

---

# IB Maths: AA HL

## Inverse & Reciprocal Trig Functions

### Topic Questions

These practice questions can be used by students and teachers and is Suitable for IB Maths AA HL Topic Questions

Course	IB Maths
Section	3. Geometry & Trigonometry
Topic	3.7 Inverse & Reciprocal Trig Functions
Difficulty	Medium

**Level: IB Maths**

**Subject: IB Maths AA HL**

**Board: IB Maths**

**Topic: Inverse & Reciprocal Trig Functions**

## Question 1

(a)

State the value of  $\arctan(\sqrt{3})$ .

[1 mark]

(b)

If  $\arccos x = \frac{\pi}{6}$  find

(i)

the exact value of  $\arcsin x$ .

(ii)

the exact value of  $\sec(\arccos x)$ .

[6 marks]

## Question 2

Find the exact values of the following expressions:

(i)

$$\operatorname{cosec}\left(\frac{\pi}{3}\right) + \tan\left(\frac{\pi}{6}\right)$$

(ii)

$$3 \sin\left(\frac{\pi}{4}\right) - \cot\left(\frac{\pi}{3}\right)$$

[6 marks]

## Question 3

a)

Sketch the graph of  $y = \cot x$  for  $-\pi \leq x \leq \pi$ .

[2 marks]

b)

Given that  $\cot \theta = \frac{9}{7}$  and  $\pi \leq \theta \leq \frac{3\pi}{2}$ , find the values of  $\cos \theta$ ,  $\sin \theta$  and  $\tan \theta$ .

[5 marks]

### Question 4

Solve  $\tan^2 x = \sec x + 11$  for  $0 \leq x \leq \pi$ .

[5 marks]

### Question 5

a)

Show that the equation

$$\sec \theta - 5 \cos \theta = 2\sqrt{2}$$

can be rewritten as

$$5 \cos^2 \theta + 2\sqrt{2} \cos \theta - 1 = 0$$

[3 marks]

b)

Hence, solve the equation  $\sec \theta - 5 \cos \theta = 2\sqrt{2}$  for all values of  $\theta$  in the interval  $-\pi \leq \theta \leq \frac{\pi}{2}$ .

[3 marks]

### Question 6

A function  $f$  can be defined by  $f(x) = 3x - 5x \arcsin(x)$ , where  $-1 \leq x \leq 1$ .

a)

Sketch the graph of  $f$  indicating clearly any intercepts with the coordinate axes and the coordinates of any local maximum or minimum points.

[3 marks]

b)

State the domain and range of  $f$ .

[2 marks]

c)

Solve the inequality  $3x - 5x \arcsin(x) > -2$ .

[3 marks]

### Question 7

The function  $f$  is defined as  $f(x) = \arccos x$ ,  $-1 \leq x \leq 1$ , and the function  $g$  is such that  $g(x) = f(3x)$ .

a)

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

[3 marks]

b)

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

[3 marks]

c)

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

[2 marks]

### Question 8

a)

Show that  $\sec \theta \cot \theta \equiv \operatorname{cosec} \theta$ .

[2 marks]

b)  
Hence solve in the range  $0 \leq \theta \leq 2\pi$ , the equation  $\sec \theta \cot \theta = -2$

[3 marks]

## Question 9

a)  
Show that the equation

$$\tan^2 x = 6 \sec x - 10$$

can be rewritten in the form

$$(\sec x - 3)^2 = 0$$

[3 marks]

b)  
Hence, solve the equation  $\tan^2 x = 6 \sec x - 10$  in the range  $0 \leq x \leq 2\pi$ .

[3 marks]

## Question 10

a)  
Show that the equation

$$\cot^2 x = 9 - 3 \operatorname{cosec} x$$

can be rewritten in the form

$$(\operatorname{cosec} x - 2)(\operatorname{cosec} x + 5) = 0.$$

[3 marks]

b)  
Hence, solve the equation  $\cot^2 x = 9 - 3 \operatorname{cosec} x$  in the interval  $-180^\circ \leq x \leq 180^\circ$ . Give your answers correct to 1 decimal place.

[3 marks]