YEAR 11 - MATHEMATICS

Preliminary Topic 12 - Applied Trigonometry

MATHEMATICS ADVANCED

LEARNING PLAN			
Learning Intentions Student is able to:	**Learning Experiences** Implications, considerations and implementations:	**Success Criteria** I can:	**Resources**
Use the sine, cosine and tangent ratios to solve problems involving right-angled triangles where angles are measured in degrees, or degrees and minutes.	Review of the following may be needed: - angle measures, representations and conversions - Pythagoras' theorem and the trigonometric ratios for angles in right-angled triangles - angles of elevation and depression - true bearings (three-figure bearings, eg 025°, 240°) - compass bearings expressed as: ● one of the 16 points of a mariners compass, eg SSW ● the number of degrees east or west of the north-south line, eg N30°E, S80°W ● common descriptions, eg 'due East', 'South-West'.	- Use SOHCAHTOA to find sides and angles of right-angled triangles. - Locate the trig ratios on the Reference Sheet -Interpret true and compass bearings and know their difference -Solve a variety of problems involving right-angled triangles including questions: (i) where a diagram is not provided (ii) involving angles of elevation and depression (iii) involving bearings	Right-Angled Trigonometry Review Right-Angled Trigonometry Review Solutions

		(iv) involving sides and angles of 2-D geometric figures (v) to find heights of building, widths of rivers, bearings, etc, where measurements are not directly given but need to be found	
Establish and use the sine rule, cosine rule and the area of a triangle formula for solving problems where angles are measured in degrees, or degrees and minutes	- The sine rule, cosine rule, and area rule $(A = \frac{1}{2}ab\sin C)$ - Explore the complementary and supplementary angle relationships: $\cos(90° - A) = \sin A$ and $\sin(90° - A) = \cos A$, where A is an acute angle $\sin(180° - A) = \sin A$, $\cos(180° - A) = -\cos A$, $\tan(180° - A) = -\tan A$ where A is an acute angle. - Be familiar with various forms of the sine and cosine rules and how to change the subject of the formula. Eg: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ or $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$ and $a^2 = b^2 + c^2 - 2bc\cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$	-Use the sine rule to calculate the length of a side given 2 angles and a side or calculate an angle given 2 sides and an angle to a variety of problems including real life problems involving bearings, angles of elevation/depression or geometric figures. -Use the cosine rule to calculate the length of a side given two sides and the included angle or find an angle given all three sides to a variety of problems including real life problems involving bearings, angles of elevation/depression or geometric figures. -Apply the cosine rule if both the sine rule and the cosine rule can be used in a problem. -Use the area of a triangle rule to calculate the area given 2 sides and the included angle.	Review of Sine, Cosine and Area Rules

	Eg. A regular octagon is inscribed in a circle of radius 4cm. Find the exact value of the area bounded by the circle and the octagon.	-Apply the sine/ cosine rule first before the area can be found.	
Find angles and sides involving the ambiguous case of the sine rule: - use technology and/or geometric construction to investigate the ambiguous case of the sine rule when finding an angle, and the condition for it to arise.		-Apply the condition(s) for the ambiguous case when solving triangle problems	
Solve problems involving the use of trigonometry in two and three dimensions **AAM .** – interpret information about a two or three-dimensional context given in diagrammatic or written form and construct diagrams where required.	Students could either be given a diagram for a three-dimensional problem or construct a diagram from information provided. Eg. (1)The elevation of a hill at a place *P* due East of it is 48º, and at a place *Q* due South of *P* the elevation is 30º. If the distance from *P* to *Q* is 500 metres, find the height of the hill. (2)From a point A the bearings of two points *B* and *C* are found to be 333ºT and 013ºT respectively. From a point *D*, 5km due north of *A*, the bearings are 301ºT and 021ºT respectively. By considering the triangle *ABC*, show that if the distance between *B* and *C* is *d* km, then: $d^2 = 25\left\{\left(\frac{\sin 59^\circ}{\sin 32^\circ}\right)^2 + \left(\frac{\sin 21^\circ}{\sin 8^\circ}\right)^2 - 2\frac{\sin 59^\circ \sin 21^\circ}{\sin 32^\circ \sin 8^\circ}\cos 40\right.$ (3) See also 1996 HSC Question 7 .	- Solve problems involving sides and angles and bearings of 3-dimensional geometrical figures using trig ratios of right triangles, sine and cosine rules, reciprocal ratios, trigonometric identities and any other point of reference to this topic. - Draw and label a diagram that models the information in the 3-dimensional problem.	3D Trig Exercises

Solve practical problems involving Pythagoras' theorem and the trigonometry of triangles, which may involve the ambiguous case, including but not limited to finding and using angles of elevation and depression and the use of true bearings and compass bearings in navigation **AAM .**	- Questions should include problems on angles of elevation and depression as well as problems with bearings.	-Solve a variety of problems where I need to choose the most appropriate rule to answer a variety of problems.	Trig Review Assignment Trig Review Assignment Solutions