

Year 10 Higher Unit 8 – Transformations and constructions

Learning Outcome	Students will know and remember ...	So that they can....
Understand reflections.	<p>That a reflection is a mirror image and needs a reflection line to perform.</p> <p>That some coordinates may be invariant under a reflection.</p> <p>That congruence means exactly the same.</p> <p>That horizontal and vertical lines are in the form $y=$ and $x=$.</p>	Perform and describe reflections
Understand translations.	<p>That a translation moves the object and therefore size, shape and orientation do not change.</p> <p>That a column vector describes a translation.</p>	Perform and describe translations
Understand rotations.	<p>That a rotation spins an object and needs a centre of rotation, a direction and an angle to perform.</p>	Perform and describe rotations
Understand enlargements.	<p>That an enlargement makes a shape bigger or smaller.</p> <p>That a centre of enlargement and scale factor is needed.</p> <p>That a negative scale factor also has the effect of rotating the object.</p>	Perform and describe enlargements
Understand the effect of combined transformations.	<p>Invariant means coordinates may remain unchanged when a specified transformation is applied.</p> <p>That some coordinates may be invariant under a transformation.</p>	<p>Describe and transform 2D shapes using a combination of transformations.</p> <p>Describe the changes and invariance achieved by combinations of transformations.</p>
Understand elevations.	<p>That a face is a flat surface of a 3D shape.</p> <p>That a vertex is a corner of a 3D shape.</p> <p>That an edge is where 2 faces join on a 3D shape.</p> <p>That a front elevation is the 2D shape seen from the front.</p> <p>That a side elevation is the 2D shape seen from the side.</p> <p>That a plan elevation is the 2D shape seen from above.</p> <p>That 3D solids can be drawn as their faces.</p>	<p>Draw sketches of 3D solids.</p> <p>Draw the front, side and plan elevation of 3D solids.</p>
Understand scales and bearings.		<ol style="list-style-type: none"> 1. Use and interpret maps and scale drawings, using a variety of scales and units; Read and construct scale drawings, drawing lines and shapes to scale; Estimate lengths using a scale diagram; 2. Understand, draw and measure bearings; Calculate bearings and solve bearings problems, including on scaled maps, and find/mark and measure bearings

		<p>3. Construct: a region bounded by a circle and an intersecting line; a given distance from a point and a given distance from a line; equal distances from two points or two line segments; regions which may be defined by 'nearer to' or 'greater than';</p> <p>4. Find and describe regions satisfying a combination of loci, including in 3D;</p> <p>5. Use constructions to solve loci problems including with bearings; Know that the perpendicular distance from a point to a line is the shortest distance to the line.</p>
Perform constructions.	<p>That perpendicular means at right angles to.</p> <p>That to bisect an angle means to cut it exactly in half.</p> <p>That construction lines are not erased.</p>	<p>Accurately construct a perpendicular bisector of a line segment.</p> <p>Accurately construct a perpendicular to a given line through a given point.</p> <p>Accurately construct an angle bisector</p>
Understand Loci.	<p>That bearings describe an angle taken from north, clockwise and has 3 figures.</p> <p>That locus is a set of points which satisfies a given condition.</p>	<p>Draw and construct diagrams from given instructions, including: a region bounded by a circle and an intersecting line; a given distance from a point and a given distance from a line; equal distances from two points or two-line segments.</p> <p>Find and describe regions satisfying a combination of loci.</p> <p>Use and interpret maps and scale drawings.</p> <p>Estimate lengths using a scale diagram; Make accurate scale drawings from a diagram;</p> <p>Use accurate drawing to solve problems involving bearings and loci.</p>
Year 10 Higher Unit 9 – Quadratics and Inequalities		
Learning Outcome	Students will know and remember ...	So that they can....
Understand the algebra of quadratics.	<p>That a quadratic expression involves x^2.</p> <p>That a quadratic expression is in the form $ax^2 + bx + c$</p> <p>That a factorised quadratic expression takes the form $(x+a)(x+b)$</p> <p>That when you solve a quadratic equation these are the roots to the equation.</p> <p>That equations may need rearranging into the form $ax^2 + bx + c$</p> <p>That the quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$</p>	<p>Factorise a quadratic expression.</p> <p>Solve quadratic equations by factorising, using the quadratic formula or completing the square.</p>

Form and solve simultaneous equations.	<p>That you can solve a pair of linear simultaneous equations using elimination or substitution.</p> <p>That you may need to multiply an equation to create the same number of variables.</p> <p>That you can only solve a linear and quadratic simultaneous equation by using substitution.</p> <p>That the equation of a circle is given by $x^2 + y^2 = r^2$</p> <p>That the solution of simultaneous equations represents the intersection of the lines/curves.</p>	Find the exact solutions of two simultaneous equations and interpret in context.
Form and solve linear inequalities.	<p>That inequalities can be represented on a number line.</p> <p>That a solid circle represents it includes the number stated.</p> <p>That errors can be expressed using inequality notation $a \leq x < b$</p>	<p>Construct inequalities to represent a set shown on a number line and write down whole number values that satisfy an inequality.</p> <p>Solve linear inequalities and represent the solution set on a number line.</p> <p>Use inequality notation to specify error intervals due to truncation or rounding.</p>

Year 10 Higher Unit 10 – Probability

Learning Outcome	Students will know and remember ...	So that they can....
Understand the language and notation of probability.	<p>The words impossible, unlikely, even chance, likely, and certain describe probability.</p> <p>That the probability scale goes from 0 to 1.</p> <p>Probability can be written as a fraction, decimal or percentage.</p> <p>That mutually exclusive means that events cannot happen at the same time.</p> <p>That the sum of probabilities is 1.</p> <p>Theoretical probability uses theory.</p> <p>Experimental probability uses results from an experiment and can be called relative frequency.</p> <p>That probabilities can be calculated from frequency tables, frequency trees and two-way tables.</p>	<p>List the possible outcomes of an event.</p> <p>Calculate the probability of events happening or not.</p> <p>Find missing probabilities.</p> <p>Compare experimental and theoretical probabilities.</p>
Use diagrams with probabilities.	<p>That a sample space diagram displays all possible outcomes.</p> <p>That venn diagrams use the following notation: $A \cup B$ $A \cap B$</p> <p>That $A \cup B$ means A or B and is called the union.</p> <p>That $A \cap B$ means A and B and is called the intersection.</p> <p>That independent are mutually exclusive.</p>	<p>Calculate probabilities from different diagrams.</p> <p>Complete sample space diagrams, Venn diagrams, two-way tables and tree diagrams.</p>

Year 10 Higher Unit 11 – Multiplicative reasoning

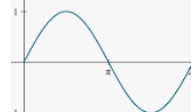
Learning Outcome	Students will know and remember ...	So that they can....
-------------------------	--------------------------------------------	-----------------------------

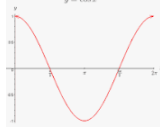
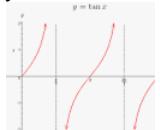
Understand compound measures	That speed = distance/time That the unit for speed is m/s That density = mass/volume That the unit for density is kg/m ² That pressure = force/area That the unit for pressure is N/ m ²	Calculate real life problems involving speed, distance, time, force, pressure, area, density, mass and volume.
Calculate with proportionality.	That direct proportion means that as one variable increases so does the other. That direct proportion is in the form $y = kx$. That inverse proportion means that as one variable increases the other decreases. That direct proportion is in the form $y = k/x$.	Set up, solve and interpret equations that describe direct and inverse proportionality.
Calculate repeated proportional change.	That a percentage increase or decrease can be calculated using a multiplier. That compound interest is an example of repeated percentage change.	Calculate compound interest and depreciation problems.
Understand geometric progressions.	That a geometric progression has a constant ratio. That a geometric progression is a sequence.	Recognise and continue geometric progression. Find the rule to represent a geometric progression.

Year 10 Higher Unit 12 – Similarity and Congruence

Learning Outcome	Students will know and remember ...	So that they can....
Understand the conditions of similar triangles.	That congruence means exactly the same. That when a shape is enlarged the size of angles are reserved. That the scale factor of an enlargement of a similar shape can be described as the ratio of the lengths of two corresponding sides. That congruent triangles can be proved if they follow the following conditions: use SSS, SAS, ASA and RHS.	Prove the congruence of triangles using formal arguments. Identify similarity and corresponding scale factors. Solve problems involving frustums of cones using similar triangles.
Understand similarity and scale factors.	That area scale factor is the length scale factor squared. That volume scale factor is the length scale factor cubed.	Find missing lengths, areas and volumes in similar 3D solids

Year 10 Higher Unit 13 – Trigonometry

Learning Outcome	Students will know and remember ...	So that they can....
Understand the trigonometric graphs.	$y = \sin x$ 	Recognise, sketch and interpret graphs of the trigonometric functions

	<p>$y = \cos x$</p>  <p>$y = \tan x$</p> 	
Understand the transformations of graphs.	<p>That reflections are algebraically represented by $y = -f(x)$, $y = f(-x)$.</p> <p>That translations are algebraically represented by $y = f(x) + a$, $y = f(x + a)$.</p>	Translate and reflect graphs.
Understand the use of Pythagoras and Trigonometry in 2D and 3D situations.	<p>That Pythagoras Theorem is $a^2 + b^2 = c^2$</p> <p>That the area of a triangle can be found using $\frac{1}{2} ab \sin$</p> <p>That the sine rule can find missing sides or angles in non-right-angled triangles.</p> <p>That the sine rule needs a pair of information.</p> <p>That the sine rule is $a/\sin A = b/\sin B$</p> <p>That the cosine rule can find missing sides or angles in non-right-angled triangles.</p> <p>That the cosine rule is $a^2 = b^2 + c^2 - 2bc \cos A$</p> <p>That the sine and cosine rule can be used in 3D scenarios.</p>	Calculate the area, sides or angles of any triangle in 2D and 3D situations. Calculate the length of a diagonal of a cuboid and find the angle between a line and a plane.

Year 10 Higher Unit 14 – Statistics

Learning Outcome	Students will know and remember ...	So that they can....
Understand types of data.	<p>That qualitative data is data that can only be written in words.</p> <p>That quantitative data can be counted.</p> <p>That a sample does not represent the entire population.</p>	<p>Specify the problem and plan an investigation</p> <p>Construct and interpret surveys and questionnaires.</p> <p>Collect data.</p> <p>Identify bias.</p>
Understand cumulative frequency and boxplots.	<p>That cumulative frequency represents a running total.</p> <p>That finding averages from a cumulative frequency represent estimates.</p> <p>That boxplots need the following information: least/greatest value, median and quartiles.</p>	<p>Construct and interpret cumulative frequency tables and cumulative frequency graphs.</p> <p>Use cumulative frequency graphs to estimate frequencies, find medians, quartile values and interquartile ranges.</p> <p>Compare different sets of data.</p> <p>Draw and interpret box plots draw conclusions.</p> <p>Identify outliers.</p>
Understand histograms.	<p>That histograms look like bar charts but have unequal bar widths.</p>	<p>Construct and interpret histograms.</p> <p>Estimate the mean and median from a histogram.</p>

	<p>That histograms use frequency density.</p> <p>That frequency density = frequency / class width.</p> <p>That the median for a histogram is an estimate.</p>	
Year 10 Higher Unit 15 – Quadratics and Inequalities		
<i>Learning Outcome</i>	<i>Students will know and remember ...</i>	<i>So that they can....</i>
Understand the graphical representation of quadratics.	<p>That quadratic graphs are symmetrical.</p> <p>That the roots of a quadratic graph are found from factorising.</p> <p>That the roots of a quadratic graph are where the graph intersects the x axis.</p> <p>That the turning point of a quadratic graph is the minimum point or the vertex of the graph and is found from completing the square.</p>	<p>Sketch and identify quadratic graphs.</p> <p>Identify the line of symmetry of a quadratic graph.</p> <p>Find approximate solutions to quadratic equations using a graph.</p> <p>Interpret graphs of quadratic functions from real-life problems.</p> <p>Identify and interpret roots, intercepts and turning points of quadratic graphs.</p>
Understand quadratic inequalities and their notation.	<p><i>That to solve a</i> quadratic inequality you must factorise.</p> <p>That set notation is $\{x: -3 < x < 5\}$</p>	<p>Solve quadratic inequalities.</p> <p>Represent the solution set for inequalities using set notation.</p>
Understand iteration	<p>That iteration is the repeated application of a function or process in which the output of each step is used as the input for the next iteration.</p>	<p>Use iteration with simple converging sequences.</p> <p>Use iteration to find approximate solutions to equations.</p>