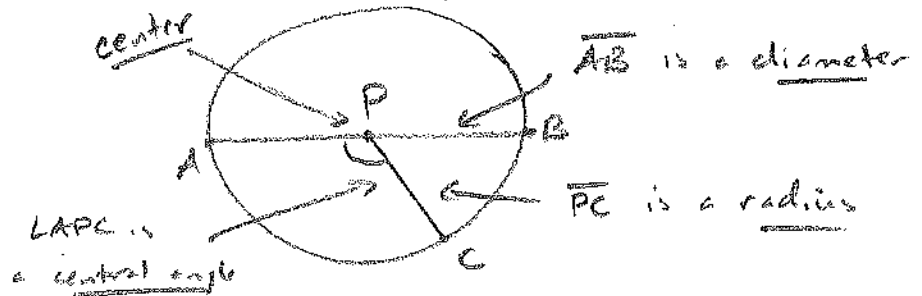


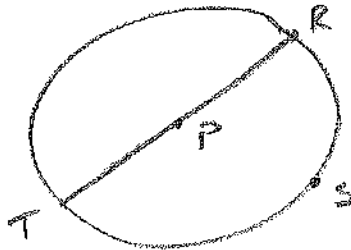
Circle:

set of all points
equidistant from
a given point. (OP)



Semicircles, Minor arcs, and Major arcs

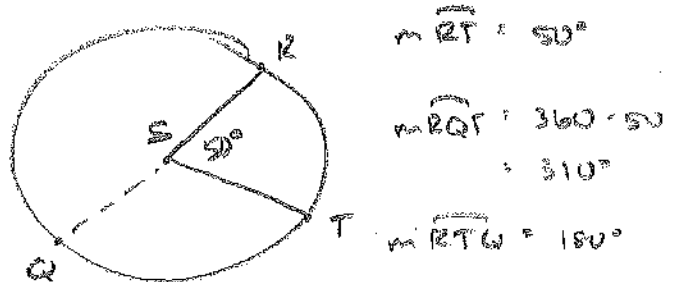
$\widehat{STR}$ is
a major
arc



$\widehat{RS}$ is a
minor arc
 $\widehat{RST}$ is a
semicircle

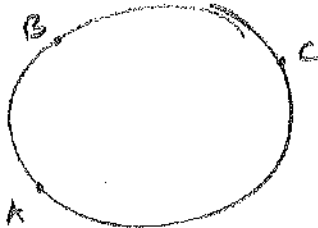
Arc Measure

- ① The measure of a minor arc is equal to the measure of its central angle.
- ② The measure of a major arc is equal to its related minor arc subtracted from 360° .
- ③ The measure of a semicircle is 180° .



Arc Addition Postulate

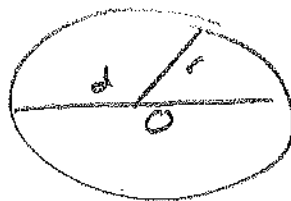
1.



$$m\widehat{ABC} = m\widehat{AB} + m\widehat{BC}$$

Circumference of a Circle

(Perimeter)



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

$d = 2r$

Arc Length

fraction of the circumference
determined by the measure
of the arc.



$$l \text{ of } \widehat{AB} = \frac{m\widehat{AB}}{360} \cdot \pi d$$

or

$$l \text{ of } \widehat{AB} = \frac{m\widehat{AB}}{360} \cdot 2\pi r$$

Find the measure of each arc in $\odot P$.

12. $\widehat{TC} = 128^\circ$

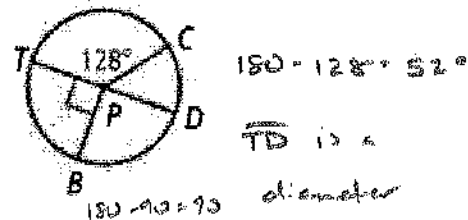
14. $\widehat{BTC} = 90 + 128 = 218^\circ$

16. $\widehat{CD} = 52^\circ$

18. $\widehat{TCD} = 180^\circ$ (semicircle)

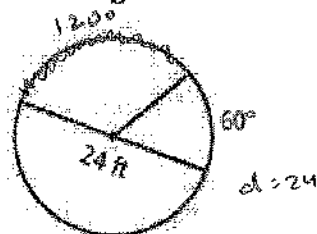
20. $\widehat{TDC} = 360 - 128 = 232^\circ$

22. $\widehat{BC} = 90 + 52 = 142^\circ$



Find the length of each arc shown in red. Leave your answer in terms of π .

31.

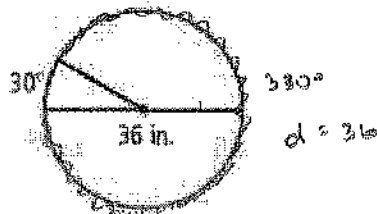


$180 - 60 = 120$

$l = \frac{120}{360} \cdot \pi(24)$

$l = 8\pi \text{ ft}$

33.

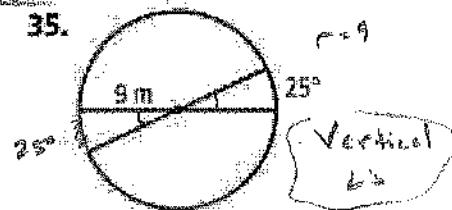


$360 - 30 = 330$

$l = \frac{330}{360} \cdot \pi(36)$

$l = 33\pi \text{ in}$

35.



$l = \frac{25}{360} \cdot 2\pi(9)$

$l = 1.25\pi \text{ m}$

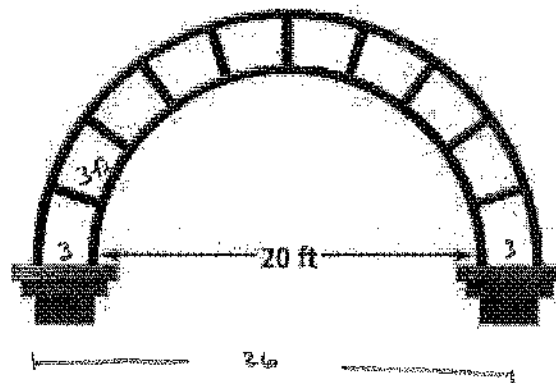
36. **Think About a Plan** Nina designed a semicircular arch made of wrought iron for the top of a mall entrance. The nine segments between the two concentric semicircles are each 3 ft long. What is the total length of wrought iron used to make this structure? Round your answer to the nearest foot.

Total = Semicircle + Semicircle + 9 segments

Semicircle = $\frac{180}{360} \cdot \pi(26) = 41 \text{ ft}$

Semicircle = $\frac{180}{360} \cdot \pi(20) = 31 \text{ ft}$

Total = $41 + 31 + 9(3) = 99 \text{ ft}$



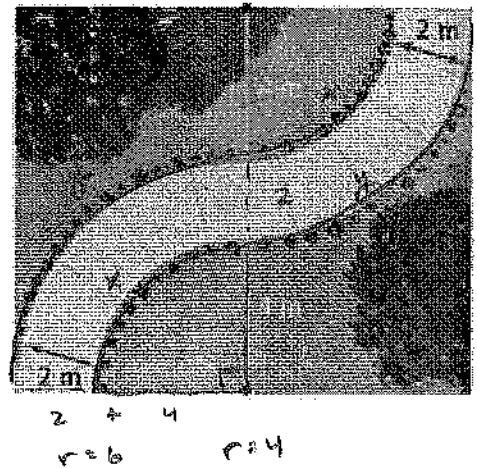
- 49. Landscape Design** A landscape architect is constructing a curved path through a rectangular yard. The curved path consists of two 90° arcs. He plans to edge the two sides of the path with plastic edging. What is the total length of plastic edging he will need? Round your answer to the nearest meter.

$$x = \frac{90}{360} \cdot 2\pi(4) = 6.3$$

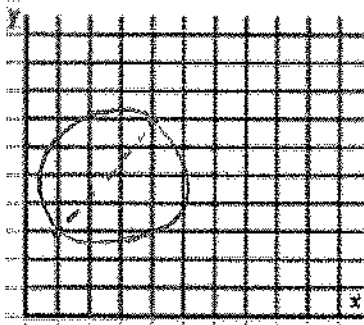
$$y = \frac{90}{360} \cdot 2\pi(6) = 9.4$$

$$\text{Total} = 2x + 2y = 2(6.3) + 2(9.4)$$

$$= 31.4 \text{ m}$$



- 55. Coordinate Geometry** Find the length of a semicircle with endpoints $(1, 3)$ and $(4, 7)$. Round your answer to the nearest tenth.



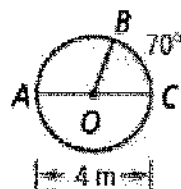
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(4 - 1)^2 + (7 - 3)^2} = \sqrt{25} = 5$$

$$L = \frac{180}{360} \cdot \pi(5) = 7.9 \text{ m}$$

- 8. Error Analysis** Your class must find the length of $\widehat{AB}$. A classmate submits the following solution. What is the error?

~~$$\begin{aligned} \text{Length of } \widehat{AB} &= \frac{m\widehat{AB}}{360} \cdot 2\pi r \\ &= \frac{110}{360} \cdot 2\pi(4) \\ &= \frac{22}{9} \pi \text{ m} \end{aligned}$$~~



The radius is not 4m.

The radius would be

$$\frac{1}{2}(4) = 2 \text{ m}$$

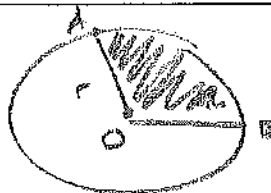
Area of a Circle



$$A = \pi r^2$$

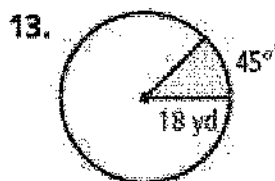
Area of a Sector of a Circle

Fraction of the circle's area determined by the measure of the arc



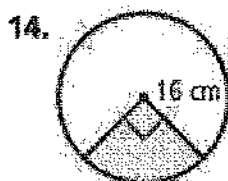
$$A_{\text{sector}} = \frac{n \text{ degrees}}{360^\circ} \cdot \pi r^2$$

Find the area of each shaded sector of a circle. Leave your answer in terms of π .



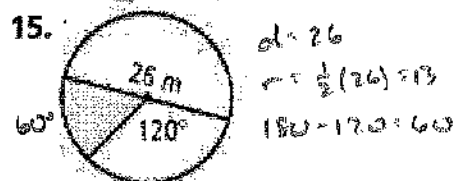
$$A = \frac{45}{360} \cdot \pi (18)^2$$

$$A = 40.5\pi \text{ yd}^2$$



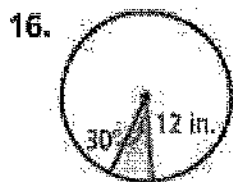
$$A = \frac{90}{360} \cdot \pi (16)^2$$

$$A = 64\pi \text{ cm}^2$$



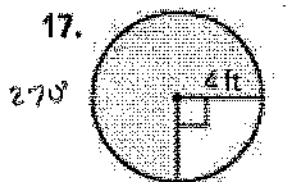
$$A = \frac{60}{360} \cdot \pi (13)^2$$

$$A = 28.17\pi \text{ m}^2$$



$$A = \frac{30}{360} \cdot \pi (12)^2$$

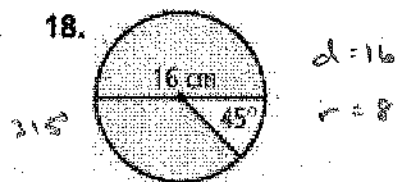
$$A = 12\pi \text{ in}^2$$



$$360 - 90 = 270$$

$$A = \frac{270}{360} \cdot \pi (4)^2$$

$$A = 12\pi \text{ ft}^2$$



$$360 - 45 = 315$$

$$A = \frac{315}{360} \cdot \pi (8)^2$$

$$A = 56\pi \text{ cm}^2$$

38. The circumference of a circle is 26π in. What is its area? Leave your answer in terms of π .

$$C = 2\pi r$$

$$\frac{26\pi}{2} = \frac{2\pi r}{2}$$

$$13 = r$$

$$A = \pi r^2$$

$$A = \pi (13)^2$$

$$A = 169\pi \text{ in}^2$$

39. In a circle, a 90° sector has area $36\pi \text{ in}^2$. What is the radius of the circle?

$$A = \frac{n}{360} \cdot \pi r^2$$

$$\frac{90}{360} \cdot 36\pi = \frac{90}{360} \cdot \pi r^2$$

$$36 = r^2$$

$$\sqrt{36} = \sqrt{r^2}$$

$$r = 6$$

$$r = 12 \text{ in}$$