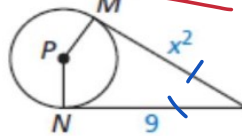


8. Points  $M$  and  $N$  are points of tangency. Find the value(s) of  $x$ .

$$x^2 = 9$$

$$x = \sqrt{9}$$

$$x = 3$$



$$\frac{36}{7} = r$$

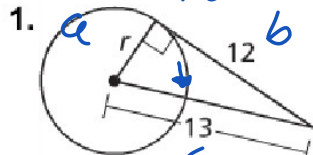
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$$a^2 + b^2 = c^2$$

Find the radius of the circle.

$$r^2 + 12^2 = 13^2$$



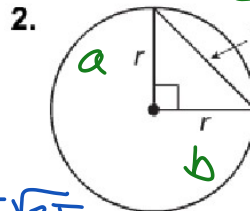
$$r^2 + 144 = 169$$

$$r^2 = 169 - 144$$

$$r^2 = 25$$

$$r = \sqrt{25}$$

$$r = 5$$



$$r^2 + r^2 = 18^2$$

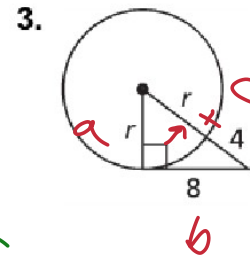
$$2r^2 = 324$$

$$r^2 = 162$$

$$r = \sqrt{162}$$

$$r = \sqrt{81 \cdot 2}$$

$$r = 9\sqrt{2}$$



$$r^2 + 8^2 = 10^2$$

$$r^2 + 64 = 100$$

$$r^2 = 100 - 64$$

$$r^2 = 36$$

$$r = \sqrt{36}$$

$$r = 6$$

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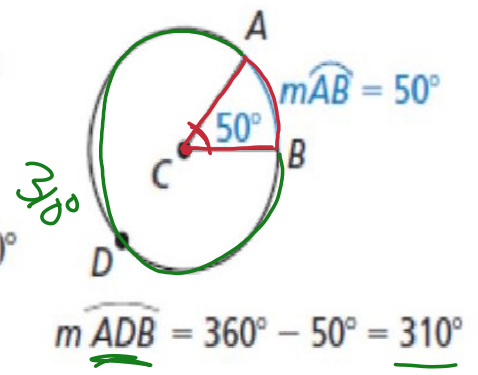
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## Core Concept

### Measuring Arcs

The **measure of a minor arc** is the measure of its central angle. The expression  $m\widehat{AB}$  is read as "the measure of arc  $AB$ ."

The measure of the entire circle is  $360^\circ$ . The **measure of a major arc** is the difference of  $360^\circ$  and the measure of the related minor arc. The measure of a semicircle is  $180^\circ$ .



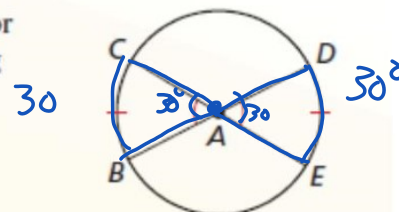
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## Theorem

### Theorem 10.4 Congruent Central Angles Theorem

In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding central angles are congruent.



Proof Ex. 37, p. 544

$\widehat{BC} \cong \widehat{DE}$  if and only if  $\angle BAC \cong \angle DAE$ .



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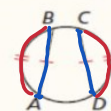
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## Theorems

### Theorem 10.6 Congruent Corresponding Chords Theorem

In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.

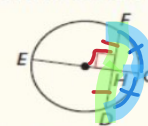


Proof Ex. 19, p. 550

$\widehat{AB} \cong \widehat{CD}$  if and only if  $\overline{AB} \cong \overline{CD}$ .

### Theorem 10.7 Perpendicular Chord Bisector Theorem

If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc.

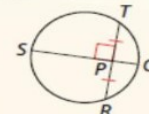


Proof Ex. 22, p. 550

If  $\overline{EG}$  is a diameter and  $\overline{EG} \perp \overline{DF}$ , then  $\widehat{HD} \cong \widehat{HF}$  and  $\widehat{GD} \cong \widehat{GF}$ .

### Theorem 10.8 Perpendicular Chord Bisector Converse

If one chord of a circle is a perpendicular bisector of another chord, then the first chord is a diameter.



Proof Ex. 23, p. 550

If  $\overline{QS}$  is a perpendicular bisector of  $\overline{TR}$ , then  $\overline{QS}$  is a diameter of the circle.

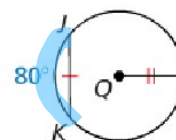


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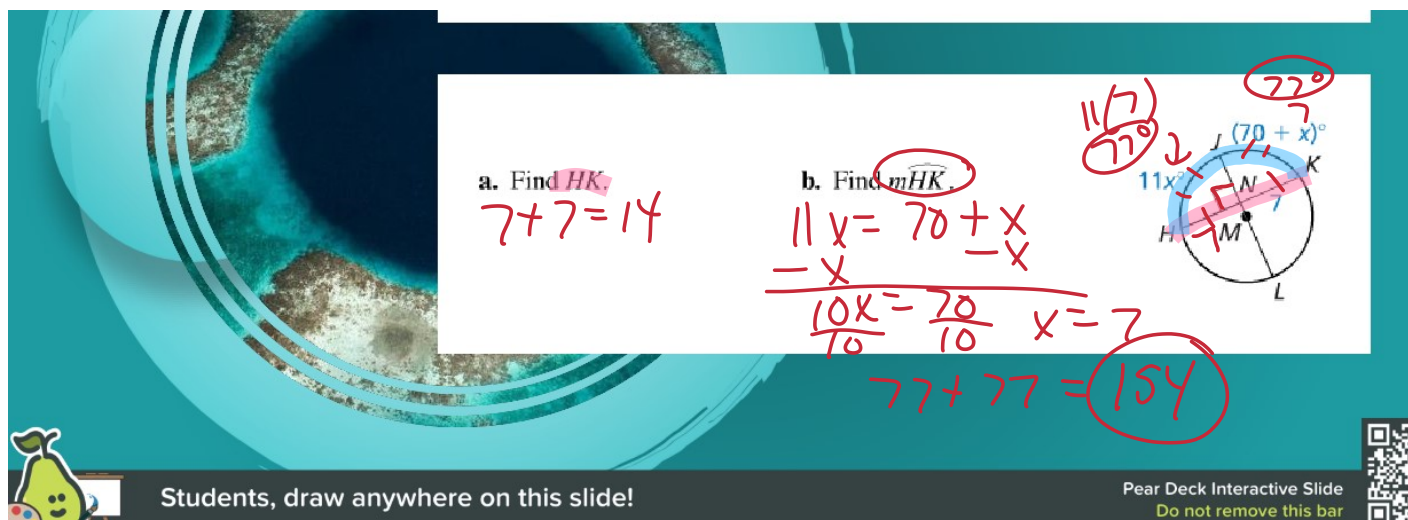
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In the diagram,  $\odot P \cong \odot Q$ ,  $\overline{FG} \cong \overline{JK}$ , and  $m\widehat{JK} = 80^\circ$ . Find  $m\widehat{FG}$ .





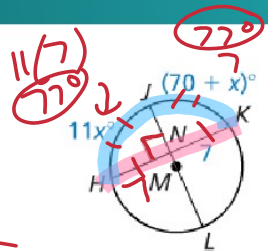


**a.** Find  $\angle HK$ .

$$7 + 7 = 14$$

**b.** Find  $m\widehat{HK}$ .

$$\begin{array}{r} 11x = 70 + x \\ -x \quad \quad -x \\ \hline 10x = 70 \\ \frac{10x}{10} = \frac{70}{10} \quad x = 7 \end{array}$$

$$77 + 77 = 154$$


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Find the measure of each arc of  $\odot P$ , where  $\overline{RT}$  is a diameter.

a.  $\widehat{RS}$   $110^\circ$

b.  $\widehat{RTS}$   $360 - 110 = 250^\circ$

c.  $\widehat{RST}$   $110 + 70 = 180$

A recent survey asked teenagers whether they would rather meet a famous musician, athlete, actor, inventor, or other person. The circle graph shows the results. Find the indicated arc measures.

a.  $m\widehat{AC}$  b.  $m\widehat{ACD}$  c.  $m\widehat{ADC}$  d.  $m\widehat{EBD}$

Handwritten calculations:

$$83 + 61 + 79 = 223$$

or

$$360 - 137 = 223$$

Handwritten calculation for d:

$$360 - 61 = 299$$

Circle Graph Data:

Category	Measure
Musician	108°
Athlete	83°
Other	61°
Actor	79°
Inventor	29°

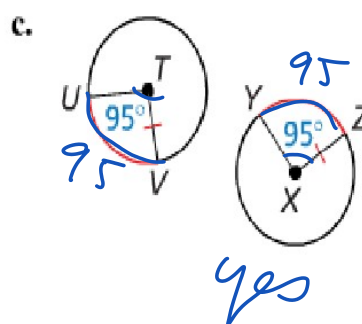
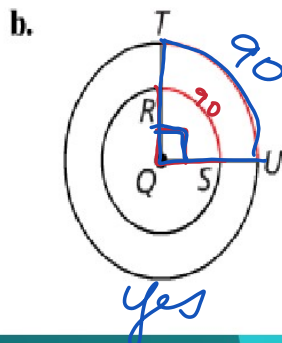
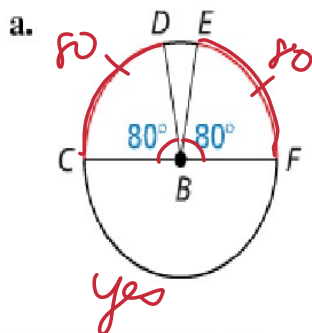


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Tell whether the red arcs are congruent. Explain why or why not.



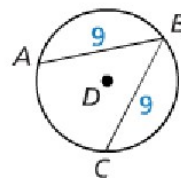
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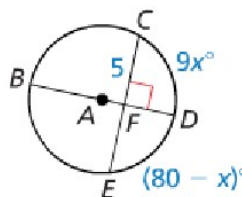
In Exercises 1 and 2, use the diagram of  $\odot D$ .

- If  $m\widehat{AB} = 110^\circ$ , find  $m\widehat{BC}$ .
- If  $m\widehat{AC} = 150^\circ$ , find  $m\widehat{AB}$ .



In Exercises 3 and 4, find the indicated length or arc measure.

- $CE$
- $m\widehat{CE}$



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