3.4 Trigonometric Equations

Question Paper

Course	CIE AS Maths
Section	3. Trigonometry
Topic	3.4 Trigonometric Equations
Difficulty	Very Hard

Time allowed: 70

Score: /52

Percentage: /100

Question 1

Solve the equation $3 \sin 3\theta = 4 \cos 3\theta$ in the interval $0 \leq \theta \leq \pi$, giving your answers to 3 significant figures.

[3 marks]

Question 2

Solve the equation $6 \cos^2 2\theta = \sin 2\theta + 5$ for $-180° \leq \theta \leq 180°$, giving your answers to 1 decimal place where appropriate.

[5 marks]

Question 3

Given that the angle θ is reflex and that $\cos \theta = \dfrac{1}{3}$, find the exact value of $\tan \theta$.

[3 marks]

Question 4

Solve the equation $2\sin^2 3x = 1$ for $-\dfrac{\pi}{2} \le x \le \dfrac{\pi}{2}$.

[5 marks]

Question 5

Solve the equation $3\sin(2x + 30°) = \tan(2x + 30°)$ for $-180° \le x \le 180°$, giving your answers to 1 decimal place where appropriate.

[5 marks]

Question 6

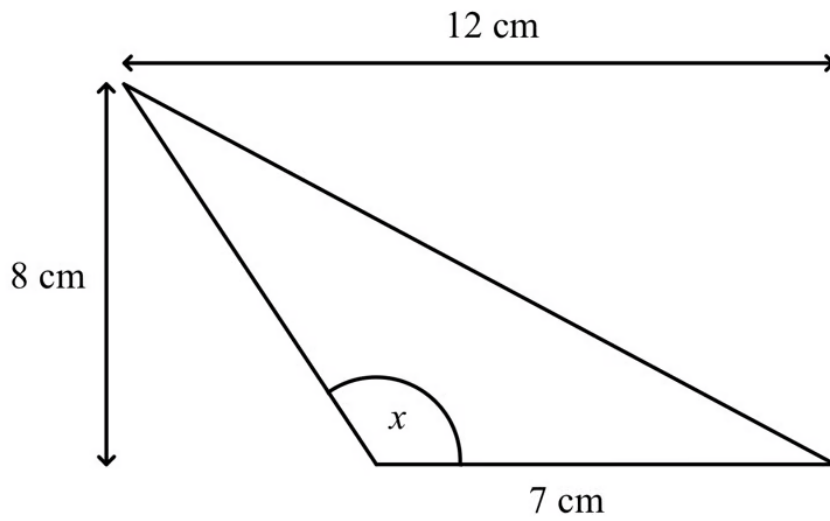For the triangle in the diagram find exact values for $\sin x$, $\cos x$ and $\tan x$.

12 cm

Diagram not to scale

8 cm

x

7 cm

[6 marks]

Question 7

Find all the values of x in the range $0° \leq x \leq 180°$ which satisfy the equation
$6 \tan^3 2x - 7 \tan^2 2x - \tan 2x + 2 = 0$, giving your answers to 1 decimal place.

[6 marks]

Question 8a

(a) Find all the solutions to the equation $2 \cos 2\theta = 4 \sin 2\theta \cos 2\theta$ in the interval $0 \leq \theta \leq 2\pi$, giving your answers in radians as multiples of π.

[6 marks]

Question 8b

(b) Find all the solutions to the equation $3\cos^2 4x + 13\cos 4x - 10 = 0$ in the interval $0 \le x \le \pi$, giving your answers in radians to three significant figures.

[6 marks]

Question 9

A seagull sits on the surface of the sea and moves up and down as waves pass.

Its height, h metres, above its position in calm water is modelled by the function $h = \frac{3}{5}\sin(90t)°$ where t is the time in seconds after timing commences.

Find the amount of time the seagull is more than 0.5 metres above its calm water position in the first 20 seconds after timing commences.

Give your answer correct to 3 significant figures.

[7 marks]