Trigonometry

Question Paper 2

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Trigonometry
Sub Topic	
Booklet	Question Paper 2

Time Allowed: **58 minutes**

Score: **/48**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 **(i)** Prove the identity $\dfrac{1}{\cos\theta} - \dfrac{\cos\theta}{1+\sin\theta} \equiv \tan\theta$. [4]

(ii) Solve the equation $\dfrac{1}{\cos\theta} - \dfrac{\cos\theta}{1+\sin\theta} + 2 = 0$ for $0° \leqslant \theta \leqslant 360°$. [3]

2 **(i)** Prove the identity $\dfrac{\tan x + 1}{\sin x \tan x + \cos x} \equiv \sin x + \cos x$. [3]

(ii) Hence solve the equation $\dfrac{\tan x + 1}{\sin x \tan x + \cos x} = 3\sin x - 2\cos x$ for $0 \leqslant x \leqslant 2\pi$. [3]

3 **(i)** Solve the equation $4\sin^2 x + 8\cos x - 7 = 0$ for $0° \leqslant x \leqslant 360°$. [4]

(ii) Hence find the solution of the equation $4\sin^2\left(\frac{1}{2}\theta\right) + 8\cos\left(\frac{1}{2}\theta\right) - 7 = 0$ for $0° \leqslant \theta \leqslant 360°$. [2]

4 Given that $\cos x = p$, where x is an acute angle in degrees, find, in terms of p,

(i) $\sin x$, [1]

(ii) $\tan x$, [1]

(iii) $\tan(90° - x)$. [1]

5 **(a)** Find the possible values of x for which $\sin^{-1}(x^2 - 1) = \frac{1}{3}\pi$, giving your answers correct to 3 decimal places. [3]

(b) Solve the equation $\sin(2\theta + \frac{1}{3}\pi) = \frac{1}{2}$ for $0 \leqslant \theta \leqslant \pi$, giving θ in terms of π in your answers. [4]

6 **(i)** Show that $\dfrac{\sin\theta}{\sin\theta+\cos\theta}+\dfrac{\cos\theta}{\sin\theta-\cos\theta}\equiv\dfrac{1}{\sin^2\theta-\cos^2\theta}$. [3]

(ii) Hence solve the equation $\dfrac{\sin\theta}{\sin\theta+\cos\theta}+\dfrac{\cos\theta}{\sin\theta-\cos\theta}=3$, for $0°\leqslant\theta\leqslant360°$. [4]

7 It is given that $a=\sin\theta-3\cos\theta$ and $b=3\sin\theta+\cos\theta$, where $0°\leqslant\theta\leqslant360°$.

(i) Show that a^2+b^2 has a constant value for all values of θ. [3]

(ii) Find the values of θ for which $2a=b$. [4]

8 **(i)** Express the equation $2\cos^2\theta=\tan^2\theta$ as a quadratic equation in $\cos^2\theta$. [2]

(ii) Solve the equation $2\cos^2\theta=\tan^2\theta$ for $0\leqslant\theta\leqslant\pi$, giving solutions in terms of π. [3]