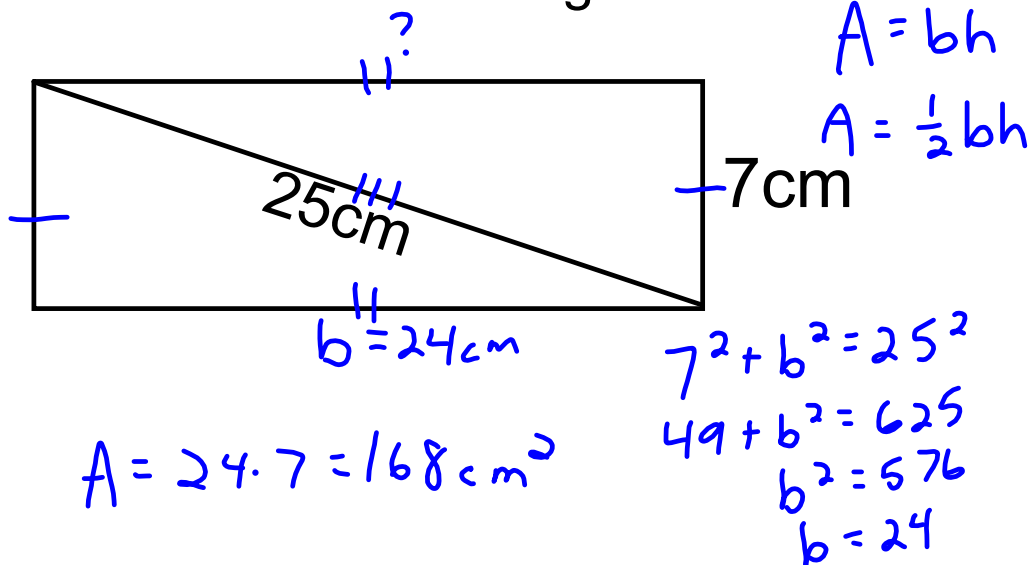


Warm-Up

Find the area of the rectangle below.



Areas of Triangles and Special Quadrilaterals

Learning Targets

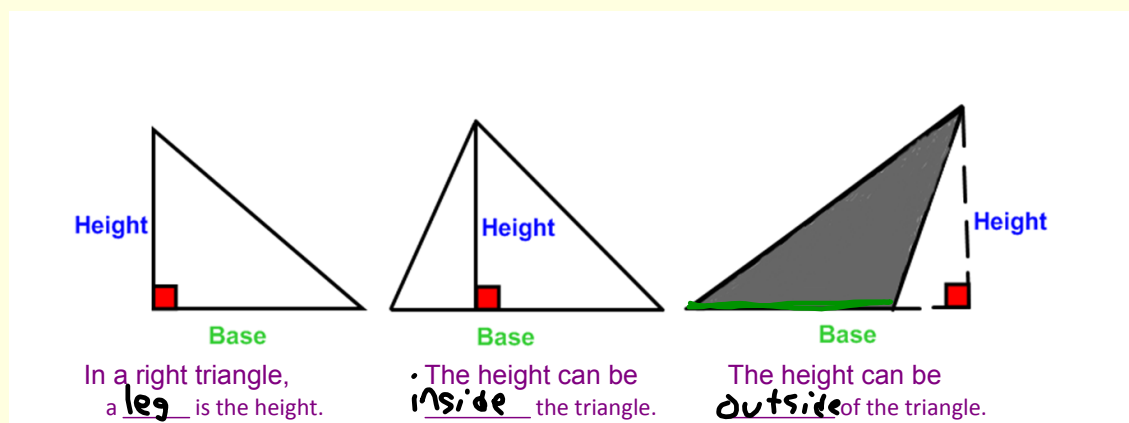
- a) I can apply the area formula(s) of Triangles to solve problems.
- b) I can apply the area formula(s) of Rhombi to solve problems.

Area of a Triangle

The **HEIGHT** of a triangle is the perpendicular segment from a vertex to the line containing the opposite side.

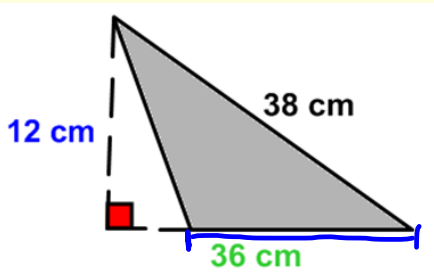
The opposite side is called the **BASE** of the triangle.

The terms **HEIGHT** and **BASE** are also used to represent the segment lengths.



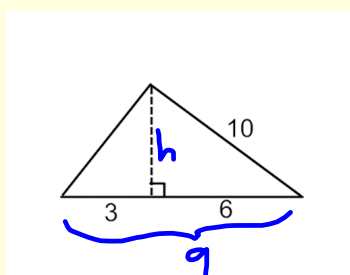
$$\text{Area of Triangle} = \frac{1}{2}bh \text{ or } \frac{bh}{2}$$

1. Find the area of the triangle.



$$\begin{aligned} b &= 36 \\ h &= 12 \\ A &= \frac{1}{2} \cdot 36 \cdot 12 \\ A &= 216 \text{ cm}^2 \end{aligned}$$

2. Find the area of the triangle



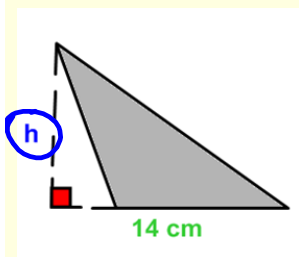
$$\begin{aligned} 6^2 + h^2 &= 10^2 \\ 36 + h^2 &= 100 \\ h^2 &= 64 \\ h &= 8 \end{aligned}$$

$$b = 9 \quad h = 8$$

$$A = \frac{1}{2} \cdot 9 \cdot 8 = 36 \text{ units}^2$$

$$\text{Area of Triangle} = \frac{1}{2}bh \text{ or } \frac{bh}{2}$$

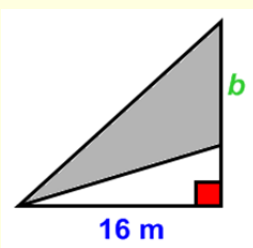
3. Area of $\triangle = 63 \text{ cm}^2$



$$9 \text{ cm}$$

$$\begin{aligned} A &= \frac{1}{2}bh \\ 63 &= \frac{1}{2} \cdot 14 \cdot h \\ 63 &= 7h \\ 9 &= h \end{aligned}$$

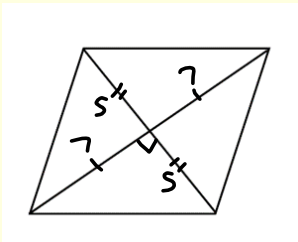
4. Area of $\triangle = 80 \text{ m}^2$



$$\begin{aligned} A &= \frac{1}{2}bh \\ 80 &= \frac{1}{2} \cdot b \cdot 16 \\ 80 &= 8b \\ 10 &= b \\ 10 \text{ m} \end{aligned}$$

Rhombus

a) Find the area of the rhombus below if the diagonals are 10 in and 14 in (use two triangles).

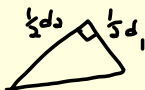
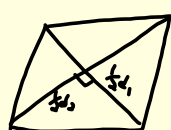


- Hint
- All sides are congruent by definition.
 - Diagonals are perpendicular bisector of each other.

$$\begin{aligned} A_{\text{triangle}} &= \frac{1}{2} \cdot 5 \cdot 7 = 17.5 \text{ in}^2 \\ 4 \text{ triangles} &\rightarrow 17.5 \times 4 = 70 \text{ in}^2 \end{aligned}$$

above

b) Now, find the area of the rhombus ~~below~~ if the diagonals are d_1 and d_2 .



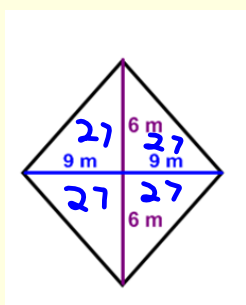
$$\begin{aligned} A_{\text{triangle}} &= \frac{1}{2} \cdot \frac{1}{2}d_1 \cdot \frac{1}{2}d_2 = \frac{1}{8}d_1d_2 \\ 4 \text{ triangles} &\rightarrow 4 \cdot \frac{1}{8}d_1d_2 = \frac{1}{2}d_1d_2 \end{aligned}$$

$$\text{Area of a Rhombus: } A = \frac{1}{2}d_1d_2 \text{ or } A = \frac{d_1d_2}{2}$$

d_1 and d_2 are diagonals

Find the area of each rhombus.

5.

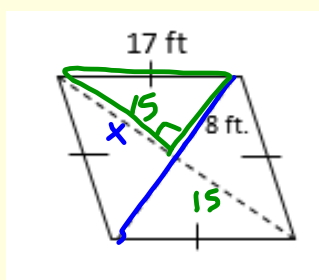


$$d_1 = 12$$

$$d_2 = 18$$

$$A = \frac{1}{2} \cdot 12 \cdot 18 = \boxed{108 \text{ m}^2}$$

6.



$$d_1 = 16$$

$$d_2 = 30$$

$$8^2 + x^2 = 17^2$$

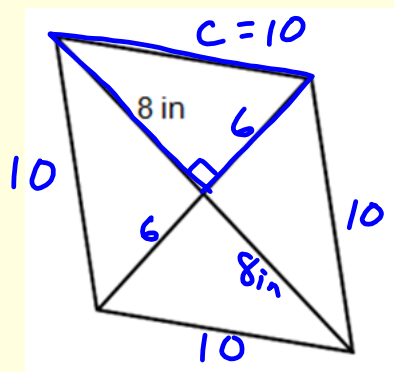
$$64 + x^2 = 289$$

$$x^2 = 225$$

$$x = 15$$

$$A = \frac{1}{2} \cdot 16 \cdot 30$$

$$A = \boxed{240 \text{ ft}^2}$$

8. The rhombus below has an area of 96 in^2 . Find the perimeter of the rhombus

$$6^2 + 8^2 = c^2$$

$$100 = c^2$$

$$10 = c$$

$$d_1 = 16$$

$$d_2 = ? \quad 12$$

$$A = \frac{1}{2} d_1 d_2$$

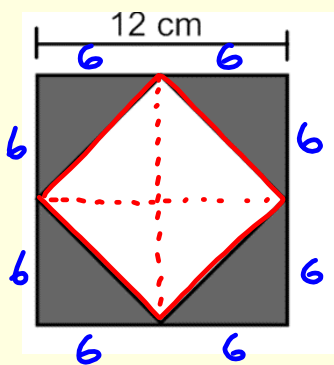
$$96 = \frac{1}{2} \cdot 16 \cdot d_2$$

$$96 = 8d_2$$

$$12 = d_2$$

$$\text{Perimeter} = 4 \cdot 10 = \boxed{40 \text{ in}}$$

9. Find the area of the shaded region using 2 different methods if the outside figure is a square.



Method 1

Area of 4 triangles

$$A = \frac{1}{2} \cdot 6 \cdot 6 = 18$$

$$\text{Total Area} = 4 \cdot 18$$

$$= 72 \text{ cm}^2$$

Method 2

Area of outside
- Area of inside

$$A_{\text{outside}} = 12 \cdot 12 = 144$$

$$A_{\text{inside}} = \frac{1}{2} \cdot 12 \cdot 12 = 72$$

$$\text{Shaded Area} = 144 - 72$$

$$= 72 \text{ cm}^2$$

Assignment:

8.1 Areas of Special Quadrilaterals Homework Day 2



