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Handwriting practice paper with horizontal lines.

- 6** It is given that $\alpha = \cos^{-1}\left(\frac{8}{17}\right)$.

Find, without using the trigonometric functions on your calculator, the exact value of $\frac{1}{\sin \alpha} + \frac{1}{\tan \alpha}$. [5]

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- 2 (a) Express the equation $3 \cos \theta = 8 \tan \theta$ as a quadratic equation in $\sin \theta$. [3]

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- (b) Hence find the acute angle, in degrees, for which $3 \cos \theta = 8 \tan \theta$. [2]

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- 3 (a)** Show that the equation $\frac{7 \tan \theta}{\cos \theta} + 12 = 0$ can be expressed as

$$12 \sin^2 \theta - 7 \sin \theta - 12 = 0. \quad [3]$$

[illegible]

- (b)** Hence solve the equation $\frac{7 \tan \theta}{\cos \theta} + 12 = 0$ for $0^\circ \leq \theta \leq 360^\circ$. [3]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. A faint, diagonal watermark reading "Pastpaper" is visible across the center.

- 3** Solve the equation $\frac{\tan \theta + 2 \sin \theta}{\tan \theta - 2 \sin \theta} = 3$ for $0^\circ < \theta < 180^\circ$. [4]

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- 3** Solve the equation $3 \tan^2 \theta + 1 = \frac{2}{\tan^2 \theta}$ for $0^\circ < \theta < 180^\circ$. [5]

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- 4 (a) Show that the equation $\cos \theta(7 \tan \theta - 5 \cos \theta) = 1$ can be written in the form $a \sin^2 \theta + b \sin \theta + c = 0$, where a , b and c are integers to be found. [3]

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- (b) Hence solve the equation $\cos 2x(7 \tan 2x - 5 \cos 2x) = 1$ for $0^\circ < x < 180^\circ$. [3]

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- 3 (a) Find the set of values of k for which the equation $8x^2 + kx + 2 = 0$ has no real roots. [2]

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- (b) Solve the equation $8 \cos^2 \theta - 10 \cos \theta + 2 = 0$ for $0^\circ \leq \theta \leq 180^\circ$. [3]

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- 4 (a) Prove that $\frac{(\sin \theta + \cos \theta)^2 - 1}{\cos^2 \theta} \equiv 2 \tan \theta$. [3]

This image shows a blank sheet of white paper designed for handwriting practice. It features multiple horizontal rows, each defined by two parallel dotted lines. A large, light gray watermark reading "nguin.com" is oriented diagonally across the page from the bottom left towards the top right. The paper is otherwise empty of any text or markings.

- (b) Hence solve the equation $\frac{(\sin \theta + \cos \theta)^2 - 1}{\cos^2 \theta} = 5 \tan^3 \theta$ for $-90^\circ < \theta < 90^\circ$. [3]

[illegible]

7 (a) Show that $\frac{\tan \theta}{1 + \cos \theta} + \frac{\tan \theta}{1 - \cos \theta} \equiv \frac{2}{\sin \theta \cos \theta}$. [4]

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This image shows a full page of blank primary-ruled paper. It features multiple sets of horizontal dashed lines for writing practice. A large, light gray watermark with the text "baspapierpenquin.com" is oriented diagonally across the page from the bottom-left towards the top-right. The background is white, and there are no other markings or text present.

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[illegible]

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- (b) Hence find the exact solutions of the equation $\frac{\sin \theta}{\sin \theta + \cos \theta} + \frac{\cos \theta}{\sin \theta - \cos \theta} = 2$ for $0 \leq \theta \leq \pi$. [4]

[illegible]

7 (a) Show that $\frac{\sin \theta + 2 \cos \theta}{\cos \theta - 2 \sin \theta} - \frac{\sin \theta - 2 \cos \theta}{\cos \theta + 2 \sin \theta} \equiv \frac{4}{5 \cos^2 \theta - 4}$. [4]

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(b) Hence solve the equation $\frac{\sin \theta + 2 \cos \theta}{\cos \theta - 2 \sin \theta} - \frac{\sin \theta - 2 \cos \theta}{\cos \theta + 2 \sin \theta} = 5$ for $0^\circ < \theta < 180^\circ$. [3]

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for $0^\circ \leq \theta \leq 180^\circ$.

[4]

for $0^\circ < \theta < 360^\circ$. [5]

$$\tan \theta \sin \theta = 1$$

for $0^\circ < \theta < 360^\circ$. [5]

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[illegible]

- 7 (a) Verify the identity $(2x - 1)(4x^2 + 2x - 1) \equiv 8x^3 - 4x + 1$. [1]

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- (b) Prove the identity $\frac{\tan^2 \theta + 1}{\tan^2 \theta - 1} \equiv \frac{1}{1 - 2 \cos^2 \theta}$. [3]

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$$\frac{\tan^2 \theta + 1}{\tan^2 \theta - 1} = 4 \cos \theta,$$

for $0^\circ \leq \theta \leq 180^\circ$.

[5]

[illegible]

- 4 (a) Show that the equation

$$\frac{\tan x + \sin x}{\tan x - \sin x} = k,$$

where k is a constant, may be expressed as

$$\frac{1 + \cos x}{1 - \cos x} = k. \quad [2]$$

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- (b) Hence express $\cos x$ in terms of k . [2]

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- (c) Hence solve the equation $\frac{\tan x + \sin x}{\tan x - \sin x} = 4$ for $-\pi < x < \pi$. [2]

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- [4]

[illegible]

- [3]

Handwriting practice lines with a large diagonal watermark reading "Pastorai".

- (a) Given that $k = 3$, find the exact solutions of the equation $f(x) = 0$. [5]

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- 11 (a) Solve the equation $3 \tan^2 x - 5 \tan x - 2 = 0$ for $0^\circ \leq x \leq 180^\circ$. [4]

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- (b) Find the set of values of k for which the equation $3 \tan^2 x - 5 \tan x + k = 0$ has no solutions. [2]

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[illegible]

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This image shows a full page of primary-ruled paper. It features multiple sets of horizontal dotted lines spaced evenly down the page. A large, light gray watermark with the text "pastpaperpenquinn.com" is oriented diagonally from the bottom-left towards the top-right, spanning across the entire page. The background is white, and there are no other markings or text present.



[5]

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