

Trig Proofs – Double Angle

Find the exact values for $\sin 2A$, $\cos 2A$, and $\tan 2A$ given the following information”

1. $\sin A = \frac{3}{5}$, angle A is in Quadrant I
2. $\cos A = -\frac{3}{5}$, angle A is in Quadrant II
3. $\tan A = -\frac{3}{4}$, angle A is in Quadrant IV
4. $\tan A = \frac{4}{3}$, angle A is in Quadrant III
5. $\cos A = \frac{-6}{7}$, angle A is in Quadrant II
6. $\sin A = \frac{-2}{7}$, angle A is in Quadrant IV
7. $\csc A = -3$, angle A is in Quadrant III
8. $\sec A = 4$, angle A is in Quadrant I

Prove the following identities:

9. $\sin 2x = \frac{2 \tan x}{1 + \tan^2 x}$
10. $\sec 2x = \frac{\sec^2 x}{2 - \sec^2 x}$
11. $\cos 2A = \frac{1 - \tan^2 A}{1 + \tan^2 A}$
12. $\sin 2A = 2 \cot A \sin^2 A$
13. $\frac{\cos 2x}{\cos x - \sin x} = \cos x + \sin x$
14. $(1 + \tan x) \tan 2x = \frac{2 \tan x}{1 - \tan x}$
15. $\tan x = \frac{1 - \cos 2x}{\sin 2x}$
16. $\tan x = \frac{\sin 2x}{1 + \cos 2x}$
17. $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$
18. $\cos^2 x = \frac{1}{2}(1 + \cos 2x)$

Answers:

| | $\sin 2A$ | $\cos 2A$ | $\tan 2A$ |
|----|---------------------------|-----------------|---------------------------|
| 1. | $\frac{24}{25}$ | $\frac{7}{25}$ | $\frac{24}{7}$ |
| 2. | $-\frac{24}{25}$ | $-\frac{7}{25}$ | $\frac{24}{7}$ |
| 3. | $-\frac{24}{25}$ | $\frac{7}{25}$ | $-\frac{24}{7}$ |
| 4. | $\frac{24}{25}$ | $-\frac{7}{25}$ | $-\frac{24}{7}$ |
| 5. | $\frac{-12\sqrt{13}}{49}$ | $\frac{23}{49}$ | $\frac{-12\sqrt{13}}{23}$ |
| 6. | $\frac{-12\sqrt{5}}{49}$ | $\frac{41}{49}$ | $\frac{-12\sqrt{5}}{41}$ |
| 7. | $\frac{4\sqrt{2}}{9}$ | $\frac{7}{9}$ | $\frac{4\sqrt{2}}{7}$ |
| 8. | $\frac{\sqrt{15}}{8}$ | $-\frac{7}{8}$ | $-\frac{\sqrt{15}}{7}$ |