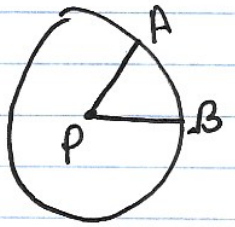
Set 4

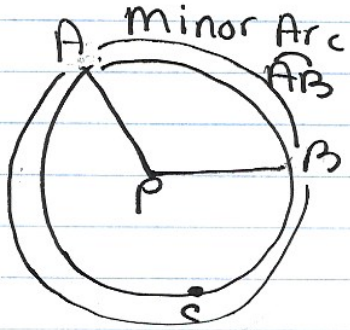
Lesson 1

Arc & Sectors

Central Angle - an angle formed by two radii with the vertex at the center of the circle $\angle APB$



Intercepted Arc - Part of the ~~Segment~~ Circle that lies between two segments, rays or lines that intersect the Circle



minor Arc - Arc smaller than a Semicircle

Major Arc ~~ACB~~ $\overset{\frown}{ACB}$

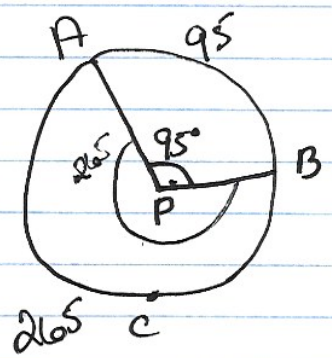
major arc - Arc Bigger than a Semicircle

$m\overset{\frown}{AB}$ = measure minor arc AB

$m\overset{\frown}{ACB}$ = measure major ar ACB

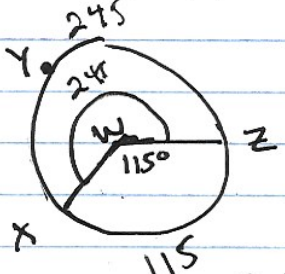
$m\overset{\frown}{AB} = m\angle AB = 95$

* Central angle and intercepted minor Arc have the same measur-



$m\overset{\frown}{ACB} = 360 - m\overset{\frown}{AB} = 360 - 95 = 265$

Ex1

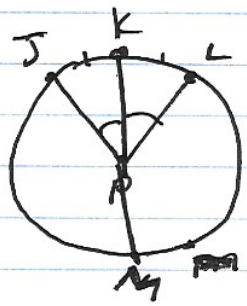


$m\overset{\frown}{XZ} = 115$

$m\overset{\frown}{XYZ} = 245$

$360^\circ - 115 = 245$

The measure of an arc is equal to the measure of its corresponding central angle $m\overset{\frown}{JM} = m\angle JPM$



Congruent central angles intercept congruent arcs, and congruent arcs are intercepted by congruent central angles

$\angle JPK \cong \angle KPL \quad \overset{\frown}{JK} \cong \overset{\frown}{KL}$

Arc Length

degrees

S = arc length

$$\frac{\text{arc length}}{\text{circumference}} = \frac{\text{arc measure}}{360^\circ}$$

$$\frac{S}{C} = \frac{\theta}{360^\circ} \Rightarrow S = \frac{\theta}{360^\circ} \cdot C \Rightarrow S = \frac{\theta}{360^\circ} \cdot 2\pi r$$

degrees ✱

radians

$$\frac{S}{C} = \frac{\theta}{2\pi} \quad S = \frac{\theta}{2\pi} \cdot C \quad S = \frac{\theta}{2\pi} \cdot 2\pi r \quad S = \theta r$$

✱ radians

Ex 2

a) Circle with radius is 4 and central angle is 80°

$$S = \frac{\theta}{360} \cdot 2\pi r \qquad S = \frac{80}{360} \cdot 2 \cdot \pi \cdot 4 = \frac{640}{360}\pi \quad \frac{16}{9}\pi$$

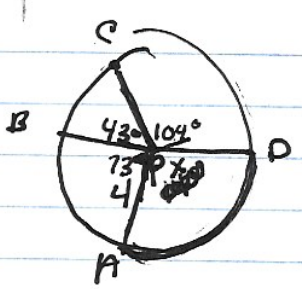
b) Circle with radius is 6 and central angle is π

$$S = \frac{\theta}{2\pi} \cdot 2\pi r \qquad S = \frac{\pi}{2\pi} \cdot 2\pi \cdot 6 = 6\pi$$

Ex3 Length of $\overset{\frown}{AD}$

$104+43+73=220$ $360-220$

$m\overset{\frown}{AD}=140$



$S=\frac{140}{360}\cdot 2\pi\cdot 4$

$\frac{112\cancel{0}}{36\cancel{0}}\pi=\frac{28}{9}\pi$

Area of a Sector

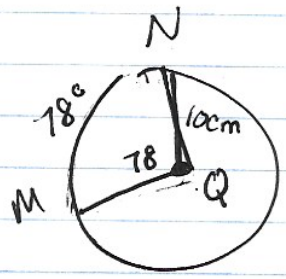
$A=\frac{\theta}{360^\circ}\cdot\pi r^2$

Ex4

$A=\frac{78}{360}\cdot\pi\cdot 10^2$

$\frac{780\cancel{0}}{36\cancel{0}}\pi$ $\frac{260}{12}\pi=\frac{130}{6}\pi$

$\frac{65}{3}\pi$

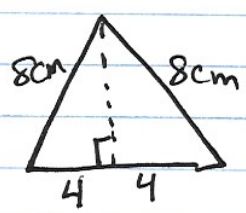


Ex5

$A=\frac{60}{360}\cdot\pi\cdot 8^2$

$A=\frac{384\cancel{0}}{36\cancel{0}}\pi=\frac{32}{3}\pi$

$\frac{32}{3}\pi-\sqrt{48}=5.8cm^2$



$4^2+b^2=8^2$

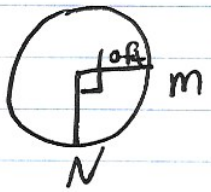
$16+b^2=64$

$b^2=48$

$b=\sqrt{48}$

$A = \frac{90^\circ}{360^\circ} \cdot \pi \cdot 10^2$

$A = 25\pi$ sector

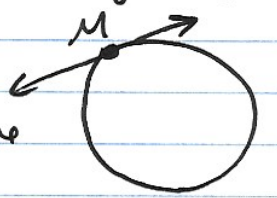


triangle $\frac{1}{2} \cdot b \cdot h = \frac{1}{2}(10 \times 10) = 50$

$25\pi - 50 = 28.54 ft^2$

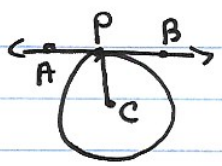
Set 4 lesson 2

Tangent to a circle - line in the plane of the circle that intersects the circle at exactly one point

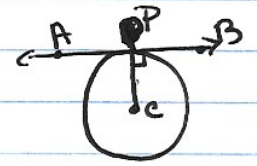


Point of tangency - the point where the tangent intersects the circle

Theorem 10-1
If $\overleftrightarrow{AB}$ is tangent to $\odot C$ at P, then $\overleftrightarrow{AB}$ is perpendicular to CP

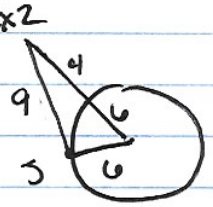


Converse Theorem 10-1
if $\overleftrightarrow{AB}$ is perpendicular to the radius $\overline{CP}$ at P, then $\overleftrightarrow{AB}$ is tangent to $\odot C$



Ex 2

a.

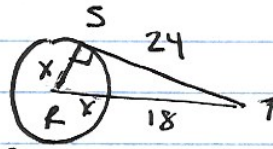


$9^2 + 6^2 = 10^2$

$81 + 36 = 100$

$117 \neq 100$

b.



$x^2 + 24^2 = (x+18)^2$

$x^2 + 576 = x^2 + 36x + 324$

$252 = 36x$

$x = 7$

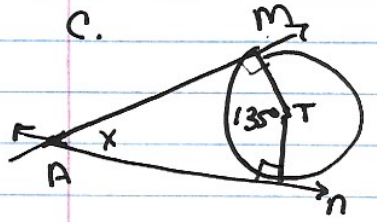
$(x+18)^2$

$(x+18)(x+18)$

$x^2 + 18x + 18x + 324$

$x^2 + 36x + 324$

C.

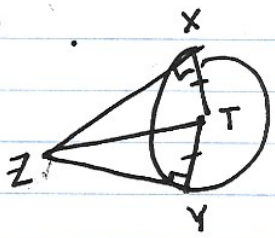


$135 + 90 + x + 90 = 360$

$315 + x = 360$

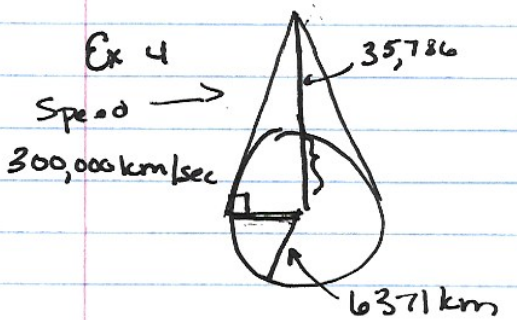
$x = 45^\circ$

Ex 3



Theorem 10-2
If two segments with a common endpoint exterior to the circle are tangent to the circle, then the segments are congruent

Ex 4



$x^2 + 6371^2 = (35786 + 6371)^2$

$x^2 + 40,589,641 = 1,777,212,649$

$x^2 = 1,736,623,008$

$x \approx 41,673$ km distance

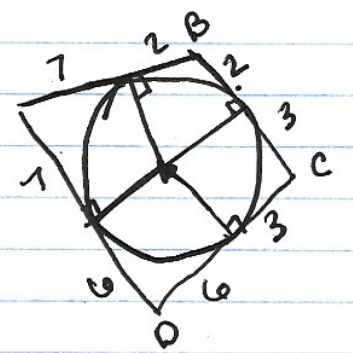
time: $d = rt$ $\frac{d}{r} = t$ $\frac{41,673}{300,000} = t \approx 0.28$ sec

try it

Perimeter

$(1+2) + (2+3) + (3+6) + (7+6)$

36



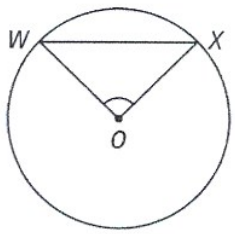
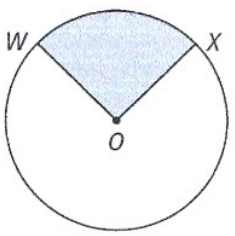
Name _____

10-1 Reteach to Build Understanding

Arcs and Sectors

1. The length of an arc and the area of a sector are fractions of the circumference and the area of the circle, respectively, based on the central angle measure. Select the formulas you would use to answer the questions.

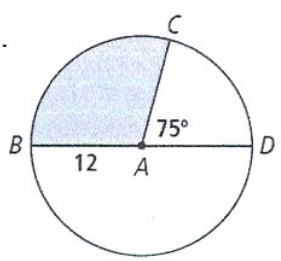
Formulas	$s = \frac{n}{360} \cdot 2\pi r$	$C = 2\pi r$	$A = \frac{n}{360} \cdot \pi r^2$	$A = \pi r^2$

Find arc length WX given $m\angle WOX = 65°$ and radius is 3 ft.	Find the area of the shaded sector given $m\angle WOX = 65°$ and radius is 3 ft.
	

2. The radius of a circle is 5 in. and the central angle measure of an arc is $\frac{\pi}{5}$ radians. Ashton finds the length of an arc in inches as shown. What is his error? What is the correct arc length expressed in terms of π?

$$s = \frac{n}{360}(2\pi r)$$
$$= \frac{\frac{\pi}{5}}{360}(2\pi(5))$$
$$= \frac{\pi^2}{360}$$

3. Find the length of BC and the area of the shaded region. First, find $n°$, the measure of the central angle of BC. This is also central angle measure of the sector.



$n° = 180° - $ _____

$= $ _____

Use the arc length formula.

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

$= \frac{\quad}{360} \cdot 2\pi(\quad)$

$= \quad\pi$

Use the area formula for a sector.

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

$= \frac{\quad}{360} \cdot \pi(\quad)^2$

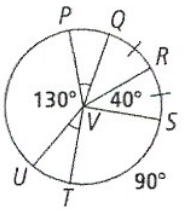
$= \quad\pi$

10-1 Additional Practice

Arcs and Sectors

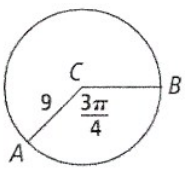
Use $\odot V$ to find each arc measure.

1. $\overset{\frown}{QR}$
2. $\overset{\frown}{PQ}$
3. $\overset{\frown}{STU}$
4. $\overset{\frown}{PSU}$

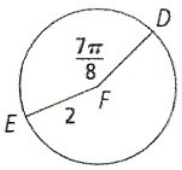


Find each arc length. Express each answer in terms of π.

5. length of $\overset{\frown}{AB}$

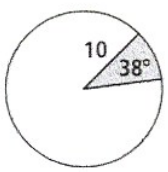


6. length of $\overset{\frown}{DE}$

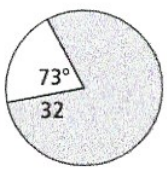


Find the area of the shaded sector. Round to the nearest tenth.

7.

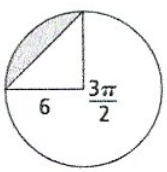


8.

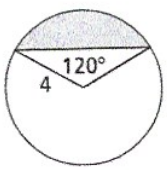


Find the area of the shaded segment. Round to the nearest tenth.

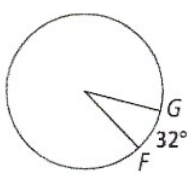
9.



10.



11. The length of $\overset{\frown}{GF}$ is 4 m. What is the radius of the circle? Round to the nearest tenth.



12. What is the area of the sector bounded by $\overset{\frown}{GF}$? Round to the nearest tenth.

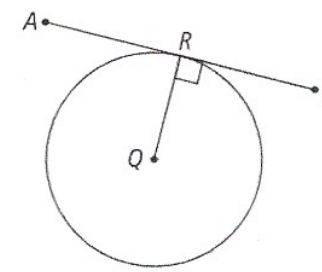
13. If an arc with measure 60° has length 5π on a circle with radius r, what is the length of a 60° arc on a circle with radius $2r$? Explain.

14. A pizza with radius 7 in. is cut into 12 equal-sized pieces. What is the area of each piece? Round to the nearest hundredth of an inch.

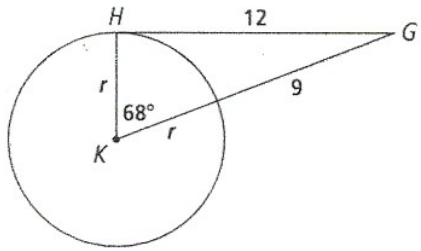
10-2 Reteach to Build Understanding

Lines Tangent to a Circle

A tangent is a line that touches a circle at exactly one point. In the diagram, $\overline{AB}$ is tangent to $\odot Q$. $\overline{AB}$ is perpendicular to the radius $\overline{QR}$.



1. Use the figure shown to answer the questions.



$\overline{GH}$ is tangent to $\odot K$.

a. Which segment is perpendicular to $\overline{HG}$?

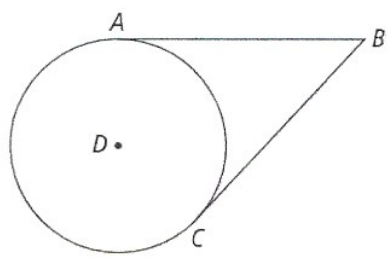
b. What is the measure of $\angle KHG$?

c. What type of triangle is $\triangle GHK$?

d. How are HK, HG, and GK related by the Pythagorean Theorem?

2. Seth calculates AB in the figure shown. Check his work and answer. Is he correct? If not, correct his error.

The radius of $\odot D$ is 3, $BC = 6$, and $\overline{AB}$ and $\overline{BC}$ are tangent to $\odot D$.



$AB^2 = BC^2 + r^2$

$AB^2 = 6^2 + 3^2$

$AB^2 = 45$

$AB = 3\sqrt{5}$

3. $\overline{QR}$ is tangent to $\odot P$. What is the value of x?
Because $\overline{QR}$ is tangent to $\odot P$, $\overline{QR}$ and $\overline{PQ}$ are

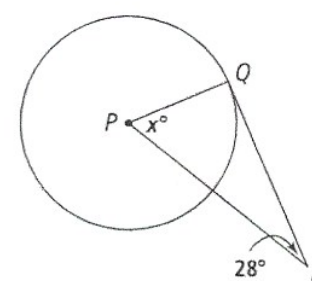
_____.

$m\angle PQR =$ _____

$x° =$ _____ $- m\angle PQR - m\angle R$

$=$ _____ $-$ _____ $- 28°$

$=$ _____



Name _____

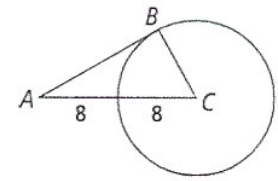
10-2 Additional Practice

Lines Tangent to a Circle

In Exercises 1 and 2, segment $\overline{AB}$ is tangent to $\odot C$. Find each value.

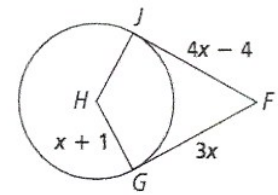
1. AB _____ or _____

2. $m\angle ABC$

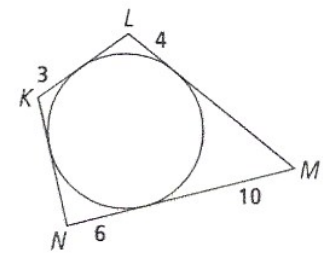


In Exercises 3–5, find each value.

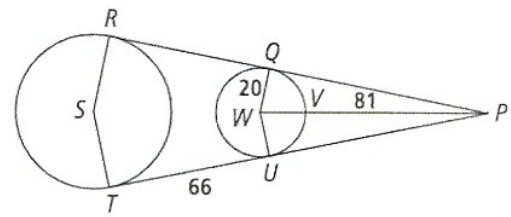
3. $\overline{JF}$ and $\overline{GF}$ are tangent to $\odot H$. What is HJ?



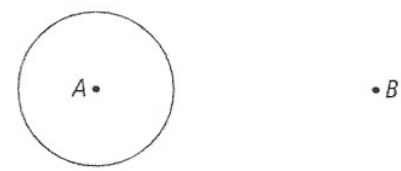
4. $\overline{KL}$, $\overline{LM}$, $\overline{MN}$, and $\overline{KN}$ are tangent to the circle. What is the perimeter of $KLMN$?



5. $\overline{RP}$ and $\overline{TP}$ are tangent to $\odot S$ and $\odot W$. What is RP?



6. Construct a tangent to $\odot A$ that passes through B.



7. If two segments share an endpoint and are tangent to the same circle at their other endpoints, what must be true of the segments?

8. A marble with radius r rolls in a L-shaped track. How far is the center of the marble from the corner of the track?