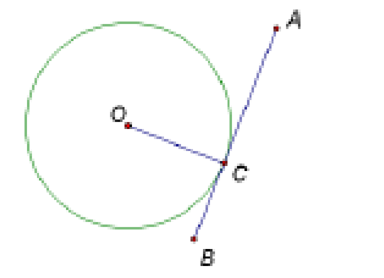
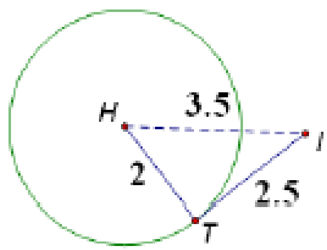
Tangents

SOL G.11 (2009)

A line is **tangent** to a circle when it intersects the circle at exactly one point (called the **point of tangency**).

If a line is tangent to a circle, then it is perpendicular to the radius with an endpoint at the point of tangency. $\overline{AB}$ is tangent to $\odot O$ $\therefore \overline{OC} \perp \overline{AB}$	
Converse: If a line is perpendicular to a radius and the point of intersection is on the circle, then that line is tangent to the circle.	

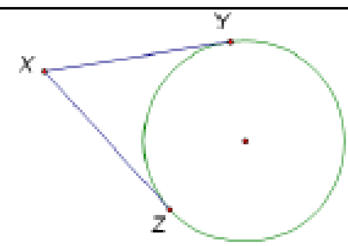
Example 1: Determine whether $\overline{IT}$ is tangent to $\odot I$.



$(HT)^2 + (IT)^2 = (HI)^2$
$2^2 + 2.5^2 = 3.5^2$
$4 + 6.25 = 12.25$
$10.25 \neq 12.25$

1. **Perpendicular lines form right angles, so use the Pythagorean Theorem.**
2. **Substitute measures and evaluate.**

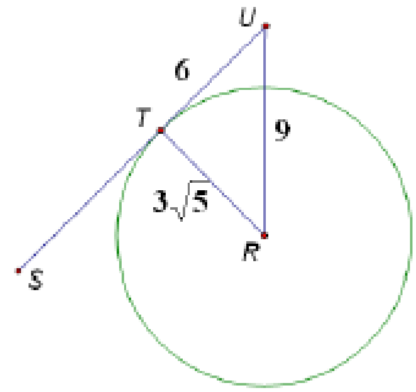
$\therefore$ **$\overline{IT}$ is not tangent to $\odot I$**

If two segments originating from the same exterior point are tangent to the same circle, then they are congruent $\overline{XY} \cong \overline{XZ}$	

Circumscribed polygons are formed by tangents about a circle. The circle inside the polygon is an **inscribed circle.**

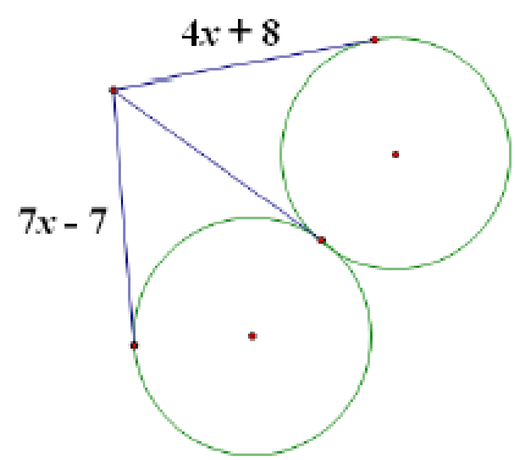
Practice

1. **Determine whether $\overline{SU}$ is tangent to circle R.**

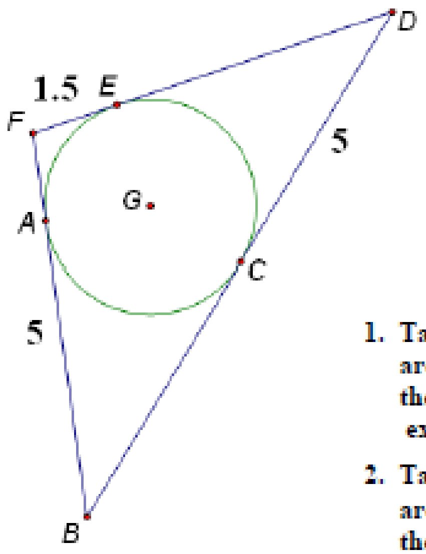


Find x. Assume that segments that appear tangent to circles are tangent.

2.



Example 2: Triangle *FDB* is circumscribed around circle *G*. Find the perimeter of triangle *FDB*.



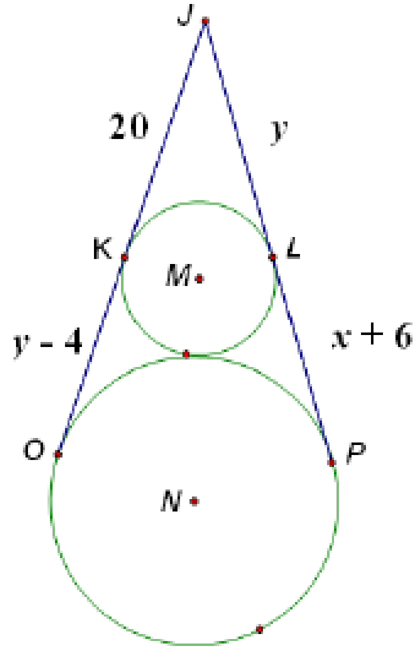
$FE = FA = 1.5$
$AB = BC = 5$
$DC = DE = 5$

$P = 2(1.5) + 2(5) + 2(5)$
$P = 23$

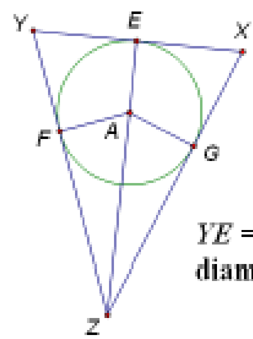
1. **Tangents $\overline{FE}$ and $\overline{FA}$ are congruent because they share the same exterior point.**
2. **Tangents $\overline{AB}$ and BC are congruent because they share the same exterior point.**
3. **Tangents $\overline{DC}$ and $\overline{DE}$ are congruent because they share the same exterior point.**
4. **Fill in missing measurements and add the sides to find perimeter.**

Find *x* and *y*.

3.



4. Find the perimeter of ΔXYZ.



$YE = XG = 22.5$ and $AZ = 43$
diameter of $\odot A = 15$