

HW16: Unit 2 Test Review**Complete on a separate piece of paper. Show all work.**Find the exact value of the indicated trigonometric function of θ .

1. $\cot \theta = -\frac{3}{2}$, $\cos \theta < 0$ Find $\csc \theta$.

2. $\cos \theta = \frac{8}{9}$, $\tan \theta < 0$ Find $\sin \theta$.

3. $\sin \theta = -\frac{2}{9}$, $\tan \theta > 0$ Find $\sec \theta$.

Find the value.

4. $\sin^{-1}\left(\cos \frac{7\pi}{6}\right)$

5. $\cos^{-1}\left(\tan \frac{3\pi}{4}\right)$

6. $\sec\left(\tan^{-1}\left(-\frac{1}{3}\right)\right)$

7. $\tan\left(\sin^{-1}\frac{\sqrt{3}}{2}\right)$

Solve the problem.

8. A radio transmission tower is 230 feet tall. How long should a guy wire be if it is to be attached 14 feet from the top and is to make an angle of 21° with the ground? Give your answer to the nearest tenth of a foot.

9. A ship leaves port with a bearing of $N62^\circ E$. After traveling 15 miles, the ship then turns 90° and travels on a bearing of $S28^\circ E$ for 11 miles. At that time, what is the bearing of the ship from the port? Round to the nearest tenth of a degree.

10. A straight trail with a uniform inclination of 15° from a lodge at an elevation of 800 feet to a mountain lake at an elevation of 7000 feet. What is the length of the trail to the nearest foot?

11. A building of 300 feet tall casts a 60 foot long shadow. If a person stands at the end of the building, what is the angle of the person's eyes to the top of the building to the nearest hundredth of a degree? Assume the person's eyes are 4 feet above ground level.

12. A planes leaves an airport with a bearing of $S41^\circ W$. After traveling 24 miles, the plane turns and travels on a bearing of $N49^\circ W$ for 32 miles. At that time, what is the bearing of the plane from the airport? Round to the nearest tenth of a degree.

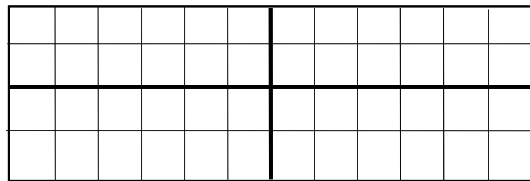
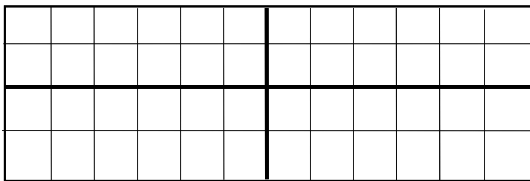
13. Tina is flying a kite. She lets out 45 yards of string and anchors it to the ground. She determines that the angle of elevation of the kite is 58° . What is the height of the kite from the ground? Round your answer to the nearest yard.

14. Two hills are 2 miles apart. The taller hill is 2707 feet high. The angle of depression from the top of the taller hill to the top of the shorter hill is 7° . Find the height of the shorter hill to the nearest foot. (1 mile = 5280 feet)

Graph one period of each function.

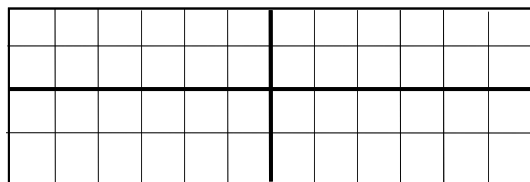
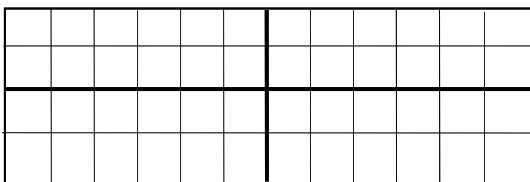
15. $y = -2\cos\left(\frac{x}{3} - \pi\right)$

16. $y = 2\cos\left(\frac{\pi}{2}x - \frac{\pi}{2}\right) - 1$



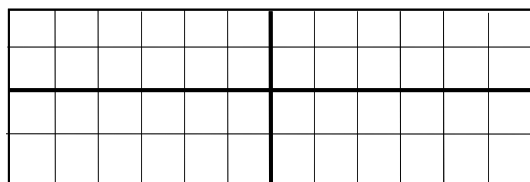
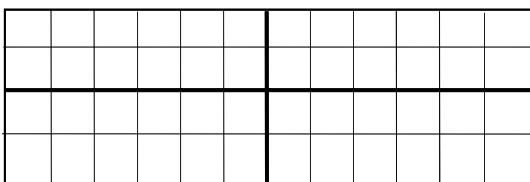
17. $y = -2\tan\left(\frac{x}{4} + \frac{\pi}{2}\right)$

18. $y = 2\csc 3x$



19. $y = -2\sec\left(\frac{x}{3} - \pi\right)$

20. $y = \cot(2x - \pi)$



Verify the following identities.

21. $\sec x - \cos x = \tan x \sin x$

22. $\cos x + \sin x \tan x = \sec x$

23. $\sin^2 \theta (1 + \cot^2 \theta) = 1$

24. $\frac{1 - \tan x}{\sin x} = \csc x - \sec x$

25. $\frac{1}{\sin t - 1} + \frac{1}{\sin t + 1} = -2 \tan t \sec t$

26. $\sin t - \cos 2t = (2 \sin t - 1)(\sin t + 1)$

27. $\frac{\sin 2\theta - \sin \theta}{\cos 2\theta + \cos \theta} = \frac{1 - \cos \theta}{\sin \theta}$

28. $\frac{\cos x - \cos x \sin^2 x}{\sin x} = \cos^2 x \cot x$

29. $1 - \frac{\sin^2 x}{1 + \cos x} = \cos x$

30. $\frac{1 - \cos t}{1 + \cos t} = (\csc t - \cot t)^2$

31. $\csc t + \cot t = \frac{\sin t}{1 - \cos t}$

32. $2 \sin^3 \theta \cos \theta + 2 \sin \theta \cos^3 \theta = \sin 2\theta$

Use sum or difference formulas to find the exact value of the following.

33. $\sin 75^\circ$ 34. $\cos 165^\circ$ 35. $\tan\left(\frac{5\pi}{4} + \frac{\pi}{6}\right)$ 36. $\tan(315^\circ - 120^\circ)$

Use double or half angle formulas to find the exact value of the following.

37. $\cos^2 15^\circ - \sin^2 15^\circ$ 38. $\sin 22.5^\circ$ 39. $\tan\left(\frac{7\pi}{12}\right)$ 40. $\frac{2 \tan \frac{5\pi}{12}}{1 - \tan^2 \frac{5\pi}{12}}$

41. $1 - 2\sin^2\left(\frac{5\pi}{8}\right)$ 42. $\cos 157.5^\circ$ 43. $\tan 67.5^\circ$

44. Given that $\tan \alpha = \frac{4}{3}$, α lies in quadrant III, find the value of $\sin 2\alpha$ and $\cos 2\alpha$.

45. Given that $\cot \beta = -\frac{24}{7}$, β lies in quadrant IV, find the value of $\sin \frac{\beta}{2}$ and $\cos \frac{\beta}{2}$.

Find all solutions to the equations.

46. $\sqrt{3} \tan x - 1 = 0$ 47. $\cos x - 5 = 3 \cos x - 6$

Solve each equation on the interval $[0, 2\pi)$.

48. $2 \sin 2x + \sqrt{3} = 0$ 49. $2 \cos^2 x + \sin x = 1$ 50. $\sin 2x = \sin x$

51. $\sin x + \cos x = -1$ 52. $\sin x \cos x = -\frac{1}{4}$ 53. $\tan x \csc x = 2 \tan x$

Answers

1. $\frac{\sqrt{13}}{2}$

2. $-\frac{\sqrt{17}}{9}$

3. $-\frac{9\sqrt{77}}{77}$

4. $-\frac{\pi}{3}$

5. π

6. $\frac{\sqrt{10}}{3}$

7. $\sqrt{3}$

8. 602.7 feet

9. S82°E

10. 23,955 feet

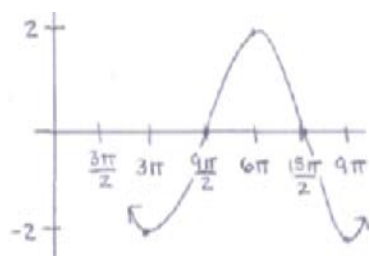
11. 78.54°

12. N86°W

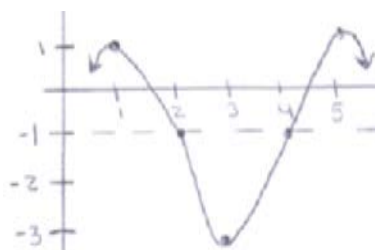
13. 38 feet

14. 1410 feet

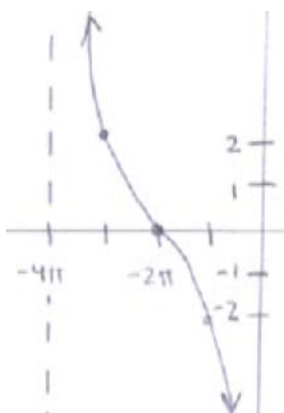
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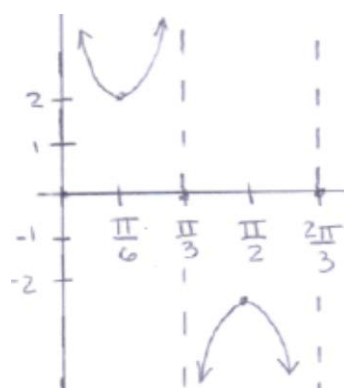
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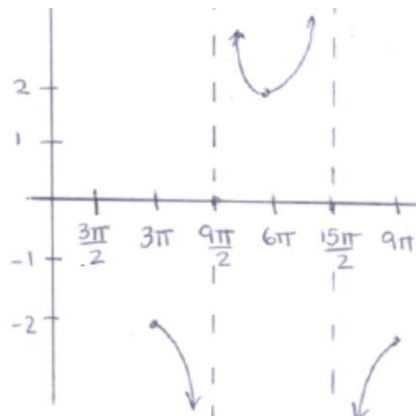
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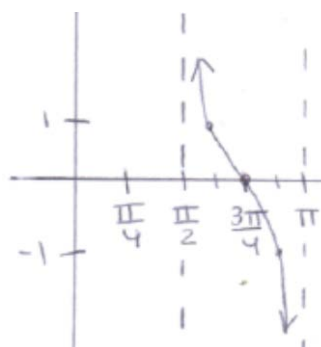
18.



19.



20.



33. $\frac{\sqrt{2}+\sqrt{6}}{4}$

34. $\frac{-\sqrt{2}-\sqrt{6}}{4}$

35. $\frac{3+\sqrt{3}}{3-\sqrt{3}}=2+\sqrt{3}$

36. $\frac{-1+\sqrt{3}}{1+\sqrt{3}}=2-\sqrt{3}$

37. $\frac{\sqrt{3}}{2}$

38. $\frac{\sqrt{2-\sqrt{2}}}{2}$

39. $-2-\sqrt{3}$

40. $-\frac{\sqrt{3}}{3}$

41. $-\frac{\sqrt{2}}{2}$

42. $-\frac{\sqrt{2+\sqrt{2}}}{2}$

43. $\sqrt{2}+1$

44. $\sin 2\alpha = \frac{24}{25}, \cos 2\alpha = -\frac{7}{25}$

45. $\sin \frac{\beta}{2} = \frac{\sqrt{2}}{10}, \cos \frac{\beta}{2} = -\frac{\sqrt{98}}{10}$

46. $x = \frac{\pi}{6} + n\pi$

47. $x = \frac{\pi}{3} + 2n\pi, x = \frac{5\pi}{3} + 2n\pi$

48. $x = \frac{2\pi}{3}, \frac{5\pi}{3}, \frac{5\pi}{6}, \frac{11\pi}{6}$

49. $x = \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$

50. $x = 0, \pi, \frac{\pi}{3}, \frac{5\pi}{3}$

51. $x = \pi, \frac{3\pi}{2}$

52. $x = \frac{7\pi}{12}, \frac{19\pi}{12}, \frac{11\pi}{12}, \frac{23\pi}{12}$

53. $x = \frac{\pi}{6}, \frac{5\pi}{6}$