2.2 Compound & Double Angle Formulae

Question Paper

Course	Edexcel IAL Maths: Pure 3
Section	2. Trigonometry
Topic	2.2 Compound & Double Angle Formulae
Difficulty	Hard

Time allowed: **60**

Score: **/53**

Percentage: **/100**

Question 1

If $A = B$, then

$$\sin(A - B) = \sin(A - A) = \sin(0) = 0 = \sin A - \sin A = \sin A - \sin B$$

By using a suitable counter-example with $A \neq B$, prove that $\sin(A - B) = \sin A - \sin B$ is **not** true in general.

[2 marks]

Question 2

(a) Express $\cos(285°)$ in terms of cosines and sines of $315°$ and $30°$.

[2 marks]

Question 2

(b) Hence show that $\cos(285°) = \frac{\sqrt{6}-\sqrt{2}}{4}$.

[3 marks]

Question 3

Show that

$$\sin 2A \equiv 2 \sin A \cos A$$

(You may use the identity $\sin(A + B) \equiv \sin A \cos B + \cos A \sin B$.)

[2 marks]

Question 4

Show that $2 \cos \theta - 5 \sin \theta$ can be written in the form $R \cos(\theta + \alpha)$, where R and α are constants with $R > 0$ and $0 < \alpha < \frac{\pi}{2}$.

Give R in the form $\sqrt{k}$ where k is an integer, and give α correct to three significant figures.

[5 marks]

Question 5

(a) Solve the equation

$$\sin 2\theta = \sin \theta \qquad -\pi \leq \theta \leq \pi$$

[6 marks]

Question 5

(b) Solve the equation

$$\cos 2x + \sin^2 x = 0 \qquad 0 \leq x \leq 2\pi$$

[4 marks]

Question 6

Show that

$$\frac{\sin(A+B)+\sin(A-B)}{\cos(A+B)+\cos(A-B)} \equiv \tan A \qquad \left(A, B \neq \left(k+\frac{1}{2}\right)\pi\right)$$

[4 marks]

Question 7

(a) Show that $2\sin\theta + 4\cos\theta$ can be written as $2\sqrt{5}\cos(\theta - \alpha)$, where $\alpha = 0.464$ to three significant figures.

[4 marks]

Question 7

(b) Hence solve the equation

$$2\sin\theta + 4\cos\theta = 3 \qquad -\pi \leq \theta \leq \pi$$

giving your answers correct to 3 significant figures.

[3 marks]

Question 8

(a) By letting $B = 2A$, use the identity for $\tan(A + B)$ to derive an expression for $\tan 3A$ in terms of $\tan A$.

[5 marks]

Question 8

(b) Hence, or otherwise, solve the equation

$$\frac{6\tan x - 2\tan^3 x}{1 - 3\tan^2 x} = 2 \qquad 0 \leq x \leq \pi$$

[3 marks]

Question 9

Sketch the graph of $y = 2(\sin x - \cos x)$ for $0° \leq x \leq 360°$.
Be sure to label any points where the graph intercepts the coordinate axes, and state the coordinates of any maximum and minimum points.

[7 marks]

Question 10

Show that

$$2 - 2\cot 2A \tan A \equiv \sec^2 A \qquad A \neq k\pi$$

[3 marks]