



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 $0^\circ \leq x < 360^\circ$. [7]

Q2, (Jan 2006, Q4)

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

Q3, (Jun 2006, Q3)

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

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

Q4, (Jan 2007, Q3)

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

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

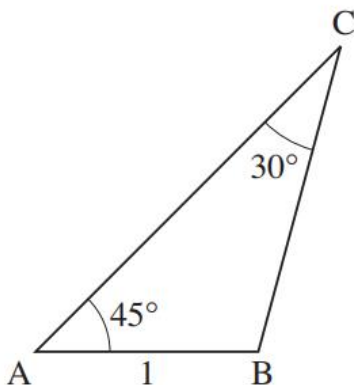


Fig. 3

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

Q5, (Jan 2008, Q4)

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

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

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

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Q6, (Jun 2012, Q5)

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

Hence solve, correct to 2 decimal places, the equation for $0^\circ \leq x \leq 360^\circ$.

[6]

Q7, (Jun 2013, Q3)

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

Hence show that $\tan 75^\circ = 2 + \sqrt{3}$.

[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 $0^\circ \leq \theta \leq 360^\circ$.

[7]

Q9, (Jun 2016, Q4)

Solve the equation $2 \sin 2\theta = 1 + \cos 2\theta$ for $0^\circ \leq \theta \leq 180^\circ$.

[5]

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