Circumference and Arc Length

• Have out calculator
Math Models: Unit 9 Geometry

Circle Vocabulary:

Arc Length: the distance around the arc

Circumference: the distance around the entire circle \( C = 2\pi r \)

Arc Length Formula

\[
\text{length} = \frac{n^\circ}{360} \cdot 2\pi r
\]

Example 1:
A 2 ft wide circular track for a camera dolly is set up for a movie scene. The two rails of the track form concentric circles. The radius of the inner circle is 8 ft. How much farther does a wheel on the outer rail travel than a wheel on the inner rail of the track in one turn?

\[
\begin{align*}
\text{inner} & \quad C = 2\pi(8) \\
C & \quad = 16\pi \\
\text{outer} & \quad C = 2\pi(10) \\
C & \quad = 20\pi \\
20\pi - 16\pi & \quad = 4\pi \approx 12.57 \text{ ft}
\end{align*}
\]
Math Models: Unit 9 Geometry

Example 2:
What is the length of the bolded arc?

\[ L = \frac{n^\circ}{360} \cdot 2\pi \]
\[ = \frac{90}{360} \cdot 2\pi \]
\[ = 4\pi \approx 12.57 \text{ in} \]

Example 3:
What is the length of the bolded arc? Leave your answer in terms of \( \pi \).

\[ L = \frac{240}{360} \cdot 2\pi \]
\[ = 20\pi \text{ cm} \]

Example 4:
What is the length of a semicircle with a radius of 1.3 m? Leave your answer in terms of \( \pi \).

\[ \text{half a circle} \quad \frac{360}{2} = 180 \]
\[ L = \frac{180}{360} \cdot 2\pi (1.3) \]
\[ = 1.3\pi \text{ m} \]
1. Nina designed a semicircular arch made of wrought iron for the top of a mall entrance. The nine segments between the two concentric semicircles are each 3 ft long. What is the total length of wrought iron used to make this structure? Round your answer to the nearest foot.

Find the length of each bolded arc. Leave your answer in terms of pi.

2. 14 cm
3. 60°
4. 18 m
5. 30°
6. 7.2 in.
7. 6 m

Show your work for # 2 - 7 here