

Special Triangle Application Problems:

Key

Name: _____

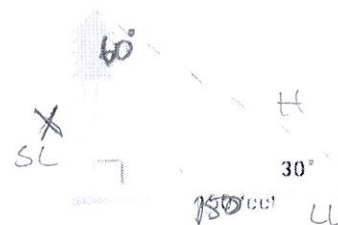
1. A tree casts a shadow that is 150 feet long.

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

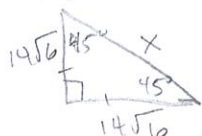
$$\frac{150}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{150\sqrt{3}}{3} = 50\sqrt{3}$$

- 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, because the tree is approx. 87 feet tall.

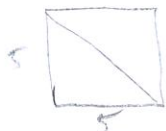


2. A triangle has the following characteristics: a 90° angle and side lengths both measuring $14\sqrt{6}$ in. Find the length of the hypotenuse.



$$14\sqrt{6} \cdot \sqrt{2} = 14\sqrt{12} = 14\sqrt{4\sqrt{3}} = 14 \cdot 2\sqrt{3} = \boxed{28\sqrt{3} \text{ in}}$$

3. The area of a square is 25 cm^2 . What is the product of the lengths of the diagonals of the square?



$$\begin{aligned} \text{Area} &= s^2 \\ 25 &= s^2 \\ s &= 5 \end{aligned}$$

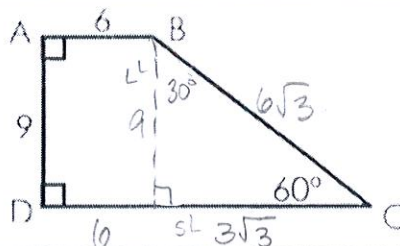
$$\text{Diagonal} = 5\sqrt{2}$$

$$(5\sqrt{2})(5\sqrt{2}) = 25 \cdot 2 = \boxed{50 \text{ cm}}$$

4. Find the perimeter of trapezoid ABCD

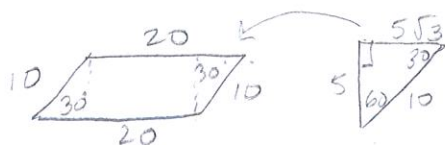
$$\text{Perimeter} = 9 + 6 + 6 + 3\sqrt{3} + 6\sqrt{3}$$

$$\boxed{P = 21 + 9\sqrt{3}}$$



$$\begin{aligned} \frac{9}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} &= \frac{9\sqrt{3}}{3} \\ &= 3\sqrt{3} \end{aligned}$$

5. A parallelogram has sides that are 10 cm, and 20 cm, long. The measure of the acute angles of the parallelogram is 30° . What is the area of the parallelogram?

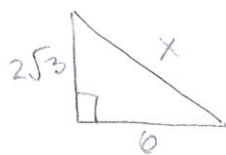


$$\begin{aligned} \text{Area} &= \text{base} \cdot \text{height} \\ &= 20 \cdot 5 \end{aligned}$$

$$\boxed{A = 100 \text{ cm}^2}$$

6. A triangle has the following characteristics: a 90° angle and side lengths measuring $2\sqrt{3}$ cm and 6 cm. Find the length of the hypotenuse.

$\sqrt{3}^2$



$$\begin{aligned} 6^2 + (2\sqrt{3})^2 &= X^2 \\ 36 + 12 &= Y^2 \\ 48 &= Y^2 \end{aligned}$$

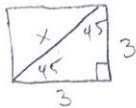
$$X = \sqrt{48}$$

$$X = \sqrt{16 \cdot 3} \cdot \sqrt{3}$$

$$\boxed{X = 4\sqrt{3} \text{ cm}}$$

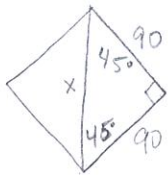
$$(2\sqrt{3})^2 = 4 \cdot 3 = 12$$

7. 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?



$$x = 3\sqrt{2} \text{ feet}$$

8. 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?



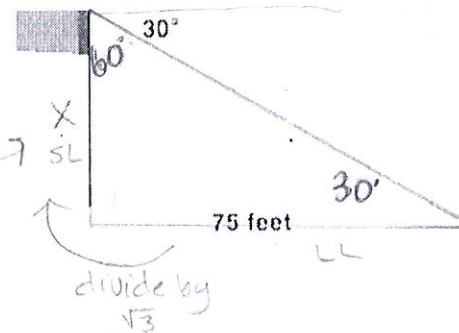
$$x = 90\sqrt{2}$$

9. The angle of depression from the top of a flag pole to a point on the ground is 30° .

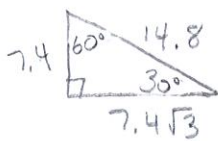
- a. If the point on the ground is 75 feet from the base of the flag pole, how tall is the pole to the nearest foot?

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

$$= 43 \text{ ft.}$$



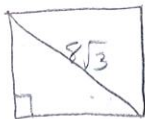
10. The shorter leg of a 30° - 60° - 90° triangle is 7.4 meters long. Find the perimeter.



$$P = 7.4 + 7.4\sqrt{3} + 14.8$$

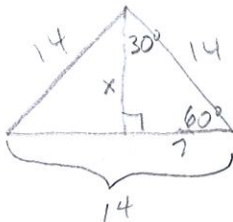
$$P = 22.2 + 7.4\sqrt{3}$$

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.



$$x = 7\sqrt{3} \text{ meters}$$