

Trigonometry

Question Paper 1

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Trigonometry
Sub Topic	
Booklet	Question Paper 1

Time Allowed: 56 minutes

Score: /46

Percentage: /100

Grade Boundaries:

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

- 1 It is given that θ is an acute angle measured in degrees such that

$$2 \sec^2 \theta + 3 \tan \theta = 22.$$

- (i) Find the value of $\tan \theta$. [3]
- (ii) Use an appropriate formula to find the exact value of $\tan(\theta + 135^\circ)$. [3]

- 2 For each of the following curves, find the exact gradient at the point indicated:

(i) $y = 3 \cos 2x - 5 \sin x$ at $(\frac{1}{6}\pi, -1)$, [3]

(ii) $x^3 + 6xy + y^3 = 21$ at $(1, 2)$. [5]

- 3 The angle α lies between 0° and 90° and is such that

$$2 \tan^2 \alpha + \sec^2 \alpha = 5 - 4 \tan \alpha.$$

- (i) Show that

$$3 \tan^2 \alpha + 4 \tan \alpha - 4 = 0$$

and hence find the exact value of $\tan \alpha$. [4]

- (ii) It is given that the angle β is such that $\cot(\alpha + \beta) = 6$. Without using a calculator, find the exact value of $\cot \beta$. [5]

- 4 (i) Express $5 \cos \theta - 12 \sin \theta$ in the form $R \cos(\theta + \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$, giving the value of α correct to 2 decimal places. [3]

- (ii) Hence solve the equation $5 \cos \theta - 12 \sin \theta = 8$ for $0^\circ < \theta < 360^\circ$. [4]

- (iii) Find the greatest possible value of

$$7 + 5 \cos \frac{1}{2}\phi - 12 \sin \frac{1}{2}\phi$$

as ϕ varies, and determine the smallest positive value of ϕ for which this greatest value occurs.

[4]

5 Solve the equation $3 \sin 2\theta \tan \theta = 2$ for $0^\circ < \theta < 180^\circ$. [4]

6 The parametric equations of a curve are

$$x = \cos 2\theta - \cos \theta, \quad y = 4 \sin^2 \theta,$$

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

(i) Show that $\frac{dy}{dx} = \frac{8 \cos \theta}{1 - 4 \cos \theta}$. [4]

(ii) Find the coordinates of the point on the curve at which the gradient is -4 . [4]