1. $\overline{GX}$ and $\overline{HX}$ are angle bisectors of $\triangle GHJ$. Find m$\angle XHG$ and the distance from X to $\overline{GH}$.
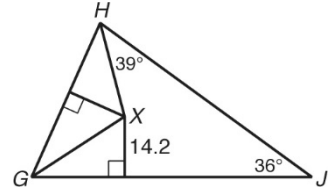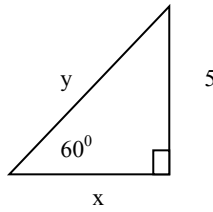
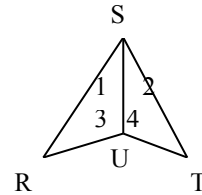2. Solve each for x and y.
a)
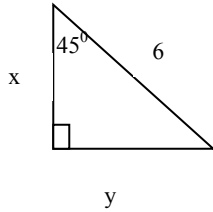
b)

3. Is it possible to have a triangle with lengths 4, 6, and 10? Explain.

4. If two sides of a triangle are 15, & 20 what are the possible lengths for the third side?

5.   a) If RS = ST and m$\angle 1 >$ m$\angle$ 2, then RU ____ TU.
        b) If RS = ST and RU = TU, then m$\angle 3$ ____ m$\angle 4$.
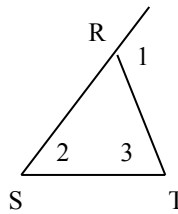   c) If RU = TU and ST < RS, then m$\angle 3$ ____ m$\angle 4$.

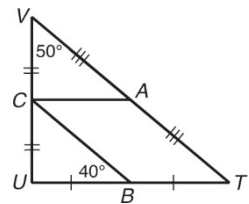6. In $\triangle KLM$, if KL = 9, LM = 12 and MK = 13, what is the largest angle?

7. Write an indirect proof in paragraph form.
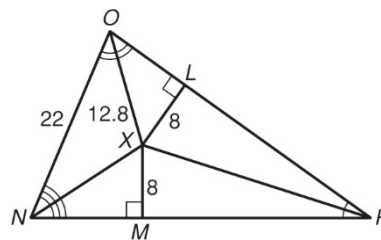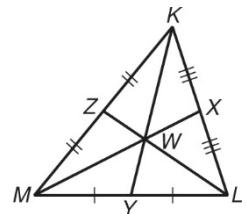   Given: m$\angle 2 = 1/3$ m$\angle 1$
        Prove: RS $\neq$ RT

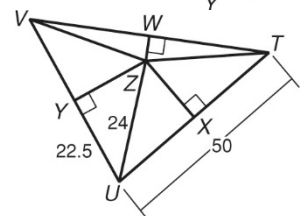8. $\overline{CA}$ is a midsegment of $\triangle VTU$. What is the measure of $\angle BCA$? If CA is 12, what is UT?

9. What is the distance from X to $\overline{ON}$?

10. If $WX = 3.6$, $WL = 6.1$, and $KW = 8$, what is the value of ZW?

11. Point Z is the circumcenter of $\triangle TUV$. What is the value of UV?

*Know the definition of incenter, circumcenter, orthocenter, centroid… how to find each and the relationships formed.

*Know how to inscribe and circumscribe a circle about a triangle – you must construct and clearly explain each step in the construction.

Answers:
1. angle bisectors intersect at the incenter which is equidistant from the sides of a triangle, so $\angle XHG$ is 39^0 and X to GH is 14.2

2. a) $x = y = 3\sqrt{2}$ b) $x = \dfrac{5\sqrt{3}}{3}$ $y = \dfrac{10\sqrt{3}}{3}$

3. NO
4. $5 < x < 35$
5. a) $>$ b) $=$ c) $>$
6. angle L

7. Assume that $RS = RT$. Then angle 2 is congruent to angle 3 by the isosceles triangle theorem and $m\angle 1 = m\angle 2 + m\angle 3$. So $m\angle 1 = 2(m\angle 2)$ and $m\angle 2 = \frac{1}{2}\, m\angle 1$. This contradicts the given. Therefore our assumption is false and RS does not equal RT.

8. 40^0, 24
9. 8
10. medians intersect at the centroid which is 2/3 the distance from the vertex to opposite side, so 2/3 $ZL = 6.1$, $ZL = 9.51$ and $ZW = 3.05$
11. The circumcenter is the point where the perpendicular bisectors intersect, which is equidistant from the 3 vertices of a triangle.
Thus, $VZ = 24$ and triangle VZU is isosceles, which makes $UV = 45$.