

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 $0 \le \alpha \le \frac{\pi}{2}$. 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 $\frac{3\pi}{2} \le B \le 2\pi$. 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 $0^{\circ} \le \theta \le 360^{\circ}$.

[3 marks]

Question 5

Solve the equation $2 \sin x = \frac{1}{\sin x}$ for $0^{\circ} \le x \le 360^{\circ}$.

[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 $0^{\circ} \le x \le 360^{\circ}$.

[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 $-180^\circ \le x \le 180^\circ$.

[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]

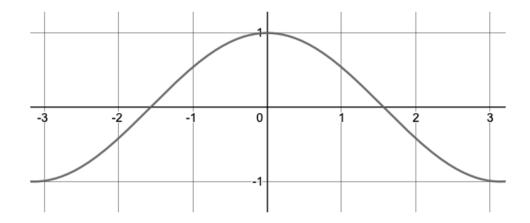
Question 8b

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

[5 marks]

Question 9a

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



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]



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Question 9b

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

[4 marks]