# 2.2 Compound & Double Angle Formulae

## Question Paper

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

**Time allowed:** **50**

**Score:** **/45**

**Percentage:** **/100**

**Question 1**

(i) Write down the exact value of $\cos 60°$.

(ii) Write down the exact value of $\cos 45°$.

(iii) Use your calculator to find the exact value of $\cos 105°$.

(iv) Hence show that $\cos 60° + \cos 45° \neq \cos 105°$.

**[5 marks]**

**Question 2**

(a) Express $\sin 15°$ in terms of $\sin 45°$ and $\sin 30°$.

**[2 marks]**

**Question 2**

(b) Hence show that

$$\sin 15° = \frac{\sqrt{6} - \sqrt{2}}{4}$$

**[3 marks]**

**Question 3**

(a) Starting with the identity

$$\sin(A + B) \equiv \sin A \cos B + \sin B \cos A$$

And using the substitution $B = A$, show that $\sin 2A \equiv 2 \sin A \cos A$.

**[2 marks]**

**Question 3**

(b) Hence show the exact value of $\sin 120° = \frac{\sqrt{3}}{2}$.

**[2 marks]**

**Question 4**

(a) Use an appropriate identity to find $\sin(\theta + \alpha)$ in terms of sines and cosines of $\theta$ and $\alpha$.

**[2 marks]**

**Question 4**

(b) Hence show that $R\sin(\theta+\alpha) \equiv R\cos\alpha\sin\theta + R\sin\alpha\cos\theta$.

**[1 mark]**

**Question 5**

Solve the following equations in the given intervals.

(a) $\sin 2\theta = \frac{1}{2}, \qquad -\pi \leq \theta \leq \pi$

**[4 marks]**

**Question 5**

(b) $\cos 2\theta = \frac{\sqrt{3}}{2}, \qquad 0 \leq \theta \leq 2\pi$

**[4 marks]**

**Question 6**

Show that

$$5\cos(\theta - \frac{\pi}{6}) \equiv \frac{5\sqrt{3}}{2}\cos\theta + \frac{5}{2}\sin\theta$$

**[4 marks]**

**Question 7**

Show that

$$\cos^2 x + \cos 2x \equiv 3\cos^2 x - 1$$

**[2 marks]**

**Question 8**

(a) (i) Show that $R\sin(\theta+\alpha) \equiv R\cos\alpha\sin\theta + R\sin\alpha\cos\theta$, where $R$ and $\alpha$ are constants with $R > 0$ and $0 < \alpha < \frac{\pi}{2}$.

(ii) Use your result from part (i) to show that $\sqrt{3}\sin\theta + \cos\theta \equiv 2\sin(\theta + \frac{\pi}{6})$.

**[4 marks]**

**Question 8**

(b) Write down the maximum value of $\sqrt{3}\sin\theta + \cos\theta$.

**[1 mark]**

**Question 9**

Sketch the graph of $y = \tan 2\theta$ for $0 \leq \theta \leq 2\pi$.
Label the points at which the graph intersects the coordinate axes.

**[3 marks]**

**Question 10**

(a) Use the difference of two squares to show that

$$\cos^4 x - \sin^4 x \equiv \cos 2x$$

**[3 marks]**

**Question 10**

(b) Hence solve the equation

$$\cos^4 x - \sin^4 x = \frac{\sqrt{2}}{2}$$

for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$.

**[3 marks]**