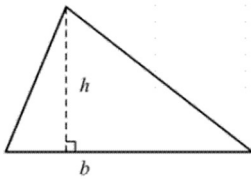


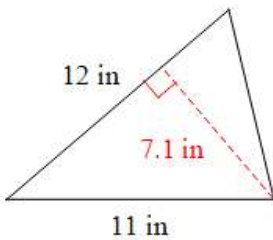
Area of a Triangle

***Remember to pay attention to units. Units of area should be squared (power of 2). Units of length like base, height, and perimeter should have a power of 1.

Triangle Area Conjecture - The area of a triangle is given by the formula $A = \frac{1}{2}bh$, where A is the area, b is the length of the base, and h is the height of the triangle. The base and height must be perpendicular.



Example 1: Finding area of a triangle given base and height



$$A = \underline{\quad? \quad}$$

***Remember that base and height of a triangle must be perpendicular (meet at a right angle). This means that the 11 in is just extra information that we don't need to use.

$$A = \frac{1}{2}bh$$

$$b = 12, h = 7.1$$

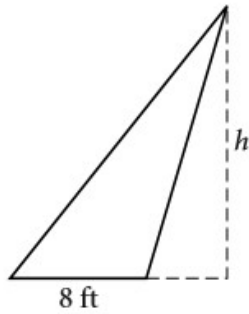
$$A = \frac{1}{2}(12)(7.1)$$

**To calculate this, you can turn the $\frac{1}{2}$ into a 0.5 and multiply (i.e. $0.5 \cdot 12 \cdot 7.1$) or you can multiply 12 and 7.1 and then divide by 2 (i.e. $\left(\frac{12 \cdot 7.1}{2}\right)$). Both methods will give you the same answer.

$$A = 42.6$$

The area is **42.6 in²**.

Example 2: Finding height of a triangle given area and base



$$A = 64 \text{ ft}^2 \quad h = \underline{\quad? \quad}$$

$$A = \frac{1}{2}bh$$

$$A = 64, b = 8$$

$$64 = \frac{1}{2}(8)(h)$$

$$64 = (4)(h)$$

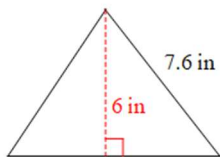
**We can multiply the $\frac{1}{2} \cdot 8$ as $0.5 \cdot 8$ or think of this as half of 8.

$$\frac{64}{4} = \frac{(4)(h)}{4}$$

$$16 = h$$

The height is **16 ft**.

Example 3: Finding base of a triangle given area and height



$$\text{Area} = 26.1 \text{ in}^2 \quad b = \underline{\quad? \quad}$$

$$A = \frac{1}{2}bh$$

$$A = 26.1, h = 6$$

$$26.1 = \frac{1}{2}(b)(6)$$

$$26.1 = (3)(b)$$

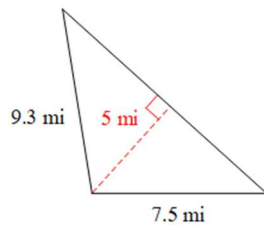
**We can reorder the multiplication in this problem so that our numbers are together and our variable is last $\left(\frac{1}{2}(6)(b)\right)$. This allows us to calculate as we did in Example 2.

$$\frac{26.1}{3} = \frac{(3)(b)}{3}$$

$$8.7 = b$$

The base is **8.7 in.**

Example 4: Finding perimeter of a triangle



$$\text{Area} = 29.5 \text{ mi}^2$$

$$P = \underline{\quad ? \quad}$$

We will need to use the area to find the remaining side which will help us find perimeter.

$$A = \frac{1}{2}bh$$

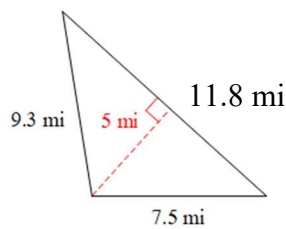
$$A = 29.5, h = 5$$

$$29.5 = \frac{1}{2}(b)(5)$$

$$29.5 = (2.5)(b)$$

$$\frac{29.5}{2.5} = \frac{(2.5)(b)}{2.5}$$

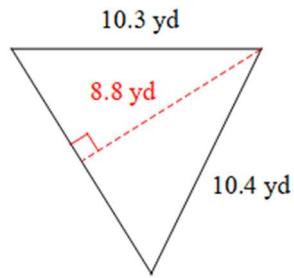
$$11.8 = b$$



$$P = 9.3 + 7.5 + 11.8 = 28.6$$

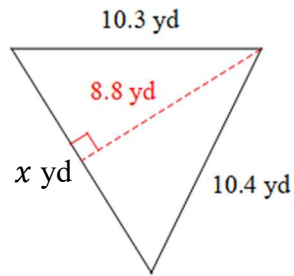
The perimeter is **28.6 mi.**

Example 5: Finding area of a triangle given perimeter, height, and two sides



$$P = 31.7 \text{ yd} \quad A = \underline{\quad ? \quad}$$

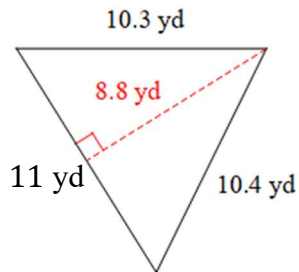
We can use the perimeter to find the length of the third side that will be the base of the triangle.



$$31.7 = 10.3 + 10.4 + x$$

$$31.7 = 20.7 + x$$

$$11 = x$$



$$A = \frac{1}{2}bh$$

$$b = 11, h = 8.8$$

$$A = \frac{1}{2}(11)(8.8)$$

$$A = 48.4$$

The area is **48.4 yd²**.