

Go to www.geogebra.org/geometry.

On toolbar to the left, click "More" to reveal all your tools

Constructions:

1a. Under basic tools, select the "Circle" tool and create a circle with center A and point B.



1b. (To re-label, first click on the "Move" icon and click on the point. Then select the "Label" tool. Rename center to A and point on circle to B.)



2. Next select the 'Point' tool and create point C anywhere outside the circle.



3. Using the "Line Segment" tool, create line segment AC.



4. Under the "Construct" section, select the "Midpoint" tool. Then click on point A then C. A gray midpoint should appear on line segment AC. Call this point D.



5. Next we will construct a circle with center D and radius CD. To do this, select the "Circle" tool. Then select point D and then point C.



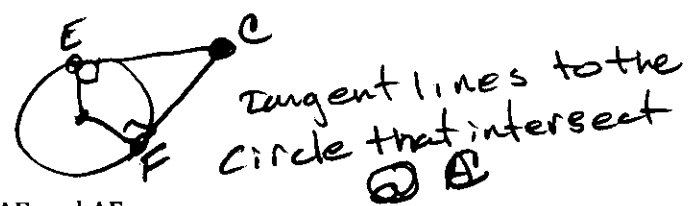
6. Using the "Point" tool, create points where Circle D and Circle A intersect. Name the points E and F. Make sure points E and F are gray.



7a. Using the "Line" tool, create lines EC and FC.

7b. Using the "Show/Hide Object" tool hide circle C by clicking anywhere on the border of the circle. (The circle should turn light gray.)

Q1: What type of lines did you just create?



8. Using the "Line Segment" tool, create radii AE and AF.



9. Using the "Measure" tool, measure angle AEC and angle AFC.

Q2: My measure of angle AEC is 90 degrees. Angle AFC is 90 degrees.



10. Using the "Move" tool, select point C. Move point C around outside Circle A.

Q3: What do you notice? Record your observations below:

to all show 90

Q4: If a line is a tangent line, then it is Perpendicular to the radius at the point of tangency.



11. Under the "Measure" section, select the "Distance" tool. Measure the length of segments EC and FC by first clicking point E then C and then point F then C.



12. Using the "Move" tool, drag point C around outside Circle A.

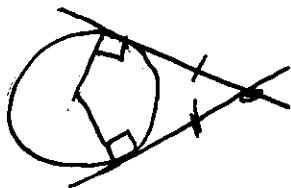
Q5: What do you notice? Write your observations below:

tangents Lines intersect at the Same Segment Line Outside Circles are Congruent.

Q6: Write your conjecture below:

Summaries:

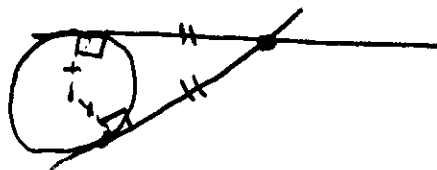
1.



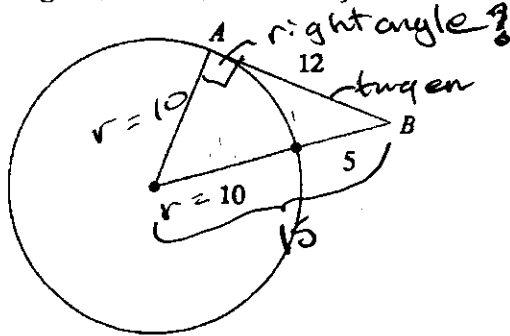
tangent lines are always \odot 90°

2.

Tangent lines that intersect outside of circle are always congruent in length.



Q7: For the figure below, label each line segment with the type of line segment you think it is (tangent, secant, or radius). Then use the Pythagorean Theorem to prove/disprove it.



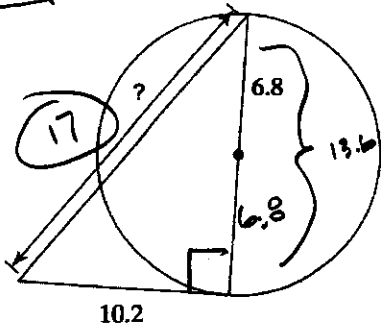
$$10^2 + 12^2 \stackrel{?}{=} 15^2$$

$$100 + 144 = 225$$

$$244 \neq 225$$

Not equal, not tangent line.

Q8: Find the segment length indicated. Assume that lines which appear to be tangent



$$10.2^2 + 13.6^2 = ?^2$$

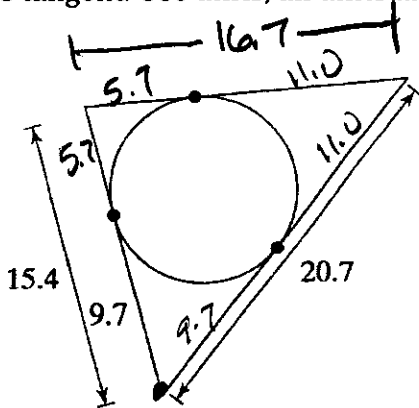
$$104.04 + 184.96 = ?^2$$

$$\sqrt{289} = \sqrt{?^2}$$

$$17 = ?$$

Q9: Explain the difference in what we are able to assume and what we are trying to show/find between questions Q7 and Q8. If it is a tangent line then the r and tangent are perpendicular and the Pythagorean equation is true.

Q10: Find the perimeter of each polygon. Assume that lines which appear to be tangent are tangent. Use units, all units are mm.



tangent lines have the same length.

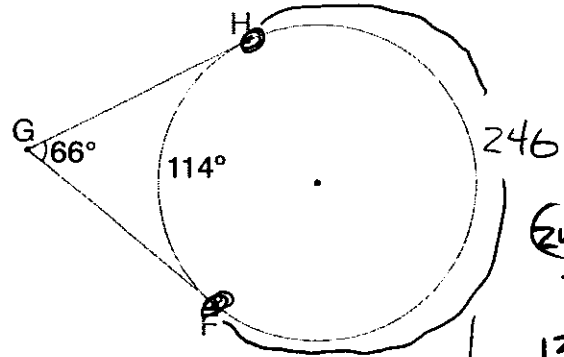
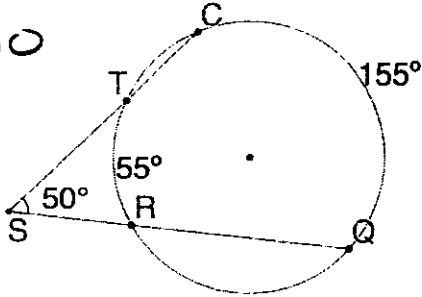
Let them try this before Showing!

Q11: Given the following three angle and arc relationships, come up with a formula for finding circumscribed angles.

$$\frac{(155 - 55)}{2} = 50$$

$$\frac{100}{2} = 50$$

$$50 = 50$$



$$\frac{(246 - 114)}{2} = 66$$

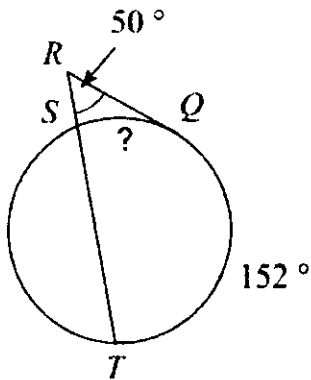
$$\frac{132}{2} = 66$$

$$66 = 66$$

Q12: Write your conjecture below:

$$\frac{(\text{Big} - \text{Little})}{2} = \text{outside angle}$$

Q13: Find the measure of the arc indicated. Assume the line that appears tangent is tangent.



$$\frac{152 - ?}{2} = 50 \quad (2)$$

$$152 - ? = 100$$

$$? = 52$$

Summaries: