Geometry

This packet includes four sections that cover the major content of Geometry. Each section includes four pages of notes and practice for each topic. For additional support, visit KCS TV on YouTube for instructional videos that accompany each section.

The following content is included in this packet:

	Section			
	Section I **Similarity**	Section II **Quadrilaterals**	Section III **Trigonometry**	Section IV **Circles**
Problem Set 1	Ratios & Proportions	The Polygon Angle-Sum Theorems	The Pythagorean Theorem and Its Converse	Tangent Lines
Problem Set 2	Similar Polygons	Properties of Parallelograms	Special Right Triangles	Chords and Arcs
Problem Set 3	Proving Triangles Similar	Proving That a Quadrilateral is a Parallelogram	Trigonometry and Angles of Elevation & Depression	Inscribed Angles
Problem Set 4	N/A	Properties of Rhombuses, Rectangles, and Squares	Law of Sines and Cosines	Angle Measures and Segments

Geometry

SECTION IV

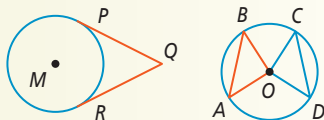| Circles |
|---|
| • Tangent Lines
• Chords and Arcs
• Inscribed Angles
• Angle Measures and Segments |

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Summer Edition

IV Circles

Connecting **BIG** ideas and Answering the Essential Questions

1 Reasoning and Proof

The measure of an arc equals the measure of its central angle. You can use this angle and arc to prove relationships of other angles and arcs.

Tangents, Chords, and Arcs (Lessons 12-1, 12-2)

$\overline{PQ}$ and $\overline{RQ}$ are tangents to $\odot M$. So $\overline{PQ} \cong \overline{RQ}$.

In a circle or congruent circles, if one is true, all are true:
$\angle AOB \cong \angle COD$,
$\overset{\frown}{AB} \cong \overset{\frown}{CD}$, $\overline{AB} \cong \overline{CD}$

Locus: A Set of Points (Lesson 12-6)

A locus is a set of points, all of which meet a stated condition.

2 Measurement

Segments intersecting circles form angles and intercepted arcs. You can find some missing measures using given information and appropriate formulas.
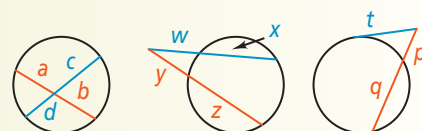
Angles and Circles (Lessons 12-3, 12-4)
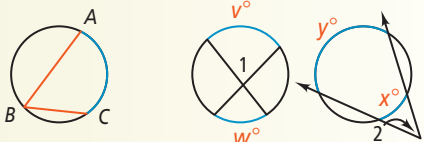
$m\angle B = \frac{1}{2} m\overset{\frown}{AC}$

$m\angle 1 = \frac{1}{2}(v + w)$

$m\angle 2 = \frac{1}{2}(y - x)$

Segment Lengths (Lesson 12-4)

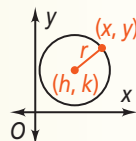$a \cdot b = c \cdot d$

$(w + x)w = (y + z)y$

$(p + q)p = t^2$

3 Coordinate Geometry

You can use the center and the radius to write an equation of a circle.

Circles in the Coordinate Plane (Lesson 12-5)

$(x - h)^2 + (y - k)^2 = r^2$

Chapter Vocabulary

- chord (p. 771)
- inscribed angle (p. 780)
- intercepted arc (p. 780)
- locus (p. 804)
- point of tangency (p. 762)
- secant (p. 791)
- standard form of an equation of a circle (p. 799)
- tangent to a circle (p. 762)

Use the figure to choose the correct term to complete each sentence.

1. $\overleftrightarrow{EF}$ is (*a secant of, tangent to*) $\odot X$.

2. $\overline{DF}$ is a (*chord, locus*) of $\odot X$.

3. $\triangle ABC$ is made of (*chords in, tangents to*) $\odot X$.

4. $\angle DEF$ is an (*intercepted arc, inscribed angle*) of $\odot X$.

5. The set of all points equidistant from the endpoints of $\overline{CB}$ is a (*locus, tangent*).
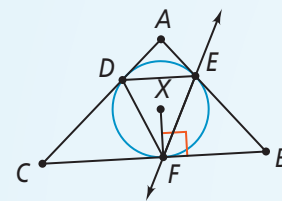
12-1 Tangent Lines

Quick Review

A **tangent** to a circle is a line that intersects the circle at exactly one point. The radius to that point is perpendicular to the tangent. From any point outside a circle, you can draw two segments tangent to a circle. Those segments are congruent.
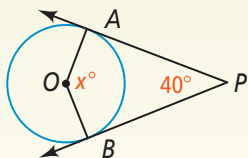
Example

$\overrightarrow{PA}$ **and** $\overrightarrow{PB}$ **are tangents. Find x.**

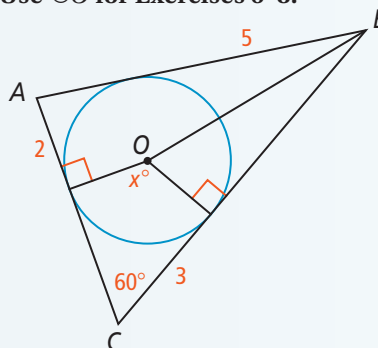The radii are perpendicular to the tangents. Add the angle measures of the quadrilateral:

$$x + 90 + 90 + 40 = 360$$
$$x + 220 = 360$$
$$x = 140$$

Exercises

Use ⊙O for Exercises 6–8.

6. What is the perimeter of $\triangle ABC$?

7. $OB = \sqrt{28}$. What is the radius?

8. What is the value of x?

12-2 Chords and Arcs

Quick Review

A **chord** is a segment whose endpoints are on a circle. Congruent chords are equidistant from the center. A diameter that bisects a chord that is not a diameter is perpendicular to the chord. The perpendicular bisector of a chord contains the center of the circle.
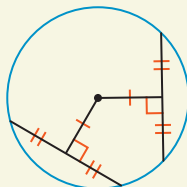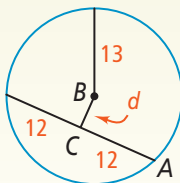
Example

What is the value of d?

Since the chord is bisected, $m\angle ACB = 90$. The radius is 13 units. So an auxiliary segment from A to B is 13 units. Use the Pythagorean Theorem.
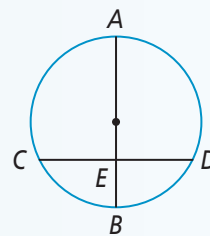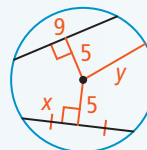
$$d^2 + 12^2 = 13^2$$
$$d^2 = 25$$
$$d = 5$$

Exercises

Use the figure at the right for Exercises 9–11.

9. If $\overline{AB}$ is a diameter and $CE = ED$, then $m\angle AEC =$? .

10. If $\overline{AB}$ is a diameter and is at right angles to $\overline{CD}$, what is the ratio of CD to DE?

11. If $CE = \frac{1}{2}CD$ and $m\angle DEB = 90$, what is true of $\overline{AB}$?

Use the circle below for Exercises 12 and 13.

12. What is the value of x?

13. What is the value of y?

12-3 Inscribed Angles
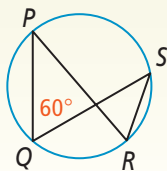
Quick Review

An **inscribed angle** has its vertex on a circle and its sides are chords. An **intercepted arc** has its endpoints on the sides of an inscribed angle, and its other points in the interior of the angle. The measure of an inscribed angle is half the measure of its intercepted arc.
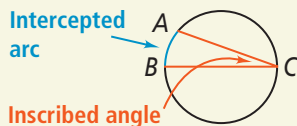
Example

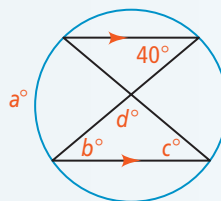**What is $m\widehat{PS}$? What is $m\angle R$?**

The $m\angle Q = 60$ is half of $m\widehat{PS}$, so $m\widehat{PS} = 120$. $\angle R$ intercepts the same arc as $\angle Q$, so $m\angle R = 60$.

Exercises

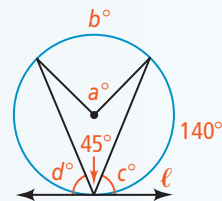**Find the value of each variable. Line ℓ is a tangent.**

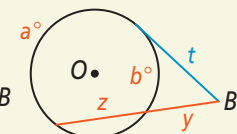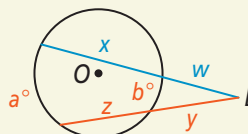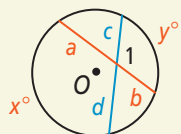**14.**

15.
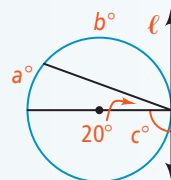
16.
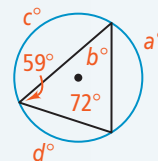
17.

12-4 Angle Measures and Segment Lengths

Quick Review

A **secant** is a line that intersects a circle at two points. The following relationships are true:

$a \cdot b = c \cdot d$

$m\angle 1 = \frac{1}{2}(x + y)$

$(w + x)w = (y + z)y$

$m\angle B = \frac{1}{2}(a - b)$

$(y + z)y = t^2$

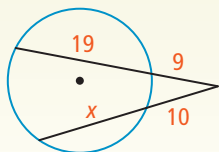$m\angle B = \frac{1}{2}(a - b)$

Example

What is the value of x?

$(x + 10)10 = (19 + 9)9$

$10x + 100 = 252$

$x = 15.2$

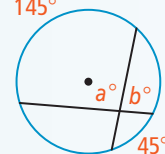
Exercises

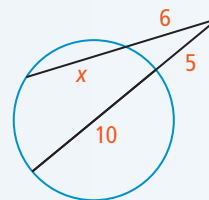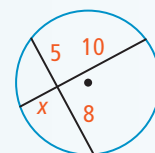**Find the value of each variable.**

18.

19.
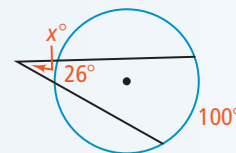
20.

21.

Section IV - Circles

1. secant of

2. chord

3. tangents to

4. inscribed angle

5. locus

6. 20

7. $\sqrt{3}$

8. 120

9. 90

10. $2:1.$

11. $\overline{AB}$ is the diameter of the circle.

12. 4.5

13. $y \approx 6.7$

14. $a = 80$, $b = 40$, $c = 40$, $d = 100$

15. $a = 40$, $b = 140$, $c = 90$

16. $a = 118$, $b = 49$, $c = 144$, $d = 98$

17. $a = 90$, $b = 90$, $c = 70$, $d = 65$

18. 37

19. $a = 95$, $b = 85$

20. 6.5

21. 4