3.4 Trigonometric Equations

Question Paper

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

Time allowed: 60

Score: /49

Percentage: /100

Question 1

Solve the equation $2\sin\theta = 3\cos\theta$ for $0 \le \theta \le 2\pi$, giving your answers to 3 significant figures.

[3 marks]

Question 2

Solve the equation $2\sin^2\theta = \cos\theta + 1$ for $-180° \le \theta \le 180°$.

[5 marks]

Question 3

Given that the angle θ is obtuse and that $\sin\theta = \dfrac{3}{4}$, find the exact value of $\cos\theta$.

[3 marks]

Question 4

Solve the equation $\tan 2x = \dfrac{3}{\tan 2x}$ for $-180° \le x \le 180°$.

[5 marks]

Question 5

Solve the equation $2\tan x - \sin x = 0$ for $-\pi \le x \le \pi$.

[5 marks]

Question 6

An isosceles triangle has sides 8 cm, 8 cm and 4 cm and equal base angles θ.

Find exact values for $\sin\theta$, $\cos\theta$ and $\tan\theta$.

[6 marks]

Question 7a

(a) Find all the solutions to the equation $\sqrt{3}\tan 2\theta = -1$ in the interval $-\pi \leq \theta \leq \pi$, giving your answers in radians as multiples of π.

[4 marks]

Question 7b

(b) Find all the solutions to the equation $6 \sin^2 x + 7 \sin x - 3 = 0$ in the interval $0 \leq x \leq 2\pi$, giving your answers in radians to three significant figures.

[5 marks]

Question 8a

(a) Show that $x = \dfrac{1}{2}$ satisfies the equation $8x^3 - 4x^2 - 6x + 3 = 0$.

[1 mark]

Question 8b

(b) Hence solve the equation $8\cos^3 x - 4\cos^2 x - 6\cos x + 3 = 0$
for $0° \leq x \leq 360°$.

[6 marks]

Question 9a

(a) 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
$h = \frac{2}{5}\sin(180t)°$ where t is the time in seconds after timing commenced.

Find the first time the seagull is 0.3 metres above its calm water position.
Give your answer to 2 decimal places.

[4 marks]

Question 9b

(b) How many times in the first minute after timing commences is the seagull 0.3 metres above its calm water position?

[2 marks]