

Trigonometry Worksheet 4

Refer to the trigonometric identities to solve the following questions.

1. Find principal and general solutions of $\cos x = 0$, $\sin x = 0$, $\tan x = 0$, and $\cot x = 0$.

2. Find general solution of the following:

1. $\cos \theta = \cos \alpha$

2. $\sin \theta = \sin \alpha$

3. $\tan \theta = \tan \alpha$

4. $\cot \theta = \cot \alpha$

3. Find the general solution of the following equations:

1. $\sin 2x = 0$

2. $\cos 3x = 0$

3. $\sin(x - \frac{\pi}{4}) = 0$

4. $\tan(\frac{\pi}{6} + 4x)$

5. $\cos(x + \frac{\pi}{8}) = 0$

6. $\sin x = \frac{1}{\sqrt{2}}$

7. $\sec x = 2$

8. $\sin 2x = -\frac{1}{2}$

9. $\tan 3x = -1$

10. $4 \sin^2 x = 1$

11. $\sin 2x - \sin 4x - \sin 6x = 0$

4. Prove that if θ and ϕ are not odd multiples of $\frac{\pi}{2}$, then $\tan \theta = \tan \phi \Rightarrow \theta = n\pi + \phi$, where $n \in \mathbb{Z}$

5. Prove: $a \cos \theta + b \sin \theta = c$

$$\Leftrightarrow \theta = 2n\pi + \alpha \pm \beta,$$

$$\text{where } \cos \alpha = \frac{a}{\sqrt{a^2+b^2}}, \cos \beta = \frac{c}{\sqrt{a^2+b^2}}.$$

6. Find the principal and general solution of the following equations:

1. $\sin x = \frac{\sqrt{3}}{2}$

2. $\sec x = \frac{2}{\sqrt{3}}$

3. $\csc x = -\frac{2}{\sqrt{3}}$

4. $\cot x = -\sqrt{3}$

5. $\tan 3x = 1$

6. $\tan x = -1$

7. $\cot 2x = -\frac{1}{\sqrt{3}}$

8. $\csc x = -2$

9. $\sec \frac{x}{2} = \sqrt{2}$

10. $\cos 2x = -\frac{1}{\sqrt{2}}$

7. Find the general solution of the following trigonometric equations:

1. $\cos 2x + \cos 4x = 0$

2. $\cos 4x = \cos 2x$

3. $\sin 3x + \sin 5x = 0$

4. $\sin 4x = \sin 2x$

5. $\cos 3x = \sin 2x$

6. $\sin 3x + \cos 2x = 0$

8. Solve

1. $\sqrt{3} \cos x - \sin x = 1$, and

2. $\sec x - \tan x = \sqrt{3}$

9. Solve

1. $2 \tan x - \cot x + 1 = 0$ (Hint: Use $\cot x = \frac{1}{\tan x}$)

2. $\tan^3 x - 3 \tan x = 0$

10. Solve

1. $\sin x \tan x - 1 = \tan x - \sin x$

2. $\sin 2x \tan 2x - 1 = \tan 2x - \sin 2x$