Please provide sufficient details about how you solved the problem. More difficult problems are marked with a ∗. If unable to solve a problem, please present your thoughts and any partial solution.
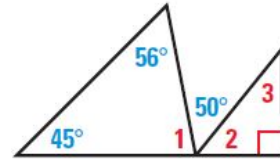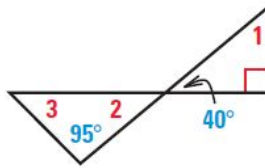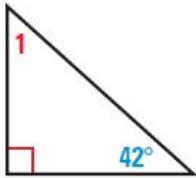
1. Segment $\overline{AB}$ is a leg of an isosceles right triangle. Find the coordinates of point C, and sketch $\triangle ABC$.
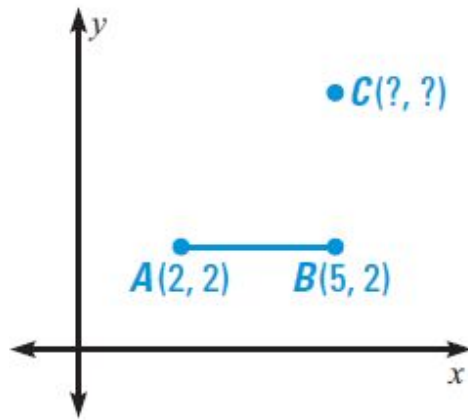
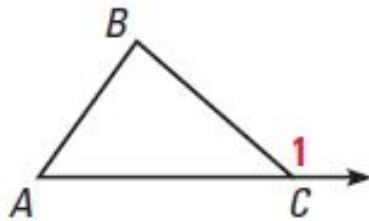2. For $\triangle ABC$, prove the **triangle sum theorem**, that is, $m\angle 1 + m\angle 2 + m\angle 3 = 180°$.
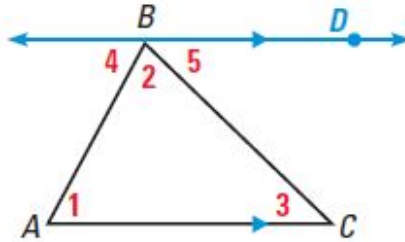
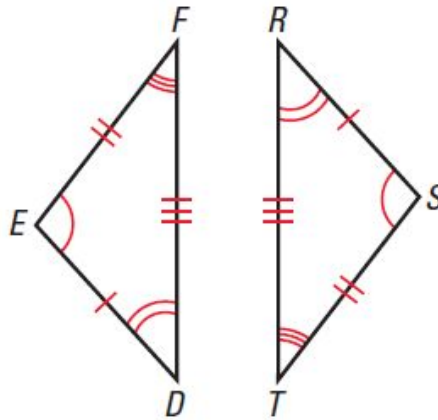3. Find the measure of the numbered angles shown:

4. For $\triangle ABC$, prove the **exterior angle theorem**, that is, $m\angle 1 = m\angle A + m\angle B$.

5. Find the measure of the exterior angles shown; utilize your expert algebra skills.


6. **Naming Congruent Parts:** In the following figure, identify all pairs of congruent angles and sides, and write the corresponding statements, for example, $\angle D \cong \angle R$ and $\overline{DE} \cong \overline{RS}$.


7. The **third angles theorem** states that if two angles of one triangle are congruent to two angles of another triangle, then the third angles are also congruent. In the following figure, if $m\angle A = m\angle D$ and $m\angle B = m\angle E$, then $m\angle C = m\angle F$.
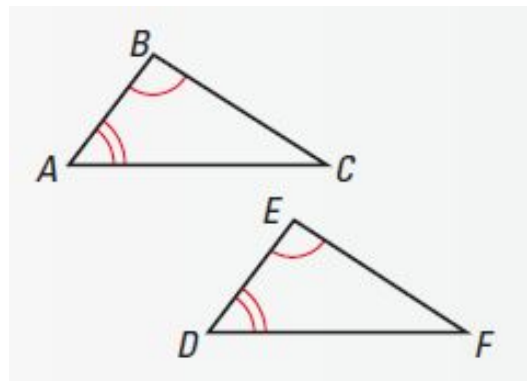
8. Two figures are **congruent** if they have exactly the same size and shape. In the following figure, determine if the two triangles are congruent.
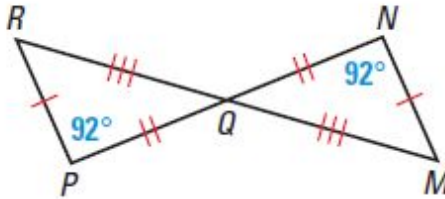

9. For the figure given below, a student states that $\triangle ABC$ is congruent to $\triangle ADE$, because the corresponding angles of the two triangles are congurent.

   (a) How does the student know that the corresponding angles are congruent?

   (b) Are the two triangles congruent? Explain.
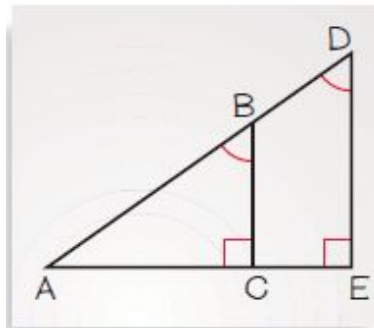
10. In the following figure, how many angles are congruent? Are the triangles congruent? Explain.
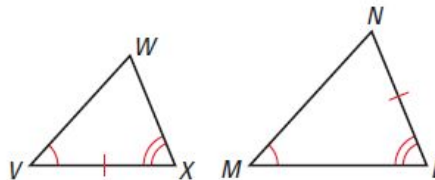
11. In the following figure, the small triangles △ADB, △CDA and △CDB are congruent.
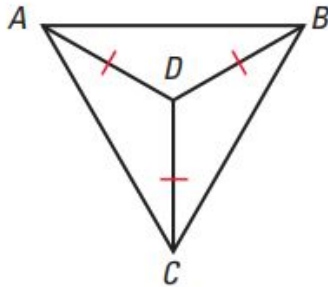
(a) Explain why △ABC is equilateral.

(b) Find m∠BDC.

(c) Each of the small isosceles triangle has two congruent acute angles. Find m∠DBC and m∠DCB.

12. The triangles with such measurements do not exist. Describe what is wrong with them?