Lesson 6.7: Arc Length

In this lesson you will:
- learn the difference between arc length and arc measures
- find a method for calculating arc length
- solve problems involving arc length

You have learned that the measure of a minor arc is equal to the measure of its _____ angle. On a clock, the measure of the arc from 12:00 to 4:00 is equal to the measure of the angle formed by the hour and minute hands. A circular clock is divided into 12 equal arcs, so the measure of each hour is $\frac{360°}{12}$, or _____°. The measure of the arc from 12:00 to 4:00 is four times 30°, or _____°.

Notice that because the minute hand is longer, the tip of the minute hand must travel farther than the tip of the hour hand even though they both move 120° from 12:00 to 4:00. So the arc *length* is different even though the arc *measure* is the same!
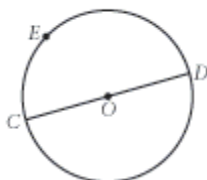
* Add "arc measure" and "arc length" to your vocabulary list.

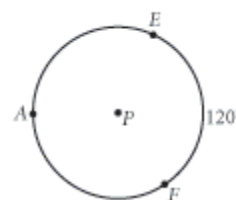- Example 1: What fraction of the circle is each arc?

a.) $\overset{\frown}{AB}$ is what fraction of circle *T*?
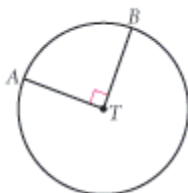
b.) $\overset{\frown}{CED}$ is what fraction of circle *O*?

c.) $\overset{\frown}{EF}$ is what fraction of circle P?

What do these fractions have to do with arc length? If you traveled halfway around a circle, you'd cover ½ of its perimeter or circumference. If you went a quarter of the way around, you'd travel _____ of its circumference. The arc length is some fraction of the circumference of its circle. The measure of an arc is calculated in units of _____, but arc length is calculated in units of _____.

Investigation 6.7: "Finding the Arcs"

In this investigation you will find a method for calculating the arc length.

A.) For $\overarc{AB}$, $\overarc{CED}$, and $\overarc{GH}$, find what fraction of the circle each arc is.
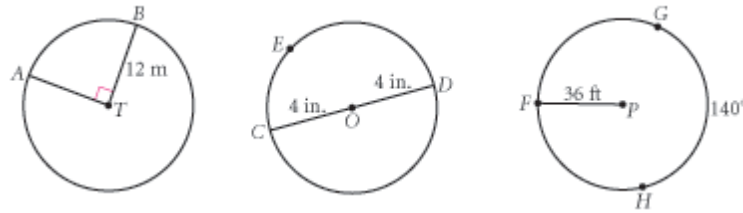

B.) Find the circumference of each circle.

C.) Combine the results of parts A and B to find the length of each arc.

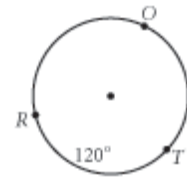D.) Generalize this method for finding the length of any arc, and us it complete the conjecture below.

Arc Length Conjecture (C-66)

The length of an arc equals the measure of the _____ divided by _____° multiplied by the _____.

•Example 2: If the radius of the circle is 24 cm and $m\angle BTA = 60°$, what is the length of $\overset{\frown}{AB}$?
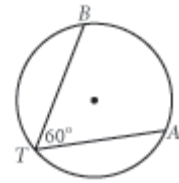
•Example 3: If the length of $\overset{\frown}{ROT}$ is 116π meters, what is the radius of the circle?

⇒**ASSIGNMENT**: _____