

# 3.1 Reciprocal Trigonometric Functions

## Question Paper

Course	CIEA Level 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  $0 \leq x \leq 2\pi$ , the equation

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

Leaving your answers as exact values.

[6 marks]

**Question 5a**

- (a) Sketch, in the interval  $-2\pi \leq \theta \leq \pi$ , 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  $\frac{1}{2+3 \sec\left(\theta+\frac{\pi}{2}\right)}$ .

**[4 marks]**