

**Skills Practice: Calculating Arc Length and Circumference**

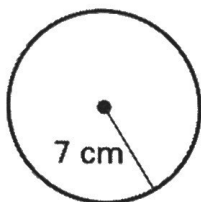
**FORMULAS OF A CIRCLE:**

**"Perimeter" (Circumference) of a Circle:**  $2\pi r$  or  $\pi d$

**Arc Length:**  $\frac{2\pi r\theta}{360}$ , where  $\theta$  is the central angle (or intercepted arc measure)

Use the diagram to find the indicated measure. Leave answers in term of pi.

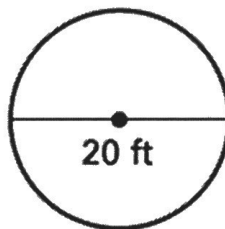
1. Find the circumference.



$$C = 2\pi(7)$$

$$C = 14\pi \text{ cm}$$

2. Find the circumference.



$$C = \pi d$$

$$C = 20\pi \text{ ft}$$

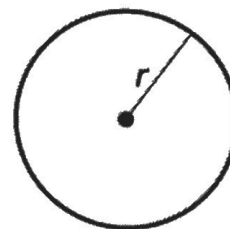
3. Find the radius. Find the indicated measure.

a. The exact radius of a circle with circumference 36 meters

$$36 = 2\pi r$$

$$\frac{36}{2\pi} = \frac{2\pi r}{2\pi}$$

$$5.7 \text{ m} \approx r$$



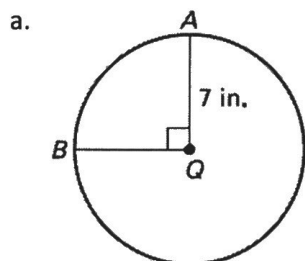
b. The exact diameter of a circle with circumference 29 feet

$$29 = \pi d$$

$$\frac{29}{\pi} = \frac{\pi d}{\pi}$$

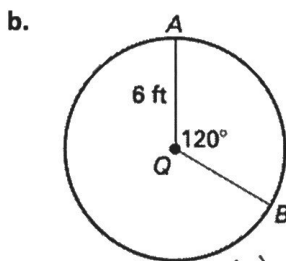
$$d \approx 9.2 \text{ ft}$$

4. Find the length of  $\widehat{AB}$ .



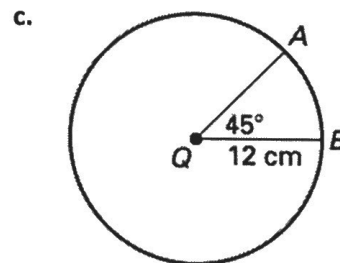
$$A_L = 2\pi(7)\left(\frac{90}{360}\right)$$

$$\frac{7\pi}{2} \text{ in}$$



$$A_L = 2\pi(6)\left(\frac{120}{360}\right)$$

$$4\pi \text{ ft}$$



$$A_L = 2\pi(12)\left(\frac{45}{360}\right)$$

$$3\pi \text{ cm}$$

5. In  $\odot D$  shown below,  $\angle ADC \cong \angle BDC$ . Find the indicated measure

a)  $m\widehat{CDB} = 360 - 40 = \frac{320}{2} = 160^\circ$

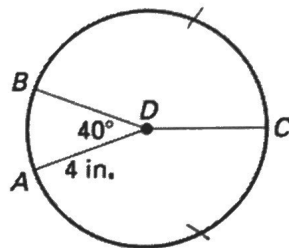
b)  $m\widehat{ACB} = 320^\circ$

c) Length of  $\widehat{CB} = A_L = 2\pi(4)\left(\frac{160}{360}\right) = \frac{32\pi}{9} \text{ in}$

d) Length of  $\widehat{ABC} = 160 + 40 = 200^\circ \quad A_L = 2\pi(4)\left(\frac{200}{360}\right) = \frac{40}{9}\pi \text{ in}$

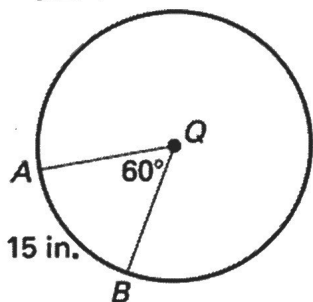
e)  $m\widehat{BAC} = 40 + 160 = 200^\circ$

f) Length of  $\widehat{ACB} = A_L = 2\pi(4)\left(\frac{320}{360}\right) = \frac{64}{9}\pi \text{ in}$



6. Find the indicated measure.

a. The radius of circle Q

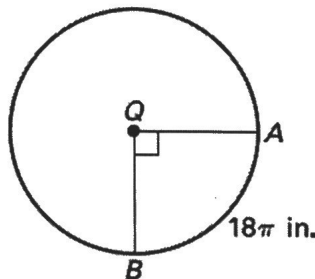


$$15 = 2\pi r \left(\frac{60}{360}\right)$$

$$\frac{90}{2\pi} = \frac{2\pi r}{2\pi}$$

$$\boxed{r \approx 14.3 \text{ in}}$$

b. Circumference of  $\odot Q$  and Radius of  $\odot Q$



1. Circumference

$$18\pi = 2\pi r \left(\frac{90}{360}\right)$$

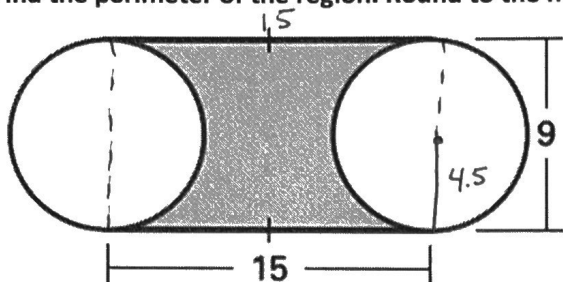
$$\boxed{72\pi} = 2\pi r = C$$

2. Radius

$$\frac{72\pi}{2\pi} = \frac{2\pi r}{2\pi}$$

$$\boxed{36 = r}$$

7. Find the perimeter of the region. Round to the nearest hundredth.



$$\begin{aligned} \text{Rectangle } 15(9) &= 135 \\ \text{Circle } 2\pi(4.5) &= 9\pi \\ 135 + 9\pi &\approx 163.3 \end{aligned}$$

8. **Birthday Cake** A birthday cake is sliced into 8 equal pieces. The arc length of one piece of cake is 6.28 inches as shown. Find the diameter of the cake.

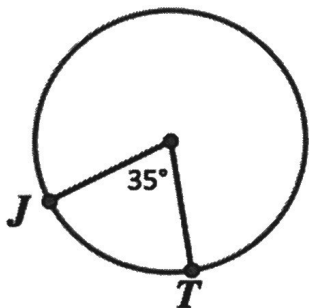


$$360/8 = 45^\circ$$

$$\begin{aligned} 6.28 &= 2\pi r \left(\frac{45}{360}\right) \\ 50.24 &= \frac{2\pi r}{2\pi} \end{aligned}$$

$$\begin{aligned} 8 &\approx r \\ \text{diameter} &= 16 \text{ in} \end{aligned}$$

9. Circumference = 10 m; Find the arc length of  $\widehat{JT}$  = \_\_\_\_\_

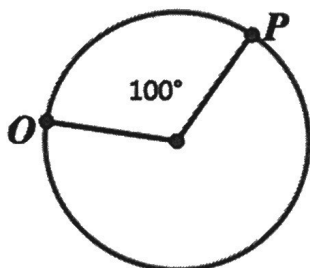


$$A_L = \frac{2\pi r}{360} \left(\frac{35}{360}\right)$$

$$(10) \left(\frac{35}{360}\right) = \frac{35}{36} \approx .97 \text{ m}$$

10. The arc length of  $\widehat{OP}$  =  $10\pi$  inches;

radius = \_\_\_\_\_



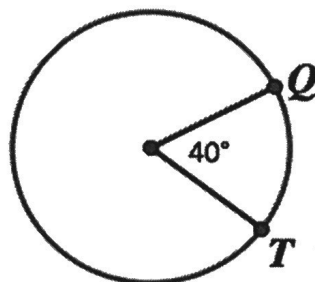
$$10\pi = 2\pi r \left(\frac{100}{360}\right)$$

$$\frac{8.727}{2\pi} = \frac{2\pi r}{2\pi}$$

$$\frac{25}{18} \approx 1.4 \approx r$$

11. The arc length of  $\widehat{QT}$  = 22 cm.;

diameter = \_\_\_\_\_ (to the tenth)



$$22 = 2\pi r \left(\frac{40}{360}\right)$$

$$\frac{198}{\pi} = \frac{2\pi r}{\pi}$$

$$63.0 \approx 2r = d$$