6.1 Trigonometric Equations

Question Paper

Course	Edexcel IAL Maths: Pure 2
Section	6. Trigonometry
Topic	6.1 Trigonometric Equations
Difficulty	Medium

Time allowed: **60**

Score: **/50**

Percentage: **/100**

Question 1

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

[4 marks]

Question 1

(b) Find all solutions to the equation $5\sin 3x = 1$ in the interval $0 \leq x \leq \pi$, giving your answer in radians to three significant figures.

[6 marks]

Question 2

(a) Show that the equation $2\sin^2 x + 3\cos x = 0$ can be written in the form $a\cos^2 x + b\cos x + c = 0$, where a, b and c are integers to be found.

[2 marks]

Question 2

(b) Hence, or otherwise, solve the equation $2\sin^2 x + 3\cos x = 0$ for $-180° \leq x \leq 180°$.

[3 marks]

Question 3

Given that $\sin\theta = \frac{3}{5}$ find the possible values of $\cos\theta$ and $\tan\theta$.

[3 marks]

Question 4

Solve the equation $2\sin 2\theta = 1$ for $0 \leq \theta \leq 2\pi$.

[3 marks]

Question 5

Solve the equation $2\sin x = \frac{1}{\sin x}$ for $0° \leq x \leq 360°$.

[5 marks]

Question 6

A right-angled triangle has hypotenuse 8cm. One of its other sides is 5cm.

Find exact values for $\sin\theta$, $\cos\theta$ and $\tan\theta$, where θ is the smallest angle in the triangle.

[6 marks]

Question 7

Solve the equation $2 \sin x \cos x = \cos x$ for $-\pi \leq x \leq \pi$.

[5 marks]

Question 8

(a) Show that $(x + 1)(x - 2)(x - 3) \equiv x^3 - 4x^2 + x + 6$.

[2 marks]

Question 8

(b) Hence, or otherwise, solve the equation $\tan^3 x - 4\tan^2 x + \tan x + 6 = 0$ for $0° \leq x \leq 360°$, giving your answers to 1 decimal place where appropriate.

[5 marks]

Question 9

(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 $h = \frac{1}{2}\sin(180t)$ where t is the time in seconds after timing commences.

Sketch a graph of h against t for $0 \leq t \leq 10$ showing the coordinates of the points of intersection with the t axis.

[2 marks]

Question 9

(b) How many times in the first minute after timing commences is the seagull 0.25 metres above its calm water position?

[1 mark]

Question 9

(c) Find the time at which the seagull is first 0.25m above its calm water position **and moving downwards**. Give your answer to 3 significant figures.

[3 marks]