ALBERT

Name _____ Date _____

Radian Measure Worksheet

Algebra 2 · Common Core HSF-TF.A.1

> Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

Practice

Builds the skill step by step.

1. Write 90° in radians as kπ. What is k?

2. Write 60° in radians as kπ. What is k?

3. How many degrees is $\frac{\pi}{4}$ radians?

4. An angle of 2 radians is drawn at the center of the unit circle. How long is the arc it subtends?

5. What is one radian?

   A. 1/360 of a full turn

   B. the angle in an equilateral triangle

   C. exactly 60°

   D. the central angle whose arc is as long as the radius

6. Write 270° in radians as kπ. What is k?

7. How many degrees is $\frac{2\pi}{3}$ radians?

8. A full turn is $k\pi$ radians. What is k?

9. A circle has radius 5. How long is the arc subtended by a central angle of 2 radians?

10. Write 30° in radians as $k\pi$. What is k?

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On Level

Grade-level practice.

1. A circle has radius 4. A central angle subtends an arc of length 6. What is the angle in radians?

2. A circle has radius 3. The arc subtended by a central angle of $\frac{\pi}{3}$ has length $k\pi$. What is k?

3. Using $\pi \approx 3.14$, how many degrees is 1 radian, to the nearest tenth?

4. Write 225° in radians as $k\pi$. What is k?

5. How many degrees is $\frac{5\pi}{6}$ radians?

6. Explain why a full circle measures 2π radians.

7. A wheel of radius 10 inches turns through an angle of 3 radians. How far does a point on its rim travel?

8. Which angle is larger?

   A. 2 radians

   B. 100°

   C. They are equal.

   D. It can't be told.

9. How many degrees is $-\frac{\pi}{2}$ radians?

10. The minute hand of a clock turns for 15 minutes. It turns through $k\pi$ radians. What is k?

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Challenge

Multi-step and word problems that stretch it.

1. A circle has radius 6. The arc subtended by a 150° central angle has length $k\pi$. What is k?

2. A sector has radius 4 and central angle $\frac{\pi}{4}$. Its area, $A = \frac{1}{2}r^2\theta$, is $k\pi$. What is k?

3. Earth turns 2π radians in 24 hours. In 8 hours it turns $k\pi$ radians. What is k?

4. The angle between 0 and 2π that is coterminal with $-\frac{\pi}{4}$ is $k\pi$. What is k?

5. A 2-meter pendulum swings through 0.3 radians. How long is the arc its tip travels?

6. The radius of a circle doubles but the central angle stays the same. What happens to the arc length?

   A. It stays the same.

   B. It doubles.

   C. It halves.

   D. It quadruples.

7. Using $\pi \approx 3.14$, how many degrees is 1.5 radians, to the nearest degree?

8. Describe what an angle of 3 radians looks like on the unit circle.

9. A bicycle wheel of radius 0.35 meters turns 10 full revolutions. The bike travels $k\pi$ meters. What is k?

10. A wheel of radius 0.5 meters turns at 4 radians per second. How fast does a point on its rim move?