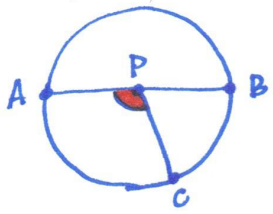
Circles & Arcs (Section 12-1)



"P" is the center of the circle

$\overline{AB}$ is the diameter

$\overline{AP}$, $\overline{BP}$, $\overline{CP}$ are all radii.

$\angle APC$ is a central angle.

$\overset{\frown}{ACB}$ is a semicircle arc

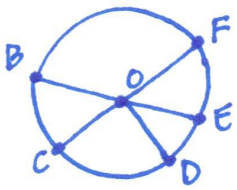
$\overset{\frown}{AC}$ is a minor arc. (2 letters)

$\overset{\frown}{BC}$ is a minor arc

$\overset{\frown}{ABC}$ is a major arc (3 letters)

* major arc > semicircle
  minor arc < semicircle

#1 & 2 ex:



major arcs? $\overset{\frown}{BFD}$, $\overset{\frown}{BED}$, $\overset{\frown}{BFC}$, $\overset{\frown}{BEC}$, $\overset{\frown}{BDC}$, $\overset{\frown}{FEB}$, $\overset{\frown}{FDB}$, $\overset{\frown}{FCB}$, $\overset{\frown}{CBE}$, $\overset{\frown}{CFB}$...

semicircles? $\overset{\frown}{BFE}$, $\overset{\frown}{BCE}$, $\overset{\frown}{BDE}$, $\overset{\frown}{CDF}$, $\overset{\frown}{CEF}$, $\overset{\frown}{CBF}$

minor arcs? $\overset{\frown}{BC}$, $\overset{\frown}{BD}$, $\overset{\frown}{CD}$, $\overset{\frown}{CE}$, $\overset{\frown}{DE}$, $\overset{\frown}{DF}$, $\overset{\frown}{BF}$, $\overset{\frown}{EF}$

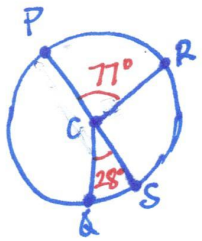
* On HW → only list 4 of each!

* Arc Measure: measure of a minor arc = measure of central angle

measure of a major arc = 360° − minor arc

measure of a semicircle = 180°

ex:



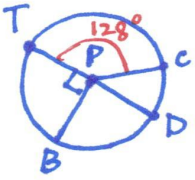
a) $m\overset{\frown}{PR} = 77°$

b) $m\overset{\frown}{RS} = 180-77 = 103°$

c) $m\overset{\frown}{PRQ} = 180+28 = 208°$

d) $m\overset{\frown}{PQR} = 180+103 = 283°$

ex:



$\overset{\frown}{CD} = 180-128 = 52°$

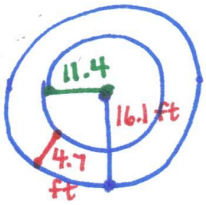
a) $m\overset{\frown}{CBD} = 360-\overset{\frown}{CD}$
$= 360-52$
$= 308°$

b) $m\overset{\frown}{BCT}$
$= 360-90°$
$= 270°$

* Circumference of a Circle: $C=\pi d$ or $C=2\pi r$

↑ Distance around the circle.

Got it?
ex:



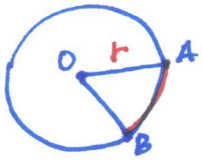
How much farther does a tire travel on the outside ring than the inside ring?

$C_{BIG} = \pi(2)(16.1)$ $\quad C_{SMALL} = \pi(2)(11.4)$

$= 101.16$ ft $\quad = 71.63$ ft

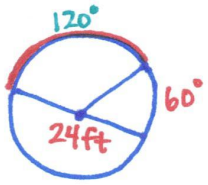
$\therefore$ 29.53 ft more

* Arc Length: a fraction of the circumference.



length of $\overset{\frown}{AB} = \frac{m\overset{\frown}{AB}}{360} \cdot 2\pi r$ or $\frac{m\overset{\frown}{AB}}{360} \cdot \pi d$

#7
ex:

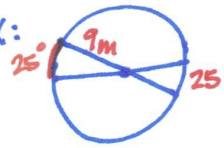


length $= \frac{120}{360} \cdot \pi(24)$

$= 24\pi\left(\frac{1}{3}\right)$

$= 8\pi$ ft or 25.1 ft

ex:



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

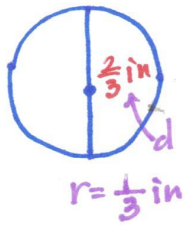
$= \frac{5}{4} \cdot 18\pi$

$= \frac{5\pi}{4}$ m or 3.93 m

Areas of Circles & Sectors (Section 12-2)

* Area of a Circle: $A = \pi r^2$ * Units for area is unit^2!

#1
ex:



$r = \frac{1}{3}$ in

$A = \pi\left(\frac{1}{3}\right)^2$

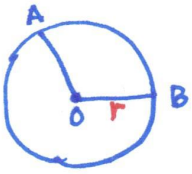
$= \frac{\pi}{9}$ or $0.35\ in^2$

#2
ex: radius = 300ft
area covered?

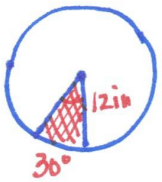
$A = \pi(300)^2$

$= 282{,}743\ ft^2$

* Area of a Sector of a Circle: $\text{Area of } AOB = \frac{m\overset{\frown}{AB}}{360} \cdot \pi r^2$



ex:



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

$= \frac{1}{12} \cdot \pi(144)$

$= 12\pi$ or $37.7\ in^2$

ex: $d = 16$in, $r = 8$in

$m\overset{\frown}{PT} = 135$

Find Area.

$\text{Area} = \frac{135}{360}\pi(8)^2$

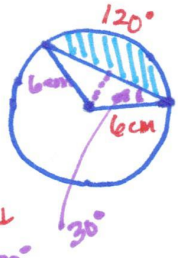
$= \frac{3}{8}\pi(64)$

$= 24\pi$ or $75.4\ in^2$

* Area of Segment of a Circle:

(Area of a Sector) − (Area of a triangle) = Area of a Segment

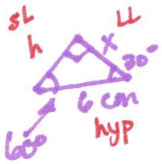
ex:



$\text{Area of sector} = \frac{120}{360} \cdot \pi(6)^2$

$= \frac{1}{3}\pi(36)$

$= 12\pi$



Hyp = 2·SL LL = √3·SL

6 = 2·h LL = √3·3

h = 3 x = 3√3

base = 2x = 6√3

$\text{Area of triangle} = \frac{1}{2}(6\sqrt{3})(3)$

$= 9\sqrt{3}$

Area of Seg = $12\pi - 9\sqrt{3}$

$= 22.1\ cm^2$

ex:

$\text{Area of sector} = \frac{90}{360} \cdot \pi(8)^2$

$\frac{64\pi}{4} = 16\pi$

Area of Triangle = $\frac{1}{2}(8)(8) = 32$

Hyp = √2 · leg

$= 8\sqrt{2}$

Area of Seg = $16\pi - 32$

$= 18.27\ ft^2$