 Goal: Relate 3 different units for measuring angles and rotations: degrees,
revolutions, and radians.

	Questions
Warm Up: Considering basic arithmetic, what are the pros and cons to using feet and inches to measure length? What about using centimeters and meters?	

Introduction

A circle is the set _____
on a plane that are a fixed _____
from a point. A rotation is a transformation that
"_____" the point along the circle.
Label the image, preimage and center of
rotation.
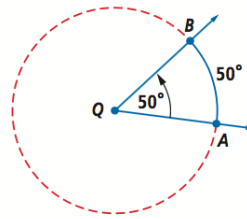
Revolutions and Degrees

Full Turn	Half Turn	Quarter Turn

Convert the following degrees to revolutions:

a. 720º   b. 200º   c. 400º   d. 1080º

Questions	The Case for Radians

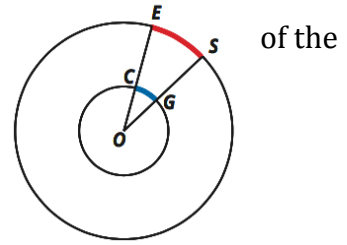**The Case for Radians**

Degrees and revolutions can tell about the size _____ but nothing about the _____. Enter radians. of the

Common Conversions:

Degrees	0º	30º			90º	120º		150º	180º	360º
Radians			$\frac{\pi}{4}$	$\frac{\pi}{3}$						
Revolutions							$\frac{3}{8}$			

Example 1:
  a. Convert 1000º to radians exactly.
  b. Convert 1000º to radians approximately.

Example 2: Convert 1 radian to degrees.

Example 3

Find the length of an arc of a 50° central angle in a circle of radius 6 feet.

Circle Arc Length Formula

If s is the length of the arc of a central angle of θ radians in a circle of radius r, then $s = r\theta$.

	Questions
Example 4 A swing hangs from chains that are 8 ft long. How far does the seat of the swing travel if it moves through an angle of 1.25 radians? Example 5: The swing height can be adjusted to accommodate a taller person by shortening the length of the ropes to 7 ft. How far would the seat of the swing travel if it moves through an angle of 1.5 radians at the shorter length.	

Summary:

1 rev =		
1º =		
1 rad =		
π rad =		

AAT
4-1 Magnitudes of Rotations   **A#1**
and Measures of Arcs

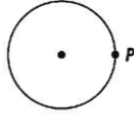In 1 and 2, the magnitude of a rotation is given.
a. Convert the magnitude to revolutions.
b. On the circle draw the image of the given point under the rotation.
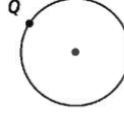
1. $-225°$ a. _____

          b.

2. $\frac{7\pi}{2}$ a. _____

          b.

3. Give two other magnitudes in degrees, one positive and one negative, for a rotation of $152°$.

_____

4. Give two other magnitudes in radians, one positive and one negative, for a rotation of $\frac{5\pi}{6}$.

_____

In 5-7, convert to a magnitude in radians without using a calculator.

5. $30°$ _____

6. $45°$ _____

7. $-240°$ _____

In 8-10, convert to a degree measure without using a calculator.

8. $\frac{\pi}{10}$ _____

9. $\frac{11\pi}{6}$ _____

10. 3.14159 _____

In 11-14, convert the given magnitude to the indicated unit to the nearest thousandth.

11. $-37°$ a. to revolutions   b. to radians

         _____   _____

12. 17π a. to revolutions   b. to degrees

         _____   _____

13. 17 a. to degrees   b. to radians

         _____   _____

14. $0.\overline{3}$ revolution clockwise
         a. to degrees   b. to radians

         _____   _____