Topic 3—Circular functions and trigonometry 16 hrs

Aims

The aims of this section are to explore the circular functions and to solve triangles using trigonometry.

Details

	Content	Amplifications/inclusions	Exclusions
3.1	The circle: radian measure of angles; length of an arc; area of a sector.	Radian measure may be expressed as multiples of π, or decimals.	
3.2	Definition of $\cos\theta$ and $\sin\theta$ in terms of the unit circle. Definition of $\tan\theta$ as $\frac{\sin\theta}{\cos\theta}$. The identity $\cos^2\theta+\sin^2\theta=1$.	Given $\sin\theta$, finding possible values of $\cos\theta$ without finding θ. Lines through the origin can be expressed as $y=x\tan\theta$, with gradient $\tan\theta$.	The reciprocal trigonometric functions $\sec\theta$, $\csc\theta$ and $\cot\theta$.
3.3	Double angle formulae: $\sin 2\theta=2\sin\theta\cos\theta$; $\cos 2\theta=\cos^2\theta-\sin^2\theta$.	Double angle formulae can be established by simple geometrical diagrams and/or by use of a GDC.	Compound angle formulae.
3.4	The circular functions $\sin x$, $\cos x$ and $\tan x$: their domains and ranges; their periodic nature; and their graphs. Composite functions of the form $f(x)=a\sin(b(x+c))+d$.	On examination papers: radian measure should be assumed unless otherwise indicated by, for example, $x\mapsto\sin x°$. Example: $f(x)=2\cos(3(x-4))+1$. Examples of applications: height of tide, Ferris wheel.	The inverse trigonometric functions: $\arcsin x$, $\arccos x$ and $\arctan x$.

Topic 3—Circular functions and trigonometry (continued)

	Content	Amplifications/inclusions	Exclusions
3.5	Solution of trigonometric equations in a finite interval. Equations of the type $a\sin(b(x+c))=k$. Equations leading to quadratic equations in, for example, $\sin x$. Graphical interpretation of the above.	Examples: $2\sin x=3\cos x$, $0\le x\le 2\pi$. $2\sin 2x=3\cos x$, $0°\le x\le 180°$. $2\sin x=\cos 2x$, $-\pi\le x\le\pi$. Both analytical and graphical methods required.	The general solution of trigonometric equations.
3.6	Solution of triangles. The cosine rule: $c^2=a^2+b^2-2ab\cos C$. The sine rule: $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$. Area of a triangle as $\frac{1}{2}ab\sin C$.	Appreciation of Pythagoras' theorem as a special case of the cosine rule. The ambiguous case of the sine rule. Applications to problems in real-life situations, such as navigation.	