

Practice Questions

Pythagorean Identities

Unsolved with Given solutions

www.geeksforgeeks.org



Practice Questions

Q1) If $\sin\theta = 4/5$, then find the value of $\cos\theta$.

Q2) Prove that $\cos 2\theta = 1 - 2\sin^2\theta$.

Q3) Simplify the expression: $\sec^2\theta - \tan^2\theta$.

Q4) if $\tan\theta = 2$, the find the value of $\sec\theta$.

Q5) Solve for θ , if $\operatorname{cosec}^2\theta = 2$.

Q6) If $\tan\theta=1$, find $\sec\theta$.

Q7) Find $\cos\theta$ if $\sec\theta = 5/4$.

Q8) Express $\sec^2\theta$ in terms of $\tan\theta$.

Q9) Find $\sin\theta$ if $\cos\theta = 3/5$ and θ is in first quadrant.

Q10) If $\sin\theta = 1/3$, find $\tan\theta$.

Solutions

Answer 1 - $\pm 3/5$

Solution-

we know pythagorean identity $\sin^2\theta + \cos^2\theta = 1$

put the value of $\sin\theta$ in above equation

$$(4/5)^2 + \cos^2\theta = 1$$

$$16/25 + \cos^2\theta = 1$$

$$\cos^2\theta = 1 - 16/25$$

$$\cos^2\theta = 9/25$$

$$\cos\theta = \pm 3/5$$

Answer 2 -

using formula we know:

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

using the first Pythagorean identity, $\cos^2\theta = 1 - \sin^2\theta$

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

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

Answer 3 - 1

by second identity we know that $\sec^2\theta - \tan^2\theta = 1$

Answer 4 - $\sqrt{5}$ **Solution-**

using the identity we know that: $1 + \tan^2\theta = \sec^2\theta$

$$1 + 2^2 = \sec^2\theta$$

$$1 + 4 = \sec^2\theta$$

$$\sec^2\theta = 5$$

$$\sec\theta = \sqrt{5}$$

Answer 5 - $\theta = 45^\circ, 135^\circ, 225^\circ, 315^\circ$ **Solution-**

using the identity we know that: $\operatorname{cosec}^2\theta = 1 + \cot^2\theta$

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

$$\cot^2\theta = 1$$

$$\cot\theta = \pm 1$$

for $\cot\theta = 1$ or $\cot\theta = -1$ the answer for $\theta = 45^\circ, 135^\circ, 225^\circ, 315^\circ$

Answer 6 - $\sqrt{2}$ **Solution-**

we know $\tan\theta = 1$ for $\theta = 45^\circ$ or 225°

also, $\sec\theta = 1/\cos\theta$

for $\theta = 45^\circ$

$$\cos\theta = \frac{1}{\sqrt{2}}$$

$$\sec\theta = \sqrt{2}$$

$$\sec 45^\circ = \sqrt{2}$$

Answer 7 - $\pm 4/5$ **Solution-**

we know

$$\sec \theta = 1/\cos \theta$$

$$5/4 = 1/\cos \theta$$

$$\cos \theta = \pm 4/5$$

Answer 8 -

We know by identity that:

$$\sec^2 \theta - \tan^2 \theta = 1$$

transferring $\tan^2 \theta$ in right side

$$\sec^2 \theta = 1 + \tan^2 \theta$$

Answer 9 - $4/5$ **Solution-**

We know using the pythagorean identity that:

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

putting value of $\cos \theta = 3/5$

$$\sin^2 \theta + (3/5)^2 = 1$$

$$\sin^2 \theta + 9/25 = 1$$

$$\sin^2 \theta = 1 - 9/25$$

$$\sin^2\theta = 16/25$$

$$\sin\theta = 4/5 \text{ (as } \theta \text{ is present in first quadrant)}$$

Answer 10 - $1/\sqrt{8}$

Solution-

We know by identity that: $\sin^2\theta + \cos^2\theta = 1$

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

$$1/9 + \cos^2\theta = 1$$

$$\cos^2\theta = 1 - 1/9$$

$$\cos^2\theta = 8/9$$

$$\cos\theta = \pm \sqrt{8/3}$$

$$= \pm 2\sqrt{2/3}$$

By using the formula: $\tan\theta = \sin\theta/\cos\theta$

$$\tan\theta = 1/3 / 2\sqrt{2/3}$$

$$= \sqrt{2}/4$$

$$= 1/\sqrt{8}$$