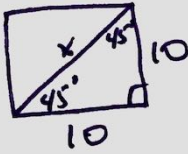


Geometry - DAY 5.8
Special Right Triangle Application Problems

Name: Key
Date: _____

1. Find the length of a diagonal of a square with sides 10 inches long.



$$10^2 + 10^2 = x^2$$

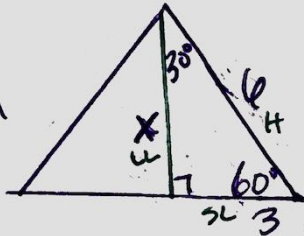
$$100 + 100 = x^2$$

$$\sqrt{200} = \sqrt{x^2}$$

$$\sqrt{100} \cdot \sqrt{2} = x$$

$$x = 10\sqrt{2}$$

2. One side of an equilateral triangle measures 6 cm. Find the measure of an altitude of the triangle.

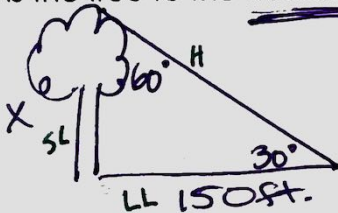


$$x = 3\sqrt{3} \text{ cm}$$

Equilateral Triangle
⇒ All 3 sides are equal

3. A tree casts a shadow that is 150 feet long.

- a. If the angle of elevation from the tip of the shadow to the top of the tree is 30 degrees, how tall is the tree to the nearest foot?

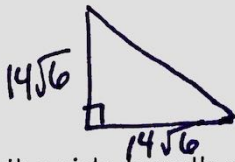


$$\frac{150}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{150\sqrt{3}}{3} = 50\sqrt{3} \approx 87 \text{ ft}$$

- b. If the tree begins to fall and your car is parked 90 feet away from the tree, would you have to move your car?

No, your car is safe!

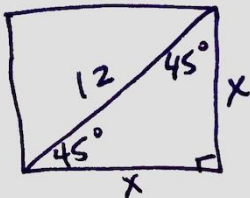
4. A triangle has the following characteristics: a 90 degree angle and side lengths both measuring $14\sqrt{6}$ inches. Find the length of the hypotenuse.



$$14\sqrt{6} \cdot \sqrt{2} = 14\sqrt{12} = 14\sqrt{4\sqrt{3}} = 14 \cdot 2\sqrt{3}$$

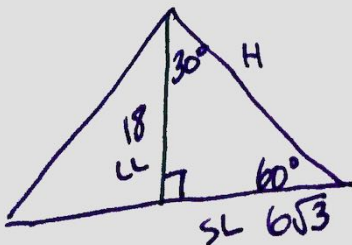
$$H = 28\sqrt{3}$$

5. What is the side length of a square that has a diagonal length of 12 inches?



$$\frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{12\sqrt{2}}{2} = 6\sqrt{2} \text{ in}$$

6. What is the perimeter of an equilateral triangle that has a height of 18 cm?

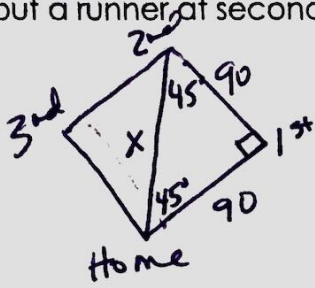


$$\frac{18}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{18\sqrt{3}}{3} = 6\sqrt{3}$$

$$6\sqrt{3}(2) = 12\sqrt{3} \Rightarrow \text{one side}$$

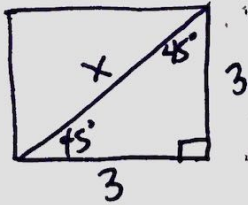
$$12\sqrt{3}(3) = 36\sqrt{3} \text{ cm} \Rightarrow \text{Perimeter}$$

7. The baseball diamond is in the shape of a square with each side being 90 feet. If the catcher throws out a runner at second base who was trying to steal, how far does he need to throw the ball?



$$90\sqrt{2} \text{ ft.}$$

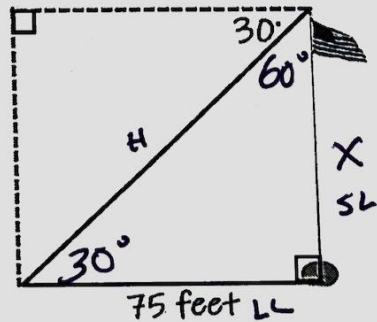
8. A bookcase is 3 feet high and 3 feet wide. Two braces are going to be built to diagonally cross the back of the case. How long is the piece of wood that is needed to build each brace?



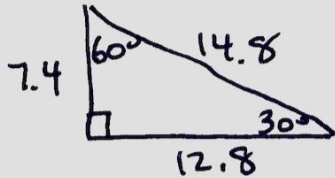
$$3\sqrt{2} \text{ ft.}$$

9. The angle of depression from the top of a flag pole to a point on the ground is 30 degrees. If the point on the ground is 75 feet from the base of the flag pole, how tall is the pole to the nearest foot?

$$\frac{75}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{75\sqrt{3}}{3} = 25\sqrt{3} \approx 43 \text{ ft.}$$



10. The shorter leg of a 30-60-90 triangle is 7.4 meters long. Find the perimeter.

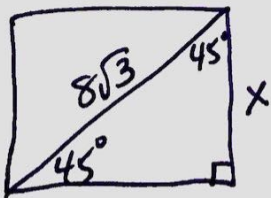


$$H: 7.4(2) = 14.8$$

$$LL: 7.4\sqrt{3} \approx 12.8$$

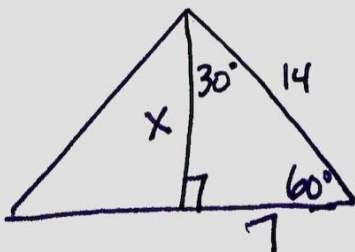
$$\text{Perimeter: } 7.4 + 14.8 + 12.8 = 35 \text{ m}$$

11. If a diagonal of the square is $8\sqrt{3}$, what is the length of each side?



$$\frac{8\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{6}}{2} = 4\sqrt{6}$$

12. Find the altitude of an equilateral triangle, if each side of the triangle has a length of 14 meters.



$$\text{Altitude} = 7\sqrt{3}$$