Solving Equations Using Compound Angle Formulae Exam Questions (From OCR 4754A)

Q1, (Jun 2005, Q5)

Solve the equation $2\cos 2x = 1 + \cos x$, for $0° \leqslant x < 360°$. [7]

Q2, (Jan 2006, Q4)

Solve the equation $2\sin 2\theta + \cos 2\theta = 1$, for $0° \leqslant \theta < 360°$. [6]

Q3, (Jun 2006, Q3)

Given that $\sin(\theta + \alpha) = 2\sin\theta$, show that $\tan\theta = \dfrac{\sin\alpha}{2 - \cos\alpha}$.

Hence solve the equation $\sin(\theta + 40°) = 2\sin\theta$, for $0° \leqslant \theta \leqslant 360°$. [7]

Q4, (Jan 2007, Q3)

(i) Use the formula for $\sin(\theta + \phi)$, with $\theta = 45°$ and $\phi = 60°$, to show that $\sin 105° = \dfrac{\sqrt{3}+1}{2\sqrt{2}}$. [4]

(ii) In triangle ABC, angle BAC = 45°, angle ACB = 30° and AB = 1 unit (see Fig. 3).

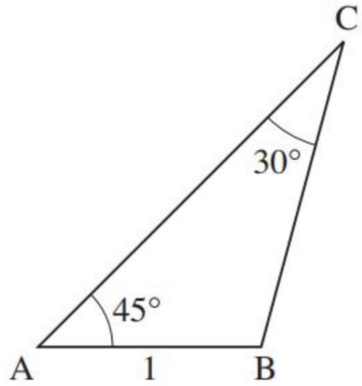

Fig. 3

Using the sine rule, together with the result in part (**i**), show that $AC = \dfrac{\sqrt{3}+1}{\sqrt{2}}$. [3]

Q5, (Jan 2008, Q4)

The angle θ satisfies the equation $\sin(\theta + 45°) = \cos\theta$.

(i) Using the exact values of $\sin 45°$ and $\cos 45°$, show that $\tan\theta = \sqrt{2} - 1$. [5]

(ii) Find the values of θ for $0° < \theta < 360°$. [2]

Q6, (Jun 2012, Q5)

Given the equation $\sin(x + 45°) = 2\cos x$, show that $\sin x + \cos x = 2\sqrt{2}\cos x$.

Hence solve, correct to 2 decimal places, the equation for $0° \leqslant x \leqslant 360°$. **[6]**

Q7, (Jun 2013, Q3)

Using appropriate right-angled triangles, show that $\tan 45° = 1$ and $\tan 30° = \frac{1}{\sqrt{3}}$.

Hence show that $\tan 75° = 2 + \sqrt{3}$. **[7]**

Q8, (Jun 2015, Q2)

Express $6\cos 2\theta + \sin\theta$ in terms of $\sin\theta$.

Hence solve the equation $6\cos 2\theta + \sin\theta = 0$, for $0° \leqslant \theta \leqslant 360°$. **[7]**

Q9, (Jun 2016, Q4)

Solve the equation $2\sin 2\theta = 1 + \cos 2\theta$ for $0° \leqslant \theta \leqslant 180°$. **[5]**
