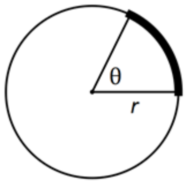
Section 12.3

Objective: Arc length, sector area, more tangent & chord theorems

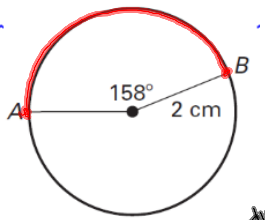
Arc Length: $\text{Arc Length} = \frac{\theta}{360^\circ} \cdot \text{circumference of circle} = \frac{\theta}{360^\circ} \cdot 2\pi r$

arc Length = $\frac{\text{central angle}}{360^\circ} \times 2 \times \text{radius} \times \pi$



Examples: Find the length of $\overset{\frown}{AB}$. Write your answers in terms of π and as decimals rounded to the nearest hundredth.

a)



length of AB $= \frac{158}{360} \cdot 2(2) \cdot \pi$ (radius)

in terms of π

$(158 \div 360 \times 2 \times 2)\pi$

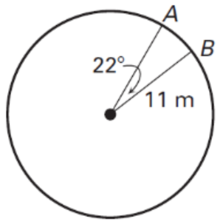
$\boxed{\frac{79}{45}\pi \text{ cm}}$

as a decimal

$158 \div 360 (2)(2)\pi$

5.52 cm

b)



length of $\overset{\frown}{AB} = \frac{22}{360}(2)(11)\pi$

in terms of π

$(22 \div 360 (2)(11))\pi$

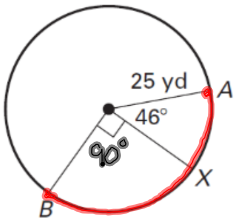
$\frac{121}{90}\pi$ meters

as a decimal

$(22 \div 360)(2)(11)\pi$

4.22 meters

c)



length of AB $= \frac{(90+46)}{360} \cdot 2 \cdot 25 \cdot \pi$

$\frac{136}{360} \cdot 2 \cdot 25 \cdot \pi$

in terms of π

$(136 \div 360)(2)(25)\pi$

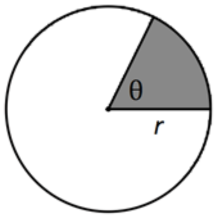
$\boxed{\frac{170}{9}\pi \text{ yards}}$

as a decimal

$(136 \div 360)(2)(25)\pi$

$\boxed{59.34 \text{ yards}}$

Sector Area: $\text{Sector Area} = \dfrac{\theta}{360°} \cdot \text{area of circle} = \dfrac{\theta}{360°} \cdot \pi r^2$

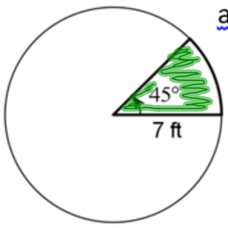


To Find area in terms of π its best to put π last in the formula.

In terms of π means the symbol π needs to be part of answer.

Examples: Find the area of each sector. Write your answers in terms of π and as decimals rounded to the nearest tenth.

a)



in terms of π

$$\text{Area} = \frac{45}{360} \cdot 7 \cdot 7 \cdot \pi$$

$$\text{Area} = (45 \div 360)(7)(7) \cdot \pi$$

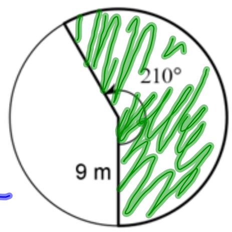
$$\boxed{\frac{49}{8}\pi \text{ ft}^2}$$

As a decimal

$$(45 \div 360)(7)(7)\pi$$

$$\boxed{19.2 \text{ ft}^2}$$

b)



in terms of π

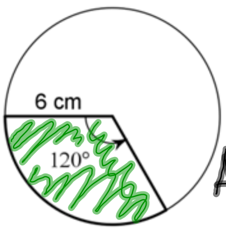
$$\frac{210}{360}(9)(9)\pi$$

$$\boxed{\frac{189}{4}\pi \text{ meters}^2}$$

as a decimal

$$(210 \div 360)(9)(9)\pi$$

$$\boxed{148.4 \text{ m}^2}$$



In terms of π

$$A = \frac{120}{360} \cdot 6 \cdot 6 \cdot \pi$$

$$\underbrace{(120 \div 360)(6)(6)}\pi$$

$$\boxed{12\pi \text{ cm}^2}$$

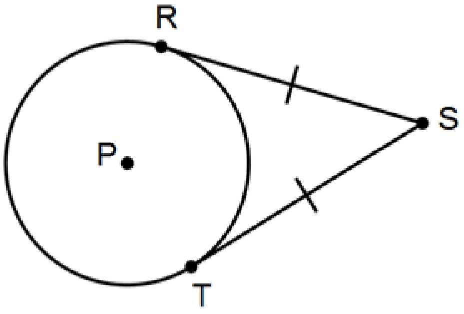
as a decimal

$$(120 \div 360)(6)(6)(\pi)$$

$$\boxed{37.7 \text{ cm}^2}$$

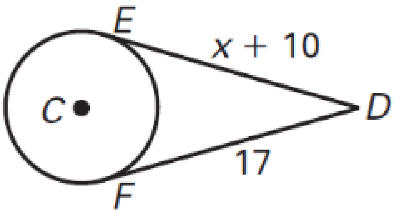
Theorem: If two segments from the same point outside a circle are both tangent to the circle, then they are congruent.

If $\overline{SR}$ and $\overline{ST}$ are tangent to $\odot P$ at points R and T, then $\overline{SR} \cong \overline{ST}$.



Examples: $\overline{DE}$ and $\overline{DF}$ are both tangent to $\odot C$. Find the value of x.

a)



From theorem

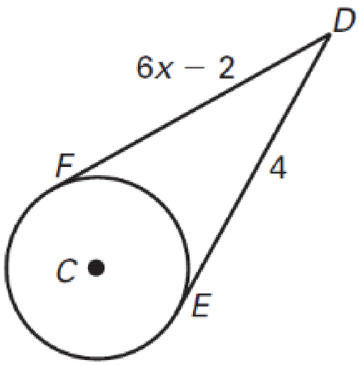
$ED = FD$

$x + 10 = 17$

$-10 \quad -10$

$\boxed{x = 7}$

b)



$FD = ED$

$6x - 2 = 4$

$+2 \quad +2$

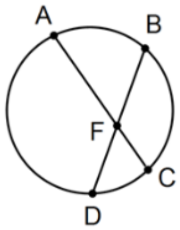
$6x = 6$

$\frac{6x}{6} = \frac{6}{6}$

$\boxed{x = 1}$

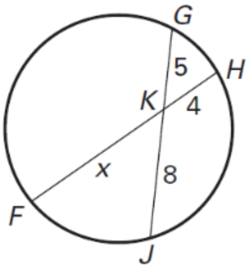
Theorem: two chords intersect inside a circle, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord.

$$AF \cdot FC = BF \cdot FD$$



Examples: Find the value of x.

a)



$FK \cdot KH = GK \cdot KJ$

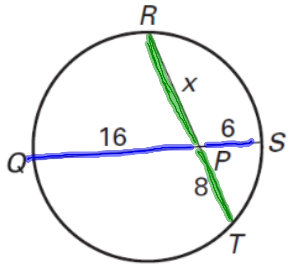
$x \cdot 4 = 5 \cdot 8$

$4x = 40$

$\frac{4x}{4} = \frac{40}{4}$

$\boxed{x = 10}$

b)



$RP \cdot PT = QP \cdot PS$

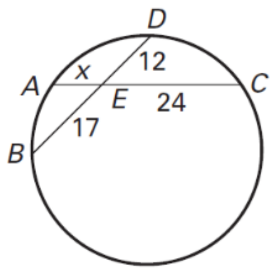
$x \cdot 8 = 16 \cdot 6$

$8x = 96$

$\frac{8x}{8} = \frac{96}{8}$

$\boxed{x = 12}$

c)



$AE \cdot EC = BE \cdot ED$

$x \cdot 24 = 17 \cdot 12$

$24x = 204$

$\frac{24x}{24} = \frac{204}{24}$

$\boxed{x = 8.5}$