



# Trigonometric Ratios Ex 5.1 Q7

**Answer :**

(i) Given:  $\cot \theta = \frac{7}{8}$

To evaluate:  $\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)}$

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} \dots\dots (1)$$

We know the following formula

$$(a + b)(a - b) = a^2 - b^2$$

By applying the above formula in the numerator of equation (1) ,

We get,

$$(1 + \sin \theta)(1 - \sin \theta) = 1^2 - \sin^2 \theta \dots \text{(Where } a = 1 \text{ and } b = \sin \theta \text{)}$$

$$(1 + \sin \theta)(1 - \sin \theta) = 1 - \sin^2 \theta \dots\dots (2)$$

Similarly,

By applying formula  $(a + b)(a - b) = a^2 - b^2$  in the denominator of equation (1) ,

We get,

$$(1 + \cos \theta)(1 - \cos \theta) = 1^2 - \cos^2 \theta \dots \text{(Where } a = 1 \text{ and } b = \cos \theta \text{)}$$

$$(1 + \cos \theta)(1 - \cos \theta) = 1 - \cos^2 \theta \dots\dots (3)$$

Substituting the value of numerator and denominator of equation (1) ,from equation (2) and(3)

Therefore,

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \frac{1 - \sin^2 \theta}{1 - \cos^2 \theta} \dots\dots (4)$$

Since,

$$\cos^2 \theta + \sin^2 \theta = 1$$

Therefore,

$$\cos^2 \theta = 1 - \sin^2 \theta$$

$$\text{Also, } \sin^2 \theta = 1 - \cos^2 \theta$$

Putting the value of  $1 - \sin^2 \theta$  and  $1 - \cos^2 \theta$  in Equation (4)

We get,

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \frac{\cos^2 \theta}{\sin^2 \theta}$$

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \left( \frac{\cos \theta}{\sin \theta} \right)^2$$

$$\text{We know that, } \frac{\cos \theta}{\sin \theta} = \cot \theta$$

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = (\cot \theta)^2$$

$$\text{Since, It is given that } \cot \theta = \frac{7}{8}$$

Therefore,

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \left(\frac{7}{8}\right)^2$$

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \frac{7^2}{8^2}$$

$$\frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \frac{49}{64}$$

$$\text{Answer: } \frac{(1 + \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(1 - \cos \theta)} = \frac{49}{64}$$

(ii) Given:  $\cot \theta = \frac{7}{8}$

To evaluate:  $\cot^2 \theta$

$$\cot \theta = \frac{7}{8}$$

Squaring on both sides,

We get,

$$(\cot \theta)^2 = \left(\frac{7}{8}\right)^2$$

$$\cot^2 \theta = \frac{7^2}{8^2}$$

$$\cot^2 \theta = \frac{49}{64}$$

Answer:  $\cot^2 \theta = \frac{49}{64}$

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