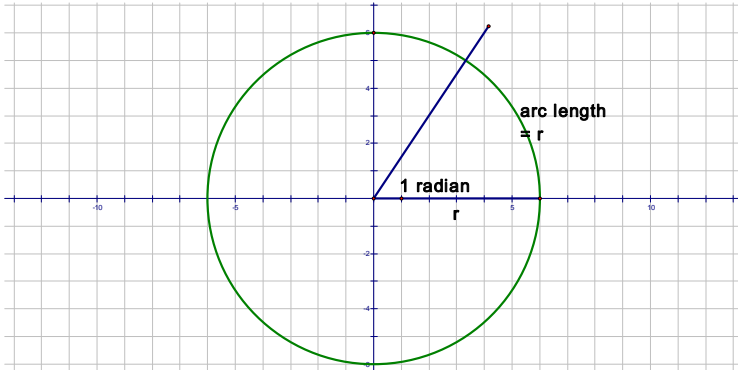




ANGLE MEASURES WORKSHEET

When a central angle intercepts an arc that has the same length as a radius of the circle, the measure of this angle is defined to be one **radian**.



The circumference of a circle is $2\pi r$, where r is the length of a radius. There are 2π radians in one complete revolution about a point and one complete revolution equals 360° .

$$2\pi \text{ radians} = 360^\circ \quad \pi \text{ radians} = 180^\circ \quad 1 \text{ radian} \approx 57.3^\circ$$

Convert each degree measure to radian measure.

Convert each radian measure to degree measure.

1. 120°

2. -245°

3. $\frac{\pi}{3}$ radians

4. $-\frac{3\pi}{4}$ radians

Convert each degree measure to radian measure.

5. 150°

6. 210°

7. 45°

8. 240°

Each radian measure to degree measure.

9. $\frac{\pi}{6}$

10. $\frac{\pi}{4}$

11. $\frac{5\pi}{6}$

12. $\frac{7\pi}{6}$

1 minute ($1'$) = $(\frac{1}{60})^\circ$ 1 second ($1''$) = $(\frac{1}{60})'$ or $(\frac{1}{3600})^\circ$

Convert each angle measure as indicated.

13. 12.464° to degrees, minutes and seconds, to the nearest second.

14. $23^{\circ}42'45''$ to decimal degrees, to the nearest tenth.

Convert to degrees, minutes, and seconds, to the nearest second.

15. 23.42°

16. 15.27°

17. 48.35°

18. 62.73°

Convert to decimal degrees , to the nearest tenth of a degree.

19. $14^{\circ}33'45''$

20. $38^{\circ}24'36''$

21. $35^{\circ}45'10''$

22. $28^{\circ}32'20''$

Using Radians to Solve Problems

23. A circle has a radius of 4 inches. Find the length of the arc intercepted by a central angle of 240 degrees.

24. San Antonio, Texas, is located about 30° north of the equator. If the Earth's radius is about 3959 miles, approximately how many miles is San Antonio from the equator?

25. A bicycle traveled a distance of 100 meters. The diameter of the wheel of this bicycle is 40 cm. Find the number of rotations of the wheel.

26. The wheel of a machine rotates at the rate of 300 rpm (rotation per minute). If the diameter of the wheel is 80 cm, what are the angular (in radian per second) and linear speed (in cm per second) of a point on the wheel?

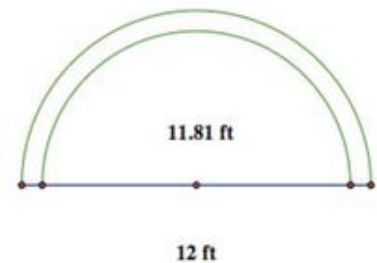
27. The diameter of a merry-go-round at the playground is 12 feet. Elijah stands on the edge and his sister pushes him around.

a) How far does Elijah travel if he moves through an angle of $\frac{5\pi}{4}$ radians?

b) Through what angle does Elijah move if he travels a distance of 80 feet around the circumference?

28. The hands of a clock show 11:20. Express the obtuse angle formed by the hour and minute hands in radian measure.

29. The free-throw line on an NCAA basketball court is 12 ft wide. In international competition, it is only about 11.81 ft. How much longer is the half circle above the free-throw line on the NCAA court?



30. Two connected gears are rotating. The smaller gear has a radius of 4 inches and the larger gear's radius is 7 inches. What is the angle through which the larger gear has rotated when the smaller gear has made one complete rotation?

