

2 Find the exact solution of the equation

$$\frac{1}{6}\pi + \tan^{-1}(4x) = -\cos^{-1}(\frac{1}{2}\sqrt{3}). \quad [2]$$

[illegible]

- Solve the equation $8 \sin^2 \theta + 6 \cos \theta + 1 = 0$ for $0^\circ < \theta < 180^\circ$.

[illegible]

- 5 (a) Show that the equation

$$4 \sin x + \frac{5}{\tan x} + \frac{2}{\sin x} = 0$$

may be expressed in the form $a \cos^2 x + b \cos x + c = 0$, where a , b and c are integers to be found. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) Hence solve the equation $4 \sin x + \frac{5}{\tan x} + \frac{2}{\sin x} = 0$ for $0^\circ \leq x \leq 360^\circ$. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Solve the equation

$$\frac{\tan \theta + 3 \sin \theta + 2}{\tan \theta - 3 \sin \theta + 1} = 2$$

for $0^\circ \leq \theta \leq 90^\circ$.

$$\text{for } 0^\circ \leq \theta \leq 90^\circ. \quad [5]$$

pastpaperpenguin.com

- [4]

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 is oriented diagonally across the page, displaying the text "basitpaperpenquin.com". The watermark is semi-transparent, allowing the underlying ruled lines to remain visible. There are no other markings, text, or illustrations on the page.

- [3]

[illegible]

- 5 (a)** Prove the identity $\frac{\sin^2 x - \cos x - 1}{1 + \cos x} \equiv -\cos x$. [3]

[illegible]

- (b)** Hence solve the equation $\frac{\sin^2 x - \cos x - 1}{2 + 2 \cos x} = \frac{1}{4}$ for $0^\circ \leq x \leq 360^\circ$. [3]

[illegible]

- 3 (a) Show that the equation

$$5 \cos \theta - \sin \theta \tan \theta + 1 = 0$$

may be expressed in the form $a \cos^2 \theta + b \cos \theta + c = 0$, where a , b and c are constants to be found. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) Hence solve the equation $5 \cos \theta - \sin \theta \tan \theta + 1 = 0$ for $0 < \theta < 2\pi$. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

may be expressed in the form $a \sin^2 \theta + b \sin \theta + c = 0$, where a , b and c are constants to be found. [3]

$$\frac{1}{\sin \theta + \cos \theta} + \frac{1}{\sin \theta - \cos \theta} = 1$$

may be expressed in the form $a \sin^2 \theta + b \sin \theta + c = 0$, where a , b and c are constants to be found. [3]

[illegible]

- 6 (a) Prove the identity $\left(\frac{1}{\cos x} - \tan x\right)\left(\frac{1}{\sin x} + 1\right) \equiv \frac{1}{\tan x}$. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) Hence solve the equation $\left(\frac{1}{\cos x} - \tan x\right)\left(\frac{1}{\sin x} + 1\right) = 2 \tan^2 x$ for $0^\circ \leq x \leq 180^\circ$. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

[illegible]

[illegible]

10 (a) Prove the identity $\frac{1 + \sin x}{1 - \sin x} - \frac{1 - \sin x}{1 + \sin x} \equiv \frac{4 \tan x}{\cos x}$. [4]

[illegible]

[illegible]



[4]

pastpaperpenguin.com

7 (a) Prove the identity $\frac{1 - 2 \sin^2 \theta}{1 - \sin^2 \theta} \equiv 1 - \tan^2 \theta$. [2]

[illegible]

[illegible]

- $$(k+1)\sin^2 x + (k-1)\sin x - (k+1) = 0. \quad [4]$$

[4]

[illegible]

- 4 (a) Show that the equation

$$3 \tan^2 x - 3 \sin^2 x - 4 = 0$$

may be expressed in the form $a \cos^4 x + b \cos^2 x + c = 0$, where a , b and c are constants to be found. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (b) Hence solve the equation $3 \tan^2 x - 3 \sin^2 x - 4 = 0$ for $0^\circ \leq x \leq 180^\circ$. [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

pastpaperpenguin.com

(b) Hence solve the equation

$$\frac{\sin^3 \theta}{\sin \theta - 1} - \frac{\sin^2 \theta}{1 + \sin \theta} = \tan^2 \theta (1 - \sin^2 \theta)$$

for $0 < \theta < 2\pi$.

[2]

[illegible]



[4]

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 "pastpaperpenquin.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.

(b) Find the exact solutions of the equation $4 \sin(\frac{1}{2}x - 30^\circ) = 2\sqrt{2}$ for $0^\circ \leq x \leq 360^\circ$. [3]

[illegible]

- 7 (a) (i) By first expanding $(\cos \theta + \sin \theta)^2$, find the three solutions of the equation

$$(\cos \theta + \sin \theta)^2 = 1$$

for $0 \leq \theta \leq \pi$.

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (ii) Hence verify that the only solutions of the equation $\cos \theta + \sin \theta = 1$ for $0 \leq \theta \leq \pi$ are 0 and $\frac{1}{2}\pi$. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (c) Using the results of (a)(ii) and (b), solve the equation

$$\frac{\sin \theta}{\cos \theta + \sin \theta} + \frac{1 - \cos \theta}{\cos \theta - \sin \theta} = 2(\cos \theta + \sin \theta - 1)$$

for $0 \leq \theta \leq \pi$.

[3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Handwriting practice lines consisting of 25 horizontal dotted lines.