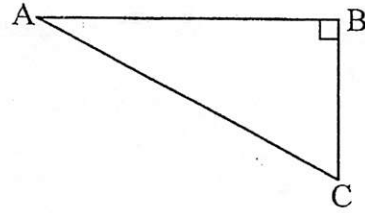


**Practice Problems**

1. Classify each of the three angles in the figure at right as an angle of elevation, an angle of depression, or neither.



2. Multiple-Choice: A 15 foot ladder rests against a tree on level ground and forms a  $75^\circ$  angle of elevation. Where is the correct location of the  $75^\circ$  angle?

- A) Between the ladder and the ground
- B) Between the ladder and the tree
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3. Tammi Jo, whose eyes are five feet off the ground, is standing 50 feet away from the base of a building, and she looks up at a  $73^\circ$  angle of elevation to a point on the edge of building's roof. To the nearest foot, how tall is the building?

4. A pilot is traveling at a height of 30,000 feet above level ground. She looks down at an angle of depression of  $6^\circ$  and spots the runway. As measured along the ground, how many miles away is she from the runway? Round to the nearest tenth of a mile.

5. A dog, who is 8 meters from the base of a tree, spots a squirrel in the tree at an angle of elevation of  $40^\circ$ . What is the direct-line distance between the dog and the squirrel?

6. A ship is on the surface of the water, and its radar detects a submarine at a distance of 238 feet, at an angle of depression of  $23^\circ$ . How deep underwater is the submarine?

7. The sun is at an angle of elevation of  $58^\circ$ . A tree casts a shadow 20 meters long on the ground. How tall is the tree?

8. Two observers on the ground are looking up at the top of the same tree from two different points on the horizontal ground. The first observer, who is 83 feet away from the base of the tree, looks up at an angle of elevation of  $58^\circ$ . The second observer is standing only 46 feet from the base of the tree. (Note: you may ignore the heights of the observers and assume their measurements are made directly from the ground.)

a) How tall is the tree, to the nearest foot?

b) At what angle of elevation must the second observer look up to see the top of the tree?

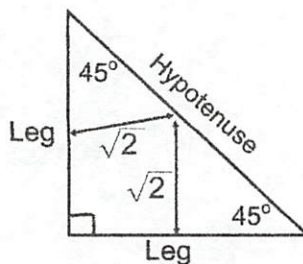
Name: \_\_\_\_\_

Trigonometry Prerequisite: Special Right Triangles

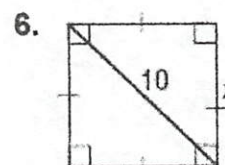
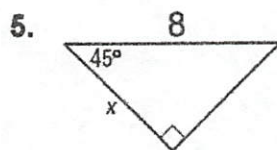
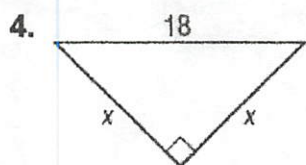
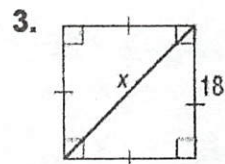
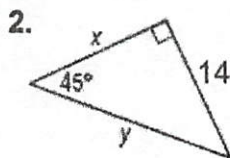
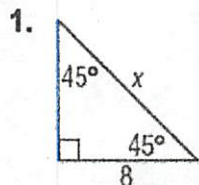
**Special Right Triangles: 45° - 45° - 90°**

Hypotenuse = Leg \*  $\sqrt{2}$   $\sqrt{2}$

Leg =  $\frac{\text{hypotenuse}}{\sqrt{2}}$



Find the value of x in each triangle.

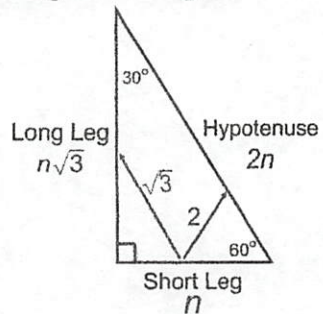


Trigonometry Prerequisite: Special Right Triangles

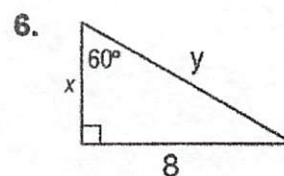
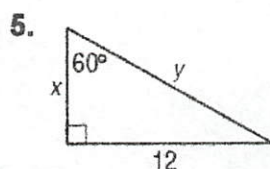
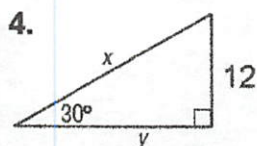
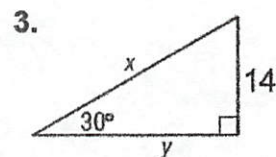
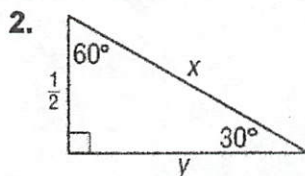
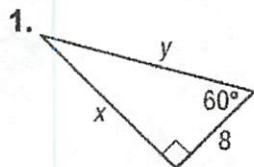
**Special Right Triangles: 30° - 60° - 90°**

Hypotenuse = 2 \* Short Leg

Long Leg = Short Leg \*  $\sqrt{3}$

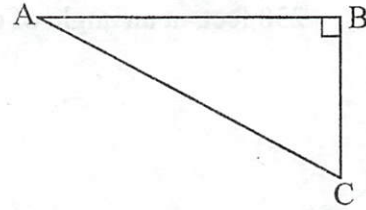


Find the value of x and y in each triangle.



**Practice Problems**

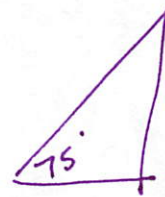
1. Classify each of the three angles in the figure at right as an angle of elevation, an angle of depression, or neither.



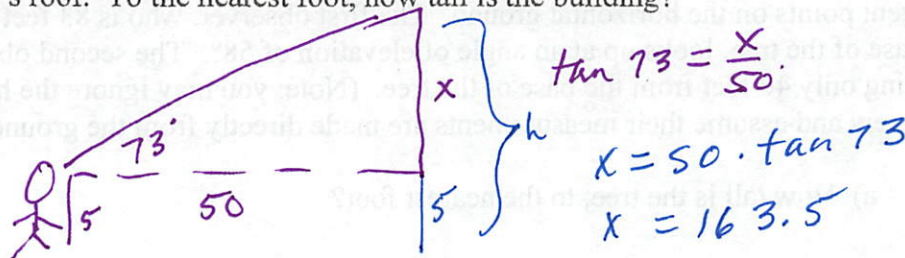
$\angle A$  angle of depression  
 $\angle B$  &  $\angle C$  neither

2. Multiple-Choice: A 15 foot ladder rests against a tree on level ground and forms a  $75^\circ$  angle of elevation. Where is the correct location of the  $75^\circ$  angle?

- A) Between the ladder and the ground
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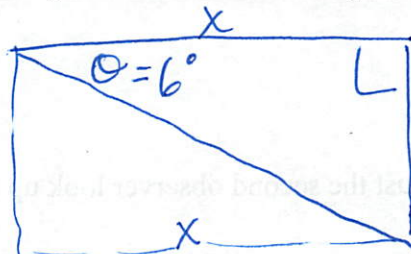
$$\tan 73 = \frac{x}{50}$$

$$x = 50 \cdot \tan 73$$

$$x = 163.5$$

$$h = 169 \text{ ft}$$

4. A pilot is traveling at a height of 30,000 feet above level ground. She looks down at an angle of depression of  $6^\circ$  and spots the runway. As measured along the ground, how many miles away is she from the runway? Round to the nearest tenth of a mile.



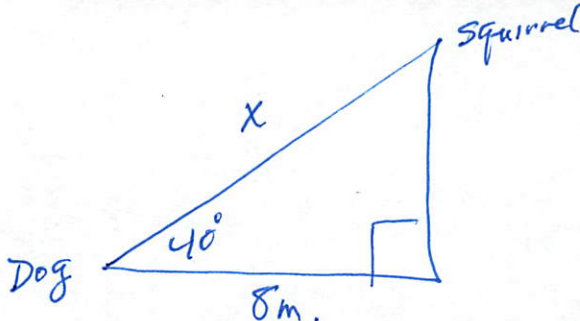
$$30,000 \text{ ft} = 5.68 \text{ miles}$$

$$\tan 6 = \frac{5.68}{x}$$

$$x = \frac{5.68}{\tan 6}$$

$$x = 54 \text{ miles}$$

5. A dog, who is 8 meters from the base of a tree, spots a squirrel in the tree at an angle of elevation of  $40^\circ$ . What is the direct-line distance between the dog and the squirrel?

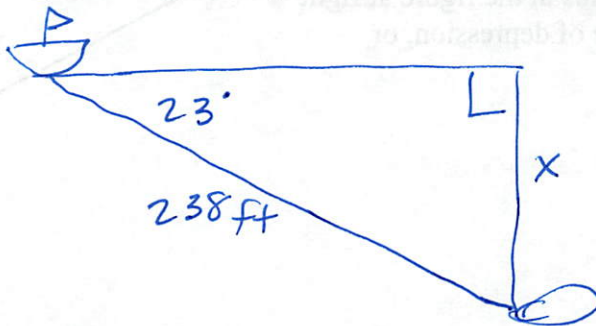


$$\cos 40 = \frac{8}{x}$$

$$x = \frac{8}{\cos 40}$$

$$x \approx 10.4 \text{ m}$$

6. A ship is on the surface of the water, and its radar detects a submarine at a distance of 238 feet, at an angle of depression of  $23^\circ$ . How deep underwater is the submarine?

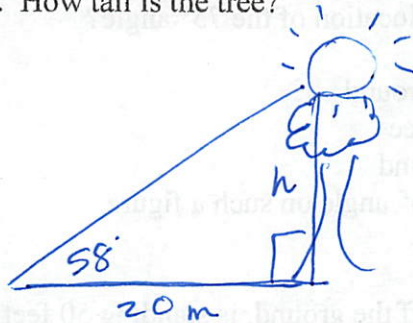


$$\sin 23^\circ = \frac{x}{238}$$

$$238 \cdot \sin 23^\circ = x$$

$$x \approx 93 \text{ ft.}$$

7. The sun is at an angle of elevation of  $58^\circ$ . A tree casts a shadow 20 meters long on the ground. How tall is the tree?



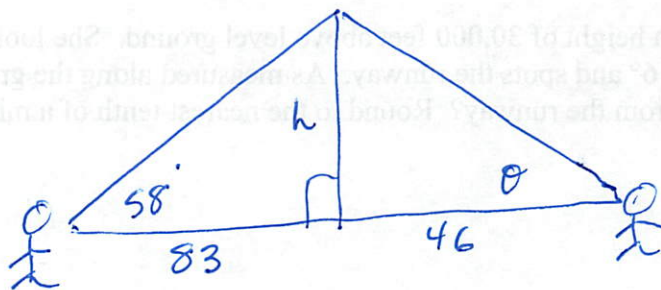
$$\tan 58^\circ = \frac{h}{20}$$

$$20 \cdot \tan 58^\circ = h$$

$$h = 32 \text{ m}$$

8. Two observers on the ground are looking up at the top of the same tree from two different points on the horizontal ground. The first observer, who is 83 feet away from the base of the tree, looks up at an angle of elevation of  $58^\circ$ . The second observer is standing only 46 feet from the base of the tree. (Note: you may ignore the heights of the observers and assume their measurements are made directly from the ground.)

- a) How tall is the tree, to the nearest foot?

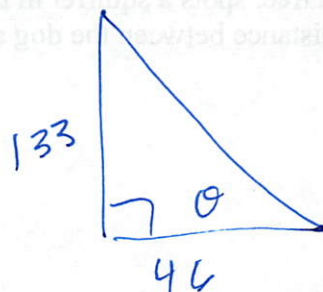


$$\tan 58^\circ = \frac{h}{83}$$

$$h = 83 \cdot \tan 58^\circ$$

$$= 133 \text{ ft.}$$

- b) At what angle of elevation must the second observer look up to see the top of the tree?



$$\tan \theta = \frac{133}{46}$$

$$\theta = \tan^{-1}\left(\frac{133}{46}\right)$$

$$\theta \approx 70.9^\circ$$

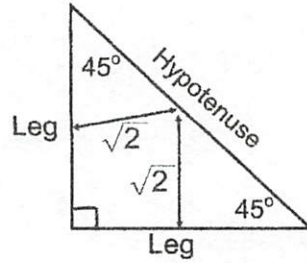
Name: \_\_\_\_\_

Trigonometry Prerequisite: Special Right Triangles

**Special Right Triangles: 45° - 45° - 90°**

Hypotenuse = Leg \*  $\sqrt{2}$

Leg =  $\frac{\text{hypotenuse}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{h\sqrt{2}}{2}$



Find the value of x in each triangle.

1.  $x = 8\sqrt{2}$

2.  $x = 14$   
 $y = 14\sqrt{2}$

3.  $x = 18\sqrt{2}$

4.  $x = 9\sqrt{2}$   
 $x = \frac{h\sqrt{2}}{2} = \frac{18\sqrt{2}}{2}$

5.  $x = 4\sqrt{2}$   
 $x = \frac{h\sqrt{2}}{2} = \frac{8\sqrt{2}}{2}$

6.  $x = 5\sqrt{2}$   
 $x = \frac{h\sqrt{2}}{2} = \frac{10\sqrt{2}}{2}$

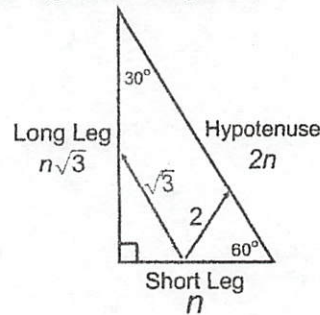
Trigonometry Prerequisite: Special Right Triangles

**Special Right Triangles: 30° - 60° - 90°**

Hypotenuse = 2 \* Short Leg

Long Leg = Short Leg \*  $\sqrt{3}$

$S = \frac{1}{2}h$  ;  $S = \frac{l\sqrt{3}}{3}$



Find the value of x and y in each triangle.

1.  $x = 8\sqrt{3}$  ;  $y = 16$

2.  $x = 2$  ;  $y = \frac{1}{2}\sqrt{3}$

3.  $x = 28$  ;  $y = 14\sqrt{3}$

4.  $x = 24$  ;  $y = 12\sqrt{3}$

5.  $x = 4\sqrt{3}$  ;  $y = 8\sqrt{3}$   
 $S = \frac{12\sqrt{3}}{3} = 4\sqrt{3}$

6.  $x = \frac{8\sqrt{3}}{3}$   
 $y = \frac{16\sqrt{3}}{3}$   
 $S = \frac{8\sqrt{3}}{3}$