



## Trigonometry Questions with detailed Solutions PDF

Trigonometry questions are a major type of questions asked in competitive exams. These questions carry a weightage of 3-4 questions (6-8 marks) in SSC exams. To get a good rank in competitive exams, you should have a great practice of a variety of trigonometry questions

Here are some tips for solving Trigonometry questions: Clear the basic concepts, Memorise the key ratios, Memorise the identities and formulas, practice a variety of questions, and crack the question you should have a great understanding and practice.

So, we have attached 10 questions of Trigonometry for you to practice with. You should aim to solve these questions in less than half a minute for each.

## Practice Questions on Trigonometry

You can also download the Trigonometry questions and answers pdf. Just click on the **Download PDF** button. So let's start with the very first question.

**Q:1** Find the value of  $(\sin^4 x + \cos^2 x)/(\cos^4 x + \sin^2 x)$ .

1.  $\tan x$
2.  $\tan^2 x$
3. 1
4. 0

(**Difficulty:** 3, **Estimated Time:** 20 Seconds) This was not an easy one! Did you get it right?

**Q:2** Two buildings are present along a straight line 30 m apart. The angle of elevation from the foot of the taller building to the middle-most point of the smaller building is  $30^\circ$  whereas the angle of elevation from the top of the smaller building to the top of the taller building is  $60^\circ$ . What is the length of the taller building (in m)?

1. 30
2.  $30\sqrt{3}$
3.  $50\sqrt{3}$
4. 90

(**Difficulty:** 3, **Estimated Time:** 20 Seconds) In these questions, keep in mind the range of angle given in the question!

**Q:3** What is the value of the following expression?





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$$\{1 - (\sin^2 31^\circ / \sin^2 59^\circ)\} / \{\sin^2 32^\circ + \sin^2 58^\circ + (\cos^2 59^\circ / \cos^2 31^\circ)\}$$

1. 1
2.  $\sin 31^\circ$
3.  $\cos 31^\circ$
4.  $\cos 62^\circ$

(Difficulty: 2, Estimated Time: 10 Seconds) Do you remember some Pythagorean triplets?

**Q:4** If  $X = r (\sin A \cos B)$ ,  $Y = r (\sin A \sin B)$  and  $Z = r (\cos A)$ , then  $(X^2 + Y^2 + Z^2)$  is equal to:

1.  $r$
2.  $r^2$
3.  $2r^2$
4.  $r^3$

(Difficulty: 3, Estimated Time: 20 Seconds) Should we increase the level?

**Q:5** Find the value of:

$$[\cot 13^\circ \times \cot 26^\circ \times \cot 54^\circ \times \cot 60^\circ \times \cot 36^\circ \times \cot 77^\circ \times \cot 64^\circ] / [\cos^2 37^\circ + \cos^2 53^\circ + 5]$$

1.  $18/\sqrt{5}$
2.  $18/\sqrt{3}$
3.  $\sqrt{3}/6$
4.  $\sqrt{3}/18$

(Difficulty: 3, Estimated Time: 20 Seconds) We're halfway through. Have you got all your questions correct so far?

**Q:6** If  $x = (\sec 135^\circ \times \tan^2 240^\circ) / \sin^2 315^\circ$ , find  $x$ .

1.  $6\sqrt{2}$
2.  $-6\sqrt{2}$
3.  $3\sqrt{2}$
4.  $-3\sqrt{2}$

(Difficulty: 4, Estimated Time: 30 Seconds) This was a test of your concepts!





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**Q:7** An observer, 1.5 m tall, is  $20\sqrt{3}$  m away from a tower. The angle of elevation from his eye to the top of the tower is  $30^\circ$ . The height of the tower is:

1. 21 m
2. 21.5 m
3. 20
4. 20.5

(**Difficulty:** 3, **Estimated Time:** 20 Seconds) This was a hard nut to crack, be prepared for such questions in exam!

**Q:8** If  $3\sin x \cos^2 x - \sin 3x = a \times \sin^n x$ , then what is the value of  $(n + a)/(n - a)$ ?

1.  $1/2$
2. 1
3.  $3/2$
4. 2

(**Difficulty:** 2, **Estimated Time:** 15 Seconds) Another easy one!

**Q:9** Which of the following is equivalent to the given trigonometric expression?

$$(\sin x + \sin 2x + \sin 3x)/(\sin x)$$

1.  $2 \cos^2 x + 2 \cos x$
2.  $2 \sin^2 x + 2 \sin x$
3.  $4 \cos^2 x + 2 \cos x$
4.  $4 \sin^2 x + 2 \sin x$

(**Difficulty:** 3, **Estimated Time:** 20 Seconds) Yes, You know how to solve such questions!

**Q:10** If  $\sin 120^\circ/(1 + \sin 240^\circ) + \sin 150^\circ/(1 + \sin 210^\circ) = a^2$ , then what is the value of  $(a - 1)$ ?

1. 0
2. 1
3.  $\sqrt{3}$
4. 2

(**Difficulty:** 2, **Estimated Time:** 15 Seconds) Do you remember the formulas?



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## Answer Key

Let's check out your score in this test.

1. (3)	2. (3)	3. (4)	4. (2)	5. (4)
6. (2)	7. (2)	8. (4)	9. (3)	10. (3)

Comment below your score, considering each question has 1 mark only. If you scored 8 to 10, congratulations! You are one step closer to selection. If you have scored 5 to 8 marks, then you are doing well, keep it up. If you have scored less than 5 marks then you need to work a little harder on this subject. But don't worry, we are here to help you master the subject.

Let's check the answers and solutions and try to find out what went wrong.

## Answers and Solutions

**Q:1** The correct answer is **option 3** i.e. 1

$$(\sin^4 x + \cos^2 x) / (\cos^4 x + \sin^2 x)$$

Substituting  $\cos^2 x = 1 - \sin^2 x$

$$\Rightarrow (\sin^4 x + 1 - \sin^2 x) / \{(1 - \sin^2 x)^2 + \sin^2 x\}$$

$$\Rightarrow (\sin^4 x - \sin^2 x + 1) / (1 + \sin^4 x - 2\sin^2 x + \sin^2 x)$$

$$\Rightarrow (\sin^4 x - \sin^2 x + 1) / (\sin^4 x - \sin^2 x + 1) = 1$$

**Q:2** The correct answer is **option 3** i.e.  $50\sqrt{3}$



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In triangle BED

$$\Rightarrow ED/BD = \tan \angle EBD$$

$$\Rightarrow ED/30 = \tan 30^\circ$$

$$\Rightarrow ED/30 = 1/\sqrt{3}$$

$$\therefore ED = 10\sqrt{3} \text{ m}$$

$$\therefore CD = 2 \times ED = 20\sqrt{3} \text{ m} [\because E \text{ is the middlemost point}]$$

In triangle AFC

$$\Rightarrow \tan \angle ACF = AF/FC$$

$$\Rightarrow FC = BD = 30$$

$$\Rightarrow \tan 60^\circ = AF/30$$

$$\Rightarrow \sqrt{3} = AF/30$$

$$\therefore AF = 30\sqrt{3} \text{ m}$$

$$\Rightarrow AB = AF + CD$$

$$\Rightarrow 50\sqrt{3} \text{ m}$$

**Q:3** The correct answer is **option 4** i.e. **cos 62°**.

$$\sin^2 59^\circ = \sin^2 (90^\circ - 31^\circ) = \cos^2 31^\circ$$

$$\sin^2 58^\circ = \sin^2 (90^\circ - 32^\circ) = \cos^2 32^\circ$$

$$\cos^2 59^\circ = \cos^2 (90^\circ - 31^\circ) = \sin^2 31^\circ$$

$$\therefore \{1 - (\sin^2 31^\circ / \sin^2 59^\circ)\} / \{\sin^2 32^\circ + \sin^2 58^\circ + (\cos^2 59^\circ / \cos^2 31^\circ)\}$$

$$= \{1 - (\sin^2 31^\circ / \cos^2 31^\circ)\} / \{\sin^2 32^\circ + \cos^2 32^\circ + (\sin^2 31^\circ / \cos^2 31^\circ)\}$$

$$\Rightarrow \{1 - \tan^2 31^\circ\} / \{1 + \tan^2 31^\circ\}$$

$$[\because \sin x / \cos x = \tan x \text{ and } \sin^2 x + \cos^2 x = 1]$$

$$\Rightarrow \cos (2 \times 31) = \cos 62^\circ$$

$$[\because \cos^2 x = (1 - \tan^2 x) / (1 + \tan^2 x)]$$





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**Q:4** The correct answer is **Option 2** i.e.  $r^2$

Given:

$$X = r (\sin A \cos B)$$

$$Y = r (\sin A \sin B)$$

$$Z = r (\cos A)$$

Formula:

$$\sin 0^\circ = 0$$

$$\cos 0^\circ = 1$$

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

$$(X^2 + Y^2 + Z^2) = r^2(\sin^2 A \cos^2 B) + r^2(\sin^2 A \sin^2 B) + r^2(\cos^2 A)$$

$$= r^2(\sin^2 A \cos^2 B + \sin^2 A \sin^2 B + \cos^2 A)$$

$$= r^2[\sin^2 A(\cos^2 B + \sin^2 B) + \cos^2 A]$$

$$= r^2[\sin^2 A + \cos^2 A] = r^2$$

**Trick:**

Take  $A = 0$  and  $B = 0$

$$X = r (\sin A \cos B) = 0$$

$$Y = r (\sin A \sin B) = 0$$

$$Z = r (\cos A) = r$$

$$\text{so, } (X^2 + Y^2 + Z^2) = 0 + 0 + r^2 = r^2$$

**Q:5** The correct answer is **option 4** i.e.  $\sqrt{3/18}$

$$[\cot 13^\circ \times \cot 26^\circ \times \cot 54^\circ \times \cot 60^\circ \times \cot 36^\circ \times \cot 77^\circ \times \cot 64^\circ] / [\cos^2 37^\circ + \cos^2 53^\circ + 5]$$

We know that:

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



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$$\cot \theta = 1/\tan \theta$$

$$\cot 60^\circ = 1/\sqrt{3}$$

$$\cos (90^\circ - \theta) = \sin \theta$$

$$[(\sin^2 \theta) + (\cos^2 \theta)] = 1$$

Now, solving the numerator:

$$[\cot (90^\circ - 77^\circ) \times \cot (90^\circ - 64^\circ) \times \cot (90^\circ - 36^\circ) \times \cot 60^\circ \times \cot 36^\circ \times \cot 77^\circ \times \cot 64^\circ]$$

$$= [\tan 77^\circ \times \tan 64^\circ \times \tan 36^\circ \times \cot 60^\circ \times \cot 36^\circ \times \cot 77^\circ \times \cot 64^\circ]$$

$$= [\tan 77^\circ \times \tan 64^\circ \times \tan 36^\circ \times \cot 60^\circ \times 1/\tan 36^\circ \times 1/\tan 77^\circ \times 1/\tan 64^\circ]$$

$$= \cot 60^\circ = 1/\sqrt{3}$$

solving the denominator:

$$[\cos^2 37^\circ + \cos^2 53^\circ + 5]$$

$$= [(\cos^2 (90^\circ - 53^\circ) + \cos^2 53^\circ) + 5]$$

$$= [(\sin^2 53^\circ) + (\cos^2 53^\circ) + 5]$$

$$= [1 + 5] = 6$$

$$\text{so, } N/D = (1/\sqrt{3})/6 = 1/6\sqrt{3} = \sqrt{3}/18$$

**Q:6** The correct answer is **option 2** i.e.  **$-6\sqrt{2}$**

We know that

$$\sec(90 + \beta) = -\operatorname{cosec} \beta$$

$$\tan(180 + \beta) = \tan \beta$$

$$\sin (360 - \beta) = -\sin \beta$$

Therefore,

$$\{\sec (90 + 45) \times \tan^2 (180 + 60)\} / \sin^2 (360 - 45)$$

$$\{-\operatorname{cosec} 45 \times \tan^2 60\} / \sin^2 45$$

$$\Rightarrow -\sqrt{2} \times 3/0.5 = -6\sqrt{2}$$



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**Q:7** The correct answer is **option 2** i.e. **21.5 m**.

$$AB = CD$$

In triangle BDE,

$$\tan 30^\circ = DE/BD$$

$$\Rightarrow 1/\sqrt{3} = DE/20\sqrt{3}$$

$$\Rightarrow DE = 20 \text{ m}$$

$$\text{So, Height of tower} = 20 + 1.5 = 21.5 \text{ m}$$

**Q:8** The correct answer is **Option 4** i.e. **2**.

$$3\sin x \cos^2 x - \sin 3x$$

$$\Rightarrow 3\sin x(1 - \sin^2 x) - \sin 3x$$

$$\Rightarrow (3\sin x - 3\sin^3 x) - (3\sin x - 4\sin^3 x) [\because \sin 3x = 3\sin x - 4\sin^3 x]$$

$$\Rightarrow \sin^3 x = a \times \sin^n x$$

$$\text{here, } a = 1 \text{ and } n = 3$$

$$\therefore (n + a)/(n - a) = (3 + 1)/(3 - 1)$$





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$\Rightarrow 2$

**Q:9** The correct answer is **option 3** i.e.  $4 \cos^2 x + 2 \cos x$

$$\sin A + \sin B = 2 \sin \left\{ \frac{(A+B)}{2} \right\} \cos \left\{ \frac{(A-B)}{2} \right\}$$

$$\sin x + \sin 3x = 2 \sin 2x \cos x$$

$$\sin x + \sin 2x + \sin 3x = 2 \sin 2x \cos x + \sin 2x$$

$$\Rightarrow \sin 2x (2 \cos x + 1)$$

$$\Rightarrow 2 \sin x \cos x (2 \cos x + 1) [\because \sin 2x = 2 \sin x \cos x]$$

$$(\sin x + \sin 2x + \sin 3x)/(\sin x) = \{2 \sin x \cos x (2 \cos x + 1)\}/(\sin x)$$

$$\Rightarrow 4 \cos^2 x + 2 \cos x$$

**Q:10** The correct answer is **option 3** i.e.  $\sqrt{3}$

$$\sin 120^\circ = \sin (180^\circ - 60^\circ) = \sin 60^\circ = \sqrt{3}/2$$

$$\sin 240^\circ = \sin (180^\circ + 60^\circ) = -\sin 60^\circ = -\sqrt{3}/2$$

$$\sin 150^\circ = \sin (180^\circ - 30^\circ) = \sin 30^\circ = 1/2$$

$$\sin 210^\circ = \sin (180^\circ + 30^\circ) = -\sin 30^\circ = -1/2$$

$$\therefore \sin 120^\circ/(1 + \sin 240^\circ) + \sin 150^\circ/(1 + \sin 210^\circ) = a^2$$

$$\Rightarrow (\sqrt{3}/2)/(1 - \sqrt{3}/2) + (1/2)/(1 - 1/2) = a^2$$

$$\Rightarrow \sqrt{3}/(2 - \sqrt{3}) + 1 = a^2$$

$$\Rightarrow (\sqrt{3} + 2 - \sqrt{3})/(2 - \sqrt{3}) = a^2$$

$$\Rightarrow 2/(2 - \sqrt{3}) = a^2$$

$$\Rightarrow 4/(4 - 2\sqrt{3}) = a^2$$

$$\Rightarrow 4/(\sqrt{3} - 1)^2 = a^2$$

$$\Rightarrow a = 2/(\sqrt{3} - 1)$$

$$\Rightarrow a = \{2 \times (\sqrt{3} + 1)\}/\{(\sqrt{3} - 1) \times (\sqrt{3} + 1)\}$$



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$$\Rightarrow a = \sqrt{3} + 1$$

$$\Rightarrow a - 1 = \sqrt{3}$$

So, this is it for today. We will meet again with another new topic. Till then, you can practice the questions again by downloading the PDF of Trigonometry.

