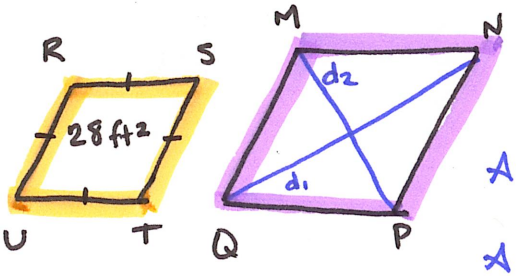
Example #7: Rhombuses MNPQ and RSTU are similar. The area of RSTU is 28 square feet. The diagonals of MNPQ are 25 feet long and 14 feet long. Find the area of MNPQ. Then use the ratio of the areas to find the lengths of the diagonals of RSTU. ← need to use P/S ratio



Rhombus

$A = \frac{1}{2} d_1 \cdot d_2$

$A = \frac{1}{2}(25)(14)$

$A = 175\,ft^2$

$A = 28\,ft^2$ $d_1 = 25\,ft$

d_1 = long $d_2 = 14\,ft$

d_2 = short

Area Ratio $= \frac{28}{175} \overset{(\div 7)}{\Rightarrow} \frac{4}{25}$

P/S Ratio $= \frac{\sqrt{4}}{\sqrt{25}} \Rightarrow \frac{2}{5}$

$\frac{2}{5} = \frac{d_1}{25}$ $\quad \frac{2}{5} = \frac{d_2}{14}$

$\frac{50}{5} = \frac{5d_1}{5}$ $\quad \frac{28}{5} = \frac{5d_2}{5}$

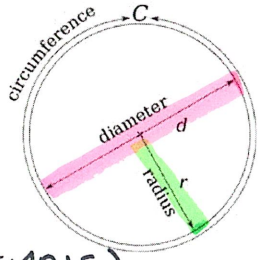
$d_1 = 10\,ft$ $\quad d_2 = 5.6\,ft$

Chapter 11.4: Circumference and Arc Length

Circumference of a Circle (Theorem 11.8):

The circumference C of a circle is $C = d\pi$ OR $C = 2\pi r$

Where d is the diameter of the circle and r is the radius of the circle



Exact Measure:

Putting your answers in terms of π. (NO DECIMALS)

Ex. $d = 8\,in$ $C = 8\pi\,in$ (Exact) $\quad C = 25.1327\ldots$ Approx. because @ some point you would need to round the answer.

Example #1: Find the indicated measure.

a.) Circumference of a circle with radius 9 cm

$C = 2\pi r \Rightarrow C = 2\pi(9)$

Exact → $C = 18\pi\,cm$

Approximate → $C \approx 56.55\,cm$

b.) Radius of a circle with circumference 26 m

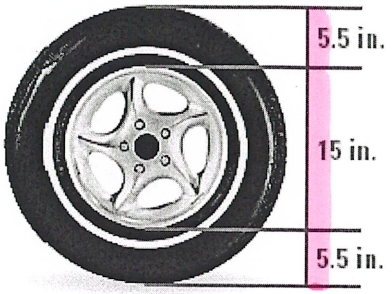
$C = 2\pi r \Rightarrow \frac{26}{2\pi} = \frac{2\pi r}{2\pi}$

Exact → $\frac{13}{\pi}\,m = r$

Approximate → $4.14\,m \approx r$

Example #2: The dimensions of a car tire is shown at the right.
To the nearest foot, how far does the tire travel when it makes 15 revolutions?

Distance — how many times it goes around.



Distance = Circumference · Revolutions

$D = 26\pi(15)$

$D \approx 1225.22$ in — need to convert to ft

$D = 1225.22\text{in} \times \frac{1\text{ ft}}{12\text{ in}} = 102\text{ ft}$

$d = 5.5 + 15 + 5.5$

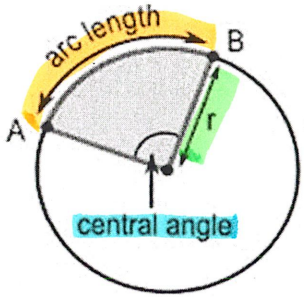
$d = 26$ in

$C = 26\pi$ in

Central Angle: A central angle of a circle is an angle whose vertex is the center of the circle.

Arc Length: is a portion of the circumference of circle.

- The measure of the arc is measured in degrees
- The measure of the length is measured in linear units



Arc Length Corollary

In a circle, the ratio of the length of a given arc to the circumference is equal to the ratio of the measure of the arc to 360°

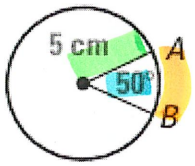
Portion of side length → $\frac{\text{Arc Length of } \overset{\frown}{AB}}{2\pi r = C} = \frac{m\overset{\frown}{AB}}{360^\circ}$ ← central angle (part) / ← measure of whole circle

Circumference → (Distance around whole circle)

$$\text{Arc Length of } \overset{\frown}{AB} = \frac{m\overset{\frown}{AB}}{360^\circ} \cdot 2\pi r$$

Example #3: Find the indicated measure.

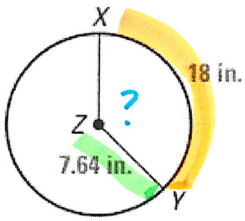
a.) Arc Length of $\overset{\frown}{AB}$



Arc Length of $\overset{\frown}{AB} = \frac{50^\circ}{360^\circ} \cdot 2\pi(5)$

$= 4.36$cm

b.) $m\overset{\frown}{XY}$

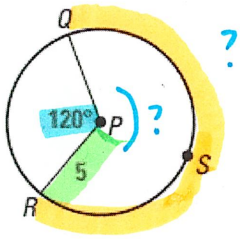


$\frac{18}{2\pi(7.64)} = \frac{m}{360^\circ}$

$\frac{15.28\pi m}{15.28\pi} = \frac{6480}{15.28\pi}$

$m\overset{\frown}{XY} = 135^\circ$

c.) Arc Length of $\overset{\frown}{QSR}$



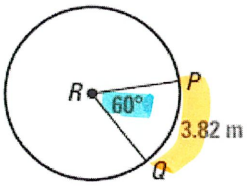
? = 360° − 120°

? = 240°

Arc Length $\overset{\frown}{QSR}$ $= \frac{240°}{360°} \cdot 2\pi(5)$

$= 20.94$ units

d.) Circumference of $\odot R$



$\frac{3.82}{C} = \frac{60°}{360°}$

$\frac{1375.2}{60} = \frac{60°C}{60}$

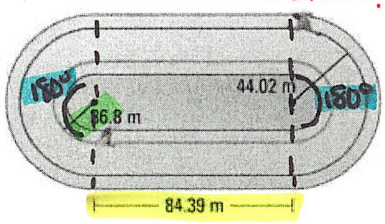
$C = 22.92$ m

Example #4: The curves at the ends of the track show are 180° arc of circles. The radius of the arc for a runner on the inside path is 36.8 meters. About how far does this runner travel to go once around the track? Round to the nearest tenth of a meter.

Distance!

Distance = curve + straight + curve + straight

(Arc Length)



Arc Length $= \frac{180°}{360°} \cdot 2\pi(36.8)$

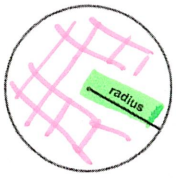
$= 115.6$m

$D = 115.6 + 84.39 + 115.6 + 84.39$ $\quad D \approx 400$m

Chapter 11.5: Areas of Circles and Sectors

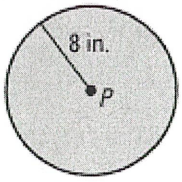
Area of a Circle (Theorem 11.9):

$A =$ πr^2 ← squared is only with the radius NOT the π.



Example #1: Find the indicated measure

a.) Find the area of $\odot P$.

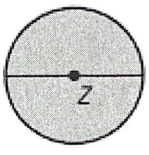


$A = \pi(8)^2$

$A = 64\pi$ in^2 ← Exact

$A = 201.06$ in^2 ← Approx.

b.) Find the diameter of $\odot Z$ if the $A = 96cm^2$



$\frac{96}{\pi} = \frac{\pi r^2}{\pi}$

$\sqrt{\frac{96}{\pi}} = \sqrt{r^2}$

$r = 5.53$cm

$d = 2(5.53) = 11.06$cm