3.6 Trigonometric Equations & Identities

Question Paper

Course	DP IB Maths
Section	3. Geometry & Trigonometry
Topic	3.6 Trigonometric Equations & Identities
Difficulty	Medium

Time allowed: 60

Score: /50

Percentage: /100

Question 1

The value of $\sin\alpha = \frac{3}{7}$ for $0 \leq \alpha \leq \frac{\pi}{2}$. Find:

(i) $\cos\alpha$

(ii) $\sin 2\alpha$

(iii) $\cos 2\alpha$

(iv) $\tan 2\alpha$.

[6 marks]

Question 2

The value of $\cos B = \frac{1}{5}$, for $\frac{3\pi}{2} \leq B \leq 2\pi$. Find:

(i) $\cos 2B$

(ii) $\sin 2B$

(iii) $\tan 2B$.

[6 marks]

Question 3

An angle M has the properties such that $\sin M = r$ and $\sin 2M = s$. Find, in terms of r and s, an expression for:

(i) $\cos M$

(ii) $\tan M$.

[4 marks]

Question 4

Solve the equation $2 \sin 2\theta = 1$ for $0° \leq \theta \leq 360°$.

[3 marks]

Question 5

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

[5 marks]

Question 6a

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

[2 marks]

Question 6b

(b) Use your result from part (a) to solve the equation

$$\tan^3 x - 4\tan^2 x + \tan x + 6 = 0$$

in the interval $0° \leq x \leq 360°$.

[5 marks]

Question 7a

(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 7b

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

[3 marks]

Question 8a

(a) Show that the equation

$$2\cos^2 x - \sin x = 1$$

can be written in the form

$$2\sin^2 x + \sin x - 1 = 0$$

[1 mark]

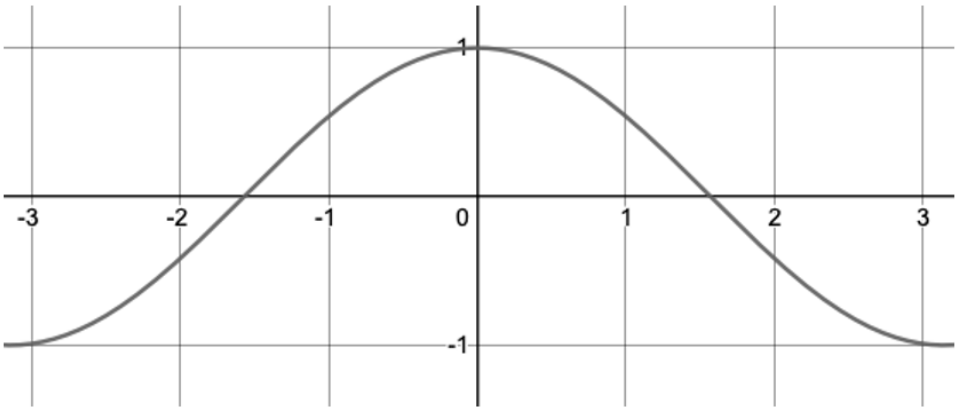
Question 8b

(b) Hence, solve the equation $2\cos^2 x - \sin x = 1$, for $0 \leq x \leq 4\pi$

[5 marks]

Question 9a

The graph below shows the function $y = f(x)$ where $f(x) = \cos x$ for $-\pi \leq x \leq \pi$.



The function $g(x)$ is formed by translating the function $f(x)$ 1 unit vertically downwards.

The function $h(x)$ is formed by stretching the function $f(x)$ by a factor of $\frac{1}{2}$ in the y direction. The domain of $h(x)$ remains the same as $f(x)$.

(a) (i) Sketch the functions $y = h(x)$ and $y = g(x)$.

(ii) State the number of roots for $g(x)$.

[4 marks]

Question 9b

(b) Find the solutions to the equation $\cos 2x = \cos x - 1$, for $-\pi \leq x \leq \pi$, and label them clearly on the graph of $y = f(x)$ given above.

[4 marks]