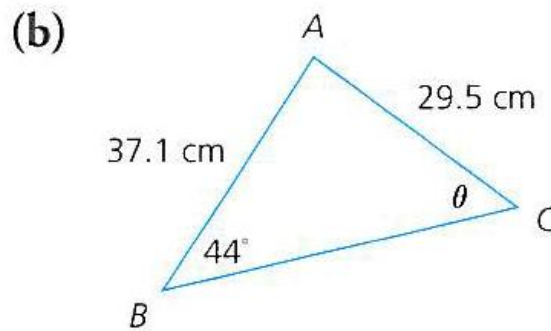
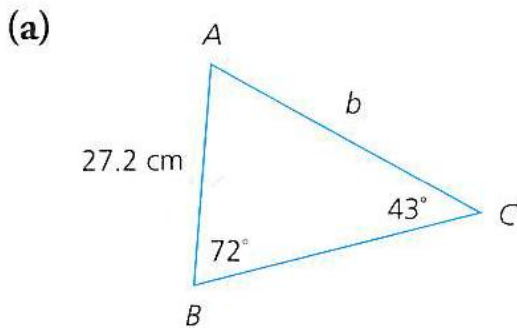


### Objectives:

- Practice using the Sine Rule to find unknown angles and sides of non-right triangles
- Derive a formula for the area of any triangle given two sides and the angle between them
- Practice finding the area of non-right triangles

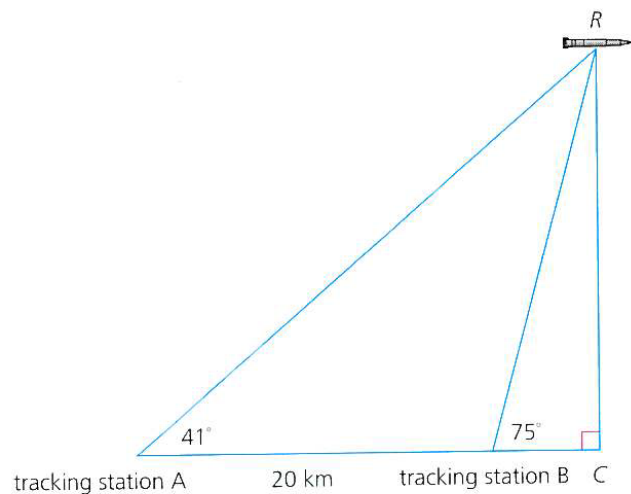
### (A) Examples of Working with the Sine Law



### (B) Examples of Working with the Sine Law

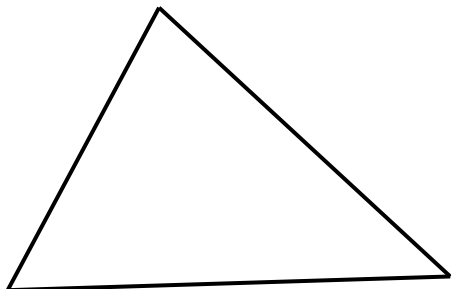
#### Example 2

Two tracking stations, 20 km apart, measure the angles of elevation of a rocket that was launched with a weather satellite. From station  $A$ , the angle of elevation is  $41^\circ$ ; from station  $B$ , it is  $75^\circ$ , as shown. What is the altitude of the rocket, to the nearest tenth of a kilometre?

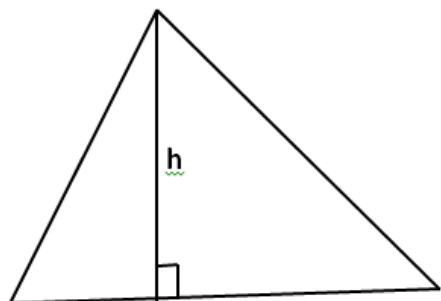


**(C) Deriving the Formula for Area of a Triangle**

1. Label this triangle using the standard naming conventions that we used when using the Sine Rule.

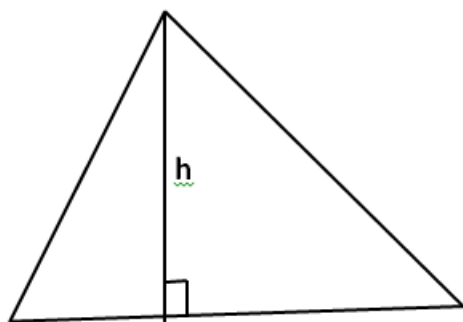


2. Write an expression for the area of **your** triangle:



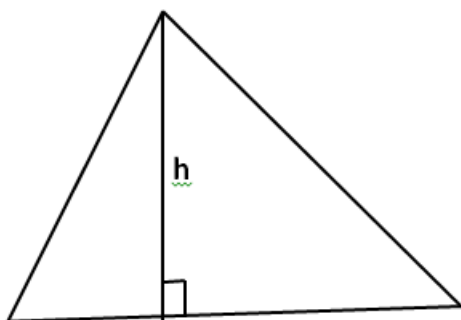
$$A =$$

3. Use trigonometry to write an expression for  $h$ :



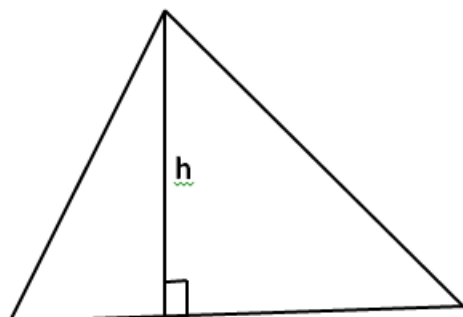
$$h =$$

4. Use your expression for the **height in part 3** to rewrite your expression for the **area in part 2**.



$$A =$$

5. Now use trigonometry to write a **different** expression for  $h$  and write another expression for the area of the triangle.



$$h =$$

$$A =$$

In my triangle \_\_\_\_\_, the area of my triangle is:  
 \_\_\_\_\_  
 \_\_\_\_\_

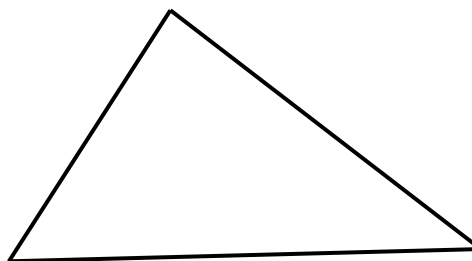
6. Compare your area formulas for your triangle areas with at least 2 other people. What do they have in common?

7. For triangle PQR, write 3 formulas for area.

$$\text{Area} = \underline{\hspace{10em}}$$

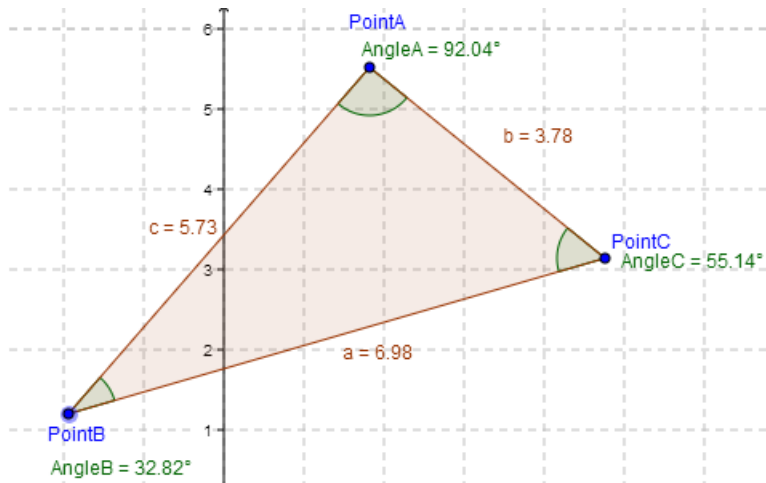
$$\text{Area} = \underline{\hspace{10em}}$$

$$\text{Area} = \underline{\hspace{10em}}$$

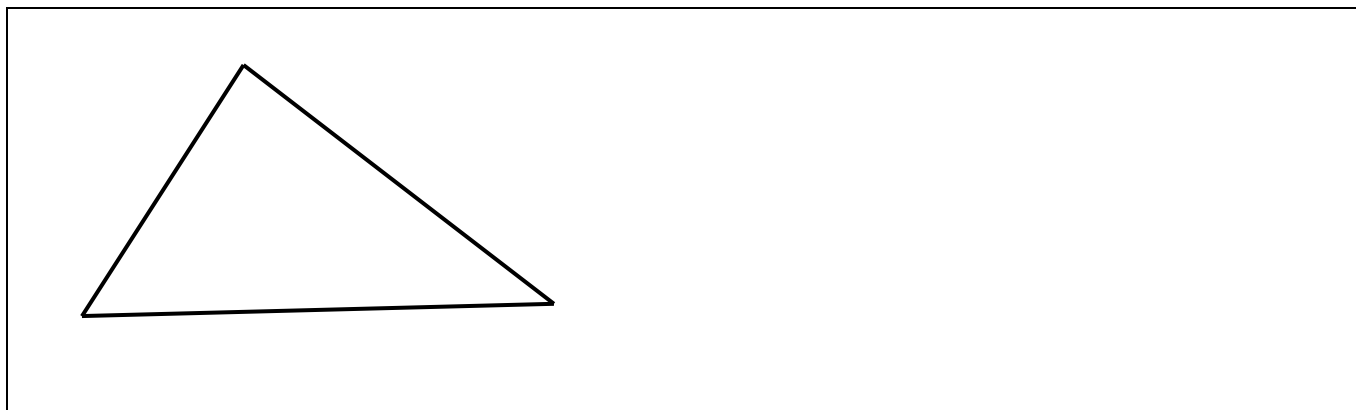


8. **IN WORDS:** What do you need to know about a triangle to determine the area using trigonometry?

9. Justify that **ALL** formulas give us the same area. Determine the area of triangle ABC using 3 formulas.



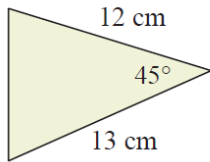
10. **SUMMARY:** In triangle ABC the area of the triangle may be found by:



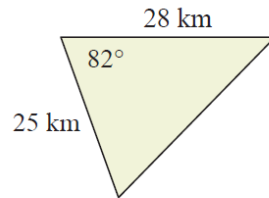
**11. Practice****EXERCISE 10E**

1 Find the area of:

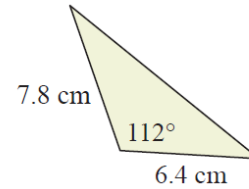
a



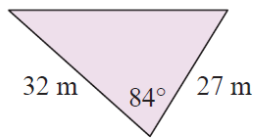
b



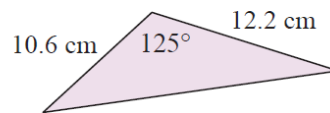
c



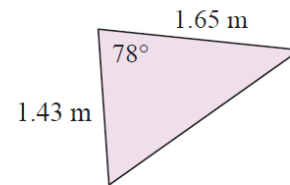
d



e



f



2 Find the area of a parallelogram with sides 6.4 cm and 8.7 cm and one interior angle  $64^\circ$ .

**Challenge:**

1. In triangle RUN, angle R =  $48^\circ$ , side r = 16cm and side u = 11cm. Determine the area of the triangle.

2. The area of triangle RST is  $40\text{cm}^2$ . If sides r = 8cm and t = 13cm, find angle S.

3. The area of triangle ABC is  $256\text{cm}^2$ . Angle A is  $30^\circ$  and side b is twice the length of side c. Find the lengths of sides b and c.