

KCATM 2011
Trigonometry

1. If the tangent of an angle is negative and its secant is positive, in which quadrant does the angle terminate?
 - a) I
 - b) II
 - c) III
 - d) IV

2. Find the exact value of $\sec 60^\circ + \cot 45^\circ + \csc 30^\circ$
 - a) 1
 - b) 2
 - c) $\frac{3}{2} + \frac{\sqrt{3}}{2}$
 - d) 5

3. What is the value of $\sin(-240^\circ)$?
 - a) $\frac{1}{2}$
 - b) $-\frac{1}{2}$
 - c) $\frac{\sqrt{3}}{2}$
 - d) $-\frac{\sqrt{3}}{2}$

4. Expressed in radian measure 225° is
 - a) $\frac{\pi}{4}$
 - b) $\frac{3\pi}{4}$
 - c) $\frac{5\pi}{4}$
 - d) $-\frac{7\pi}{4}$

5. What is the value of $\sin \frac{3\pi}{2} + \cos \frac{2\pi}{3}$?
 - a) $\frac{1}{2}$
 - b) $-\frac{1}{2}$
 - c) $\frac{3}{2}$
 - d) $-\frac{3}{2}$

6. What is the value of $\text{Arc sin}\left(-\frac{\sqrt{2}}{2}\right)$?
- a) $\frac{\pi}{4}$
 - b) $-\frac{\pi}{4}$
 - c) $\frac{\pi}{2}$
 - d) $-\frac{3\pi}{4}$
7. The expression $(1 + \cos \theta)(1 - \cos \theta)$ is equivalent to
- a) 1
 - b) $\sec^2 \theta$
 - c) $\sin^2 \theta$
 - d) $\csc^2 \theta$
8. The expression $\cos(10^\circ)$ is equivalent to
- a) $\cos 80^\circ \cos 70^\circ - \sin 80^\circ \sin 70^\circ$
 - b) $\cos 80^\circ \cos 70^\circ + \sin 80^\circ \sin 70^\circ$
 - c) $\sin 80^\circ \cos 70^\circ + \cos 80^\circ \sin 70^\circ$
 - d) $\sin 80^\circ \cos 70^\circ - \cos 80^\circ \sin 70^\circ$
9. If $\cos \alpha = \frac{12}{13}$ and $\sin \beta = \frac{4}{5}$ with both angles in quadrant I, then $\sin(\alpha - \beta)$ equals
- a) $\frac{72}{65}$
 - b) $\frac{56}{65}$
 - c) $-\frac{16}{65}$
 - d) $-\frac{33}{65}$
10. What value of x in the interval $0^\circ \leq x \leq 180^\circ$ satisfies the equation $\sqrt{3} \tan x + 1 = 0$?
- a) -30°
 - b) 30°
 - c) 120°
 - d) 150°

11. What is the amplitude of the graph $y = 2\sin(x) - 1$?
- a) -1
 - b) 1
 - c) 2
 - d) 3
12. What is the period of the graph $y = -\cos(2x)$?
- a) -2π
 - b) π
 - c) 2π
 - d) 4π
13. Which value of x is NOT in the domain of the function $y = \tan(x)$?
- a) 0
 - b) $\frac{\pi}{2}$
 - c) π
 - d) $\frac{2\pi}{3}$
14. In $\triangle ABC$, $m\angle A = 120^\circ$, $b = 10$ ", and $c = 18$ ". What is the area of the triangle to the nearest square inch?
- a) 52
 - b) 78
 - c) 90
 - d) 156
15. In $\triangle ABC$, $m\angle A = 45^\circ$, $m\angle B = 30^\circ$, and $a = 10$. What is the length of side b ?
- a) 7.071
 - b) 8.660
 - c) 14.142
 - d) 17.321
16. In $\triangle ABC$, $a = 2$, $b = 4$, and $c = 2\sqrt{7}$. Find the largest angle of the triangle?
- a) 60°
 - b) 120°
 - c) 150°
 - d) 30°

17. A flower bed is planted in the shape of an arc along the edge of a circular walkway. If the circle has a radius of 5 yards and the angle subtended by the arc measures 1.5 radians, what is the length, in yards, of the border?
- a) 0.5
 - b) 2.0
 - c) 5.0
 - d) 7.5
18. The expression $\sin 2A - 2\sin A$ is equivalent to...
- a) $(2\sin A)(\cos A - 1)$
 - b) $(\sin A)(\sin A - 2)$
 - c) $(2\sin A)(\sin A - 1)$
 - d) $(\sin A)(2\cos A - 1)$
19. The graph of the function $y = 3\sin(2x + \pi)$ will display a horizontal shift of
- a) π units to the left
 - b) π units to the right
 - c) $\pi/2$ units to the left
 - d) $\pi/2$ units to the right
20. You must cut a triangle out of a sheet of paper. The only requirements you must follow are that one of the angles must be 60 degrees, the side opposite the 60 degree angle must be 40 centimeters, and one of the other sides must be 15 centimeters. How many different triangles can you make?
- a) 1
 - b) 2
 - c) 3
 - d) 0
21. Al is standing 50 yards from a maple tree and 30 yards from an oak tree in a park. If he is looking at the maple tree, he needs to turn his head 120 degrees to look at the oak tree. How many yards apart are the two trees?
- a) 58.3
 - b) 65.2
 - c) 70
 - d) 75

22. $y = \csc(x)$ is...

- a) odd
- b) even
- c) Both even and odd
- d) Neither even nor odd

23. Given that θ is an angle in standard position with the terminal side passing through the point $(-7, -3)$, find $\sec \theta$.

- a) $-\frac{7\sqrt{58}}{58}$
- b) $-\frac{\sqrt{58}}{3}$
- c) $-\frac{\sqrt{58}}{7}$
- d) $\frac{3}{7}$

24. A guitar string is plucked so that it vibrates with a frequency of $F = 67$. Suppose the maximum displacement at the center of the string is $s(0) = 0.55$. Find an equation of the form $s(t) = a \cos(bt)$ to model this displacement. Round constants to 2 decimal places.

- a) $s(t) = 1.10 \cos(10.66t)$
- b) $s(t) = 0.55 \cos(420.97t)$
- c) $s(t) = 0.55 \cos(10.66t)$
- d) $s(t) = 1.10 \cos(420.97t)$

25. For a given circle, the radius is 10 cm and the arc length is 50 cm. Find the measurement of θ , the interior angle, in radian measurement.

- a) 5π
- b) 500π
- c) 500
- d) 5