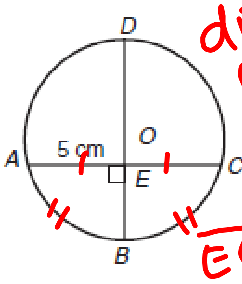
Questions on Lesson 9.4?

Answer these questions to help you review.

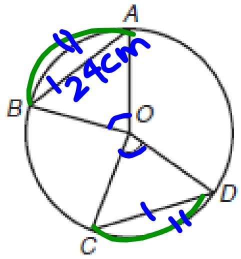
7. If $\overline{BD}$ is a diameter, what is the length of $\overline{EC}$?



diameter chord thm. p691

$\overline{EC} = 5cm$

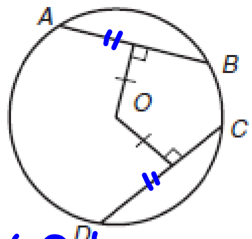
9. If the length of $\overline{AB}$ is 24 centimeters, what is the length of $\overline{CD}$?



congruent chord-congruent arc converse thm. p.698

$\overline{CD} = 24 cm.$

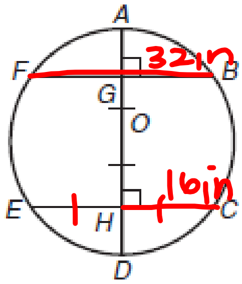
8. If the length of $\overline{AB}$ is 13 millimeters, what is the length of $\overline{CD}$?



p694 Equidistant chord converse thm.

$\overline{CD} = 13mm$

10. If the length of $\overline{BF}$ is 32 inches, what is the length of $\overline{CH}$?



$\overline{CH} = 16in$

equidistant chord converse thm. p694

&

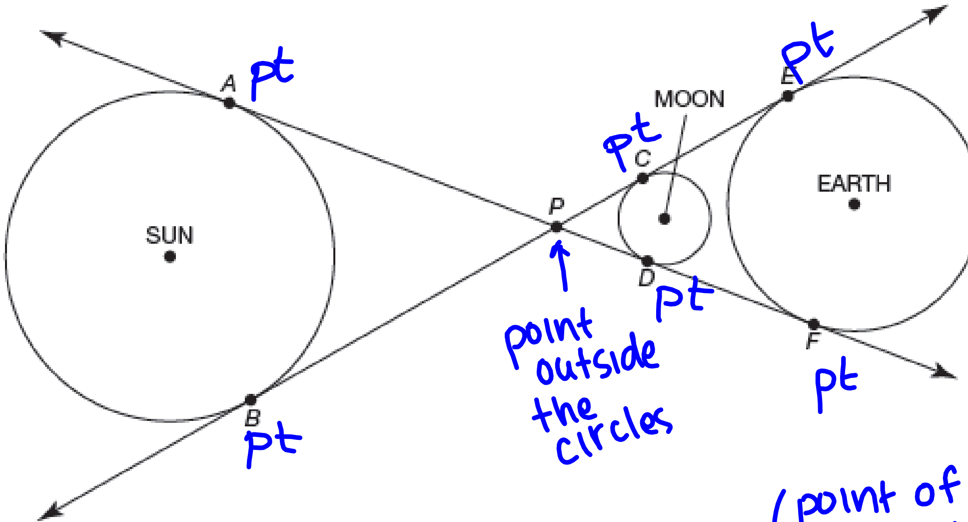
diameter-chord thm. p691

Solar Eclipses
Tangents and Secants
9.5

pg.701 & 703 in your book

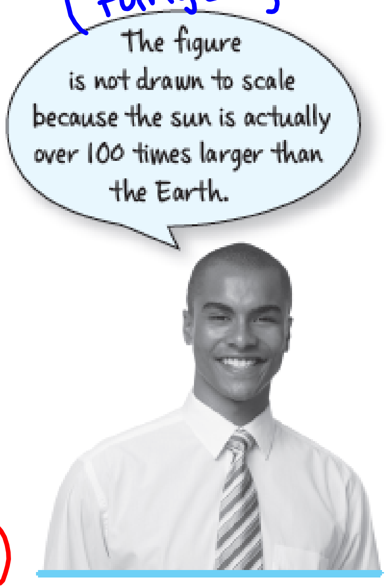
For the purposes of the problem situation, the Moon, the Sun, and Earth are represented by circles of different sizes.

Consider point *P* located outside of the Moon, Earth, and the Sun. Lines *AF* and *BE* are drawn tangent to the Moon, Earth, and the Sun as shown.



(point of tangency pt)

A **tangent segment** is a line segment formed by connecting a point outside of the circle to a point of tangency.



1. Identify the two tangent segments drawn from point *P* associated with the Sun. Then, use a compass to compare the length of the two segments.

$\overline{PA}$ & $\overline{PB}$ (same length)

2. Identify the tangent segments drawn from point *P* associated with the Moon. Then, use a compass to compare the length of the two line segments.

$\overline{PC}$ & $\overline{PD}$ (same length)

3. Identify the tangent segments drawn from point *P* associated with the Earth. Then, use a compass to compare the length of the two line segments.

$\overline{PF}$ & $\overline{PE}$ (same length)

Jan 4-9:01 AM

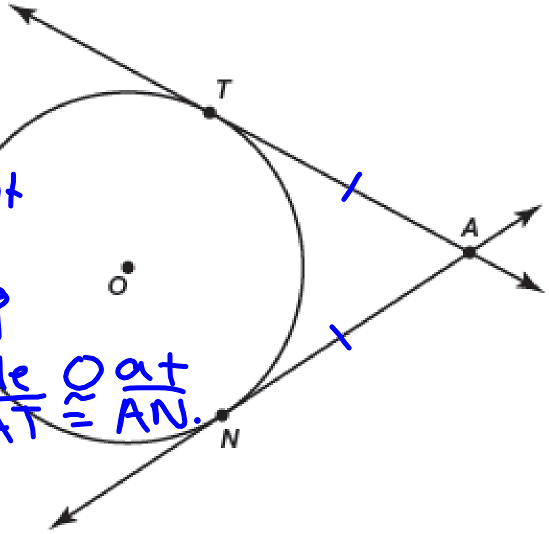
pg.704 in your book

It appears that two tangent segments drawn to the same circle from the same point outside of the circle are congruent.

This observation can be proved and stated as a theorem.

4. Prove the Tangent Segment Conjecture.

If $\overleftrightarrow{AT}$ is tangent to circle O at point T and $\overleftrightarrow{AN}$ tangent to circle O at point N, then $\overline{AT} \cong \overline{AN}$.



Given: $\overleftrightarrow{AT}$ is tangent to circle O at point T.

$\overleftrightarrow{AN}$ is tangent to circle O at point N.

Prove: $\overline{AT} \cong \overline{AN}$

The **Tangent Segment Theorem** states: “If two tangent segments are drawn from the same point on the exterior of a circle, then the tangent segments are congruent.

Jan 4-9:10 AM

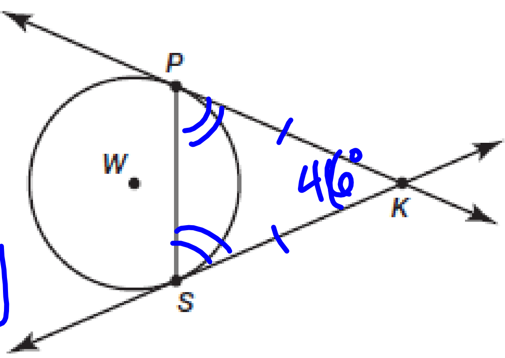
pg.705 in your book

5. In the figure, $\overleftrightarrow{KP}$ and $\overleftrightarrow{KS}$ are tangent to circle W and $m\angle PKS = 46°$. Calculate $m\angle KPS$. Explain your reasoning.

$180 - 46 = 134°$

$\frac{134}{2} = 67°$

$\boxed{m\angle KPS = 67°}$



$\overline{PK} \cong \overline{KS}$

$\angle KPS \cong \angle KSP$

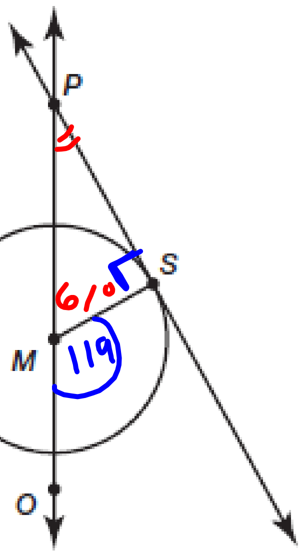
(b/c $\triangle KPS$ is isosceles)

6. In the figure, $\overleftrightarrow{PS}$ is tangent to circle M and $m\angle SMO = 119°$. Calculate $m\angle MPS$. Explain your reasoning.

$180 - 119 = 61 = m\angle PMS$

$m\angle MPS = 180 - 90 - 61$

$\boxed{m\angle MPS = 29°}$

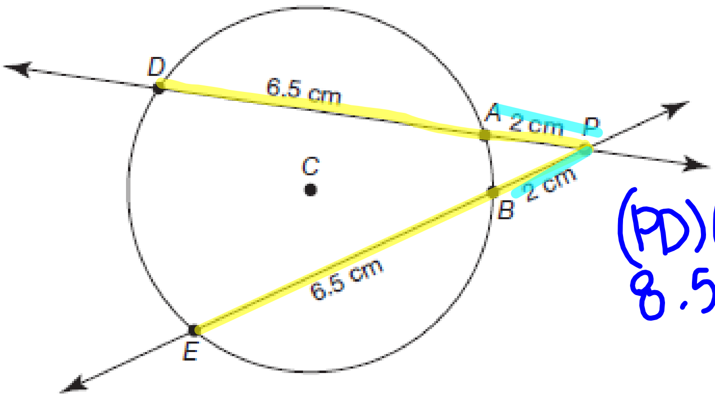


pg.706 in your book

A **secant segment** is the line segment formed when two secants intersect outside a circle. A secant segment begins at the point at which the two secants intersect, continues into the circle, and ends at the point at which the secant exits the circle.

An **external secant segment** is the portion of each secant segment that lies on the outside of the circle. It begins at the point at which the two secants intersect and ends at the point where the secant enters the circle.

1. Consider circle C with the measurements as shown.



$(PD)(PA) = (PE)(PB)$

$8.5(2) = 8.5(2)$

The vertex of $\angle DPE$ is located outside of circle C. Because this angle is formed by the intersection of two secants, each secant line contains a secant segment and an external secant segment.

a. Identify the two secant segments.

$\overline{PD}$ & $\overline{PE}$

b. Identify the two external secant segments.

$\overline{PA}$ & $\overline{PB}$

It appears that the product of the lengths of the segment and its external secant segment is equal to the product of the lengths of the second secant segment and its external secant segment.

This observation can be proved and stated as a theorem.

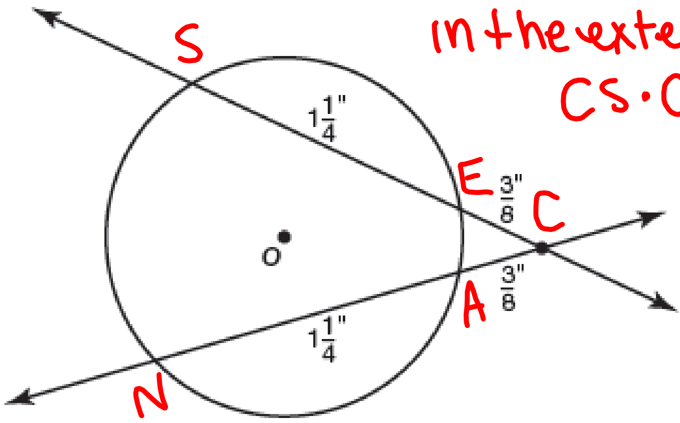
pg.707 in your book

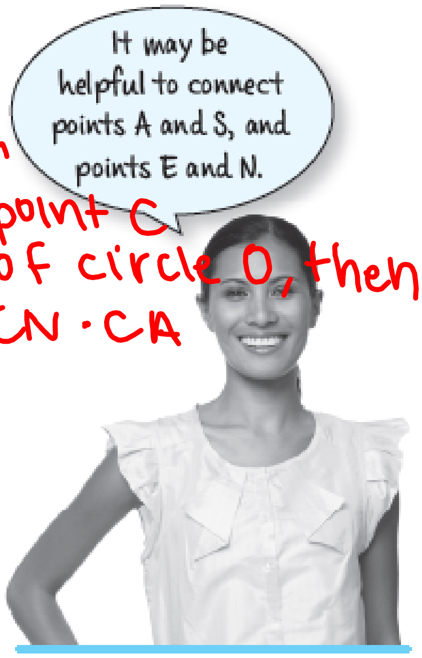
2. Prove the Secant Segment Conjecture.

Given: Secants *CS* and *CN* intersect at point *C* in the exterior of circle *O*.

Prove: $CS \cdot CE = CN \cdot CA$

If secants CS & CN intersect at point C in the exterior of circle O, then $CS \cdot CE = CN \cdot CA$

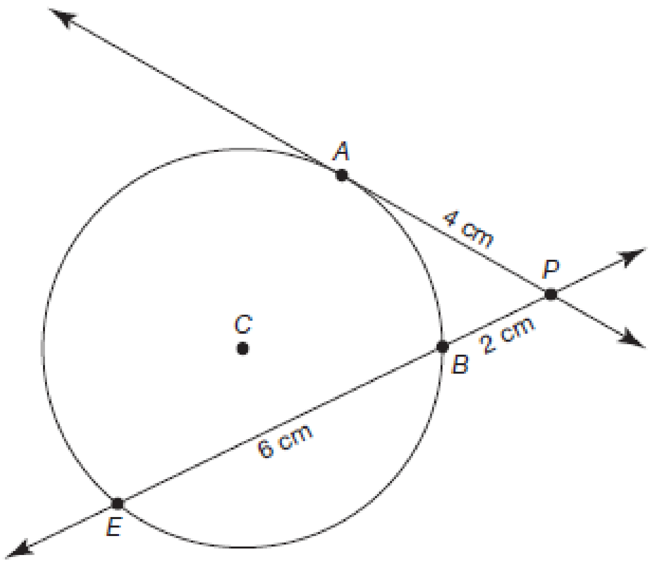




The **Secant Segment Theorem** states: "If two secants intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the product of the lengths of the second secant segment and its external secant segment."

pg.708 in your book

3. Consider circle C with the measurements as shown.



The vertex of $\angle APE$ is located outside of circle C. Because this angle is formed by the intersection of a secant and a tangent, the secant line contains a secant segment and an external secant segment whereas the tangent line contains a tangent segment.

a. Identify the secant segment.

$\overline{PE}$

$m\overline{PE} = 2 + 6 = 8\text{ cm}$

$PE(PB) = (PA)^2$

$8(2) = (4)^2$

$16 = 16$ ✓

b. Identify the external secant segment.

$\overline{PB}$

$m\overline{PB} = 2\text{cm}$

c. Identify the tangent segment.

$\overline{PA}$

$m\overline{PA} = 4\text{cm}$

It appears that the product of the lengths of the secant segment and its external secant segment is equal to the square of the length of the tangent segment.

This observation can be proved and stated as a theorem.

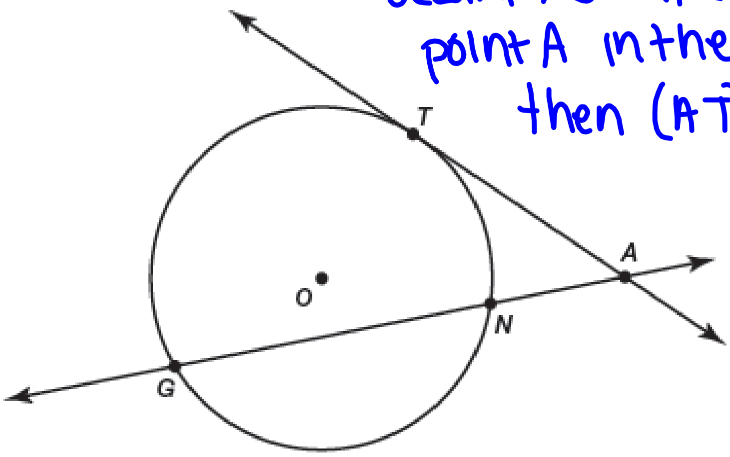
pg.709 in your book

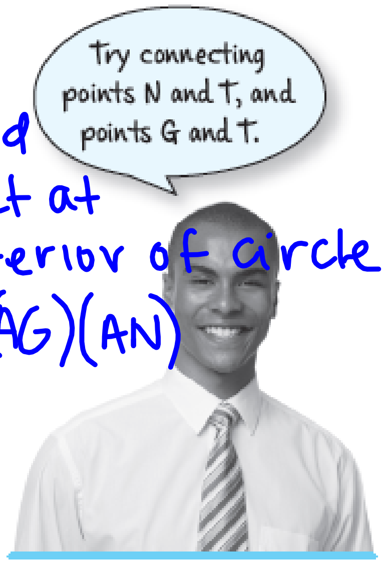
4. Prove the Secant Tangent Conjecture.

Given: Tangent AT and secant AG intersect at point A in the exterior of circle O.

Prove: $(AT)^2 = AG \cdot AN$

If tangent AT and secant AG intersect at point A in the exterior of circle O, then $(AT)^2 = (AG)(AN)$





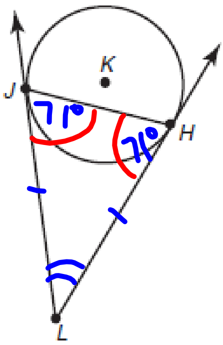
The **Secant Tangent Theorem** states: "If a tangent and a secant intersect in the exterior of a circle, then the product of the lengths of the secant segment and its external secant segment is equal to the square of the length of the tangent segment."

2. In the figure shown, rays *LJ* and *LH* are tangent to circle *K*, and the measure of angle *LJH* is 71°. What is the measure of angle *JLH*? Explain your reasoning.

Tangent segment thm.

$180 - (71 + 71) = \underline{38°}$

$m\angle JLH$

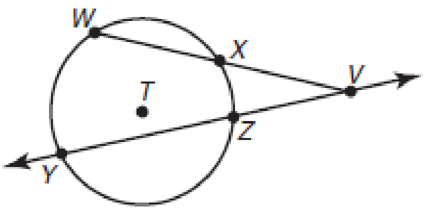


$\overline{JL} \cong \overline{LH}$

3. In the figure shown, *WV* = 36 inches, point *X* is a midpoint of segment *WV*, and *YV* = 40 inches. What is *YZ*? Explain your reasoning.

Secant segment thm.

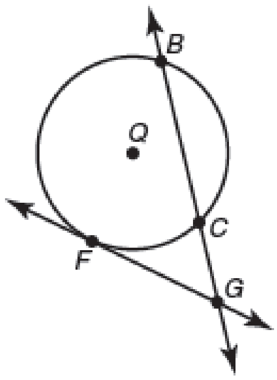
$WV(XV) = YV(ZV)$



4. In the figure shown, line *FG* is tangent to circle *Q*, *BC* = 10 feet, and *CG* = 4 feet. What is *FG*? Explain your reasoning.

Secant tangent

$(FG)^2 = GB(CG)$



Homework

Finish Lesson 9.5