

# IB Maths: AA HL Further Trigonometry

## **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	3.8 Further Trigonometry
Difficulty	Medium

**Level: IB Maths** 

**Subject: IB Maths AA HL** 

**Board: IB Maths** 

**Topic: Further Trigonometry** 



#### **Question 1**

Show that

(i)

$$\cos\left(\theta + \frac{\pi}{2}\right) = -\sin\theta$$

(ii)

$$\tan(\theta - \pi) = \tan \theta$$

(iii)

$$\sin\left(\theta - \frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}(\sin\theta - \cos\theta)$$

[6 marks]

#### **Question 2**

Let 
$$f(x) = \tan(x + \pi) \sin(x + \frac{\pi}{2})$$
 where  $0 < x < \frac{\pi}{2}$ .

By using the compound angle formulae, express f(x) in terms of  $\sin x$ .

[4 marks]

#### **Question 3**

Consider the equation  $\cos(x-45) = 2 \sin x$  in the interval  $0 \le x \le 360^\circ$ .

Find an exact value for  $\tan x$ .

[5 marks]

#### **Question 4**

a)

Express  $\cos 4\theta$  in terms of  $\cos 2\theta$ .

[1 mark]

b)

Hence, show that  $\cos 4\theta = 8\cos^2 \theta (\cos^2 \theta - 1) + 1$ .

[5 marks]



#### **Question 5**

Given that  $\tan A = \frac{\sqrt{3}}{2}$ , solve the equation  $\tan (A + x) = \frac{4}{5}$  in the interval  $0 \le x \le 360^{\circ}$ .

[6 marks]

#### **Question 6**

Prove that  $\cos 3x \equiv 4 \cos^3 x - 3 \cos x$ .

[6 marks]

#### **Question 7**

Solve the equation  $\sin 2x - \cos 2x = \frac{\sin x + \cos x}{2} - 1$  for the interval  $-\pi < x < 0$ .

[7 marks]

#### **Question 8**

a) Show that  $1 - \cos 2x = 2 - 2\cos^2 x$ 

[2 marks]

Show that 
$$\frac{1}{\cos 2x} - \tan 2x = \frac{\cos x - \sin x}{\cos x + \sin x}$$

[5 marks]



### **Question 9**

a)

Find the exact values for  $\tan x$  given that  $\tan^2 x + 4 \tan x + 1 = 0$ 

[3 marks]

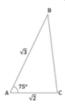
b)

Hence, solve the equation  $\frac{\tan x}{2 \tan x + 1} = \tan 2x$  algebraically for the interval  $0 \le x \le 2\pi$ .

[5 marks]

#### **Question 10**

The following diagram shows the triangle ABC where  $AB = \sqrt{2}$ ,  $AC = \sqrt{3}$  and  $BAC = 75^{\circ}$ .



۵)

By writing 75° as  $30^{\circ} + 45^{\circ}$  find the value of  $\sin(75^{\circ})$ .

[3 marks]

b)

Find the area of the triangle, giving your answer in the form  $\frac{a+\sqrt{b}}{c}$ , where  $a,b,c\in\mathbb{Z}$ .

[4 marks]