3.1 Reciprocal Trigonometric Functions

Question Paper

Course	CIE AS Maths
Section	3. Trigonometry
Topic	3.1 Reciprocal Trigonometric Functions
Difficulty	Very Hard

Time allowed: 40

Score: /30

Percentage: /100

Question 1

Solve, in the range $-\pi < \theta \leq \pi$, the equation

$$\frac{\sec\theta \cot\theta}{\operatorname{cosec}\theta \tan\theta} = -\sqrt{3}.$$

[5 marks]

Question 2

Solve, in the range $0 \leq \theta \leq 2\pi$, the equation

$$6\sec\theta + \frac{2\sqrt{3}}{\sec\theta} = -3 - 4\sqrt{3}.$$

Leaving your answers as exact values.

[6 marks]

Question 3

Using the double angle formulae $\sin 2A \equiv 2\sin A\cos A$ and $\cos 2A \equiv \cos^2 A - \sin^2 A$, find the solutions to the equation

$$(\operatorname{cosec} x - \sec x)\left(\frac{1}{\sec x} + \frac{1}{\operatorname{cosec} x}\right) = \cot 2x + 3$$

in the range $-\pi < x \leq \pi$. Give your answers correct to 3 significant figures.

[6 marks]

Question 4

Solve, in the range $0 \le x \le 2\pi$, the equation

$$3\cot^2 x - 4\sqrt{3} = \left(6 - 2\sqrt{3}\right)\operatorname{cosec} x - 3.$$

Leaving your answers as exact values.

[6 marks]

Question 5a

(a) Sketch, in the interval $-2\pi \le \theta \le \pi$, the graph of $y = 2 + 3\sec\left(\theta + \frac{\pi}{2}\right)$, include asymptotes and label the coordinates of all maximum and minimum points.

[3 marks]

Question 5b

(b) Deduce the maximum and minimum values of $\dfrac{1}{2+3\ \sec\left(\theta+\frac{\pi}{2}\right)}$.

[4 marks]