

- 6 (a)** Using the expansions of $\sin(3x + 2x)$ and $\sin(3x - 2x)$, show that

$$\frac{1}{2}(\sin 5x + \sin x) \equiv \sin 3x \cos 2x. \quad [3]$$

[illegible]

2 Solve the equation $\cos(\theta - 60^\circ) = 3 \sin \theta$, for $0^\circ \leq \theta \leq 360^\circ$. [5]

This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

- 4** Solve the equation $2 \cos x - \cos \frac{1}{2}x = 1$ for $0 \leq x \leq 2\pi$. [5]

[illegible]

- 4** Solve the equation $\tan(x + 45^\circ) = 2 \cot x$ for $0^\circ < x < 180^\circ$. [5]

[illegible]

5 (a) Show that $\frac{\cos 3x}{\sin x} + \frac{\sin 3x}{\cos x} = 2 \cot 2x$.

[4]

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5 Solve the equation $\sin \theta = 3 \cos 2\theta + 2$, for $0^\circ \leq \theta \leq 360^\circ$.

[5]

[illegible]

- 3 Express the equation $\tan(\theta + 60^\circ) = 2 + \tan(60^\circ - \theta)$ as a quadratic equation in $\tan \theta$, and hence solve the equation for $0^\circ \leq \theta \leq 180^\circ$. [6]

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- 3** By first expressing the equation $\tan(x + 45^\circ) = 2 \cot x + 1$ as a quadratic equation in $\tan x$, solve the equation for $0^\circ < x < 180^\circ$. [6]

[illegible]

- 5** The angles α and β lie between 0° and 180° and are such that

$$\tan(\alpha + \beta) = 2 \quad \text{and} \quad \tan \alpha = 3 \tan \beta.$$

Find the possible values of α and β .

[6]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

5 (a) Given that

$$\sin(x + \frac{1}{6}\pi) - \sin(x - \frac{1}{6}\pi) = \cos(x + \frac{1}{3}\pi) - \cos(x - \frac{1}{3}\pi),$$

find the exact value of $\tan x$.

[4]

[illegible]

for $0 \leq x \leq 2\pi$.

[2]

[illegible]

- 4 (a) Show that the equation $\sin 2\theta + \cos 2\theta = 2 \sin^2 \theta$ can be expressed in the form

$$\cos^2 \theta + 2 \sin \theta \cos \theta - 3 \sin^2 \theta = 0. \quad [2]$$

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- (b) Hence solve the equation $\sin 2\theta + \cos 2\theta = 2 \sin^2 \theta$ for $0^\circ < \theta < 180^\circ$. [4]

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- 5 (a)** By first expanding $\tan(2\theta + 2\theta)$, show that the equation $\tan 4\theta = \frac{1}{2} \tan \theta$ may be expressed as $\tan^4 \theta + 2 \tan^2 \theta - 7 = 0$. [4]

This image shows a full page of primary-ruled paper. It features approximately 20 horizontal dotted lines spaced evenly down the page, providing a guide for handwriting practice. The paper is otherwise blank, with no margins, text, or other markings.

(b) Hence solve the equation $\tan 4\theta = \frac{1}{2} \tan \theta$, for $0^\circ < \theta < 180^\circ$.

[3]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.