

Trigonometry

Question Paper 3

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|------------|-----------------------|
| Level | International A Level |
| Subject | Maths |
| Exam Board | CIE |
| Topic | Trigonometry |
| Sub Topic | |
| Booklet | Question Paper 3 |

Time Allowed: 59 minutes

Score: /49

Percentage: /100

Grade Boundaries:

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

- 1 (i) Sketch, on the same diagram, the curves $y = \sin 2x$ and $y = \cos x - 1$ for $0 \leq x \leq 2\pi$. [4]
- (ii) Hence state the number of solutions, in the interval $0 \leq x \leq 2\pi$, of the equations
- (a) $2 \sin 2x + 1 = 0$, [1]
- (b) $\sin 2x - \cos x + 1 = 0$. [1]
- 2 (i) Solve the equation $2 \cos^2 \theta = 3 \sin \theta$, for $0^\circ \leq \theta \leq 360^\circ$. [4]
- (ii) The smallest positive solution of the equation $2 \cos^2(n\theta) = 3 \sin(n\theta)$, where n is a positive integer, is 10° . State the value of n and hence find the largest solution of this equation in the interval $0^\circ \leq \theta \leq 360^\circ$. [3]
- 3 (i) Show that the equation $2 \cos x = 3 \tan x$ can be written as a quadratic equation in $\sin x$. [3]
- (ii) Solve the equation $2 \cos 2y = 3 \tan 2y$, for $0^\circ \leq y \leq 180^\circ$. [4]
- 4 Solve the equation $7 \cos x + 5 = 2 \sin^2 x$, for $0^\circ \leq x \leq 360^\circ$. [4]
- 5 Solve the equation $\sin 2x = 2 \cos 2x$, for $0^\circ \leq x \leq 180^\circ$. [4]
- 6 (i) Prove the identity $\tan x + \frac{1}{\tan x} \equiv \frac{1}{\sin x \cos x}$. [2]
- (ii) Solve the equation $\frac{2}{\sin x \cos x} = 1 + 3 \tan x$, for $0^\circ \leq x \leq 180^\circ$. [4]

- 7 (i) Prove the identity $\tan^2 \theta - \sin^2 \theta \equiv \tan^2 \theta \sin^2 \theta$. [3]
- (ii) Use this result to explain why $\tan \theta > \sin \theta$ for $0^\circ < \theta < 90^\circ$. [1]
- 8 (i) Solve the equation $\sin 2x + 3 \cos 2x = 0$ for $0^\circ \leq x \leq 360^\circ$. [5]
- (ii) How many solutions has the equation $\sin 2x + 3 \cos 2x = 0$ for $0^\circ \leq x \leq 1080^\circ$? [1]
- 9 (i) Sketch, on a single diagram, the graphs of $y = \cos 2\theta$ and $y = \frac{1}{2}$ for $0 \leq \theta \leq 2\pi$. [3]
- (ii) Write down the number of roots of the equation $2 \cos 2\theta - 1 = 0$ in the interval $0 \leq \theta \leq 2\pi$. [1]
- (iii) Deduce the number of roots of the equation $2 \cos 2\theta - 1 = 0$ in the interval $10\pi \leq \theta \leq 20\pi$. [1]