

Accelerated Geometry
Notes 10.9: Circumference & Arc Length

Name _____

Date _____

Formulas that you need and are already familiar with:

Area of a Circle:

$$A = \pi r^2$$

Circumference of a Circle:

$$C = \pi d \text{ or } 2\pi r$$

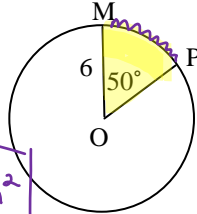
New Formulas:

Area of a Sector:

"Piece of Pie"

$$\text{Sector} = \left(\frac{\text{angle}}{360} \right) (\pi r^2)$$

$$\frac{50}{360} \cdot 36\pi = 5\pi \text{ in}^2$$



Length of an Arc:

"crust"

$$\text{Length} = \left(\frac{\text{angle}}{360} \right) (2\pi r)$$

$$\frac{50}{360} (12\pi) = \frac{5\pi}{3} \text{ in}$$

(When finding the area of a sector or the length of an arc, keep your answers in terms of π unless told to approximate.)

Example:

Given: Circle O, length of $AB = 6\pi$ and the $m\angle AOB = 40^\circ$

a. Find the radius of the circle

$$\text{length} = \left(\frac{\text{angle}}{360} \right) (2\pi r)$$

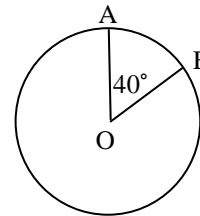
$$6\pi = \frac{40}{360} (2\pi r)$$

$$6\pi = \frac{2\pi r}{9}$$

b. Area of sector AOB

$$6 = \frac{2r}{9} \quad \boxed{r = 27}$$

$$A = \frac{40}{360} (\pi 27^2) = \frac{1}{9} (\pi 27^2) = \boxed{81\pi \text{ in}^2}$$

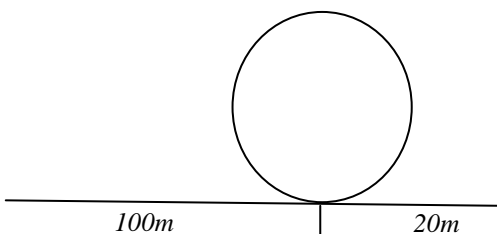


Problems from the book from pages 502-503.

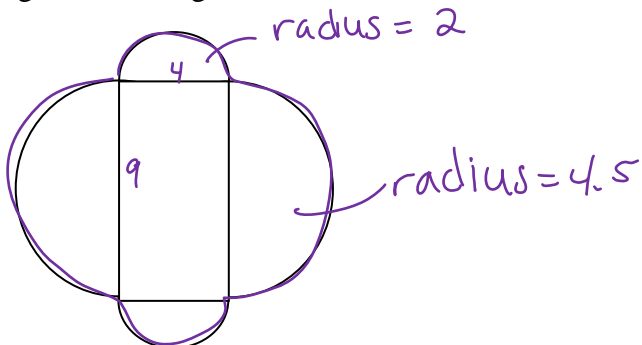
11) Awful Kanaufil plans to ride his cycle on a single-loop track. There is 100m of straight track before the loop and 20 m after. The loop has a radius of 15m. To the nearest meter, what is the total length of the track he must ride?

$$C = 2\pi(15) = 30\pi$$

$$\text{Length} = 120 + 30\pi \approx \boxed{214\text{m}}$$

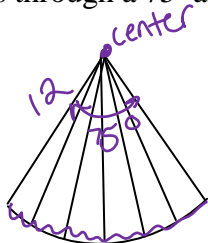


12) Find the outer perimeter of the figure which is composed of semicircles mounted on the sides of a rectangle with a length of 9 and a width of 4.



$$\text{Per} = 9\pi + 4\pi = 13\pi \text{ units}$$

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



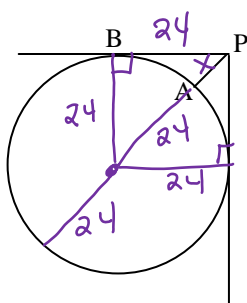
$$\frac{75}{360} (24\pi) = 5\pi \text{ one direction}$$

$$10\pi \text{ in}$$

16) A circular garage can is wedged into a rectangular corner. The can has a diameter of 48cm.

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

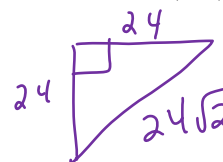
b. Find the distance from the corner point to the point of contact of the can with the wall (PB).



$$(24)^2 = x(48+x)$$

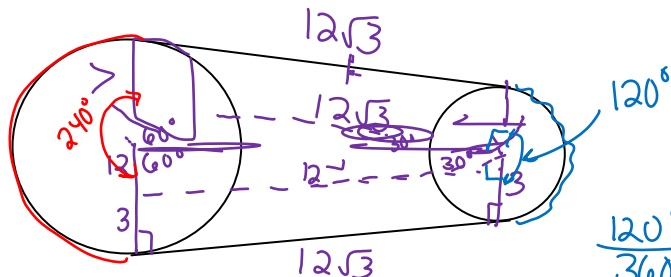
$$0 = x^2 + 48x - 576$$

Not factorable



$$PA = 24\sqrt{2} - 24 \text{ cm}$$

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



$$\frac{240}{360} (30\pi)$$

$$\frac{2}{3} (30\pi) = 20\pi$$

$$\frac{120}{360} (6\pi)$$

$$\frac{1}{3} (6\pi) = 2\pi$$

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