



Essential Knowledge	Teaching Points
<ul style="list-style-type: none"> Recognise, sketch and interpret graphs of the trigonometric functions (in degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size. Know the exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° and exact value of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60° and find them from graphs. Apply to the graph of $y = f(x)$ the transformations $y = -f(x)$, $y = f(-x)$ for sine, cosine and tan functions $f(x)$. Apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$, $y = f(x + a)$ for sine, cosine and tan functions $f(x)$. Know and apply Area = $\frac{1}{2}ab \sin C$ to calculate the area, sides or angles of any triangle. Know the sine and cosine rules, and use to solve 2D problems (including involving bearings). Use the sine and cosine rules to solve 3D problems. Understand the language of planes, and recognise the diagonals of a cuboid. Solve geometrical problems on coordinate axes. Understand, recall and use trigonometric relationships and Pythagoras' Theorem in right-angled triangles, and use these to solve problems in 3D configurations. Calculate the length of a diagonal of a cuboid. <ul style="list-style-type: none"> Find the angle between a line and a plane. 	<ul style="list-style-type: none"> Students should be able to match the characteristic shape of the graphs to their functions and transformations Translations and reflections of functions are included in this specification, but not rotations or stretches. This work could be supported by the used of graphical calculators or suitable ICT. Students need to recall the above exact values for sin, cos and tan. Students need to justify when to use the cosine rule, sine rule, Pythagoras' Theorem or normal trigonometric ratios to solve problems. Students need to understand the cosine rule is used when we have SAS and used to find the side opposite the 'included' angle or when we have SSS to find an angle. Ensure that finding angles with 'normal trig' is refreshed prior to this topic. Students may find it useful to be reminded of simple geometrical facts, i.e. the shortest side is always opposite the shortest angle in a triangle. The sine and cosine rules and general formula for the area of a triangle are not given on the formulae sheet. In multi-step questions emphasise the importance of not rounding prematurely and using exact values where appropriate. Whilst 3D coordinates are not included in the programme of study, they provide a visual introduction to trigonometry in 3D.
Assumed Prior Knowledge/ Links / Interleaving	
<ul style="list-style-type: none"> Students should be able to use axes and coordinates to specify points in all four quadrants. Students should be able to recall and apply Pythagoras' Theorem and trigonometric ratios. Students should be able to substitute into formulae. 	
Potential Barriers to Access / Misconceptions	Opportunities for Reasoning/Problem Solving/Proofs

<ul style="list-style-type: none">• Not using the correct rule, or attempting to use 'normal trig' in non-right-angled triangles.• When finding angles students will be unable to rearrange the cosine rule or fail to find the inverse of $\cos \theta$.	<ul style="list-style-type: none">• Match a given list of events/processes with their graph.• Calculate and justify specific coordinates on a transformation of a trigonometric function.• Triangles formed in a semi-circle can provide links with other areas of mathematics
Key Mathematical Vocabulary	Axes, coordinates, sine, cosine, tan, angle, graph, transformations, side, angle, inverse, square root, 2D, 3D, diagonal, plane, cuboid