

Practice Questions - Term I

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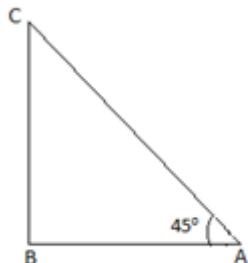
Subject: Mathematics

Topic : Introduction to Trigonometry

Class: X

1. In triangle ABC, right angled at B, if $\angle A$ is 45° , find the value of $\cot A$ and $\tan C$.

- A. 1, 1
- B. $\sqrt{2}, \sqrt{2}$
- C. $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$
- D. $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$



In right angle triangle ABC,

$$\angle B = 90^\circ \text{ and } \angle A = 45^\circ.$$

$$\text{Then } \angle C = 180^\circ - 90^\circ - 45^\circ = 45^\circ \text{ (using angle sum property)}$$

$$\cot A = \cot 45^\circ = 1$$

$$\tan C = \tan 45^\circ = 1$$

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2. The value of $\operatorname{cosec} 30^\circ + \cot 45^\circ$ is



A. 1



B. 2



C. 3



D. 4

$$\operatorname{cosec} 30^\circ + \cot 45^\circ$$

$$= 2 + 1$$

$$= 3$$

3. If $\sin A = \frac{8}{17}$, find the value of $\sec A \cos A + \operatorname{cosec} A \cos A$.



A. $\frac{6}{23}$



B. $\frac{8}{15}$



C. $\frac{15}{8}$



D. $\frac{23}{8}$

$$\sin A = \frac{8}{17}$$

$$\operatorname{cosec} A = \frac{17}{8}$$

$$\cos A = \sqrt{1 - \sin^2 A}$$

$$= \sqrt{1 - \frac{64}{289}} = \sqrt{\frac{225}{289}} = \frac{15}{17}$$

$$\sec A = \frac{17}{15}$$

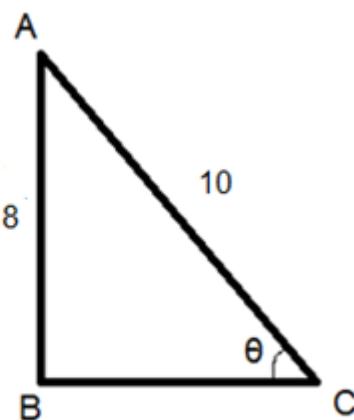
$$\sec A \cos A + \operatorname{cosec} A \cos A = \frac{17}{15} * \frac{15}{17} + \frac{17}{15} * \frac{15}{17}$$

$$= 1 + \frac{15}{8} = 2\frac{7}{8}$$

$$= \frac{23}{8}$$

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4. What is the value of $\tan \theta$ in the given triangle?



- A. $\frac{3}{5}$
- B. $\frac{4}{3}$
- C. $\frac{5}{3}$
- D. $\frac{4}{5}$

$$BC = \sqrt{AC^2 - AB^2} = 6$$

$\tan \theta = \text{Opposite side} / \text{Adjacent side}$

But the adjacent side is not given.

Using Pythagoras theorem,

$$AC^2 = AB^2 + BC^2$$

$$BC = \sqrt{AC^2 - AB^2} = 6$$

$$\tan \theta = AB/BC = 4/3$$

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5. If triangle ABC is right angled at B and $\sin A = \frac{3}{5}$, then find the value of $\cos A$.



A. $\frac{3}{5}$



B. $\frac{5}{4}$

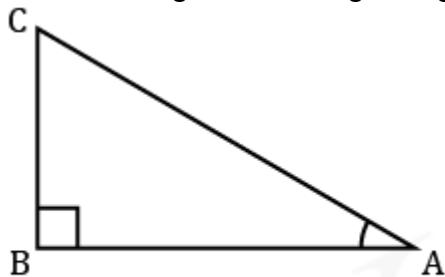


C. $\frac{4}{5}$



D. $\frac{5}{3}$

Given, triangle ABC is right angled at B.



Since,

$$\sin A = \frac{3}{5} = \frac{BC}{AC}$$

Let $BC = 3k$ and $AC = 5k$.

Applying Pythagoras theorem,
 $AB^2 + BC^2 = AC^2$

$$AB^2 = (5k)^2 - (3k)^2 = 16k^2$$

$$AB = 4k$$

$$\cos A = \frac{AB}{AC} = \frac{4}{5}$$

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6. Find the value of $\sin(60^\circ + \theta) - \cos(30^\circ - \theta)$.

- A. $2 \cos\theta$
- B. $2 \sin\theta$
- C. 0
- D. 1

To find the value of :

$$\begin{aligned}
 & \sin(60^\circ + \theta) - \cos(30^\circ - \theta) \\
 &= \cos(90^\circ - (60^\circ + \theta)) - \cos(30^\circ - \theta) \\
 (\because \cos(90^\circ - \theta) &= \sin\theta) \\
 &= \cos(30^\circ - \theta) - \cos(30^\circ - \theta) \\
 &= 0
 \end{aligned}$$

7. Which of the following trigonometric ratios will have the same value as $\cot 53^\circ$?

- A. $\sin 65^\circ$
- B. $\tan 47^\circ$
- C. $\tan 37^\circ$
- D. $\cosec 37^\circ$

Using the identity,

$$\cot \theta = \tan (90^\circ - \theta)$$

$$\therefore \cot 53^\circ = \tan(90^\circ - 53^\circ)$$

$$\Rightarrow \cot 53^\circ = \tan 37^\circ.$$

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8. If $\tan 2A = \cot(A-18^\circ)$, then find the value of A.

A. 18°

B. 36°

C. 24°

D. 27°

Given, $\tan 2A = \cot(A - 18^\circ)$

$$\Rightarrow \tan 2A = \tan(90 - (A - 18^\circ))$$

$$\Rightarrow \tan 2A = \tan(108^\circ - A)$$

$$\Rightarrow 2A = 108^\circ - A$$

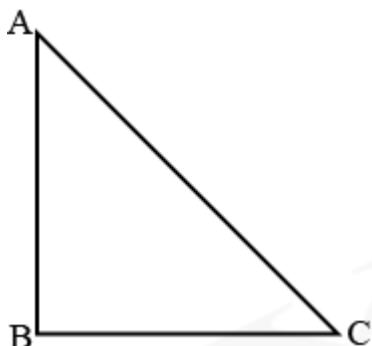
$$\Rightarrow 3A = 108^\circ$$

$$\Rightarrow A = 36^\circ$$

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9. In a right angled triangle ABC (right angled at B),
the value of $\tan A \times \tan C = \underline{\hspace{2cm}}$.

- A. 1
- B. 2
- C. 5
- D. 10



From the above figure,

$$\tan A = \frac{BC}{AB}$$

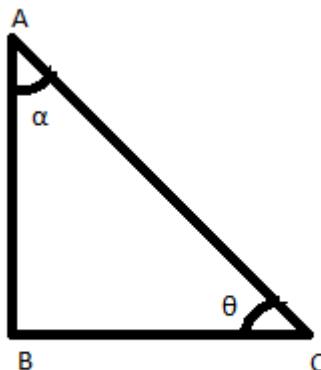
$$\tan C = \frac{AB}{BC}$$

So,

$$\tan A \times \tan C = \left(\frac{BC}{AB}\right) \times \left(\frac{AB}{BC}\right) = 1$$

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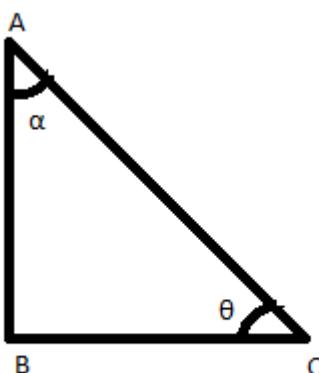
10. In the given right angle triangle, if $\sin\theta = \frac{3}{5}$, then find the value of $3\tan\alpha$.



- A. 4
- B. 3
- C. 5
- D. 1

In the given figure.

Given,



$$\begin{aligned}\sin \theta &= \frac{3}{5} = \frac{AB}{AC} \\ AC^2 &= AB^2 + BC^2 \\ 5^2 &= 3^2 + BC^2 \\ BC &= 4\end{aligned}$$

Hence,

$$3\tan\alpha = 3 \times \frac{BC}{AB} = \frac{4}{3}$$

$$3\tan\alpha = 4$$

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11. The value of $\sin^2 29^\circ + \sin^2 61^\circ$ is

- A. 1
- B. 0
- C. $2 \sin^2 29^\circ$
- D. $2 \cos^2 61^\circ$

$$\begin{aligned}
& \sin^2 29^\circ + \sin^2 61^\circ \\
&= \sin^2 29^\circ + \sin^2 (90^\circ - 29^\circ) \quad (\text{As, } \sin(90^\circ - A) = \cos A) \\
&= \sin^2 29^\circ + \cos^2 29^\circ [\text{As } \sin(90^\circ - \theta) = \cos \theta] \\
&= 1 \quad [\text{As, } \sin^2 \theta + \cos^2 \theta = 1]
\end{aligned}$$

12. If $5\tan\theta=4$, then value of $(5\sin\theta - 4\cos\theta)/(5\sin\theta + 4\cos\theta)$ is:

- A. $\frac{5}{3}$
- B. 0
- C. $\frac{5}{6}$
- D. $\frac{1}{6}$

Divide both numerator and denominator by $\cos \theta$ and solve

$$\begin{aligned}
& \frac{(5\sin\theta - 4\cos\theta)}{(5\sin\theta + 4\cos\theta)} \\
&= \frac{\frac{(5\sin\theta - 4\cos\theta)}{\cos\theta}}{\frac{(5\sin\theta + 4\cos\theta)}{\cos\theta}} \\
&= \frac{5\tan\theta - 4}{5\tan\theta + 4} \\
&= \frac{4 - 4}{4 + 4} \\
&\quad (\text{since, given that } 5 \tan \theta = 4) \\
&= 0
\end{aligned}$$

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13. $\frac{\cos \theta}{1-\tan \theta} + \frac{\sin \theta}{1-\cot \theta} = \underline{\hspace{2cm}}$

- A. 1
- B. $\cos \theta + \sin \theta$
- C. $\cos \theta \sin \theta$
- D. $\cos \theta - \sin \theta$

$$\begin{aligned}
 & \frac{\cos \theta}{1-\tan \theta} + \frac{\sin \theta}{1-\cot \theta} \\
 &= \frac{\cos \theta}{1-\frac{\sin \theta}{\cos \theta}} + \frac{\sin \theta}{1-\frac{\cos \theta}{\sin \theta}} \\
 &= \frac{\cos \theta}{\frac{\cos \theta - \sin \theta}{\cos \theta}} + \frac{\sin \theta}{\frac{\sin \theta - \cos \theta}{\sin \theta}} \\
 &= \frac{\cos^2 \theta}{\cos \theta - \sin \theta} - \frac{\sin^2 \theta}{\cos \theta - \sin \theta} \\
 &= \frac{\cos^2 \theta - \sin^2 \theta}{\cos \theta - \sin \theta} \\
 &= \frac{(\cos \theta + \sin \theta)(\cos \theta - \sin \theta)}{\cos \theta - \sin \theta} = \cos \theta + \sin \theta
 \end{aligned}$$

14. The value of $(1 - \cos A)(1 + \cos A)(\cosec^2 A)$ is:

- A. 0
- B. 1
- C. 2
- D. 3

$$\begin{aligned}
 & (1 - \cos A)(1 + \cos A)(\cosec^2 A) \\
 &= (1 - \cos^2 A)(\cosec^2 A) \\
 &= \sin^2 A \times \cosec^2 A \\
 &= \sin^2 A \times \frac{1}{\sin^2 A} \\
 &= 1
 \end{aligned}$$

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15. $9\sec^2\theta - 9\tan^2\theta$ is equal to:

- A. 1
- B. -1
- C. 9
- D. -9

We know that, $\sec^2\theta - \tan^2\theta = 1$

Therefore, $9\sec^2\theta - 9\tan^2\theta = 9(\sec^2\theta - \tan^2\theta) = 9$

16. If $(\sec\theta - \tan\theta) = \frac{1}{3}$, the value of $(\sec\theta + \tan\theta)$ is:

- A. 1
- B. 2
- C. 3
- D. 4

We know that, $\sec^2\theta - \tan^2\theta = 1$

Therefore, $(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$

Since, $(\sec\theta - \tan\theta) = \frac{1}{3}$

Thus, $(\sec\theta + \tan\theta) = 3$

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17. $\frac{\cos A}{\cot A} + \sin A = ?$

- A. $\cot A$
- B. $2 \sin A$
- C. $2 \cos A$
- D. $\sec A$

$$\frac{\cos A}{\cot A} + \sin A$$

$$= \frac{\cos A}{\left(\frac{\cos A}{\sin A}\right)} + \sin A \quad (\because \cot A = \frac{\cos A}{\sin A})$$

$$= \sin A + \sin A = 2 \sin A$$

$$\therefore \frac{\cos A}{\cot A} + \sin A = 2 \sin A$$

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18. If in a right-angled triangle ABC angles A and B are acute, then evaluate

$$1 + \frac{\tan A}{\tan B} =$$

- A. 1
- B. $\sec^2 A$
- C. $\sec A$
- D. 2

Given, in a right-angled triangle ABC angles A and B are acute.

Hence, $A + B = 90^\circ$.

$$\text{So, } 1 + \frac{\tan(90-B)}{\tan B}$$

$$= 1 + \frac{\cot B}{\tan B}$$

$$\text{We know } \frac{1}{\tan B} = \cot B$$

$$= 1 + \cot^2 B$$

$$= 1 + \cot^2(90 - A)$$

$$= 1 + \tan^2 A$$

$$= \sec^2 A \quad (\sec^2 A - \tan^2 A = 1)$$

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19. $\sec^4\theta - \sec^2\theta$ is equal to

- A. $\tan^2\theta - \tan^4\theta$
- B. $\tan^4\theta - \tan^2\theta$
- C. $\tan^4\theta + \tan^2\theta$
- D. $\tan\theta + \tan^4\theta$

$$\begin{aligned}
& \sec^4\theta - \sec^2\theta \\
&= \sec^2\theta(\sec^2\theta - 1) \\
&= (1 + \tan^2\theta)(\tan^2\theta) [\because \sec^2\theta = 1 + \tan^2\theta] \\
&= \tan^4\theta + \tan^2\theta
\end{aligned}$$

20. $\frac{1+\tan^2A}{1+\cot^2A} =$

- A. \sec^2A
- B. -1
- C. \cot^2A
- D. \tan^2A

$$\begin{aligned}
& \frac{1+\tan^2A}{1+\cot^2A} \\
&= \frac{1+\tan^2A}{1+\frac{1}{\tan^2A}} \\
&= \frac{1+\tan^2A}{\frac{\tan^2A+1}{\tan^2A}} \\
&= \frac{(1+\tan^2A)(\tan^2A)}{(\tan^2A+1)} \\
&= \tan^2A.
\end{aligned}$$