## St. Mary's School, Dwarka <br> Holiday Homework <br> Class XII <br> Subject: Mathematics <br> Week 2 <br> Worksheet 2

## (INVERSE TRIGONOMETRIC FUNCTIONS)

Q1. If $\sin ^{-1} x-\cos ^{-1} x=\frac{\pi}{6}$, then $x=$
(a) $\frac{1}{2}$
(b) $\frac{\sqrt{3}}{2}$
(c) $-\frac{1}{2}$
(d) none of these

Q2. $\quad \sin \left[\cot ^{-1}\left\{\tan \left(\cos ^{-1} \mathrm{x}\right)\right\}\right]$ is equal to
(a) x
(b) $\sqrt{1-\mathrm{x}^{2}}$
(c) $\frac{1}{\mathrm{x}}$
(d) none of these

Q3. The number of solution of the equation

$$
\tan ^{-1} 2 x+\tan ^{-1} 3 x=\frac{\pi}{4} \text { is }
$$

(a) 2
(b) 3
(c) 1
(d) none of these

Q4. If $\alpha=\tan ^{-1}\left(\tan \frac{5 \pi}{4}\right)$ and $\beta=\tan ^{-1}\left(-\tan \frac{2 \pi}{3}\right)$, then
(a) $4 \alpha=3 \beta$
(b) $3 \alpha=4 \beta$
(c) $\alpha-\beta=\frac{7 \pi}{12}$
(d) none of these

Q5. If $x<0, y<0$ such that $x y=1$, then $\tan ^{-1} x+\tan ^{-1} y$ equals
(a) $\frac{\pi}{2}$
(b) $-\frac{\pi}{2}$
(c) $-\pi$
(d) none of these

Q6. If $\mathrm{u}=\cot ^{-1} \sqrt{\tan \theta}-\tan ^{-1} \sqrt{\tan \theta}$ then, $\tan \left(\frac{\pi}{4}-\frac{\mathrm{u}}{2}\right)=$
(a) $\sqrt{\tan \theta}$
(b) $\sqrt{\cot \theta}$
(c) $\tan \theta$
(d) $\cot \theta$

Q7. If $\alpha=\tan ^{-1}\left(\frac{\sqrt{3} x}{2 y-x}\right), \beta=\tan ^{-1}\left(\frac{2 x-y}{\sqrt{3} y}\right)$, then $\alpha-\beta=$
(a) $\frac{\pi}{6}$
(b) $\frac{\pi}{3}$
(c) $\frac{\pi}{2}$
(d) $-\frac{\pi}{3}$

Q8. $\quad \tan ^{-1} \frac{1}{11}+\tan ^{-1} \frac{2}{11}$ is equal to
(a) 0
(b) $1 / 2$
(c) -1
(d) none of these

Q9. If $\cos ^{-1} \frac{x}{2}+\cos ^{-1} \frac{y}{3}=\theta$, then $9 x^{2}-12 x y \cos \theta+4 y^{2}$ is equal to
(a) 36
(b) $-36 \sin ^{2} \theta$
(c) $36 \sin ^{2} \theta$
(d) $36 \cos ^{2} \theta$

Q10. If $\tan ^{-1} 3+\tan ^{-1} \mathrm{x}=\tan ^{-1} 8$, then $\mathrm{x}=$
(a) 5
(b) $1 / 5$
(c) $5 / 14$
(d) $14 / 5$

CASE STUDY1:


Two men on either side of a temple of 30 meters high observe its top at the angles of elevation $\alpha$ and $\beta$ respectively. (as shown in the figure above). The distance between the two men is $40 \sqrt{ } 3$ meters and the distance between the first-person A and the temple is $30 \sqrt{ } 3$ meters. Based on the above information answer the following:

1. $\angle C A B=\alpha=$
a. $\sin ^{-1}\left(\frac{2}{\sqrt{3}}\right)$
b. $\sin ^{-1}\left(\frac{1}{2}\right)$
c. $\sin ^{-1}(2)$
d. $\sin ^{-1}\left(\frac{\sqrt{3}}{2}\right)$
2. $\angle C A B=\alpha=$
a. $\cos ^{-1}\left(\frac{1}{5}\right)$
b. $\cos ^{-1}\left(\frac{2}{5}\right)$
c. $\cos ^{-1}\left(\frac{\sqrt{3}}{2}\right)$
d. $\cos ^{-1}\left(\frac{4}{5}\right)$
3. $\angle B C A=\beta=$
a. $\tan ^{-1}\left(\frac{1}{2}\right)$
b. $\tan ^{-1}(2)$
C. $\tan ^{-1}\left(\frac{1}{\sqrt{3}}\right)$
d. $\tan ^{-1}(\sqrt{3})$
4. $\angle A B C=$
a. $\frac{\pi}{4}$
b. $\frac{\pi}{6}$
C. $\frac{\pi}{2}$
d. $\frac{\pi}{3}$
5. Domain and Range of $\cos ^{-1} x=$
a. $(-1,1),(0, \pi)$
b. $[-1,1],(0, \pi)$
c. $[-1,1],[0, \pi]$
d. $(-1,1),\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

## CASE STUDY 2:

The Government of India is planning to fix a hoarding board at the face of a building on the road of a busy market for awareness on COVID-19 protocol. Ram, Robert and Rahim are the three engineers who are working on this project. " $A$ " is considered to be a person viewing the hoarding board 20 metres away from the building, standing at the edge of a pathway nearby. Ram, Robert and Rahim suggested to the firm to place the hoarding board at three different locations namely C, D and E. "C" is at the height of 10 metres from the ground level. For the viewer A, the angle of elevation of " $D$ " is double the angle of elevation of "C" The angle of elevation of " $E$ " is triple the angle of elevation of "C" for the same viewer. Look at the figure given and based on the above information answer the following:


1. Measure of $\angle C A B=$
a. $\tan ^{-1}(2)$
b. $\tan ^{-1}\left(\frac{1}{2}\right)$
c. $\tan ^{-1}(1)$
d. $\tan ^{-1}(3)$
2. Measure of $\angle D A B=$
a. $\tan ^{-1}\left(\frac{3}{4}\right)$
b. $\tan ^{-1}(3)$
c. $\tan ^{-1}\left(\frac{4}{3}\right)$
d. $\tan ^{-1}(4)$
3. Measure of $\angle E A B=$
a. $\tan ^{-1}(11)$
b. $\tan ^{-1} 3$
c. $\tan ^{-1}\left(\frac{2}{11}\right)$
d. $\tan ^{-1}\left(\frac{11}{2}\right)$
4. $A^{l}$ Is another viewer standing on the same line of observation across the road. If the width of the road is 5 meters, then the difference between $\angle C A B$ and $\angle C A^{\prime} B$ Is
a. $\tan ^{-1}(1 / 2)$
b. $\tan ^{-1}(1 / 8)$
c. $\tan ^{-1}\left(\frac{2}{5}\right)$
d. $\tan ^{-1}\left(\frac{11}{21}\right)$
5. Domain and Range of $\tan ^{-1} x=$
a. $R^{+},\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
b. $R^{-},\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
c. $\mathrm{R},\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
d. $\mathrm{R},\left(0, \frac{\pi}{2}\right)$
