

1. Solve for  $x$ .
- $x = 3$
  - $x = 5$
  - $x = 1$
  - $x = 7$
  - $x = 6$
2. For points  $(x, y)$  in the Cartesian plane, in what quadrant(s) is the ratio  $\frac{x}{y}$  always positive?
- II
  - IV and III
  - I and III
  - IV
  - II and IV
3. In which quadrant(s) must the terminal side of  $\theta$  lie if  $\cos \theta$  and  $\cot \theta$  are to have different sign?
- II and III
  - I and II
  - I and IV
  - III and IV
  - II
4. Find an angle  $0^\circ \leq \theta \leq 90^\circ$  for which  $\tan(2\theta) = 1$ .
- $12.5^\circ$
  - $22.5^\circ$
  - $45^\circ$
  - $60^\circ$
  - $30^\circ$
5. If  $\sin \theta = -\frac{5}{13}$  and  $\theta$  terminates in quadrant III, find  $\cos \theta$ .
- $\frac{11}{13}$
  - $\frac{5}{12}$
  - $-\frac{11}{13}$
  - $-\frac{12}{13}$
  - $\frac{12}{13}$
6. If  $\cos \theta = -\frac{1}{3}$  and  $\theta$  does not terminate in quadrant II, find  $\tan \theta$ .
- $-2\sqrt{5}$
  - $3\sqrt{2}$
  - $2\sqrt{5}$
  - $-2\sqrt{2}$
  - $2\sqrt{2}$
7. Simplify  $\frac{\csc \theta}{\sec \theta}$ .
- $\frac{1}{\cos^2 \theta}$
  - $\cos \theta$
  - $\cot \theta$
  - $\sin \theta$
  - $\tan \theta$
8. Determine which one of the following equals  $\csc \beta - \sin \beta$ .
- $\cot^2 \beta$
  - $\frac{\cos^2 \beta}{\sin \beta}$
  - $\csc^2 \beta$
  - $\tan^2 \beta$
  - $\frac{\sin^2 \beta}{\cos \beta}$
9. Use the Cofunction Theorem to fill in the blank  $\sin 35^\circ = \cos \underline{\hspace{2cm}}^\circ$  so that the expression becomes a true statement.
- $55^\circ$
  - $50^\circ$
  - $45^\circ$
  - $40^\circ$
  - $75^\circ$
10. Find the exact value for  $\csc 45^\circ$ .
- $-5\sqrt{2}$
  - 0
  - $-\sqrt{2}$
  - $5\sqrt{3}$
  - $\sqrt{2}$

11. In the figure, the distance from  $A$  to  $D$  is  $y$ , the distance from  $D$  to  $C$  is  $x$ , and the distance from  $C$  to  $B$  is  $h$ . If  $A = 45^\circ$ ,  $\angle BDC = 60^\circ$ ,  $AB = 16$  and  $DB = 12$ , find  $y$ .
- $6(\sqrt{3} + 1)$
  - $\sqrt{3} + \sqrt{2}$
  - $\frac{\sqrt{3}}{2}$
  - $6(\sqrt{3} - 1)$
  - 4
12. How long should an escalator be if it is to make an angle of  $27^\circ$  with the floor and carry people a vertical distance of 17 feet between floors?
- $17 \sec 27^\circ$
  - $17 \sin 27^\circ$
  - $17 \csc 27^\circ$
  - $17 \cos 27^\circ$
  - $17 \tan 27^\circ$
13. Find the exact value of  $\tan 480^\circ$ .
- $\frac{\sqrt{3}}{2}$
  - $\frac{\sqrt{3}}{3}$
  - $-\frac{\sqrt{3}}{2}$
  - $\sqrt{3}$
  - $-\sqrt{3}$
14. Find  $\theta$ , if  $0^\circ < \theta < 360^\circ$ ,  $\sin \theta = \frac{\sqrt{3}}{2}$  and  $\theta$  is in quadrant II.
- $120^\circ$
  - $30^\circ$
  - $150^\circ$
  - $330^\circ$
  - $240^\circ$
15. Two cities are approximately 600 miles apart on the surface of the earth. Assuming that the radius of the earth is 4000 miles, find the radian measure of the central angle with its vertex at the center of the earth that has one city on one side and another one on the other side.
- $\frac{7}{50}$  radians
  - $\frac{3}{10}$  radians
  - $\frac{3}{20}$  radians
  - $\frac{1}{5}$  radians
  - $2\pi$
16. Determine the reference angle for  $\theta = 170^\circ$  in radians.
- $-\frac{\pi}{18}$
  - $\frac{\pi}{18}$
  - $\frac{\pi}{9}$
  - $\frac{\pi}{3}$
  - $-\frac{\pi}{3}$
17. Find all values of  $\theta$  between 0 and  $2\pi$  for which  $\sin \theta = \frac{\sqrt{3}}{2}$ .
- $\frac{5\pi}{6}, \frac{7\pi}{6}$
  - $\frac{7\pi}{6}, \frac{11\pi}{6}$
  - $\frac{\pi}{3}, \frac{2\pi}{3}$
  - $\frac{\pi}{6}, \frac{11\pi}{6}$
  - $\frac{\pi}{3}$
18. Find the algebraic expression below that is equal to  $\sec \alpha - \cos(-\alpha)$ .
- $\frac{\cos^2 \alpha}{\sin \alpha}$
  - $\tan^2 \alpha$
  - $\frac{1}{\cos \alpha}$
  - $\frac{\sin^2 \alpha}{\cos \alpha}$
  - $\frac{1}{\sin \alpha}$

19. If  $\theta = 10$  radians is a central angle that cuts off an arc of length 5 feet, find the radius of the circle.

a)  $\frac{1}{2}$  ft.

b)  $\frac{1}{4}$  ft.

c)  $\frac{2}{5}$  ft.

d)  $\frac{1}{5}$  ft.

e) 10 ft.

20. Find the angular velocity associated with 9.1 rpm.

a)  $18.2\pi$  rad/min

b) 9 rad/min

c)  $2\pi$  rad/min

d)  $9.1\pi$  rad/min

e) 2 rad/min