

# Unit 5

## REVIEW: Trigonometry of Right Triangles

5.1 Solving for Angles, Lengths, and Distances

5.2 Solving Complex Problems in the Real World



Name: \_\_\_\_\_

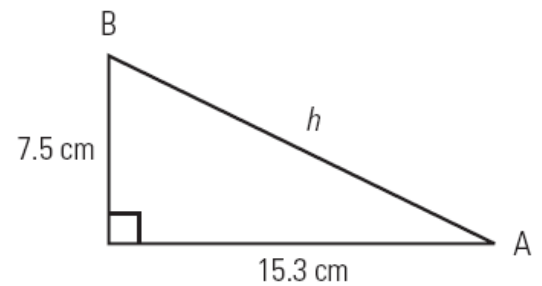
## 5.1 Solving for Angles, Lengths, and Distances

### Review of Pythagorean Theorem:

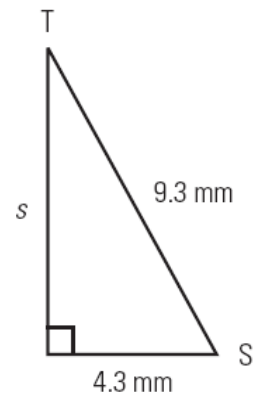
The **Pythagorean Theorem** can be used to solve the lengths of missing sides in **right triangles**.

$$a^2 + b^2 = c^2$$

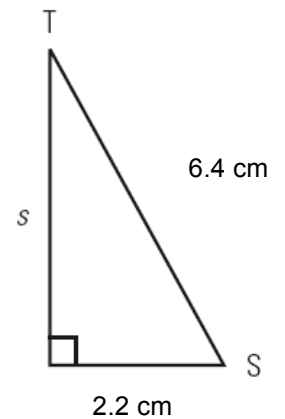
**Example 1:** Find the value of the hypotenuse,  $h$ .



**Example 2:** Find the missing side,  $s$ , using the Pythagorean Theorem.

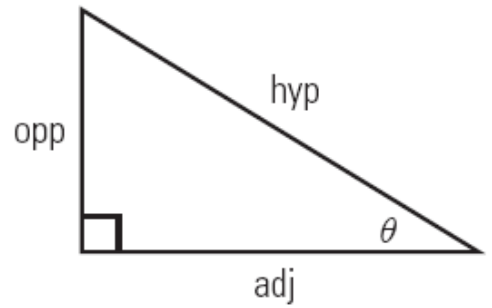


**Practice:** Find the missing side,  $s$ .



### Trigonometric Ratios:

There are three trigonometric ratios that can be used to solve problems of **right triangles**. Recall:



$$\sin\theta = \text{—————} \quad \cos\theta = \text{—————} \quad \tan\theta = \text{—————}$$

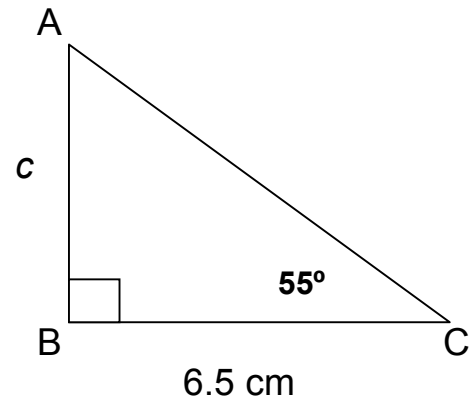
*SOH    CAH    TOA*

You will need to be able to solve **right triangles** for all missing sides and angles.

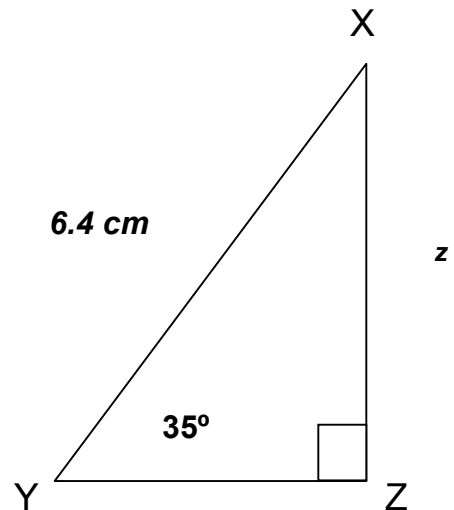
### Three types of Trigonometry Questions:

#### 1. Solving for the top of the ratio

Solve for c:

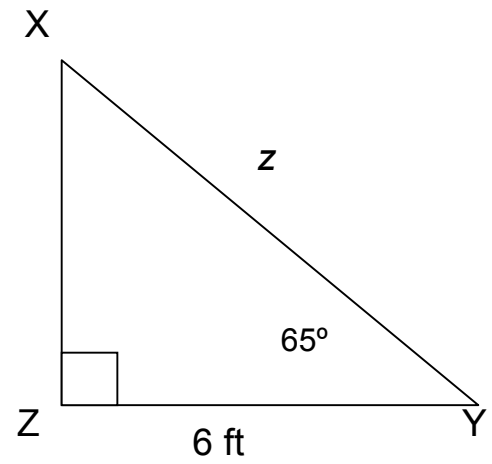


**Practice:** Solve for the missing side, z.

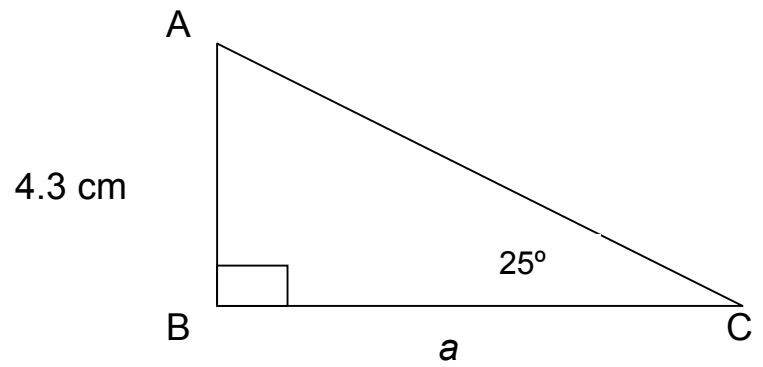


## 2. Solving for the bottom of the ratio

Solve for  $z$ :

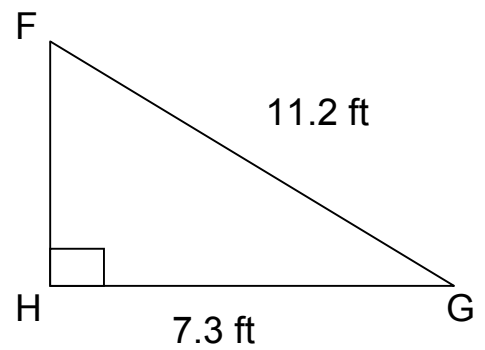


**Practice:** Solve for  $a$ :



## 3. Solving for the angle

Solve for angle  $G$ :

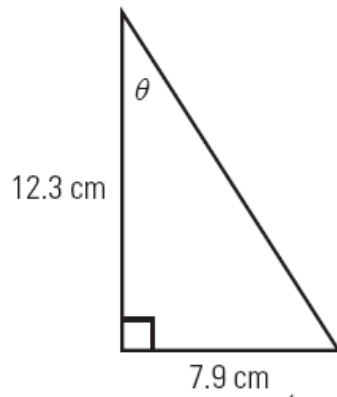


**Worksheet: Trigonometric Ratios**

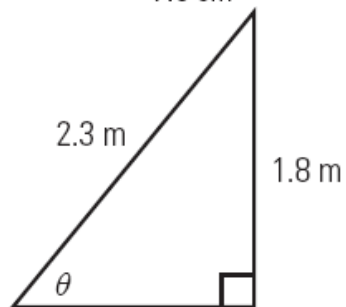
## Trigonometric Ratios Worksheet

1. Determine the value  $\theta$  of to four decimal places.

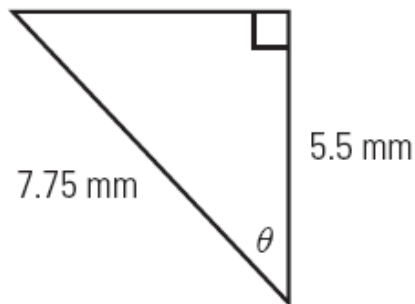
(a)



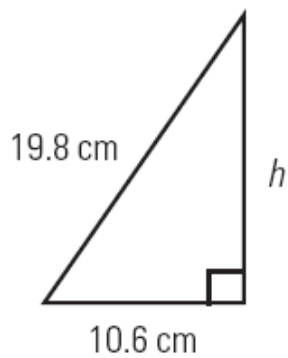
(b)



(c)

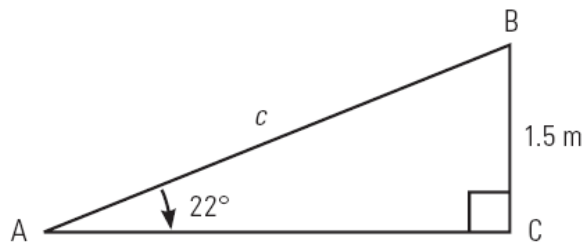


2. Find the height,  $h$ , of the triangle to one decimal place.

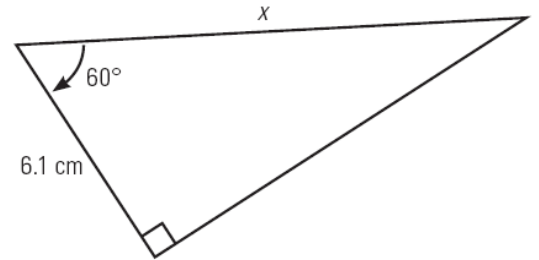


3. Calculate the length of the indicated side.

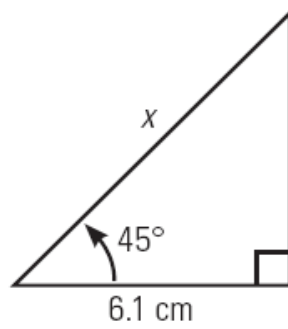
(a)



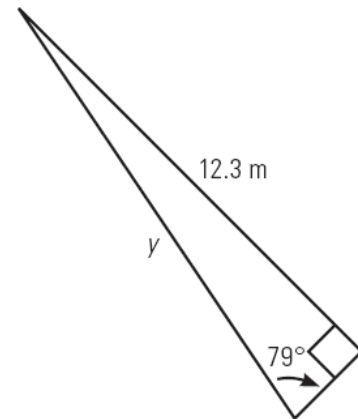
(b)



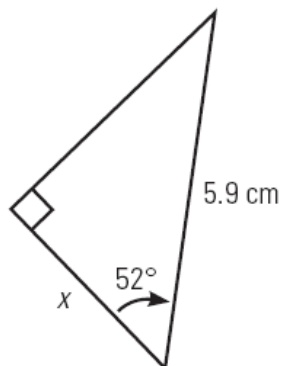
(c)



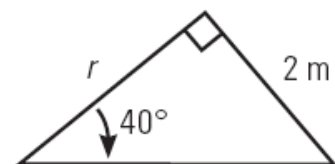
(d)



(e)



(f)



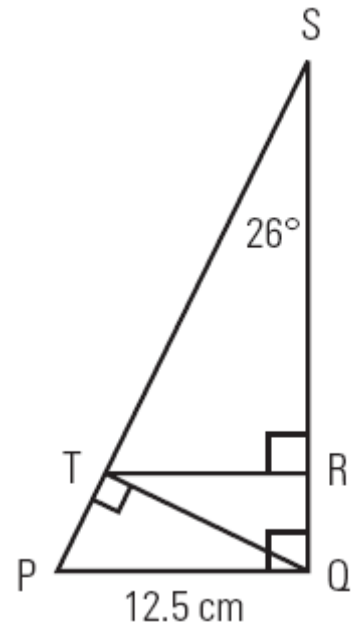
Answers:

1. a)  $32.71117^\circ$  b)  $51.5001^\circ$  c)  $44.7913^\circ$  2. 16.7cm 3. a) 4m b) 12.2cm c) 8.6cm d) 12.5m e) 3.6 cm f) 2.4m

### Trigonometric Ratios in Complex Situations

Trigonometric ratios can be used to solve real-life situations; these calculations may require multiple steps.

**Example:** Solve for QS, ST, and RT.

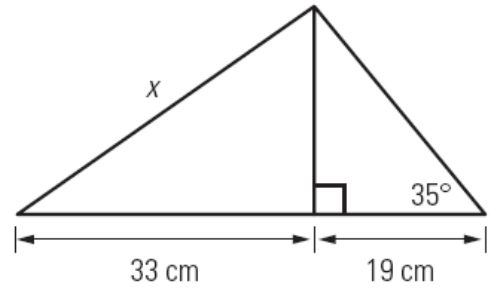


**Worksheet: Trigonometric Ratios and Complex Problems**

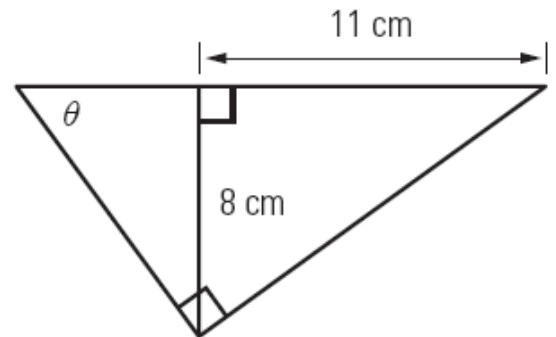
**Note: the sum of the angles in a triangle is  $180^\circ$ .**

**Trigonometric Ratios and Complex Problems Worksheet**

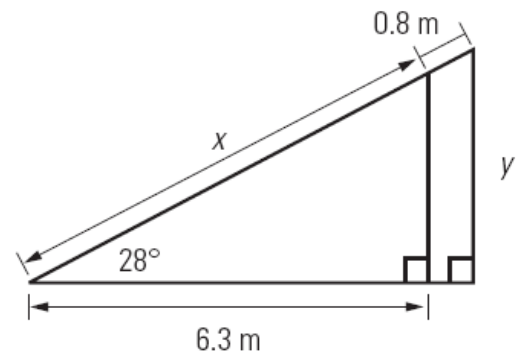
1. What is the length of  $x$ ?



2. Calculate the measure of angle  $\theta$ .



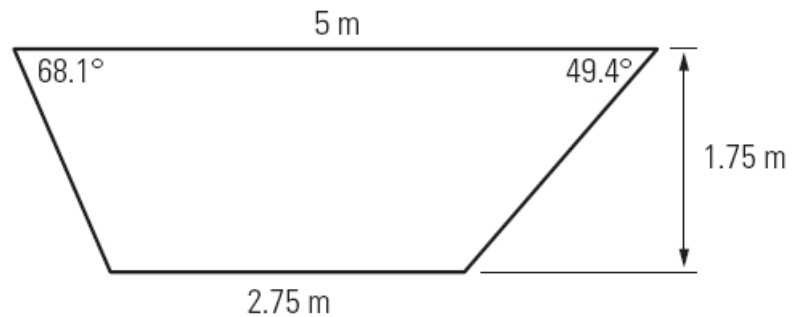
3. Find each of the indicated sides.



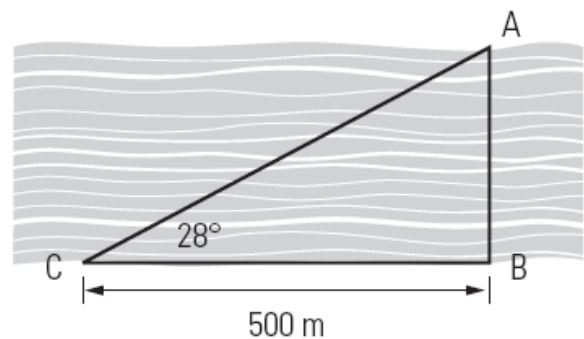


4. A ladder placed against a wall forms an angle of  $65^\circ$  with the ground. If the foot of the ladder is 1.8 m from the wall, how long is the ladder?

5. Pauline is building a fence around her vegetable garden, shown below. What length of fence will she need to build?



6. A surveyor must determine the distance, AB, across a river. He stands at point C, downriver 500 m from B, measures the angle of vision to A as  $28^\circ$ . How wide is the river?



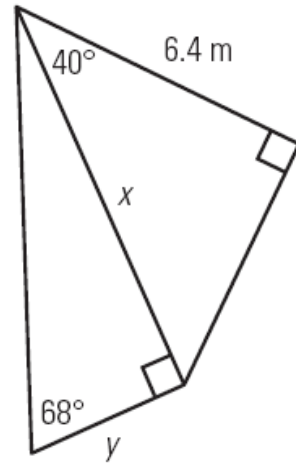
Answers:

1. 35.6 cm 2.  $54^\circ$  3. 7.1 m; 3.7 m 4. 4.3 m 5. 11.94 m 6. 265.9 m

## 5.2 Solving Complex Problems in the Real World

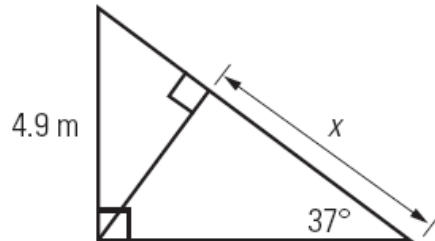
More complex problems may require you to break down the problem into two or more triangles with work through several steps. You can use the values from one triangle in the other if they share a common edge.

**Example 1:** Solve for  $x$  and  $y$  in the following diagram.

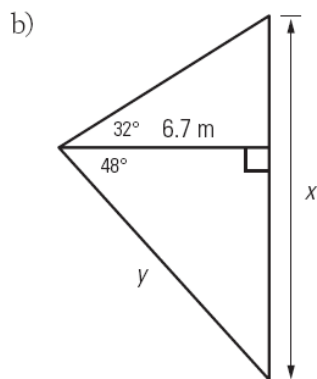
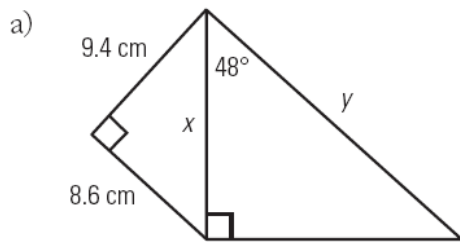


**Worksheet: Working with Two Triangles**  
**Working with Two Triangles Worksheet**

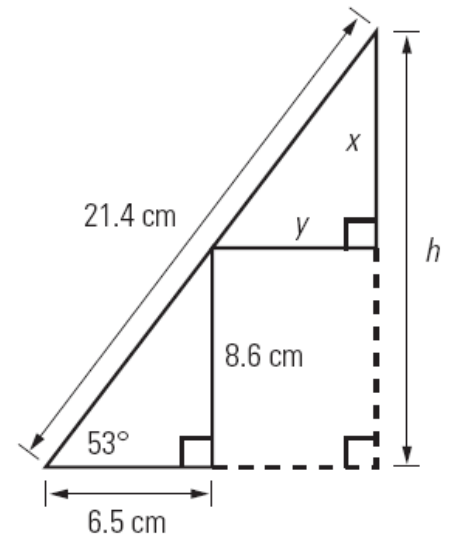
1. Calculate  $x$  in the following diagram.



2. Find  $x$  and  $y$  in the following diagrams.



3. Calculate  $x$ ,  $y$ , and  $h$  for the following diagram.

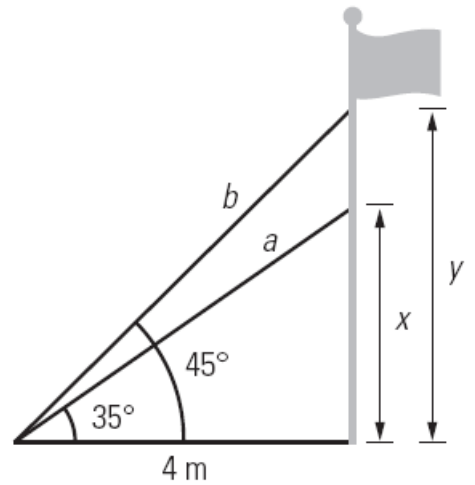


Answers:

1. 5.2 m 2. a) 12.7 cm; 19.0 cm b) 11.6 m; 10 m 3. 17.1 cm; 6.4 cm; 8.5 cm

**Example 2:** A flagpole is supported by two guy wires, each attached to a peg in the ground 4 m from the base of the pole. The guy wires have angles of elevations of  $35^\circ$  and  $45^\circ$ .

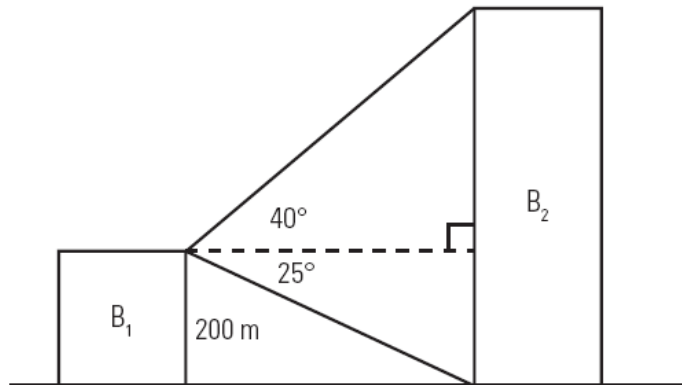
a) How much higher up the flagpole is the top guy wire attached?



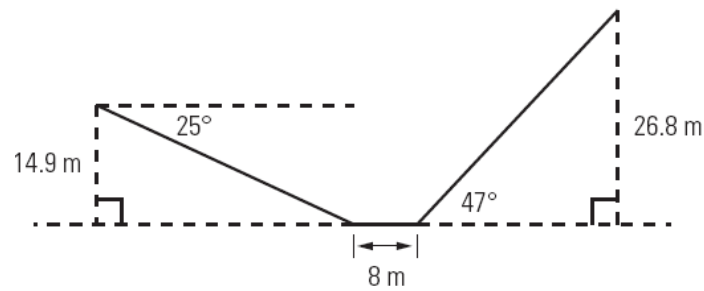
b) How long is each guy wire?

**Worksheet: Real-Life Trigonometry Problems**  
**Project: Real-World Trigonometry**  
**Real-Life Trigonometry Problems Worksheet**

1. From the top of a 200 m-tall office building, the angle of elevation to the top of another building is  $40^\circ$ . The angle of depression to the bottom of the second building is  $25^\circ$ . **How tall is the second building?**



2. A roller coaster has a track that drops at an angle of depression of  $25^\circ$  from a height of 14.9 m. When it reaches the ground, it travels horizontally for 8 m. It then rises at an angle of elevation of  $47^\circ$  to a height of 26.8 m.



- a) What is the total horizontal distance covered by this portion of track?
- b) What is the total distance travelled by a car on this portion of the roller coaster track?

Answers:

1. 560 m 2. a) 65 m b) 82.6 m