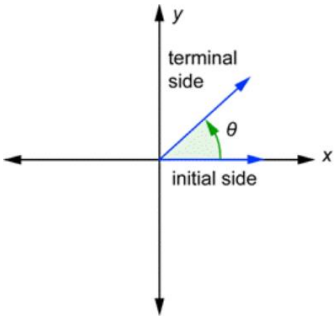
Chapter 4 Section 1
Radian and Degree Measure

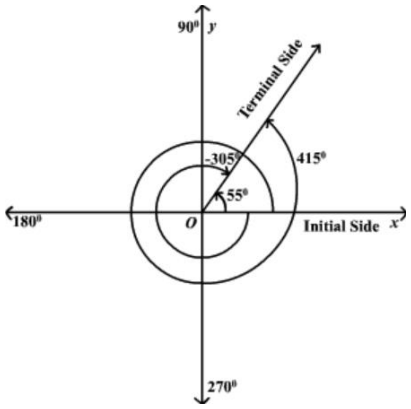
Objectives:

- Describe angles.
- Use radian measure.
- Use degree measure.
- Use angles to model and solve real-life problems.



Vocabulary

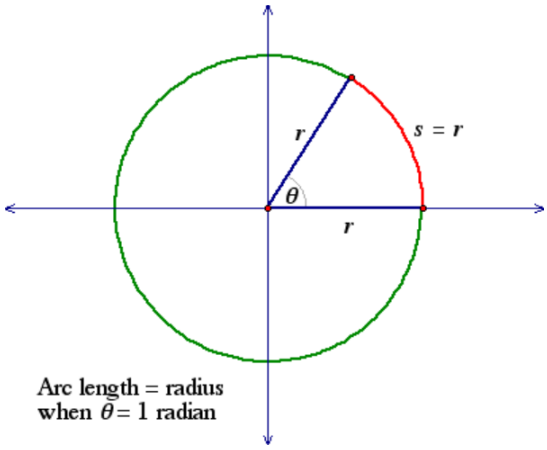
- Trigonometry – means measurement of triangles
- Angle – determined by rotating a ray about its endpoint
- Initial Side of the Angle – the starting position of the ray
- Terminal Side of the Angle – the position of the ray after rotation
- Vertex of the Angle – the endpoint of the ray
- Standard Position – when an angle fits a coordinate system in which the origin is the vertex and the initial side coincides with the positive x −axis.
- Positive Angles – generated with a counterclockwise rotation
- Negative Angles – generated with a clockwise rotation.
- Coterminal Angles – angles with the same initial and terminal sides



The measure of an angle is determined by the amount of rotation from the initial side to the terminal side. One way to measure angles is in radians. To define a radian, you can use a central angle of a circle, one whose vertex is the center of the circle.

Definition of a Radian

One radian is the measure of a central angle θ that intercepts an arc s equal in length to the radius r of the circle. Algebraically, this means that $\theta = \frac{s}{r}$ where θ is measured in radians.

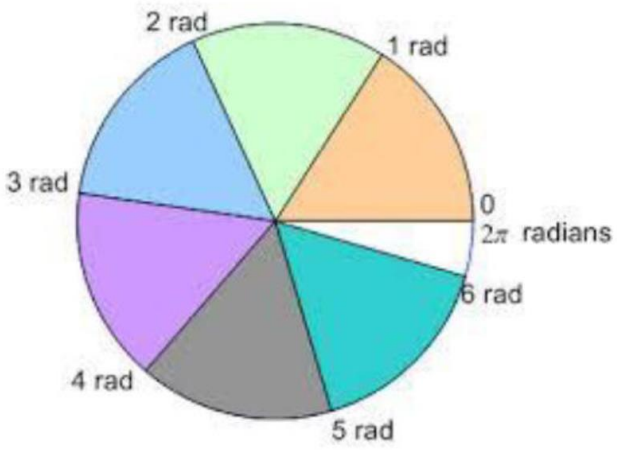


Circumference of a circle is $2\pi r$ units.
A central angle of one full revolution (counterclockwise) corresponds to an arc length of $s = 2\pi r$.
Since $2\pi \approx 6.28$, there are just over six radian lengths in a full circle.

$\frac{1}{2}$ revolution $= \frac{1}{2} \cdot 2\pi = \pi$ radians

$\frac{1}{4}$ revolution $= \frac{1}{4} \cdot 2\pi = \frac{\pi}{2}$ radians

$\frac{1}{6}$ revolution $= \frac{1}{6} \cdot 2\pi = \frac{\pi}{3}$ radians



Conversion Between Degrees and Radians

1. To convert degrees to radians, multiply degrees by $\frac{\pi\ rad}{180^\circ}$
2. To convert radians to degrees, multiply radians by $\frac{180^\circ}{\pi\ rad}$

   To apply these two conversion rules, use the basic relationship $\pi\ rad = 180^\circ$.