 Trigonometric functions

Resources

AMSI website – Supporting Australian Mathematics Project (A guide for teachers of year 11 and 12) has a good comprehensive overview of Trigonometry and Calculus.

[Trigonometric functions and circular measure](http://www.amsi.org.au/ESA_Senior_Years/SeniorTopic2/2_md/SeniorTopic2d.html) [Calculus of Trigonometric functions](http://www.amsi.org.au/ESA_Senior_Years/SeniorTopic3/3_md/SeniorTopic3g.html)

Scope and sequence note

As trigonometric functions rely on the differentiation and integration already being covered it needs to be completed later in the HSC year, but early enough to be used in Extension 1 if these courses are being taught as stand-alone courses.

| Content | Teaching strategies and activities | Resources |
| --- | --- | --- |
| Radian measure. | From the syllabus: “Practice should be given so that exact equivalents are known for common angle sizes and so that accuracy is developed in approximating sizes given in one measure by sizes in the other” | [Introducing radians – self pacing animations and activities](http://www.scootle.edu.au/ec/viewing/L7848/index.html) |
| Arc length, area of sector, area minor segment using radians. | Students should be shown (or find through investigation) the derivation of two formulas.  Arc lengthand sector area.  Although the segment area may be derived and remember a simple understanding of the use the sine rule and composite areas will allow students to solve these problems (with greater understanding). | Link above contains some formula derivations. |
| Graphs of the six trigonometric functions in radians.  Periodicity and other simple properties of the functions ,and | Where possible graphing software should be used to allow students to investigate the properties of trigonometric graphs in radians without being bogged down with plotting of points. However students should be able to sketch these graphs showing critical points such as x intercept, y intercepts, maxima and minima, asymptotes, by taking into account of the variable a and b in , andfor amplitude and periodicity. | [Self-pacing interactive introducing sin, cos and tan graphs in radians](http://www.scootle.edu.au/ec/viewing/L7847/index.html)  [EagleCat Graphing software for trigonometric functions](http://www.scootle.edu.au/ec/viewing/L10089/html/index.html)  [Interactive Geogebra files](http://mathslinks.net/faculty/curve-sketching-interactive-files) (requires login to MathsLinks) |
| General solutions in radians. | This is simply a revisit of general solutions for the preliminary course using radians rather than degrees and incorporating periodicity theory. |  |
| Small angle approximations for ,and | Students should explore using a calculator, spreadsheet or graphing software how the trig functions behave as . |  |
| Limit of as | Proof of this result is not examinable and student can use a calculator, spreadsheet or graphing software to “discover” this result | [YouTube explanation of limit](https://youtu.be/otW6HcxrRlY)  [Real world uses of this result](https://en.wikipedia.org/wiki/Small-angle_approximation#Specific_uses) |
| Differentiation of ,and | To introduction of the derivatives of trigonometric functions a guided discovery using graphing software or simply pen and paper to gain the shape of the derivatives curve will be sufficient to show the links rather than simply rote learning the derivatives. Iit is not possible to show the derivation by first principles for Mathematics students as requires the knowledge of sin(a+b)=sin a cos b +cos a sin b which is only covered in the Extension 1 course).  The derivative of tan can be shown by using the sin and cos results and the quotient rule.  Within this section of the course, the function of a function rule (chain rule), product rule and quotient rule should be revisited with the use of trigonometric functions |  |
| Integration of , and | Integrals of,andshould be derived from their primitive functions.  Problems involving definite and indefinite integrals, area and solids of volumes of revolutions should be revisited with the use of trigonometric functions |  |