3.3 Further Trigonometric Equations

Question Paper

Course	CIE A Level Maths
Section	3. Trigonometry
Topic	3.3 Further Trigonometric Equations
Difficulty	Hard

Time allowed: 50

Score: /37

Percentage: /100

Question 1

Solve the equation $\sec^2 2x = 1 + \tan 2x$ for $0° \leq x \leq 180°$.

[4 marks]

Question 2

Given that

$$\sin(2A° - B°) = \frac{\sqrt{6} + \sqrt{2}}{4}$$

and that

$$3A = 4B \text{ and } 60° < B° < A° < 300°$$

find the values of A and B.

[4 marks]

Question 3

Solve the equation

$$\frac{\cos x}{\operatorname{cosec} x} - \cot x = 0, \qquad -2\pi \leq x \leq 2\pi$$

[4 marks]

Question 4a

(a) Show that $6\cos\theta - 8\sin\theta$ can be written in the form $R\cos(\theta + \alpha)$, where $R > 0$ and α is an acute angle measured in radians.

[3 marks]

Question 4b

(b) Hence, or otherwise, solve the equation $3\cos\theta - 4\sin\theta - 2 = 0$, for $0 \leq x \leq 2\pi$. Give your answers to three significant figures.

[3 marks]

Question 4c

(c) Write down the minimum value of $6\cos\theta - 8\sin\theta$ and the smallest positive value of θ for which it occurs. Give your value of θ to three significant figures.

[2 marks]

Question 5

Solve the equation

$$2\cot^2 x = 8 - \operatorname{cosec} x, \quad -\pi \leq x \leq \pi$$

giving your answers to three significant figures where appropriate.

[4 marks]

Question 6

Solve the equation

$$8\cos^4\theta - 5\cos 2\theta - 2 = 0 \qquad 0 \leq \theta \leq \pi$$

State your answers as multiples of π.

[5 marks]

Question 7

Determine the values of the constant k for which the equation

$$\operatorname{cosec}\theta = k, \qquad -\pi \leq \theta \leq 2\pi$$

has (i) no real solutions,
(ii) 1 real solution,
(iii) 2 real solutions,
(iv) 4 real solutions

[4 marks]

Question 8

Solve the equation

$$\cot^2\theta = 15 - 6\operatorname{cosec}\theta, \qquad -180° \leq \theta \leq 180°$$

Give your answers to one decimal place where appropriate.

[4 marks]