6.

a. Find the length of \( \overarc{AB} \)

\[
\text{Length of } \overarc{AB} = \frac{90}{360}(C) = \frac{1}{4}(2\pi6) = 3\pi
\]

b. Find the perimeter of the sector AOB

\[
P_{\text{Sector AOB}} = 6 + 6 + 3\pi = 12 + 3\pi
\]

8.

The radius of \( \odot O \) is 10 mm and the length of \( \overarc{AB} \) is \( 4\pi \) mm.

a. Find the circumference of \( \odot O \)

\[
C = 2\pi r = 2\pi10 = 20\pi \text{ mm}
\]

b. Find \( m\overarc{AB} \)

\[
4\pi = \frac{m\overarc{AB}}{360}(20\pi)
\]

\[
\Rightarrow 4 = \frac{m\overarc{AB}}{18}
\]

\[
\Rightarrow m\overarc{AB} = 72^\circ
\]
9. Given arcs mounted on equilateral triangles as shown, find the length of each arc. In each case \( \overparen{OA} \) is a radius of \( \overparen{AB} \).

a. 

\[ \text{Length of } \overparen{AB} = \frac{120}{360} (2\pi \cdot 6) \]
\[ = 4\pi \sqrt{3} \]

b. 

\[ \text{Length of } \overparen{AB} = \frac{60}{360} (2\pi \cdot 18) \]
\[ = 6\pi \]

c. 

\[ \text{Length of } \overparen{AB} = \frac{180}{360} (2\pi \cdot 9) \]
\[ = 9\pi \]

10. There are 100 turns of thread on a spool with a diameter of 4 cm. Find the length of the thread to the nearest centimeter.

\[ 100(2\pi r) = 100(2\pi \cdot 2) = 400\pi \approx 1257 \text{ cm} \]

11. Awful Kanaufil plans to ride his cycle on a single loop track. There is 100 m of straight track before the loop and 20 m after. The loop has a radius of 15 m. To the nearest meter, what is the total length of the track he must ride?

\[ \text{Length} = 100 + 20 + 2\pi (15) \approx 214 \text{ m} \]
13. Sandy skated on the rink shown. To the nearest tenth of a meter, how far did she travel going once around in the outside lane? In the inside lane?

Outside lane = 40 + 2π(9) = 40 + 18π ≈ 96.5 m

Inside lane = 40 + 2π(5) = 40 + 10π ≈ 71.4 m

14. A belt, wrapped tightly around \(\odot O\) forms a right angle at \(P\), a point outside the circle. Find the length of the belt if \(\odot O\) has a radius of 6.

Length = 6 + 6 + \(\frac{3}{4}(2π(6))\) = 12 + 9π

15. Find the distance traveled in one back-and-forth swing by the weight of a 12-in. pendulum that swings through a 75° angle.

Arc length = \(2 \left(\frac{75}{360} (2π(12))\right)\)

= \(2 \left(\frac{5}{24}(24π)\right) = 10π\) in
16. A circular garbage can is wedged into a rectangular corner. The can has a diameter of 48 cm.

a. Find the distance from the corner point to the can (PA)

Since we have a square, the diagonal is $24\sqrt{2}$.
The radius is 24, so $PA = 24\sqrt{2} - 24$ cm.

b. Find the distance from the corner point to the point of contact of the can with the wall (PB)

$BP = 24$ (a side of a square)

17. Two pulleys are connected by a belt. The radii of the pulleys are 3 cm and 15 cm, and the distance between their centers is 24 cm. Find the total length of belt needed to connect the pulleys.

Length = $24\sqrt{3} + \frac{240}{360}(2\pi(15)) + \frac{120}{360}(2\pi(3))$

= $24\sqrt{3} + 20\pi + 2\pi$

= $24\sqrt{3} + 22\pi$ cm