Show all work on your own paper.

Simplify to a trig function of a single angle and find exact values in simplest form.

1. $\cos^2 90° - \sin^2 90°$

2. $2\sin 22.5° \cos 22.5°$

3. $1 - 2\sin^2 \dfrac{\pi}{3}$

4. $\csc^2 120° - 1$

5. $\sin 60° \cos 90° + \cos 60° \sin 90°$

6. $\cos \dfrac{\pi}{6} \cos \dfrac{\pi}{3} - \sin \dfrac{\pi}{6} \sin \dfrac{\pi}{3}$

7. $\dfrac{\tan \dfrac{7\pi}{6} + \tan \dfrac{\pi}{6}}{1 - \tan \dfrac{7\pi}{6} \tan \dfrac{\pi}{6}}$

8. $\dfrac{1 - \cos 660°}{\sin 660°}$

9. $\dfrac{2\tan 60°}{1 - \tan^2 60°}$

10. $-\sqrt{\dfrac{1 - \cos 600°}{2}}$

Use a sum or difference identity and find the exact simplified value.

11. $\cos 375°$ 12. $\sin 285°$

Use an identity and find the exact simplified value.

13. $\cos 112.5°$ 14. $\tan 157.5°$ 15. $\tan 75°$

Given: $\tan x = \dfrac{-4}{3}$, where $\dfrac{3\pi}{2} < x < 2\pi$ and $\sin y = \dfrac{15}{17}$, where $\dfrac{\pi}{2} \le y \le \pi$.
Find exact simplified values for:

16. $\cos 2x$ 17. $\sin 4x$ 18. $\sin (x - y)$ 19. $\cos (x + y)$

20. $\tan (y - x)$ 21. $\tan 2x$ 22. $\tan \dfrac{y}{2}$ 23. $\cos \dfrac{y}{2}$

Simplify to a single trig function.

24. $(\sec x - \tan x)(\csc x + 1)$

25. $\dfrac{1}{1 + \sin x} + \dfrac{1}{1 - \sin x}$

Solve for x, if $0 \le x < 2\pi$.

26. $\cos\left(x + \dfrac{\pi}{4}\right) - \cos\left(x - \dfrac{\pi}{4}\right) = 1$ 27. $\cos 2x = -\sin x$

Prove each identity.

28. $\dfrac{\sec x - 1}{\sin^2 x} \equiv \dfrac{\sec^2 x}{1 + \sec x}$ 29. $\cot x + \tan x \equiv 2\csc 2x$

30. $\cos 3x \equiv 4\cos^3 x - 3\cos x$

Answers:

1. $\cos 180°$; -1

2. $\sin 45°$; $\dfrac{\sqrt{2}}{2}$

3. $\cos 120°$; $\dfrac{-1}{2}$

4. $\cot^2 120°$; $\dfrac{1}{3}$

5. $\sin 150°$; $\dfrac{1}{2}$

6. $\cos \dfrac{\pi}{2}$; 0

7. $\tan 240°$; $\sqrt{3}$

8. $\tan 330°$; $\dfrac{-\sqrt{3}}{3}$

9. $\tan 120°$; $-\sqrt{3}$

10. $\sin 300°$; $\dfrac{-\sqrt{3}}{2}$

11. $\dfrac{\sqrt{2}+\sqrt{6}}{4}$

12. $\dfrac{-\sqrt{2}-\sqrt{6}}{4}$

13. $\dfrac{-\sqrt{2-\sqrt{2}}}{2}$

14. $-\sqrt{2}+1$

15. $2+\sqrt{3}$

16. $\dfrac{-7}{25}$

17. $\dfrac{336}{625}$

18. $\dfrac{-13}{85}$

19. $\dfrac{36}{85}$

20. $\dfrac{-13}{84}$

21. $\dfrac{24}{7}$

22. $\dfrac{5}{3}$

23. $\dfrac{3\sqrt{34}}{34}$

24. $\cot x$

25. $2\sec^2 x$

26. $\dfrac{5\pi}{4}, \dfrac{7\pi}{4}$

27. $\dfrac{\pi}{2}, \dfrac{7\pi}{6}, \dfrac{11\pi}{6}$