

MONTGOMERY COLLEGE
Department of Mathematics
Rockville Campus

MA 105
Trigonometry

FINAL REVIEW

Fall 2009

1-3. Convert the measure of each angle to exact radian measure.

1. 15° 2. -225° 3. 315°

4-5. Convert the radian measure of each angle to degree measure.

4. $\frac{3\pi}{8}$ 5. 1.5 6. 5.25

7. A 15-foot ladder is resting against a wall. The top of the ladder is 14 feet from the ground. What angle does the ladder make with the wall?

8. From a point 300 feet from the base of a Roman aqueduct in southern France, the angle of elevation to the top of the aqueduct is 78° . Find the height of the aqueduct.

9. Find the six trigonometric function values for the angle θ whose terminal side passes through point $P(-8, -5)$.

10. Use the unit circle to find the exact values of $\sin \theta$, $\cos \theta$, and $\tan \theta$.

a. $\theta = \pi$ b. $\theta = \frac{3\pi}{4}$ c. $\theta = \frac{5\pi}{6}$

11-14. Use a calculator to evaluate the following expressions to 4 decimal places.

11. $\sin 127^\circ$ 12. $\cos(-116^\circ)$ 13. $\sec(-4.45)$ 14. $\csc 0.34$

15-19. Find two values of θ , $0 \leq \theta < 2\pi$, that satisfy the given trigonometric equation.

15. $\sin \theta = \frac{1}{2}$

16. $\cos \theta = -\frac{\sqrt{3}}{2}$

17. $\tan \theta = -\frac{\sqrt{3}}{3}$

18. $\tan \theta = 1$

19. $\sin \theta = -\frac{1}{2}$

20. Graph the following functions and state the domain, range, amplitude, and period.

a. $y = 2\sin x$ b. $y = \frac{1}{2}\cos x$

21. Solve the equations for all values in the interval $0 \leq \theta < 2\pi$.

- a. $2 \sin \theta - \sqrt{2} = 0$
- b. $\cos \theta = 0.6725$
- c. $2 \cos \theta + 1 = 0$
- d. $2 \tan \theta + 5 = 0$

22. Use the definition of $\sin \theta = \frac{y}{r}$, $\cos \theta = \frac{x}{r}$, and $\tan \theta = \frac{y}{x}$ to prove the identities.

- a. $\sin^2 \theta + \cos^2 \theta = 1$
- b. $\tan \theta = \frac{\sin \theta}{\cos \theta}$
- c. $1 + \tan^2 \theta = \sec^2 \theta$
- d. $1 + \cot^2 \theta = \csc^2 \theta$

23. Multiply and simplify.

- a. $(\sin \theta - \cos \theta)(\sin \theta + \cos \theta)$
- b. $(\sin \theta - \cos \theta)^2$
- c. $(1 + \tan \theta)^2$
- d. $\tan \theta(\cos \theta - \csc \theta)$

Answers

- 1. $\frac{\pi}{12}$
- 2. $-\frac{5\pi}{4}$
- 3. $\frac{7\pi}{4}$
- 4. 67.5°
- 5. 85.94°
- 6. 300.80°
- 7. 21°
- 8. 1411 ft.

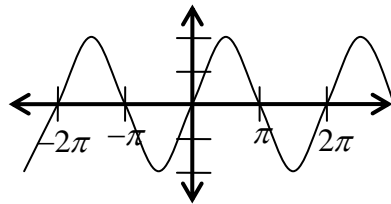
9. $\sin \theta = \frac{-5}{\sqrt{89}} = \frac{-5\sqrt{89}}{89}$ $\csc \theta = \frac{-\sqrt{89}}{5}$
 $\cos \theta = -\frac{8}{\sqrt{89}} = \frac{-8\sqrt{89}}{89}$ $\sec \theta = \frac{-\sqrt{89}}{8}$
 $\tan \theta = \frac{5}{8}$ $\cot \theta = \frac{8}{5}$

10. a. $\sin \pi = 0$ $\cos \pi = -1$ $\tan \pi = 0$
 b. $\sin \frac{3\pi}{4} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ $\cos \frac{3\pi}{4} = -\frac{1}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$ $\tan \frac{3\pi}{4} = -1$
 c. $\sin \frac{5\pi}{6} = \frac{1}{2}$ $\cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$ $\tan \frac{5\pi}{6} = -\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$

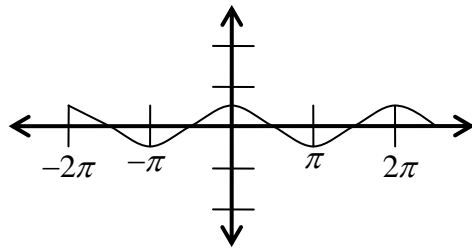
11. 0.7986 12. -0.4384 13. -3.8552 14. 2.9986
15. $\frac{\pi}{6}, \frac{5\pi}{6}$ 16. $\frac{5\pi}{6}, \frac{7\pi}{6}$ 17. $\frac{5\pi}{6}, \frac{11\pi}{6}$ 18. $\frac{\pi}{4}, \frac{5\pi}{4}$

19. $\frac{7\pi}{6}, \frac{11\pi}{6}$

20. a. Domain = \mathbb{R} Range $-2 \leq y \leq 2$ Amplitude = 2 Period = 2π



- b. Domain = \mathbb{R} Range $-\frac{1}{2} \leq y \leq \frac{1}{2}$ Amplitude = $\frac{1}{2}$ Period = 2π



21. a. $\frac{\pi}{4}, \frac{3\pi}{4}$
 b. .8332, 5.450
 c. $\frac{2\pi}{3}, \frac{4\pi}{3}$
 d. 1.9513, 5.0929

23. a. $\sin^2 \theta - \cos^2 \theta$ or $1 - 2\cos^2 \theta$ or $2\sin^2 \theta - 1$
 b. $1 - 2\sin \theta \cos \theta$
 c. $\sec^2 \theta + 2 \tan \theta$
 d. $\sin \theta - \sec \theta$