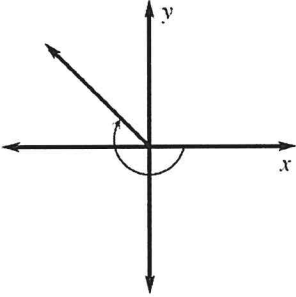


Trigonometry Test Repair**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- An arc on the unit circle is $\frac{3\pi}{4}$ units long. What is the radian measure of the arc's central angle?
 - $\frac{\pi}{4}$ radian
 - $\frac{3\pi}{4}$ radians
 - 3π radians
 - $\frac{3}{4}$ radian
- An arc on the unit circle is $\frac{4\pi}{3}$ units long. What is the degree measure of the arc's central angle?
 - 60°
 - 120°
 - 240°
 - 300°
- On the unit circle, a central angle θ in standard position intercepts an arc that is 2 units long. If you reflect angle θ across the y -axis to create a new angle α in standard position, what is the measure of α ?
 - $2 - 2\pi$ radians
 - $2 - \pi$ radians
 - $\pi - 2$ radians
 - $2\pi - 2$ radians
- Which expression has the same value as $\tan\left(-\frac{\pi}{3}\right)$?
 - $-\tan\left(\frac{\pi}{3}\right)$
 - $\tan\left(\frac{\pi}{3}\right)$
 - $-\cos\left(\frac{\pi}{3}\right)$
 - $-\sin\left(\frac{\pi}{3}\right)$
- Which angle measure is shown in the diagram?
 - $-\frac{5\pi}{4}$ radians
 - $-\frac{3\pi}{4}$ radians
 - $\frac{\pi}{4}$ radians
 - $\frac{3\pi}{4}$ radians
 - $\frac{5\pi}{4}$ radians

6. Which of the following always has the same value as $\sin \theta$?
- $\sin\left(\theta + \frac{\pi}{2}\right)$
 - $\sin(\theta + \pi)$
 - $\sin\left(\theta + \frac{3\pi}{2}\right)$
 - $\sin(\theta + 2\pi)$
7. What is the exact value of $\sin \frac{\pi}{3}$?
- $\frac{2\sqrt{3}}{3}$
 - $\frac{\sqrt{3}}{2}$
 - $\sqrt{3}$
 - $\frac{1}{2}$
8. Which has the same value as $\sin \frac{\pi}{6}$?
- $\cos \frac{\pi}{6}$
 - $\cos \frac{\pi}{3}$
 - $\sin \frac{\pi}{3}$
 - $-\sin \frac{\pi}{6}$
9. Which has the same value as $\tan \frac{\pi}{4}$?
- $\tan \frac{3\pi}{4}$
 - $\tan \frac{5\pi}{4}$
 - $\tan \frac{7\pi}{4}$
 - $-\tan \frac{\pi}{4}$
10. Which expression has the same value as $\tan(-x)$ for all values for x ?
- $-\tan x$
 - $-\tan(-x)$
 - $\tan\left(x - \frac{\pi}{4}\right)$
 - $\tan\left(x + \frac{\pi}{2}\right)$
11. Which expression has the same value as $\cos(-x)$ for all values for x ?
- $\cos x$
 - $-\cos x$
 - $\cos(x + \pi)$
 - $\sin x$
12. Fyzodeen places a ladder against his house in order to clear his gutters of leaves. The ladder just reaches the top of the gutters 23 feet above the ground and the base of the ladder is 11 feet from the house. Which is the best approximation of the angle that the ladder makes with the ground?
- 26°
 - 29°
 - 61°
 - 64°
13. Kate leans a ladder against her house to get on to the roof. The house is 25 feet tall and the foot of the ladder is 15 feet away from the side of the house. Which is the angle that the ladder makes with the ground?
- 31°
 - 37°
 - 53°
 - 59°
14. Given that $\sin \theta = -\frac{5}{13}$ and $\frac{3\pi}{2} < \theta < 2\pi$, which of the following is true?
- $\cos \theta = -\frac{12}{13}$
 - $\tan \theta = \frac{12}{5}$
 - $\sec \theta = -\frac{5}{13}$
 - $\cot \theta = -\frac{12}{5}$

15. Given that $\sin \theta = 0.3817$ and $\frac{\pi}{2} < \theta < \pi$, what is the approximate value of $\cos \theta$?
- 0.9243
 - 0.8543
 - 0.8543
 - 0.9243
16. Given that $\cos \theta = 0.7087$ and $\frac{3\pi}{2} < \theta < 2\pi$, what is the approximate value of $\sin \theta$?
- 0.7055
 - 0.4977
 - 0.4977
 - 0.7055
17. Given that $\tan \theta = 3.0096$ and $0 < \theta < \frac{\pi}{2}$, what is the approximate value of $\cos \theta$?
- 0.3153
 - 0.0994
 - 0.0994
 - 0.3153
18. Which value is equal to $-\cos(-73^\circ)$?
- $-\cos(73^\circ)$
 - $\cos(-73^\circ)$
 - $\cos(-146^\circ)$
 - $\cos(73^\circ)$
19. Which value is equal to $-\tan(148^\circ)$?
- $\tan(296^\circ)$
 - $\tan(148^\circ)$
 - $-\tan(-148^\circ)$
 - $\tan(-148^\circ)$

Multiple Response

Identify one or more choices that best complete the statement or answer the question.

1. Which arc lengths on the unit circle have central angles with measures less than 180° ?
- $\frac{\pi}{2}$
 - $\frac{11\pi}{6}$
 - $\frac{3\pi}{4}$
 - $\frac{5\pi}{3}$
 - $\frac{3\pi}{2}$
 - $\frac{5\pi}{6}$
 - $\frac{\pi}{6}$
 - 2π
2. Which angles have the same trigonometric values as $\theta = \frac{3\pi}{4}$?
- $\alpha = \frac{11\pi}{4}$
 - $\alpha = \frac{63\pi}{4}$
 - $\alpha = -\frac{25\pi}{4}$
 - $\alpha = -\frac{5\pi}{4}$
 - $\alpha = \frac{35\pi}{4}$
 - $\alpha = -\frac{9\pi}{4}$

Numeric Response

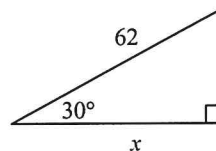
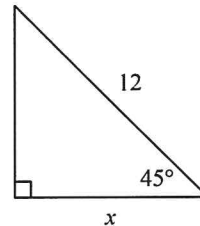
1. A hiking trail has a slope of $\frac{7}{32}$. What is the measure of the angle that the trail makes with a horizontal line? Round to the nearest degree.

Short Answer

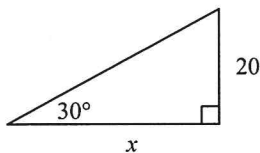
- Convert $\frac{13\pi}{6}$ radians to degrees.
- Convert $\frac{5\pi}{6}$ radians to degrees.
- An analog watch had been running fast and needed to be set back. In resetting the watch, the minute hand on the watch subtended an arc of $\frac{5\pi}{3}$ radians.

Part A: Suppose the radius of the watch is 1 unit. What is the length of the arc on the outside of the watch that the angle subtends?

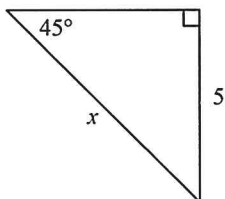
Part B: If the watch was at 10:55 before being reset, what is the new time on the watch?
- What is the exact value of $\tan\left(\frac{5\pi}{4}\right)$?
- What is the exact value of $\cos\left(\frac{5\pi}{6}\right)$?
- The coordinates of a point on the unit circle are $\left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$. What standard position angle, in the interval $[0, 2\pi)$, corresponds to this point?
- What is the reference angle corresponding to $\frac{7\pi}{4}$?
- The minute hand on a tower's clock is 11.25 feet long. To the nearest tenth of a foot, how far does the tip of the minute hand travel in 142 minutes?
- Moving counter-clockwise along the unit circle, in which two quadrants will the value of sine increase?
- A square is inscribed in the unit circle. Each vertex lies in a different quadrant. One vertex of the square is at the point $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$. What are the coordinates of the vertex in Quadrant III?
- For which radian measures x will $\tan x$ be negative?
- What is the exact value of $\sin\frac{\pi}{4}$?
- Use a special right triangle to write $\tan 60^\circ$ as a fraction.
- Which is equivalent to x ?



16. Which is equivalent to
- x
- ?



17. Which is equivalent to
- x
- ?



18. In which two quadrants is
- $\tan x$
- positive?

19. In which two quadrants is
- $\sin x$
- negative?

20. Find all possible values of
- $\sin^{-1}(1/2)$
- between 0 and
- 2π
- .

21. Find all possible values of
- $\cos^{-1}(1/2)$
- between 0 and
- 2π
- .

22. Given the restriction
- $180^\circ < \theta < 360^\circ$
- , solve
- $\cos \theta = 0.913$
- to the nearest tenth.

23. Given the restriction
- $90^\circ < \theta < 270^\circ$
- , solve
- $\sin \theta = -0.718$
- to the nearest tenth.

24. Given the restriction
- $180^\circ < \theta < 360^\circ$
- , solve
- $\tan \theta = 5.79$
- to the nearest tenth.

25. Find
- $\sin^{-1}(\sin 133^\circ)$
- .

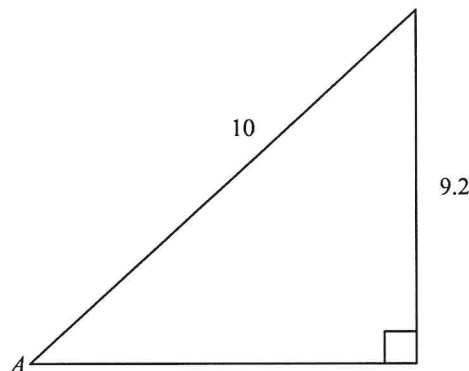
26. Find
- $\cos^{-1}(\cos(-69^\circ))$
- .

27. Find
- $\tan^{-1}(\tan(189^\circ))$
- .

28. Find
- $\sin^{-1}(\sin(-84^\circ))$
- .

29. Solve the equation
- $\sin \theta = 0.3$
- to the nearest tenth. Use the restrictions
- $90^\circ < \theta < 180^\circ$
- .

- 30.



A bird's nest is 10 meters away from you at a height of 0.92 meters. To find the angle of elevation to the nest, find $\sin^{-1}(0.92)$ to the nearest degree.

31. You can use trigonometry to measure the height of a pyramid in Egypt.

[1.] An archaeologist positions himself 260 ft from the base of a pyramid so that his eye level is 5 ft above the ground. If the pyramid is 500 feet in height, what would be the angle of elevation from the archaeologist to the top of the pyramid?

[2.] The angle of elevation from the eye level of an archaeologist to the top of a pyramid whose base is 400 feet away is 50° . To the nearest foot, what is the height of the pyramid?

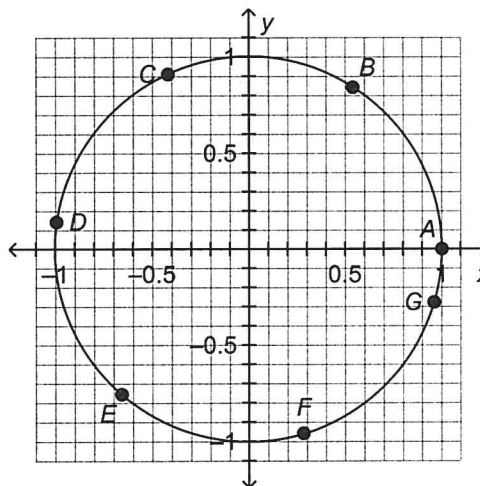
32. Use your calculator to find the angle measures
- $\sin^{-1}(0.7)$
- ,
- $\cos^{-1}(0.3)$
- , and
- $\tan^{-1}(38.4)$
- to the nearest tenth of a degree.

33. A road rises vertically 45 feet over a horizontal distance of 750 feet. What is the angle of elevation of the road? Round to the nearest tenth of a degree.

34. Charles is trying to get his kite out of a tree. The kite is 12 feet above him and he's standing 10 feet from the tree. If he could throw a ball in a straight line, at what angle would he throw it in order to hit the kite?

35. Eileen uses a laser pointer to identify a point 3.6 feet above her on a screen that is 6.7 feet across the room from her. At what angle is she holding the laser pointer?
36. Evaluate $\tan \theta$ when $\cos \theta = -0.1$ and θ is in Quadrant III. If necessary, round your answer to the nearest tenth.
37. Evaluate $\tan \theta$ when $\cos \theta = 0.6$ and θ is in Quadrant II. If necessary, round your answer to the nearest tenth.
38. Convert $\frac{3\pi}{8}$ radians to degrees.
39. Convert $\frac{16\pi}{3}$ radians to degrees.
40. Find the arc length of a sector with a radius of 7 feet and a central angle of 36° .
41. Find the arc length and area of a sector with the given radius r and central angle θ .
 $r = 2$ in., $\theta = 45^\circ$
42. Find the arc length and area of a sector with the given radius r and central angle θ .
 $r = 9$ ft, $\theta = 120^\circ$
43. Find the arc length and area of a sector with radius r and central angle θ . $r = 5$, $\theta = \frac{\pi}{3}$
44. Find the arc length and area of a sector with radius r and central angle θ . $r = 10$, $\theta = 50^\circ$
45. Find the arc length and area of a sector with the given radius r and central angle θ .
 $r = 20$ cm, $\theta = 45^\circ$

46. Describe how to find the values of the following trigonometric expressions using the unit circle. Then, find the values.
 - a. $\sin \frac{14\pi}{3}$
 - b. $\cos \frac{59\pi}{6}$
47. On the graph shown, the points $A, B, C, D, E, F,$ and G mark off arc lengths of 1 unit counterclockwise from A to G along the unit circle. Use the graph to estimate the following trigonometric function values to the nearest tenth.



- a. $\sin 1$
 - b. $\cos 6$
 - c. $\tan 2$
 - d. $\tan 5.5$
48. A student evaluates $\cos \frac{19\pi}{6}$ by repeatedly subtracting π from the angle until the result is between 0 and π , as shown. Explain why this is incorrect and find the correct value.

$\cos \frac{19\pi}{6} = \cos \frac{13\pi}{6} = \cos \frac{7\pi}{6} = \cos \frac{\pi}{6} = \frac{\sqrt{3}}{2}$

49. Verify the identity $1 - \sin^2(-\theta) = \cos^2(-\theta)$.