

Unit 4 Study Guide

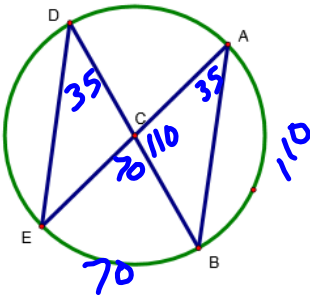
Unit 4 Circles Review

Angles in Circles

Write the formulas

- Central Angles: $\text{angle}^\circ = \text{arc}^\circ$
- Inscribed Angles: $\text{angle}^\circ = \frac{1}{2}(\text{arc}^\circ)$
- Angles Inside the Circle: $\text{angle}^\circ = \frac{\text{arc} + \text{arc}}{2}$
(not in the center)
- Angles Outside the Circle: $\text{angle}^\circ = \frac{\text{arc} - \text{arc}}{2}$

1) In the circle below, C is the center, $m\angle CAB = 35^\circ$ and $m\angle ACB = 110^\circ$. Find the following measures.



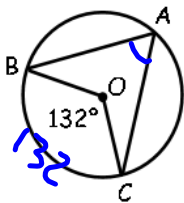
$$m\widehat{AB} = 70^\circ$$

$$m\widehat{EB} = 110^\circ$$

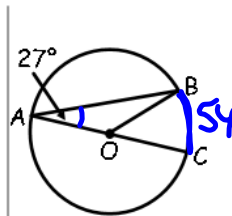
$$m\widehat{EDB} = 290^\circ$$

$$m\angle EDB = 35^\circ$$

Find the measure of the indicated angle or arc.



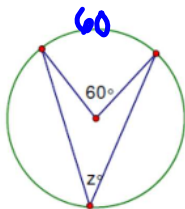
2) $m\angle BAC = 33^\circ$



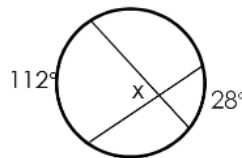
3) $m\widehat{BC} = 54^\circ$

$$\text{angle} = \frac{\text{arc} + \text{arc}}{2}$$

$$\frac{112 + 28}{2}$$

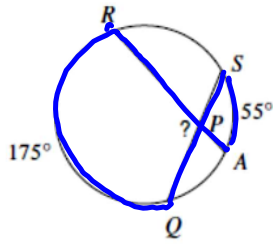


4) $z = 30^\circ$



5) $x = 70^\circ$

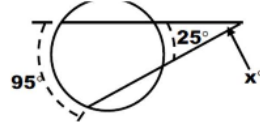
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$$? = \frac{175 + 55}{2}$$

$$? = \frac{230}{2}$$

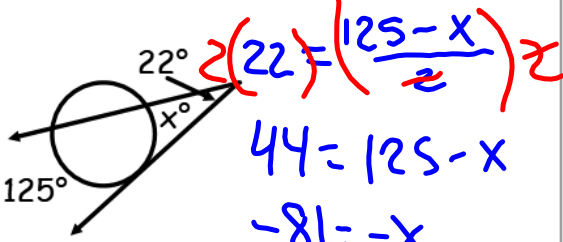
6) $m\angle P = 115^\circ$



$$x = \frac{95 - 25}{2}$$

$$\frac{70}{2}$$

7) $x = 35^\circ$

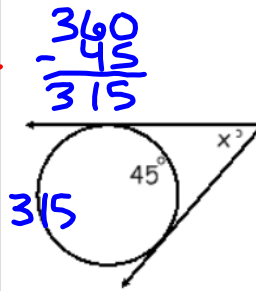


$$2(22) = \frac{125 - x}{2}$$

$$44 = 125 - x$$

$$-81 = -x$$

8) $x = 81^\circ$

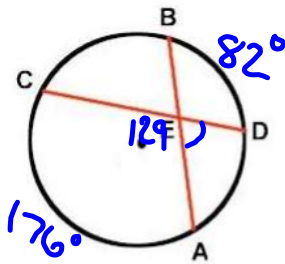


$$x = \frac{315 - 45}{2}$$

$$x = \frac{270}{2}$$

9) $x = 135^\circ$

10) $\angle AED$ is formed inside a circle by two intersecting chords. If minor arc $BD = 82$ and minor arc $CA = 176$, what is the measure of $\angle AED$?



$$\angle E = \frac{176 + 82}{2}$$

$$\angle CEA = \frac{258}{2} = 129$$

$$\angle AED$$

$$180 - 129 =$$

10) 51°

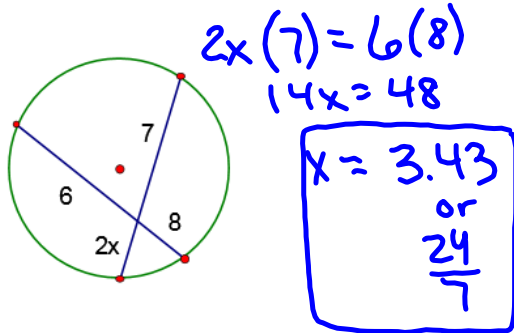
Segment Lengths in Circles

Write the formulas:

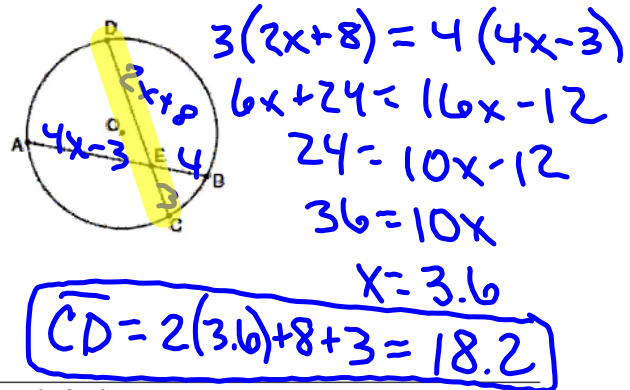
- Chords that intersect inside: part · part = part · part
- Secants that intersect outside: outside · whole = outside · whole
- Secant and Tangent that intersect outside: $t^2 = \text{outside} \cdot \text{whole}$

Find the indicated measure.

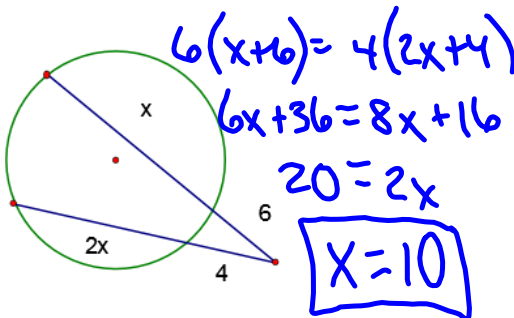
11) Find x.



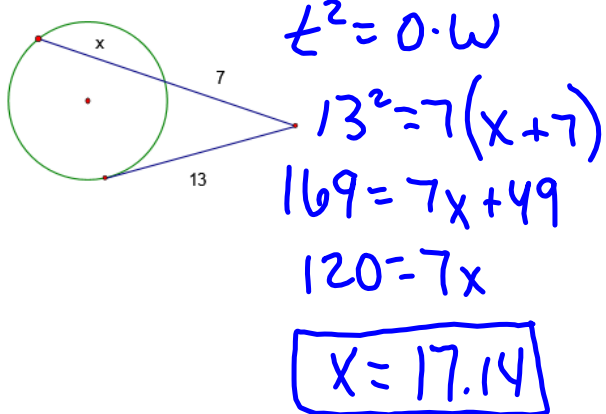
12) $DE = 2x + 8$, $EC = 3$, $AE = 4x - 3$, and $EB = 4$. Find $m\overline{CD}$.



13) Find x.

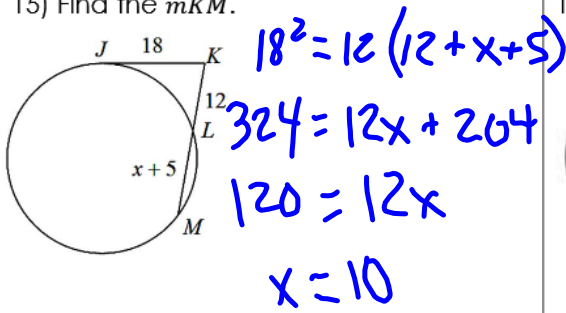


14) Find x.



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15) Find the $m\overline{KM}$.



$$18^2 = 12(12 + x + 5)$$

$$324 = 12x + 264$$

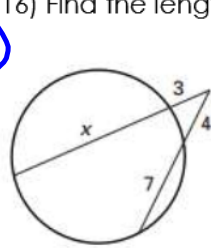
$$120 = 12x$$

$$x = 10$$

$$Km = x + 5 + 12 = 10 + 5 + 12 =$$

$$\boxed{Km = 27}$$

16) Find the length of the top secant.



$$3(x+3) = 4(11)$$

$$3x + 9 = 44$$

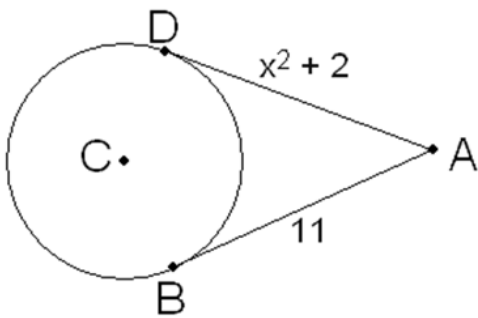
$$3x = 35$$

$$x = 11.67$$

$$x + 3 =$$

$$\boxed{14.67}$$

17) In the diagram, segments AD and AB are tangent to circle C. Solve for x.



$$\sqrt{(x^2 + 2)^2} = \sqrt{11^2}$$

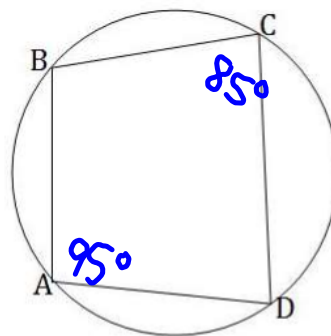
$$x^2 + 2 = 11$$

$$x^2 = 9$$

$$\boxed{x = 3}$$

18) Quadrilateral ABCD is inscribed in the circle. If $m\angle A = 95^\circ$, what also must be true?

- A) $m\angle B = 95^\circ$
- B) $m\angle C = 85^\circ$**
- C) $m\angle D = 105^\circ$
- D) $m\angle D = 95^\circ$



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Arc Length and Sector Area

Write the formulas:

Circumference: $C = 2\pi r$ or πd

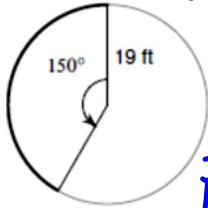
Area: $A = \pi r^2$

Arc Length: $\frac{\text{arc length}}{2\pi r} = \frac{\text{arc}^\circ}{360}$

Sector Area: $\frac{\text{sector area}}{\pi r^2} = \frac{\text{arc}^\circ}{360}$

Find the arc length and sector area of the following.

19)



$$\frac{x}{2\pi(19)} = \frac{150}{360}$$

$$360x = 5700\pi$$

Arc Length:

$$\boxed{\frac{95}{6}\pi \text{ ft}}$$

$$\frac{x}{\pi(19^2)} = \frac{150}{360}$$

Sector Area:

$$\boxed{\frac{1805}{12}\pi \text{ ft}^2}$$

20) central angle of 85° and a diameter of 5 cm.

Arc Length:

$$\frac{x}{5\pi} = \frac{85}{360}$$

$$\boxed{\frac{85}{72}\pi \text{ cm}}$$

Sector Area:

$$\frac{x}{25\pi} = \frac{85}{360}$$

$$\boxed{\frac{425}{288}\pi \text{ cm}^2}$$

21. The diameter of a pie is 10 in. The pie is cut into 8 slices. What is the arc length of each slice?

$$\frac{x}{10\pi} = \frac{1}{8}$$

$$8x = 10\pi$$

$$\boxed{x = \frac{5}{4}\pi \text{ in.}}$$

22. An Apple pie has a radius of 4.5 in. The pie is cut into 6 equal pieces. What is the area of each piece of the pie?

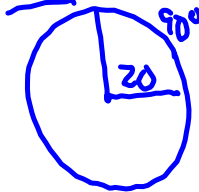
$$\frac{x}{20.25\pi} = \frac{1}{6}$$

$$6x = 20.25\pi$$

$$\boxed{x = \frac{27}{8}\pi \text{ in}^2}$$

or $x = 3.375\pi \text{ in}^2$

23. A sprinkler has a circular path that sprays 20 ft (the radius of the circle). If the sprinkler is set to a quarter turn, what is the area of the yard that will be watered?



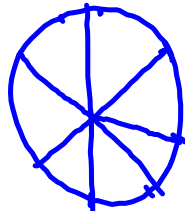
$$\frac{x}{400\pi} = \frac{1}{4}$$

$$4x = 400\pi$$

$$\boxed{x = 100\pi \text{ ft. or } 316.14 \text{ ft.}}$$

24. The radius of a bike wheel is 12 inches. There are 9 spokes on the wheel. What is the length between each spoke?

$$r = 12$$



$$\frac{x}{2\pi(12)} = \frac{1}{9}$$

$$\frac{24\pi}{9}$$

$$\boxed{\frac{8\pi}{3}}$$

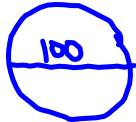
25. There are two pies each with a diameter of 12 in. One pie is cut into 6 slices. The other is cut into 10 slices. How much more pie do you get from a slice of the first pie?

$$\boxed{30.16 \text{ in}^2 \text{ or } \frac{48\pi}{5} \text{ in}^2}$$

Sector area $\frac{x}{144\pi} = \frac{1}{6}$ $\frac{y}{144\pi} = \frac{1}{10}$ $24\pi - 14.4\pi =$
 $6x = 144\pi$ $x = 24\pi$ $10y = 144\pi$ $y = 14.4\pi$

26. A circular track has a diameter of 100 yards. A track athlete sprints around half the track. How far did the athlete sprint?

$$\frac{x}{100\pi} = \frac{1}{2}$$



$D = 100$
 $\frac{314.1}{2} = \boxed{157 \text{ yds}}$ $\pi(100) = 314.1$

27. The Cheesecake Factory has two different sizes of cheesecake. A small cheesecake has a diameter of 8 inches and is cut into 8 slices. A large cheesecake has a diameter of 12 inches and is cut into 12 slices. Which option would give you more cheesecake; purchasing three slices of the small cheesecake or two slices of the large cheesecake?

Small Sector area $\frac{x}{16\pi} = \frac{3}{8}$ $8x = 48\pi$ $x = 6\pi$ $3x = 18\pi$
 Large Sector area $\frac{x}{36\pi} = \frac{2}{6}$ $6x = 36\pi$ $x = 6\pi$ $2x = 12\pi$
 $\boxed{\text{Both are same area}}$

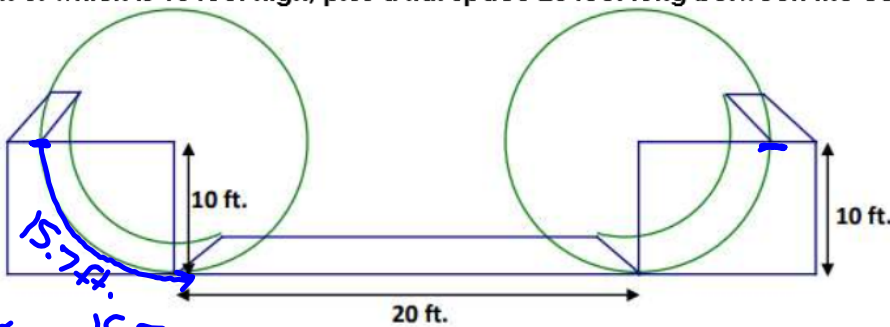
Skateboarding has become a popular sport. The parks department is thinking of constructing ramps in some of the local playgrounds. A "half-pipe" ramp is formed by two quarter-circle ramps, each of which is 10 feet high, plus a flat space 20 feet long between the centers.

$$\frac{x}{2\pi(10)} = \frac{1}{4}$$

$$\frac{x}{20\pi} = \frac{1}{4}$$

$$4x = 20\pi$$

$$x = 5\pi = 15.7$$



28. Find the distance a skater travels from the top of one ramp to the top of the other.

$$\boxed{51.4 \text{ ft.}}$$

29. Another launch ramp is formed by 2 arcs, each with a central angle of 60 degrees and a radius of 10 ft. Find the length from the top of one ramp to the top of the other.

$$\frac{x}{20\pi} = \frac{60}{360}$$

$$\frac{x}{20\pi} = \frac{1}{6}$$

$$6x = 20\pi$$

$$x = \frac{10}{3}\pi \quad x = 10.5$$

$$\boxed{41 \text{ ft.}}$$