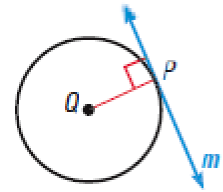
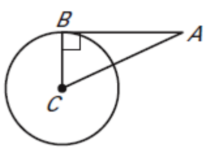
Geometry H
10.1 (cont.): Use Properties of Tangents

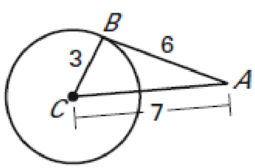
Name: ______________________________
Date: _______________ Period: __________

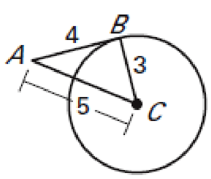
- I can use properties of tangents to verify a tangent to a circle.
- I can use properties of tangents to find segment lengths in circles.

Theorem	**Example**
In a plane, a line is tangent to a circle if and only if the line is perpendicular to a radius of the circle at its endpoint on the circle.	• If line m is tangent to ⊙Q, then _____________. • If $m \perp \overline{QP}$, then ________ _____________________. 

Example 1: Verify a tangent to a circle.
In the diagram, $\overline{BC}$ is a radius of $\odot C$. Determine whether $\overline{AB}$ is tangent to $\odot C$. Explain your reasoning.

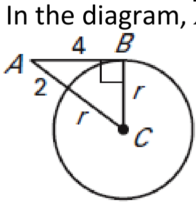
a)


b)


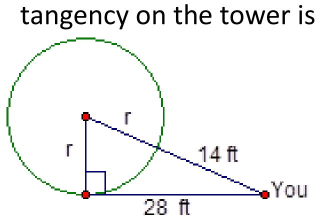
c)


Example 2: Find length of radius of circle.

a) In the diagram, $\overline{AB}$ is tangent to $\odot C$ at point *B*. Find the radius *r* of $\odot C$.

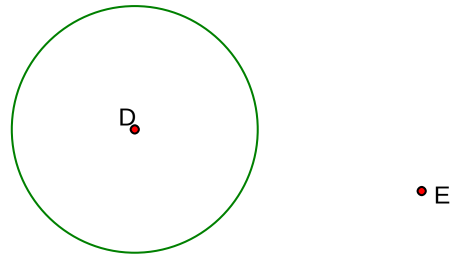


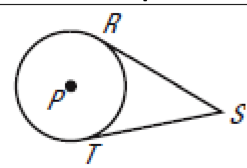
b) You are standing 14 feet from a circular water tower. The distance from you to the point of tangency on the tower is 28 feet. What is the radius of the tower?



Explore:
From a point in a circle's exterior, you can draw exactly two different tangents. Use the diagram below to complete the following:

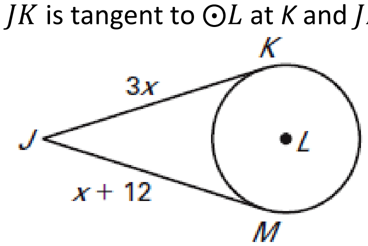
- Draw the two tangents $\overline{EP}$ and $\overline{EQ}$ to $\odot D$.
- Connect $\overline{ED}$, $\overline{DQ}$, and $\overline{DP}$.
- What types of segments are $\overline{DQ}$ and $\overline{DP}$?
  What can we conclude about $\overline{DQ}$ and $\overline{DP}$.
- Is $\Delta DPE \cong \Delta DQE$? Explain.
- Is $\overline{PE} \cong \overline{QE}$?



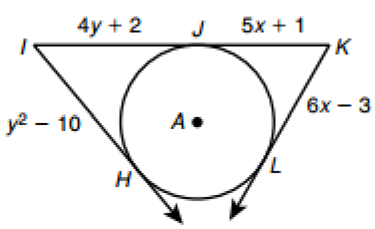
Theorem	Example
If two segments are tangent to a circle from the same external point, then the segments are ____________________________________.	 If $\overline{SR}$ and $\overline{ST}$ are tangent to $\odot P$, then __________________________.

Example 3: Find lengths of tangent segments.

a) $\overline{JK}$ is tangent to $\odot L$ at *K* and $\overline{JM}$ is tangent to $\odot L$ at *M*. Find the value of *x*.



b) $\overline{IH}$, $\overline{IK}$, and $\overline{IL}$ are tangent to $\odot A$. What is *IK*?



Geometry H
10.1 Homework: Use Properties of Tangents

Name: ______________________________
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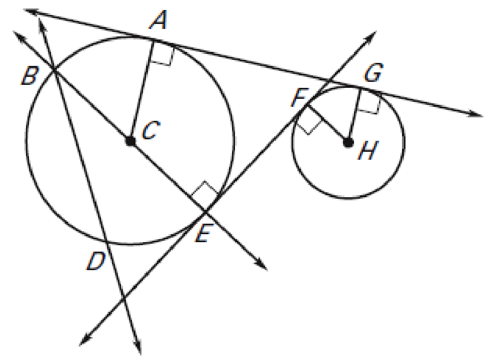
State the best term for the given figure in the diagram.

1. F ________________________
2. $\overleftrightarrow{FE}$ ________________________
3. $\overline{HG}$ ________________________
4. $\overline{DB}$ ________________________
5. C ________________________
6. $\overline{BE}$ ________________________
7. $\overleftrightarrow{DB}$ ________________________
8. $\overleftrightarrow{AG}$ ________________________



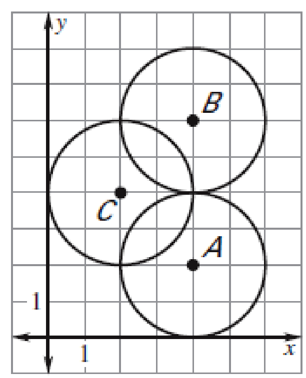
Use the diagram at the right to complete the following.

9. Find the diameter and radius of $\odot A$, $\odot B$, and $\odot C$.

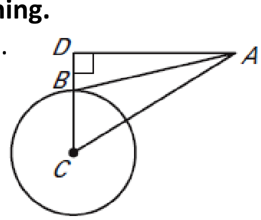
10. What is the point of intersection of all three circles?

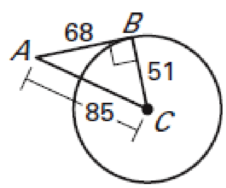
11. Draw all common tangents of $\odot A$ and $\odot B$. Write the equations of the common tangents.

12. Draw the common secant of $\odot A$ and $\odot C$ that passes through both intersections of the two circles. Write the equation of that secant line.



In the diagram, $\overline{BC}$ is a radius of $\odot C$. Determine whether $\overline{AB}$ is tangent to $\odot C$. *Explain* your reasoning.

13.


14.


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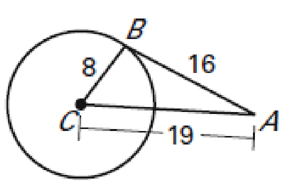
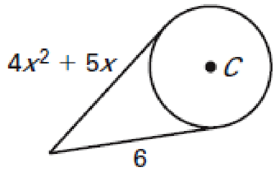


In the diagram, assume that segments are tangents if they appear to be. Find the value(s) of *x*.

16.



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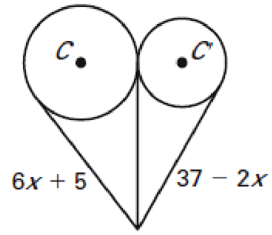

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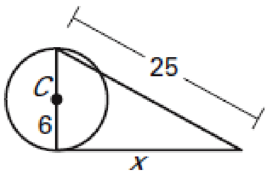

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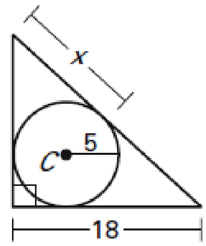
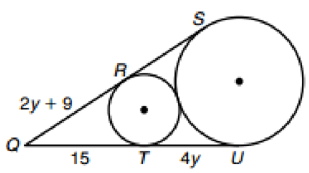
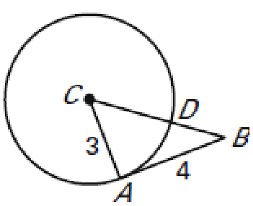


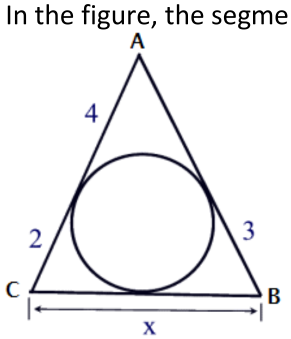
20. In the figure, segments that appear to be tangent are tangent. Find *QS*.



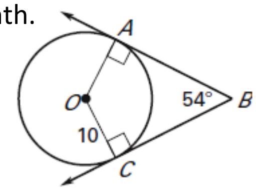
21. In the figure, $\overline{AB}$ is tangent to circle *C*. Find the length of $\overline{DB}$.



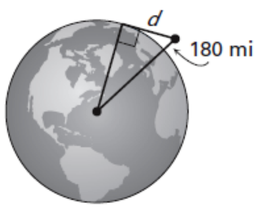
22. In the figure, the segments that appear to be tangent are tangent. Find *x* and the perimeter of $\triangle ABC$.



23. In the figure below, $OC = 10$, $m\angle ABC = 54°$, and $\overrightarrow{BA}$ and $\overrightarrow{BC}$ are tangents to $\odot O$. Find BC to the nearest tenth.

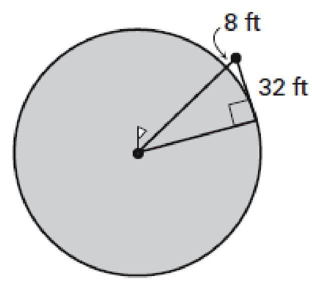


24. Suppose a space shuttle is orbiting about 180 miles above Earth. What is the distance *d* from the shuttle to the horizon? Use the fact that the radius of the Earth is approximately 4000 miles to help you solve. Round your answer to the nearest tenth.



25. A green on a golf course is in the shape of a circle. Your golf ball is 8 feet from the edge of the green and 32 feet from the point of tangency on the green as shown in the figure below.

a) Assuming that the green is flat, what is the radius of the green?



c) How far is your golf ball from the cup at the center of the green?

Answer Key

1. Point of tangency
2. Common tangent
3. Radius
4. Chord
5. Center
6. Diameter
7. Secant
8. Common tangent
9. All three circles have d = 4 and r = 2
10. (4, 4)
11. $y = 4$, $x = 2$, $x = 6$
12. $y = x$
13. No, $\overline{AB}$ is not $\perp \overline{CB}$
14. Yes, by converse of Pythagorean theorem, $\overline{AB} \perp \overline{CB}$
15. No, by Converse of Pythagorean Theorem, $\overline{AB}$ is not $\perp \overline{CB}$
16. -2 or ¾
17. 4
18. $\sqrt{481}$
19. 11.25
20. 27
21. 2
22. X=5, p = 18
23. 19.6
24. 1213.4 miles
25. a) 60 ft b) 68 ft