2$	<p>Rectangle</p> $A = lb$ $P = 2(l + b)$ <p>Cuboid</p> $V = lbh$ $SA = 2(lb + lh + bh)$	<p>Trapezium</p> $A = \frac{1}{2}(a+b)h$ <p>Prism</p> $V = \text{base area} \times h$ <p>Base Area = Cross-Sect. Area.</p>	<p>Parallelogram</p> $A = bh$ <p>Cylinder</p> $V = \pi r^2 h$ $SA = 2\pi r(r + h)$	<p>Circle</p> $A = \pi r^2$ $C = 2\pi r$ <p>Sphere</p> $V = \frac{4}{3}\pi r^3$ $SA = 4\pi r^2$	<p>Cone</p> $V = \frac{1}{3}\pi r^2 h$ $SA = \pi r(l + r)$ <p>Pyramid</p> $V = \frac{1}{3}(\text{base area})h$ $SA = \text{base area} + \text{faces}$							

Angle Properties																														
Angles on str. line 	Angles at a pt. 	Vert. Opp. Angles 	Corr. Angles 	Alt. Angles 	Int. angles 	Equi. Triangle 	Isos. Triangle 	Sum of Int. Angles 	Complementary 	Supplementary 																				
Circle Properties																														
Angle in a semi-circle 	Angles in same segment 	Angle at centre = 2 x Angle at circumference 	Cyclic Quad: Opposite angles add to 180° 	Equal chords equidistant from Centre 	Tangent ⊥ Radius 	Equal Tangents from ext. pt. 																								
Graphs																														
$y = \frac{a}{x}, a < 0$	$y = \frac{a}{x}, a > 0$	$y = ax^2, a < 0$	$y = ax^2, a > 0$	$y = ax^3, a > 0$	$y = ax^3, a < 0$	$y = ka^x, a > 1, k > 0$	$y = ka^x, a < 1, k > 0$	$y = ka^x, a > 1, k < 0$	$y = ka^x, a > 1, k < 0$	$y = ka^x, a > 1, k < 0$																				
Vectors Negative Vectors: $\overline{AB} = -\overline{BA}$ $k \begin{pmatrix} a \\ b \end{pmatrix}$ is // to $\begin{pmatrix} a \\ b \end{pmatrix}$ If $x = \begin{pmatrix} c \\ d \end{pmatrix}$, $ x = \sqrt{m^2 + n^2} \rightarrow$ Magnitude Zero/Null Vector: $\vec{0}$ Position Vector $\vec{OA} = \begin{pmatrix} x \\ y \end{pmatrix}$ $A = \frac{1}{2} \begin{vmatrix} u & v \\ \sim & \sim \end{vmatrix}$ $A = \begin{vmatrix} u & v \\ \sim & \sim \end{vmatrix}$ Collinear: All points lie on the same line.			Horizontal Graphs: $m = 0$ 	Vertical Graphs: m is undefined 	Distance-Time Graph: <ul style="list-style-type: none"> Gradient = Speed 	Speed-Time Graph: <ul style="list-style-type: none"> Gradient = Acceleration, Area under Graph = Distance 	Probability $P(A) + P(A') = 1$ Independent: $P(A \cap B) = P(A) \times P(B)$ Mutually Exclusive: $P(A \cap B) = 0$ Union of Events: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ Union of Events (Case of Mutually Exclusive) $P(A \cup B) = P(A) + P(B)$	Tree Diagram With Replacement Without Replacement Possibility Diagram <table border="1"> <tr><td></td><td>H</td><td>T</td></tr> <tr><td>H</td><td>H,H</td><td>H,T</td></tr> <tr><td>T</td><td>T,H</td><td>T,T</td></tr> </table>		H	T	H	H,H	H,T	T	T,H	T,T	Rational Numbers <ul style="list-style-type: none"> Can be expressed as fractions All integers Recurring Decimals $4, 5, \frac{1}{2}, 0.\dot{3} = 0.333\dots$ Irrational Numbers <ul style="list-style-type: none"> Cannot be expressed as fractions $\sqrt{2}, \sqrt{7}, \pi$ Prime Numbers <ul style="list-style-type: none"> Only 2 factors, 1 and itself 1 is NOT prime Prime Factorisation <table border="1"> <tr><td>2</td><td>200</td></tr> <tr><td>2</td><td>100</td></tr> <tr><td>2</td><td>50</td></tr> <tr><td>5</td><td>25</td></tr> <tr><td>5</td><td>5</td></tr> <tr><td>1</td><td></td></tr> </table> $200 = 2^3 \times 5^2$ Perfect Cube: Powers multiple of 3 Perfect Square: Powers multiple of 2	2	200	2	100	2	50	5	25	5	5	1	
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