

2.1 Reciprocal & Inverse Trigonometric Functions

Question Paper

Course	Edexcel IAL Maths: Pure 3
Section	2. Trigonometry
Topic	2.1 Reciprocal & Inverse Trigonometric Functions
Difficulty	Hard

Time allowed: 60

Score: /48

Percentage: /100

Question 1

(a) Rewrite $\tan \theta \operatorname{cosec} \theta$ as a single trigonometric function.

[2 marks]

Question 1

(b) Hence solve, in the range $-\pi < \theta \leq \pi$, the equation

$$\tan \theta \operatorname{cosec} \theta = -\frac{2\sqrt{3}}{3}.$$

[3 marks]

Question 2

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

$$\frac{2}{\operatorname{cosec} \theta} - \operatorname{cosec} \theta = 1.$$

[6 marks]

Question 3

Using the double angle formula $\sin 2A \equiv 2 \sin A \cos A$, find the solutions to the equation

$$\sec x \operatorname{cosec} x - 75 = 5 \operatorname{cosec} 2x$$

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

[6 marks]

Question 4

(a) Show that the equation

$$2 \cot^2 x = 1 - 5 \operatorname{cosec} x$$

can be rewritten in the form

$$(2 \operatorname{cosec} x - 1)(\operatorname{cosec} x + 3) = 0.$$

[3 marks]

Question 4

(b) Hence solve, in the range $0 \leq x \leq 2\pi$, the equation

$$2 \cot^2 x = 1 - 5 \operatorname{cosec} x$$

giving your answers correct to 3 significant figures.

[3 marks]

Question 5

Given that x satisfies the equation $\arcsin x = k$, where $-\frac{\pi}{2} < k < 0$,

- (i) state the range of possible values of x ,
- (ii) express both $\cos k$ and $\tan k$ in terms of x .

[5 marks]

Question 6

Prove that for $-1 \leq x \leq 0$, $\arccos x = \pi - \arcsin \sqrt{1 - x^2}$.

[7 marks]

Question 7

- (i) Sketch, in the interval $-2\pi \leq \theta \leq 2\pi$, the graph of $y = -5 + \frac{1}{2} \sec \theta$, include asymptotes and label the coordinates of all maximum and minimum points.
- (ii) Hence deduce the range of values for k for which the equation $-5 + \frac{1}{2} \sec \theta = k$ has no solutions.

[5 marks]

Question 8

The function f is defined as $f(x) = \arctan x$, $x \in \mathbb{R}$, and the function g is such that

$$g(x) = \frac{2}{\pi} f(x) - 1.$$

(a) Sketch the graph of $y = f(x)$ and state the range of f .

[3 marks]

Question 8

(b) Sketch the graph of $y = g(x)$ and state the range of g .

[3 marks]

Question 8

(c) Find the inverse function $g^{-1}(x)$ and state its domain.

[2 marks]