# INDIAN SCHOOL AL WADI AL KABIR

**Department: Mathematics**

**Class X** **Worksheet – Introduction to Trigonometry**

**15 – 04 - 2025**

**Questions of 1 mark each**

**Q.1.** If tan $\theta$ + cot $\theta$ = 5, then the value of $tan^2\,\theta + cot^2\,\theta$ is

| A | 23 | B | 25 | C | 27 | D | 15 |
|---|---|---|---|---|---|---|---|

**Q.2.** If sec$\theta$ + tan$\theta$ = 7, then sec$\theta$ - tan$\theta$ is

| A | $\frac{1}{7}$ | B | 7 | C | 6 | D | 49 |
|---|---|---|---|---|---|---|---|

**Q.3.** If tan $\alpha = \sqrt{3}$ and tan $\beta = \frac{1}{\sqrt{3}}$, $0 < \alpha, \beta < 90°$, then the value of cot $(\alpha + \beta)$ is

| A | $\sqrt{3}$ | B | 0 | C | $\frac{1}{\sqrt{3}}$ | D | 1 |
|---|---|---|---|---|---|---|---|

**Q.4.** If sin$\theta = \frac{1}{3}$, the value of $2cot^2\theta$ + 2 is

| A | 16 | B | 20 | C | 12 | D | 18 |
|---|---|---|---|---|---|---|---|

**Q.5.** The value of $(1 + tan^2\theta)(1 - \sin\theta)(1 + \sin\theta)$ is

| A | 0 | B | 1 | C | 2 | D | 8 |
|---|---|---|---|---|---|---|---|

**Q.6.** If tan x = sin 45° cos 45° + sin 30°, then x is

| A | 30° | B | 45° | C | 60° | D | 90° |
|---|---|---|---|---|---|---|---|

**Q.7.** $cos^4$A - $sin^4$A is equal to

| A | 1 – 2 $cos^2$A | B | 2 $sin^2$A - 1 | C | $sin^2$A - $cos^2$A | D | 2 $cos^2$A - 1 |
|---|---|---|---|---|---|---|---|

**Q.8.** The value of 4 $sin^2 60°$ + 3 $tan^2 30°$ - 8 $sin 45°$ $cos 45°$ is

| A | 0 | B | 1 | C | 2 | D | 5 |
|---|---|---|---|---|---|---|---|

**Q.9.** 8 $cot^2A$ - 8$cosec^2A$ is equal to

| A | 8 | B | $\frac{1}{8}$ | C | -8 | D | $-\frac{1}{8}$ |
|---|---|---|---|---|---|---|---|

**Q.10.** The value of ($sin^2\theta + \frac{1}{1+ tan^2\theta}$ ) is

| A | 0 | B | 1 | C | -1 | D | 2 |
|---|---|---|---|---|---|---|---|

**ASSERTION AND REASONING**

**DIRECTION:** In question numbers 11, a statement of **Assertion (A)** is followed by a statement of **Reason (R).** Choose the correct option.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

(b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A)

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

**Q.11.** Assertion(A): If x =2 $\sin^2\theta$ and y =2$\cos^2\theta$ +1 then the value of x + y = 3.

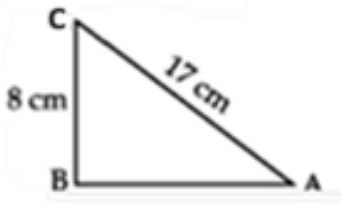
Reason(R): For any value of θ, $\sin^2\theta + \cos^2\theta$ =1

**Questions of 2 marks each**

**Q.12.** For A = 30°, verify that cos 3A = 4 $cos^3A$ – 3 cos A

**Q.13.** If cos $\theta$ + sin $\theta$ = $\sqrt{2}$ cos $\theta$, show that cos $\theta$ - sin $\theta$ = $\sqrt{2}$ sin $\theta$

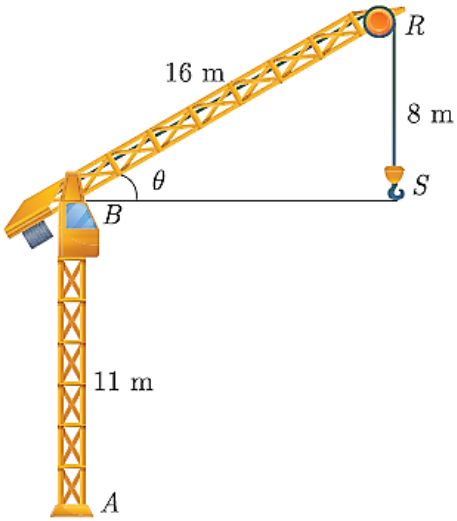
**Q.14.** In the given figure, ABC is right angled at B. If AC = 17cm and BC = 8cm, then find the value of 15$secA$ + 8$cotA$.




**Q.15.** If 5 tan θ = 3, then find the value of $\frac{(5\sin\theta - 3\cos\theta)}{(4\sin\theta + 3\cos\theta)}$

**Q.16.** If cos (A – B) = $\frac{\sqrt{3}}{2}$ and sin (A + B) = $\frac{\sqrt{3}}{2}$, find A and B where (A + B) and (A – B) are acute angles.

| | |
|---|---|
| **Questions of 3 marks each** | |
| **Q.17.** | Prove that $\frac{1}{\sec A-1}+\frac{1}{\sec A+1}$ = 2 cosec A cot A |
| **Q.18.** | Prove that: $\frac{cos^2\theta}{1-\tan\theta}+\frac{sin^3\theta}{\sin\theta-\cos\theta}=1+\sin\theta\cos\theta$ |
| **Q.19.** | In ΔABC, ∠B = 90°, BC = 5cm, AC – AB = 1. Evaluate $\frac{1+\sin C}{1+\cos C}$. |
| **Q.20.** | If x = a sin $\theta$, y = b tan $\theta$, prove that $\frac{a^2}{x^2}-\frac{b^2}{y^2}=1$ |
| **Q.21.** | Prove that $\frac{\sin\theta+\cos\theta}{\sin\theta-\cos\theta}+\frac{\sin\theta-\cos\theta}{\sin\theta+\cos\theta}=\frac{2}{1-2cos^2\theta}$ |
| **Q.22.** | Evaluate 4 - $\frac{\sin 30°+\tan 45°-cosec\,60°}{\sec 30°+\cos 60°+\cot 45°}$ |
| **Questions of 5 marks each** | |
| **Q.23.** | Prove that $sec^2\theta$ - $\frac{sin^2\theta-2sin^4\theta}{2cos^4\theta-cos^2\theta}$ = 1 |
| **Q.24.** | If x $sin^3\theta$ + y $cos^3\theta$ = sin $\theta$ cos $\theta$ and x sin $\theta$ = y cos $\theta$, prove that $x^2 + y^2 = 1$ |
| **Case study question (4 marks)** | |
| **Q.25.** | Tower cranes are a common fixture at any major construction site. They often rise hundreds of feet into the air, and can reach out just as far. The construction crew uses the tower crane to lift steel, concrete, large tools like acetylene torches and generators, and a wide variety of other building materials.<br>A crane stands on a level ground. It is represented by a tower *AB*, of height 11 m and a jib *BR*. The jib is of length 16 m and can rotate in a vertical plane about *B*. A vertical cable, *RS* carries a load *S*.<br>The diagram shows current position of the jib, cable and load. |




Based on the above information, answer the following questions:

(i) Find the length of BS.

(ii) What is the angle that the jib, *BR*, makes with the horizontal?

(iii) What is the measure of the angle *BRS*?

| **ANSWERS** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Q.1** | A | **Q.2** | A | **Q.3** | B | **Q.4** | D | **Q.5** | B | **Q.6** | B |
| **Q.7** | D | **Q.8** | A | **Q.9** | C | **Q.10** | B | **Q.11** | a | **Q.14** | 32 |
| **Q.15** | 0 | **Q.16.** | 45º, 15º | **Q.19.** | $\frac{25}{18}$ | **Q.22.** | $\frac{1+24\sqrt{3}}{11}$ | **Q.25** | (i) $8\sqrt{3}$ m | **Q.25.** | (ii) 30°<br>(iii) 60° |