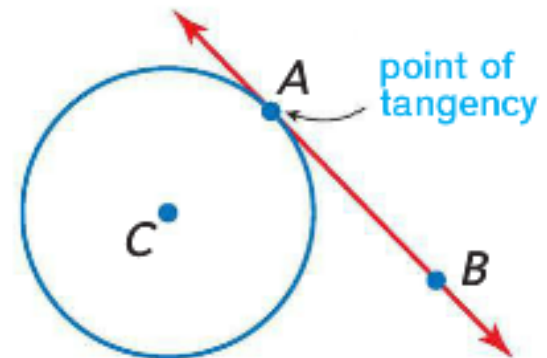


Tangents

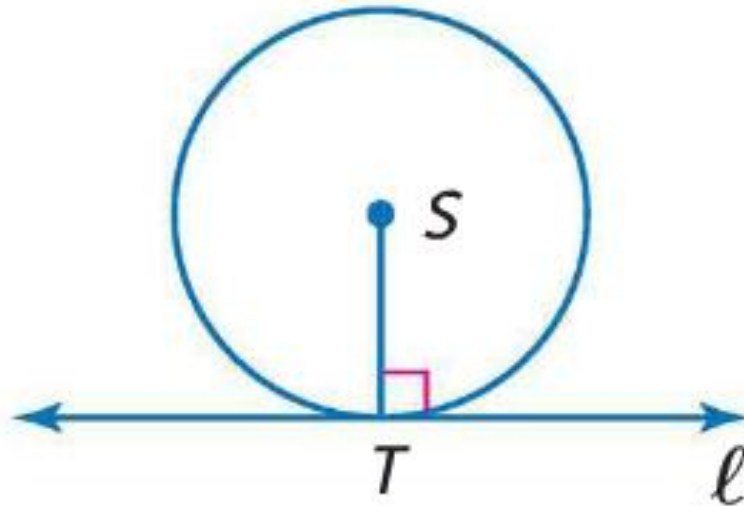
Tangent

- A tangent is a line in the same plane as a circle that intersects the circle in exactly one point, called the point of tangency.
- A common tangent is a line, ray, or segment that is tangent to two circles in the same plane.



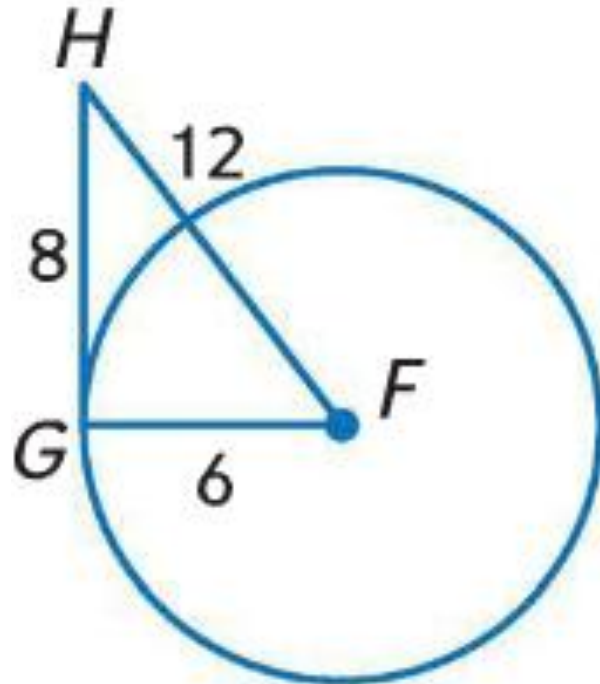
Tangent Theorem

- In a plane, a line is tangent to a circle if and only if it is perpendicular to a radius drawn to the point of tangency.



Examples

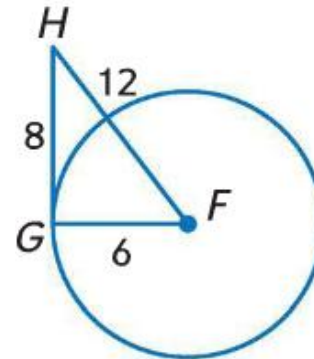
- Determine whether \overline{GH} is tangent to $\odot F$. Justify your answer.



Examples

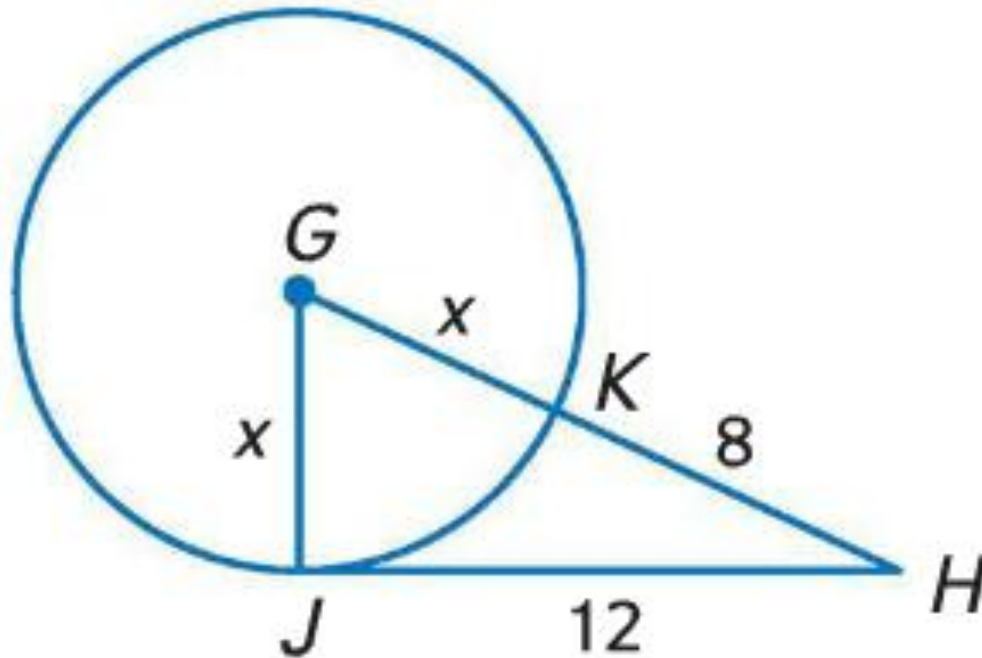
- Determine whether \overline{GH} is tangent to $\odot F$. Justify your answer.

- $6^2 + 8^2 = (6 + 12)^2$
- $36 + 64 = 18^2$
- $100 = 324$
- Not tangent



Examples

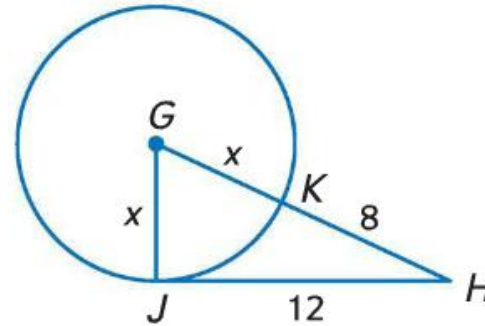
- JH is tangent to $\odot G$ at J . Find x .



Examples

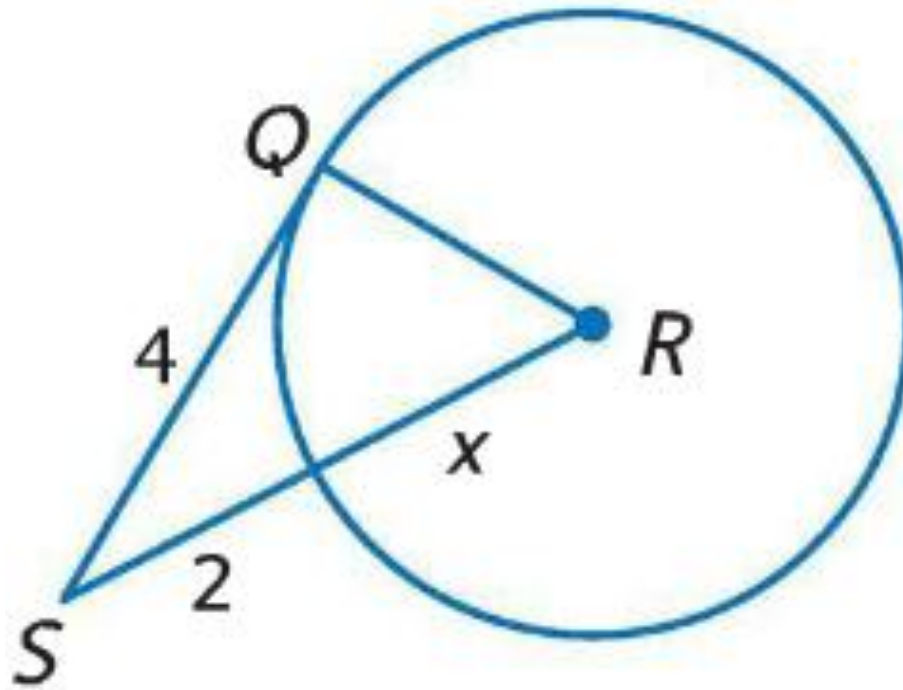
- JH is tangent to $\odot G$ at J. Find x.

- $x^2 + 12^2 = (x + 8)^2$
- $x^2 + 144 = x^2 + 16x + 64$
- $80 = 16x$
- $5 = x$
- 5, 12, 13 is a Pythagorean Triple
- Tangent



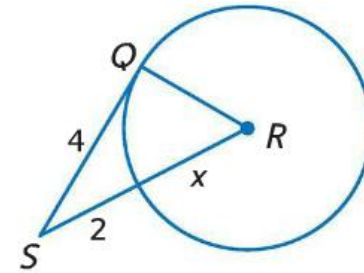
Examples

- QS is tangent to $\odot R$ at Q . Find x .



Examples

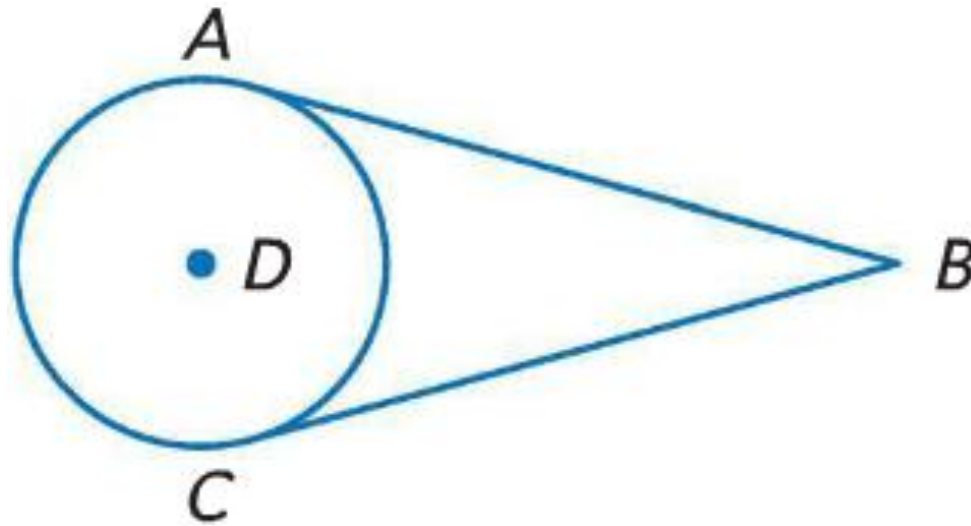
- QS is tangent to $\odot R$ at Q. Find x.



- $x^2 + 4^2 = (x + 2)^2$
- $x^2 + 16 = x^2 + 4x + 4$
- $16 = 4x + 4$
- $12 = 4x$
- $3 = x$

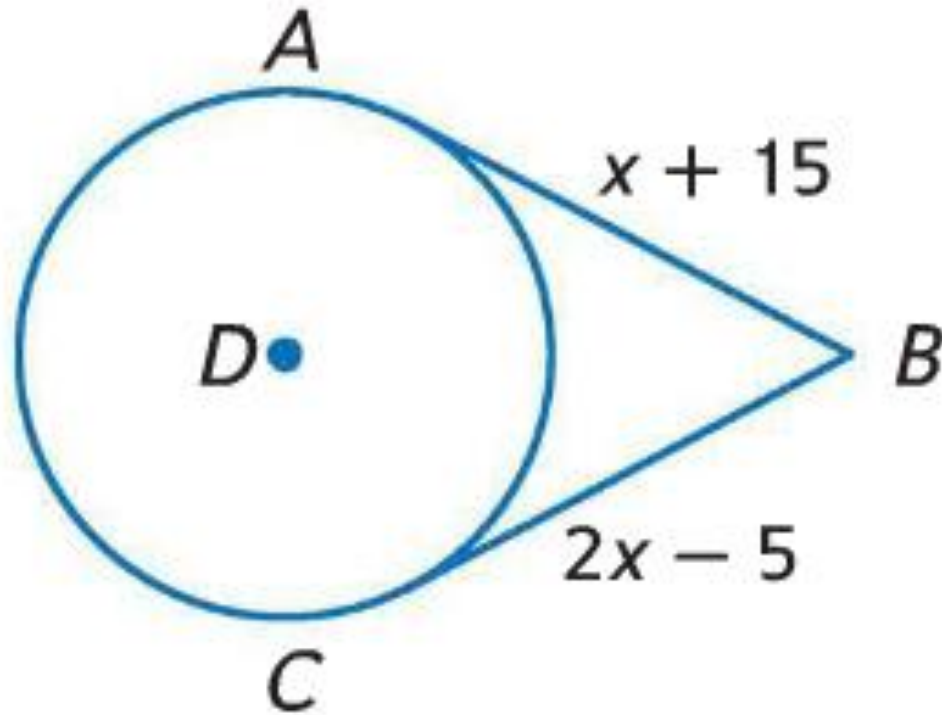
Congruent Tangents

- If two segments from the same exterior point are tangent to a circle, then they are congruent.



Examples

- AB and CB are tangent to $\odot D$. Find the value of x .



Examples

- AB and CB are tangent to $\odot D$. Find the value of x .

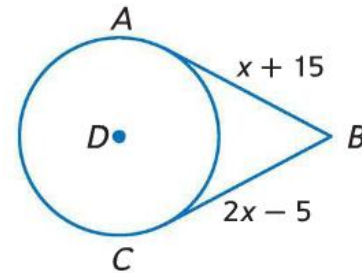
- $x + 15 = 2x - 5$

- $15 = x - 5$

- $20 = x$

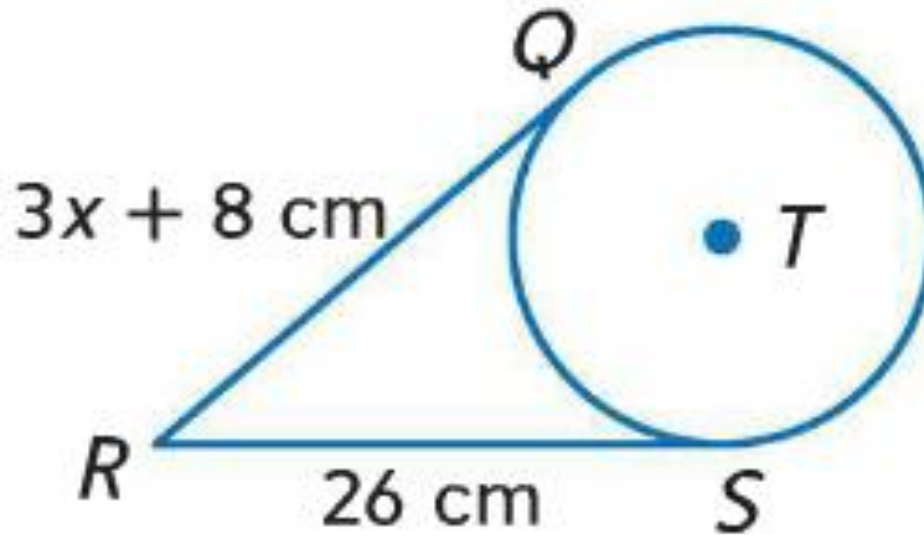
Subtract x from both sides

Add 5 to both sides



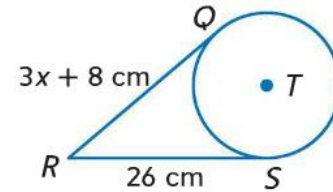
Examples

- Find the value of x . Assume that segments that appear to be tangent are tangent.



Examples

- Find the value of x . Assume that segments that appear to be tangent are tangent.



- $3x + 8 = 26$

- $3x = 18$

Subtract 8 from both sides

- $x = 6$

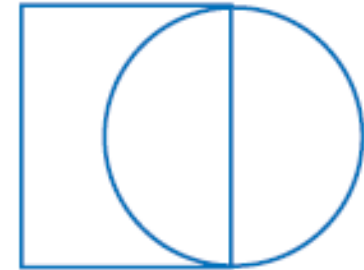
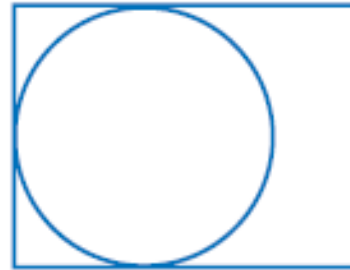
Divide by 3 on both sides

Circumscribed Polygons

- When a polygon is circumscribed about a circle, all of the sides of the polygon are tangent to the circle.



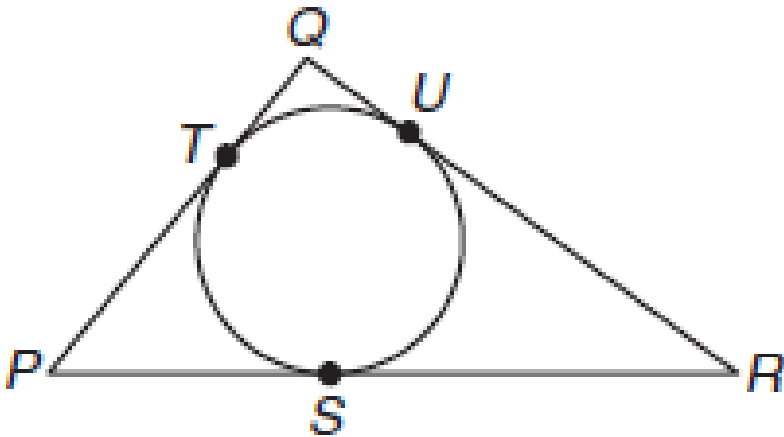
Polygons are circumscribed.



Polygons are *not* circumscribed.

Examples

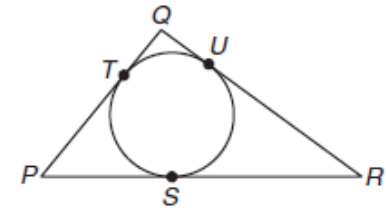
- Find the perimeter of each polygon for the given information. Assume that segments that appear to be tangent are tangent.
- $QT = 4$, $PT = 9$, $SR = 13$



Examples

- Find the perimeter of each polygon for the given information. Assume that segments that appear to be tangent are tangent.

- $QT = 4$, $PT = 9$, $SR = 13$

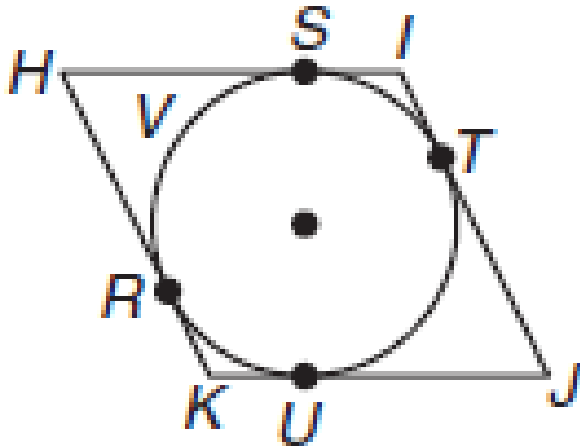


- $QT = 4$, $QU = 4$; $PT = 9$, $PS = 9$; $RS = 13$, $RU = 13$

- $\text{Perimeter} = 4 + 4 + 9 + 9 + 13 + 13 = 52$

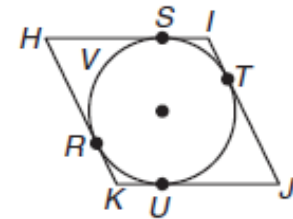
Examples

- Find the perimeter of each polygon for the given information. Assume that segments that appear to be tangent are tangent.
- $HIJK$ is a rhombus, $SI = 5$, $HR = 13$



Examples

- Find the perimeter of each polygon for the given information. Assume that segments that appear to be tangent are tangent.



- $HIJK$ is a rhombus, $SI = 5$, $HR = 13$
- $SI = 5$, $TI = 5$, $RK = 5$, $UK = 5$; $HR = 13$, $HS = 13$, $JU = 13$, $JT = 13$
- $Perimeter = 5 + 5 + 5 + 5 + 13 + 13 + 13 + 13 = 72$