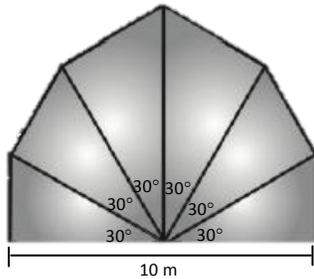1. A large stained glass window is constructed from six 30° – 60° – 90° triangles as shown in the figure below. The window is symmetric about the vertical line in its center. What is the height of the window? Show all your work. Note: Leave your answer in simplest radical form.


30° 30°
30°   30°
30°   30°
10 m

2. Tammy is 5 feet tall and she casts a 2.5 foot long shadow at a certain time of day. Her truck casts a shadow of 4 feet at the same time. Tammy notices that the shadows create similar triangles. She wants to get a taco from the Taco Bell drive through, but it has a height limit of 9 feet. Will Tammy be able to drive through safely? Show all work and justify your answer.


3. A construction worker determines that a safe angle to prop his ladder must be between 62° and 44°. If the ladder has a fixed length of 30 feet long, what is the range of heights that the ladder will reach? Show your work and round your answers to nearest tenth of a foot.
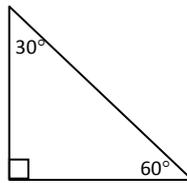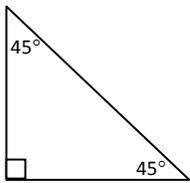

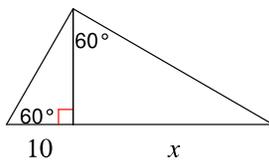62°   44°
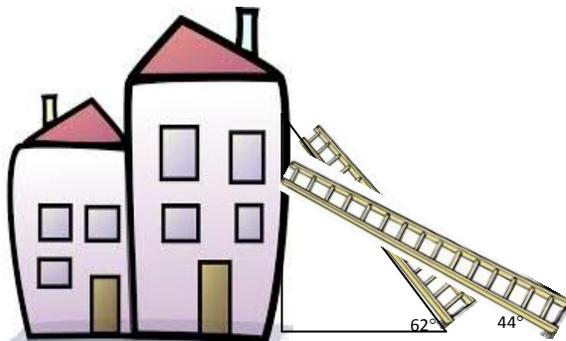
4. Determine the value of x
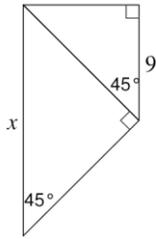
5. Find the length of the side SR and the measure of $\angle$ S in the triangle below. Round lengths to the nearest hundredth, and angle measures to the nearest degree.
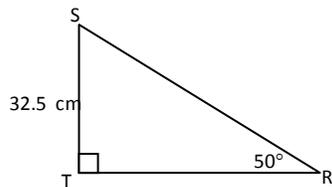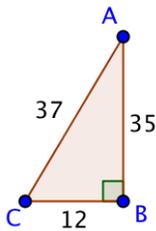

6. Label the special right triangles below with their "special" side lengths:

7. Determine the value of x:

8. Determine the trigonometric ratio's for the Sine, Cosine and Tangent of $\angle$'s A & C.
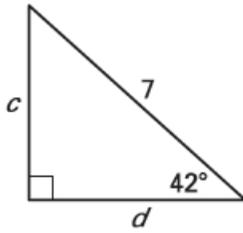

Sin A: _____

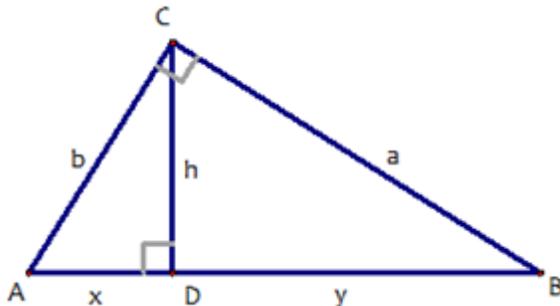Cos A: _____

Tan A: _____

Sin C: _____

Cos C: _____

Tan C: _____

9. Use the **sine ratio** to find the lengths of c and d. Round your answers to the nearest tenth.

10. Fill in the blanks to show all the relationships based on the right triangle altitude similarity theorem and geometric means.

$$\frac{}{h} = \frac{h}{}$$

$$h^2 = \underline{\hspace{2cm}}$$

$$h = \underline{\hspace{2cm}}$$

$$\frac{}{a} = \frac{a}{}$$

$$a^2 = \underline{\hspace{2cm}}$$

$$a = \underline{\hspace{2cm}}$$

$$\frac{}{b} = \frac{b}{}$$

$$b^2 = \underline{\hspace{2cm}}$$

$$b = \underline{\hspace{2cm}}$$

11. Demitry lives 8 miles away from Kabir. He sent Kabir a text message saying that he saw an airplane fly over him at an elevation of 8000 feet.

   a. At what angle should Kabir look towards Demitry's house to see the airplane? Make sure to use trigonometric ratio's, show all your work and round your answer to the nearest tenth of a degree.

   b. What is the distance that the airplane is from Kabir at the time Demitry sent the text message. Show all your work and explain your answer.

12. Carly and Kianna were standing next to each other on a cliff that was 100 feet above Ocean. Carly noticed a boat directly in front of her at the precise angle of 30° and Kianna noticed a boat directly in front of her at the precise angle of 45°. (They both carry protractors with them at all times.)

    a. Draw a picture to describe this situation. (It doesn't have to be creative)

    b. Identify the distance between the two boats, rounded to the nearest foot.

13. A right triangle has side lengths 3, 4, 5. What would the side lengths of two similar triangles have to be to have a perimeter that is between 30 and 50 feet? Show all your work and explain why your triangle is similar to the original triangle.