

Warm Up

Lesson Presentation

Lesson Quiz

Holt McDougal Geometry



Objectives

Find the lengths of segments formed by lines that intersect circles.

Use the lengths of segments in circles to solve problems.

Vocabulary

secant segment external secant segment tangent segment

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The following theorem describes the relationship among the four segments that are formed when two chords intersect in the interior of a circle.

Theorem 11-6-1 Chord-Chord Product Theorem								
THEOREM		HYPOTHESIS	CONCLUSION					
If two chords intersect interior of a circle, the products of the length the segments of the c are equal.	t in the en the hs of hords	$\frac{C}{E}$ Chords \overline{AB} and \overline{CD} intersect at E .	$AE \cdot EB = CE \cdot ED$					

Applying the Chord-Chord Product Theorem

Find the value of x and the length of each chord.





$$5 = x$$

 $EF = 10 + 7 = 17$
 $GH = 14 + 5 = 19$

$$x = 3.75$$

 $AB = 6 + 5 = 11$
 $CD = 3.75 + 8 = 11.75$

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Example 2: Art Application

The art department is contracted to construct a wooden moon for a play. One of the artists creates a sketch of what it needs to look like by drawing a chord and its perpendicular bisector. Find the diameter of the circle used to draw the outer edge of the moon.



$$8 \cdot (d - 8) = 9 \cdot 9$$

$$8d - 64 = 81$$

$$8d = 145$$

$$d = \frac{145}{8} = 18\frac{1}{8}$$
in.

Suppose the length of chord *AB* that the archeologists drew was 12 in. In this case how much longer is the disk's diameter compared to the disk on p. 793?

$$AQ \bullet QB = PQ \bullet QR$$
$$6(6) = 3(QR)$$
$$12 = QR$$
$$.2 + 3 = 15 = PR$$
$$15 - 11\frac{1}{3} = 3\frac{2}{3}$$
in.



A **<u>secant segment</u>** is a segment of a secant with at least one endpoint on the circle.

An **<u>external secant segment</u>** is a secant segment that lies in the exterior of the circle with one endpoint on the circle.



 \overline{PM} , \overline{NM} , \overline{KM} , and \overline{JM} are secant segments of $\bigcirc Q$. \overline{NM} and \overline{JM} are external secant segments.

Ì	Theorem 11-6-2 Secant-Secant Product Theorem							
	THEOR	M	HYPOTHESIS	CONCLUSION				
	If two secants intersect in the exterior of a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment. (whole•outside = whole•outside)		A B D E Secants \overline{AE} and \overline{CE} intersect at E .	AE•BE = CE•DE				

Applying the Secant-Secant Product Theorem

Find the value of x and the length of each secant segment.





6 = x

ED = 7 + 9 = 16EG = 8 + 6 = 14 14 = *z*

LG = 30 + 9 = 39

JG = 14 + 13 = 27

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A <u>tangent segment</u> is a segment of a tangent with one endpoint on the circle. <u>AB</u> and <u>AC</u> are tangent segments.



Th	Theorem 11-6-3 Secant-Tangent Product Theorem						
	THEOREM		HYPOTHESIS	CONCLUSION			
If a secant and a tangent intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. (whole•outside = tangent ²)		gent ior of a uct of cant rnal ength of squared. ngent ²)	$A \longrightarrow B \\ C \longrightarrow C \\ D \longrightarrow C \\ C \longrightarrow $	$AC \cdot BC = DC^2$			

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Applying the Secant-Tangent Product Theorem Find the value of *x* and *y*.



 $\pm 10 = x$

The value of *x* must be 10 since it represents a length.



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Lesson Quiz: Part I

1. Find the value of *d* and the length of each chord.

d = 9

ZV = 17

WY = 18



2. Find the diameter of the plate.

 $8\frac{1}{8}$ in.



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Lesson Quiz: Part II

- **3.** Find the value of x and the length of each secant segment.
 - x = 10
 - QP = 8
 - QR = 12
- 4. Find the value of a.



