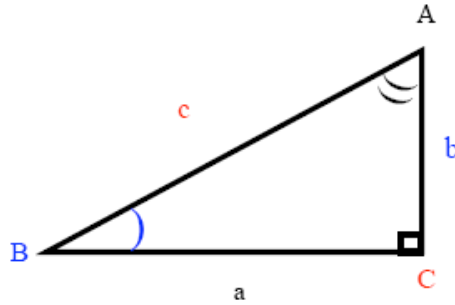


# Solving Right Triangles

To solve a **right triangle** means to determine the measure of all six parts (3 lengths, and 3 angles by using basic trigonometric functions and/or Pythagorean Theorem)



**EXAMPLE - Solve the triangle (find ALL sides and angles)**

$5-12-13 \times 3$   
 $15-36-39$   
 $15 \text{ mm}$  (adj)  
 $39 \text{ mm}$  (hyp)  
 $a = 36 \text{ mm}$   
 $\cos A = \frac{15}{39}$   
 $\angle A = 67^\circ$   
 $\angle G = 23^\circ$

$b = 14.64$  (adj)  
 $10.25$  (opp)  
 $35^\circ$   
 $\angle B = 55^\circ$   
 $\tan 35^\circ = \frac{10.25}{b}$   
 $b = \frac{10.25}{\tan 35^\circ}$   
 $b = 14.64$   
 $\sin 35^\circ = \frac{10.25}{i}$   
 $i = \frac{10.25}{\sin 35^\circ}$   
 $i = 17.87$

**Example 1** Solving a Right Triangle Given Two Sides

Solve  $\triangle XYZ$ .  
Give the measures to the nearest tenth.

 **SOLUTION**  
(erase to reveal)

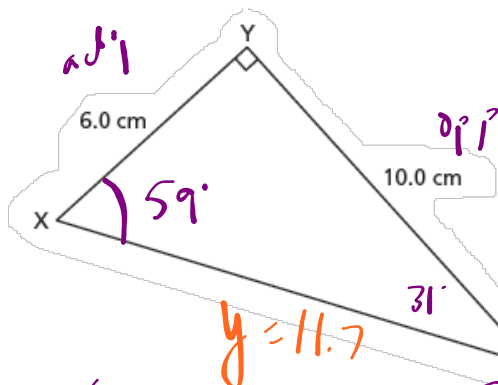
XZ is approximately 11.7 cm.  
 $\angle X$  is approximately  $59.0^\circ$  and  
 $\angle Z$  is approximately  $31.0^\circ$ .

y:

$$\sqrt{6^2 + 10^2}$$

$$11.66190379$$

$y = 11.7 \text{ cm}$



$\tan X = \frac{10}{6}$   
 $\angle X = \tan^{-1}\left(\frac{10}{6}\right)$   
 $\angle X = 59^\circ$

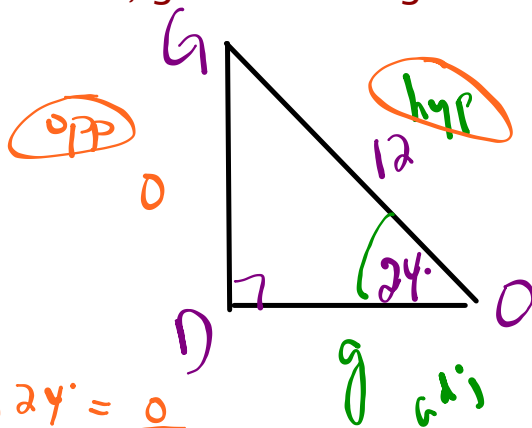
$\angle Z = 31^\circ$



CHECK YOUR UNDERSTANDING

**YOUR TURN...**

Solve  $\triangle DOG$ , given that angle  $D = 90^\circ$ , angle  $O = 24^\circ$  and  $d = 12$ .



$$\sin 24^\circ = \frac{g}{12}$$

$$12 \sin 24^\circ = g$$

$$4.9 = g$$

$$\angle G = 66^\circ$$

$$12 \cos 24^\circ = g$$

$$11.0 = g$$

## ANGLES OF ELEVATION/DEPRESSION

Review:

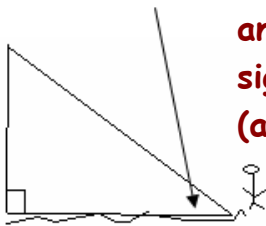
SOH CAH TOA stands for:

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

These trig ratios will only work with Right triangles.

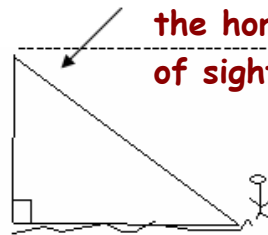
In each ratio we have 1 angle(s) and 2 side(s).

**Angle of elevation - is the angle between the ground and the line of sight. (angle of inclination)**



Always from the GROUND up

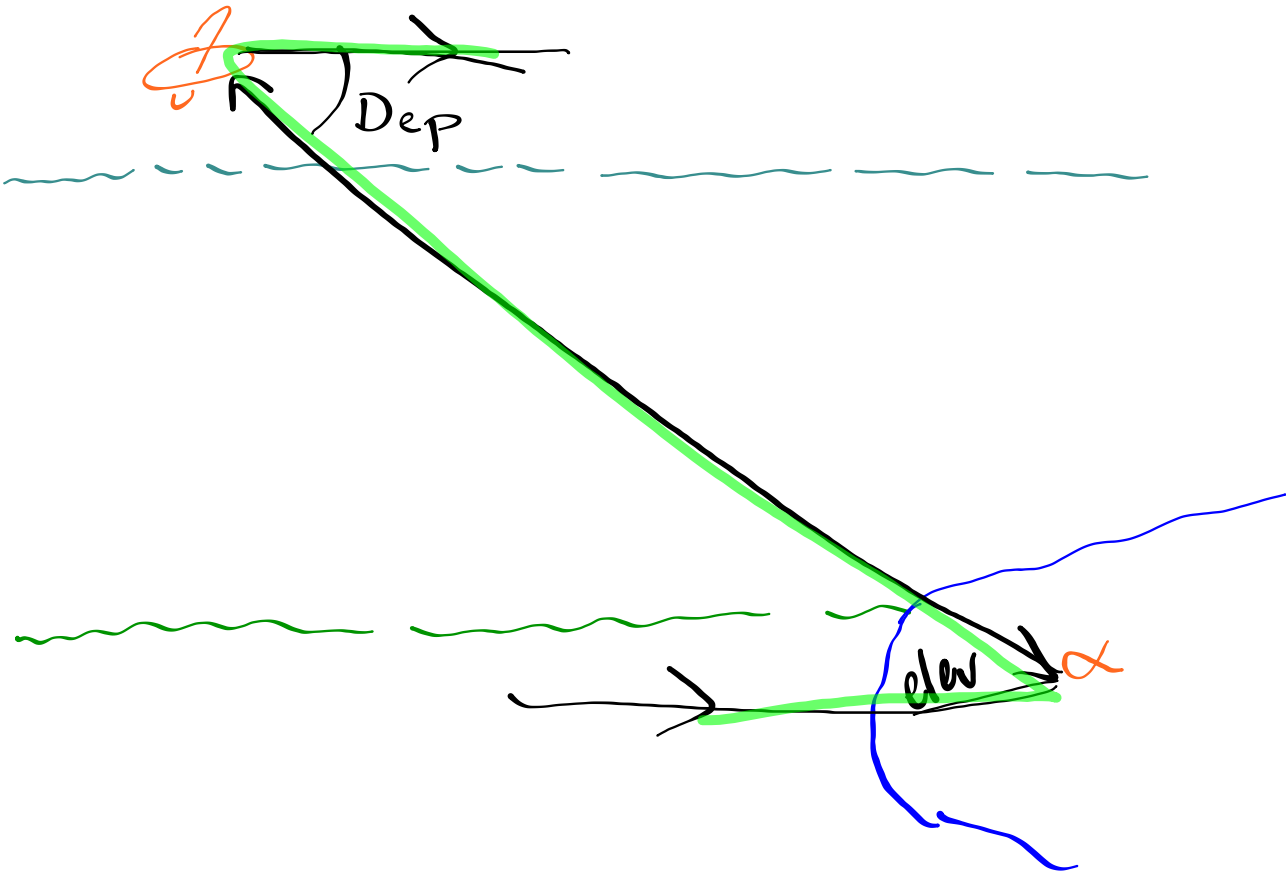
**Angle of Depression is the angle between the horizon and the line of sight.**



Always outside the triangle

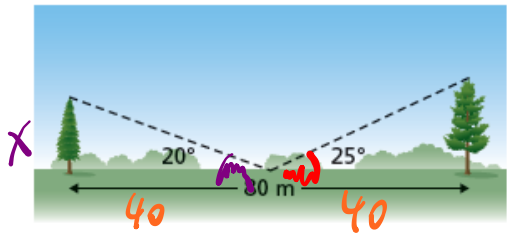
Also, note that the **angle of elevation = angle of depression**

Sometimes we don't have enough information to solve a triangle, by using just one triangle. However, if we have another associated right triangle, we may be able to solve one by using the provided data from the other.



**EXAMPLE #2:**

Two trees are 80 m apart. From a point halfway between the trees, the angles of elevation of the tops of the trees are measured. What is the height of each tree to the nearest metre?



$$40 \tan 20^\circ = \frac{x}{40}$$

$$14.5 \text{ m} = x$$

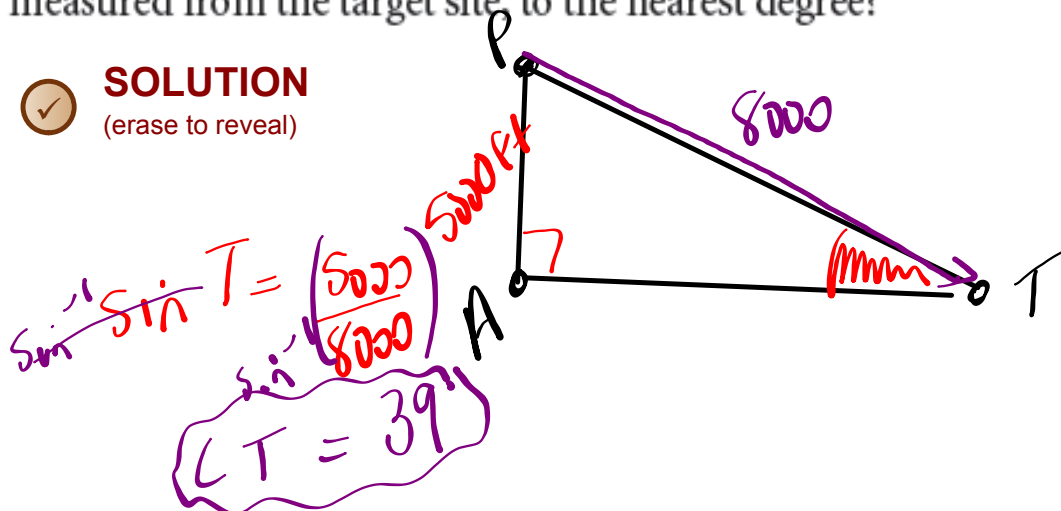
$$40 \tan 25^\circ = \frac{y}{40}$$

$$18.7 \text{ m} = y$$

**EXAMPLE 1:** Using Sine or Cosine to Solve a Problem

A water bomber is flying at an altitude of 5000 ft. The plane's radar shows that it is 8000 ft. from the target site. What is the angle of elevation of the plane measured from the target site, to the nearest degree?

✓ **SOLUTION**  
(erase to reveal)



The angle of elevation of the plane is approximately 39°.



CHECK YOUR UNDERSTANDING

HW :

# 1 ace

# 2 ace

# 3 ace

# 4-6, # 8, # 9



Worksheet - Solving and Applications.pdf



## Attachments

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Worksheet - Solving and Applications.pdf