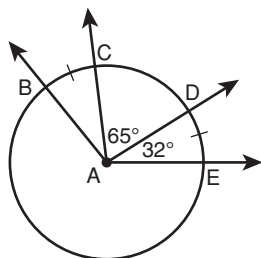Name _____ Date _____ Class _____

Reading Strategies
Use a Table

The table below shows some of the relationships among arcs, chords, and central angles.

Words	Diagram	Mathematical Symbols
A minor arc is equal to the measure of its central angle.		$m\widehat{DE} = m\angle DCE = x°$
A major arc is equal to 360° minus the measure of its central angle.		$m\widehat{DFE} = 360° - m\angle DCE$ $= 360° - x°$
The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.		$m\widehat{ABC} = m\widehat{AB} + m\widehat{BC}$
Congruent central angles have congruent chords.		$\overline{RQ} \cong \overline{YZ}$
Congruent chords have congruent arcs.		$\widehat{RQ} \cong \widehat{YZ}$
Congruent arcs have congruent central angles.		$\angle QXR \cong \angle ZXY$

Answer the following.

1. The measure of a central angle is 60°. What is the measure of its minor arc? _____

2. What will be the sum of a central angle's minor arc and major arc? _____

3. Congruent _____ have congruent chords.

Use circle *A* to find each measure.

4. $m\widehat{DE}$ _____

5. $m\widehat{CBE}$ _____

6. $m\widehat{EBD}$ _____

7. $m\widehat{CBD}$ _____

8. $m\angle CAB$ _____

9. $m\widehat{CD}$ _____

Holt Geometry

Review for Mastery
Arcs and Chords continued

Congruent arcs are arcs that have the same measure.

Congruent Arcs, Chords, and Central Angles		
If m∠BEA ≅ m∠CED, then $\overline{BA} \cong \overline{CD}$.	If $\overline{BA} \cong \overline{CD}$, then $\overline{BA} \cong \overline{CD}$.	If $\overline{BA} \cong \overline{CD}$, then m∠BEA ≅ m∠CED.
Congruent central angles have congruent chords.	Congruent chords have congruent arcs.	Congruent arcs have congruent central angles.

In a circle, if a radius or diameter is perpendicular to a chord, then it bisects the chord and its arc.

Since $\overline{AB} \perp \overline{CD}$, $\overline{AB}$ bisects $\overline{CD}$ and $\overset{\frown}{CD}$.

Find each measure.

7. $\overset{\frown}{QR} \cong \overset{\frown}{ST}$. Find m$\overset{\frown}{QR}$.

$4x°$
$(3x + 22)°$

88°

8. ∠HLG ≅ ∠KLJ. Find GH.

$2y + 5$
$y + 13$

21

Find each length to the nearest tenth.

9. NP

6   4

16.0

10. EF

9
8

30.0

Holt Geometry

Challenge
Revisiting Chords of Circles

In the figure at right, the diameter of circle O is 28 centimeters. The chord $\overline{AB}$ intercepts an arc whose measure is 86°. From your previous study of circles, you know that you can find the length of the intercepted arc, $\overset{\frown}{AB}$. In Exercises 1–5, you will see how your knowledge of trigonometry makes it possible for you to also find the length of the chord.

28 cm

Using the figure above, find each measure.

1. m∠AOB ___**86°**___   2. m∠OAB ___**47°**___

3. θ ___**43°**___   4. OA ___**14 cm**___

5. a. Using appropriate measures from Exercises 1–4, write a trigonometric equation that can be used to find AD.

   $\sin 43° = \dfrac{AD}{14}$

   b. Solve your equation from part **a**. Round to the nearest tenth.

   $AD \approx 9.5$ cm

   c. What is the length of $\overline{AB}$?

   $AB \approx 19.1$ cm

Find the length of a chord, $\overline{AB}$, that is in a circle of diameter d and that intercepts an arc, $\overset{\frown}{AB}$, of the given degree measure. Round your answers to the nearest tenth.

6. $d = 4$ inches, m$\overset{\frown}{AB}$ = 58°   7. $d = 3$ meters, m$\overset{\frown}{AB}$ = 162°   8. $d = 2\frac{1}{2}$ feet, m$\overset{\frown}{AB}$ = 60°

   $AB \approx$ ___**1.9 in.**___ $AB \approx$ ___**3.0 m**___ $AB \approx$ ___**1.3 ft**___

9. Devise a formula that can be used to find the length, ℓ, of a chord in a circle of diameter d, given the degree measure, n, of its intercepted arc, where $0° < n < 180°$.

   $\ell = d\left(\sin\left[\frac{n}{2}\right]°\right)$

In the figure at right, a regular pentagon is inscribed in a circle of diameter 10 inches. Find each measure. Students' answers may vary slightly.

10. the length of one side of the pentagon $S \approx 5.9$ in.

11. the perimeter of the pentagon $P \approx 29.4$ in.

12. the length of an apothem of the pentagon $a \approx 4.1$ in.

10 inches

13. the area of the pentagon $A \approx 59.4$ in^2

14. Devise a formula that can be used to find the area, A, of a regular n-gon given the diameter, d, of its circumscribed circle.

Formulas may vary in form.

$A = \frac{1}{4}nd^2\left(\cos\left[\frac{180}{n}\right]°\right)\left(\sin\left[\frac{180}{n}\right]°\right)$

Holt Geometry

Problem Solving
Arcs and Chords

1. Circle D has center $(-2, -7)$ and radius 7. What is the measure, in degrees, of the major arc that passes through points $H(-2, 0)$, $J(5, -7)$, and $K(-9, -7)$?

   270°

2. A circle graph is composed of sectors with central angles that measure $3x°$, $3x°$, $4x°$, and $5x°$. What is the measure, in degrees, of the smallest minor arcs?

   72°

Use the following information for Exercises 3 and 4.

The circle graph shows the results of a survey in which teens were asked what says the most about them at school. Find each of the following.

3. m$\overset{\frown}{AB}$

   154.8°

4. m∠APC

   115.2°

Teens Surveyed

Other 14%
Friends 43%
Activities 18%
Grades 25%

Choose the best answer.

5. Students were asked to name their favorite cafeteria food. The results of the survey are shown in the table. In a circle graph showing these results, which is closest to the measure of the central angle for the section representing chicken tenders?

   A 21°   Ⓒ 83°
   B 75°   **D** 270°

Favorite Lunch	Number of Students
Pizza	108
Chicken tenders	75
Taco salad	90
Other	54

6. The diameter of ⊙R is 15 units, and HJ = 12 units. What is the length of $\overline{ST}$?

   F 2.1 units   **H** 4.5 units
   Ⓖ 3 units   **J** 9.6 units

7. In the stained glass window, $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$. What is m$\overset{\frown}{CBD}$?

$(2x + 28)°$
$(4x - 42)°$

   A 35°   **C** 98°
   B 70°   Ⓓ 262°

Holt Geometry

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Congruent chords have congruent arcs.		$\overset{\frown}{RQ} \cong \overset{\frown}{YZ}$
Congruent arcs have congruent central angles.		$\angle QXR \cong \angle ZXY$

Answer the following.

1. The measure of a central angle is 60°. What is the measure of its minor arc?   **60°**

2. What will be the sum of a central angle's minor arc and major arc?   **360°**

3. Congruent ___**central angles**___ have congruent chords.

Use circle A to find each measure.

65°   32°

4. m$\overset{\frown}{DE}$ ___**32°**___   5. m$\overset{\frown}{CBE}$ ___**263°**___

6. m$\overset{\frown}{EBD}$ ___**328°**___   7. m$\overset{\frown}{CBD}$ ___**295°**___

8. m∠CAB ___**32°**___   9. m$\overset{\frown}{CD}$ ___**65°**___

Holt Geometry

Holt Geometry