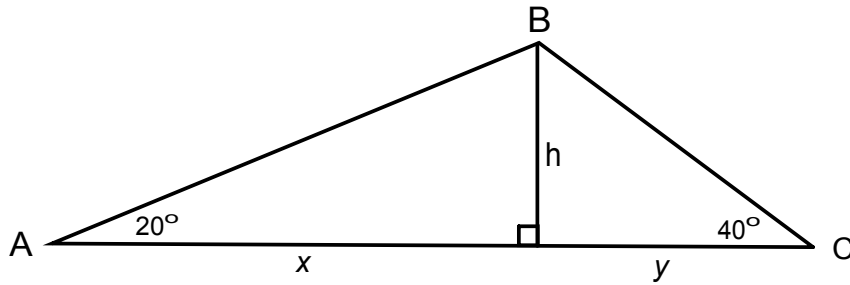


In $\triangle ABC$ $AC = 35$ m. What is the value of x and y ?



$$\tan 20^\circ = \frac{h}{x} \quad \tan 40^\circ = \frac{h}{y}$$

$$x \tan 20 = h \quad y \tan 40 = h$$

$$x \tan 20^\circ = y \tan 40^\circ \quad (1)$$

$$x + y = 35 \quad (2)$$

$$(2) \quad x = 35 - y \quad \text{sub into } (1)$$

$$(35 - y) \tan 20 = y \tan 40$$

$$35 \tan 20 - y \tan 20 = y \tan 40$$

$$12.7 - 0.364y = 0.839y$$

$$12.7 = 0.839y + 0.364y$$

$$12.7 = 1.2y$$

$$10.6 = y \quad \text{sub into } x = 35 - y$$

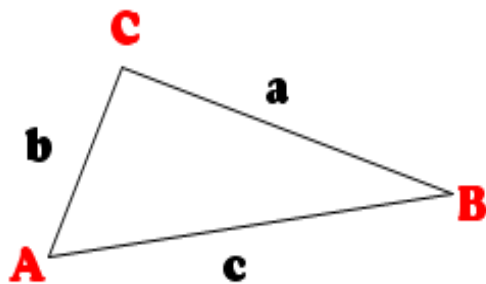
$$x = 35 - (10.6)$$

$$x = 24.4 \text{ m}$$

$$\text{So, } \boxed{x = 24.4 \text{ m}, y = 10.6 \text{ m}}$$

Area of a Triangle

How would you find the area of triangle ABC?

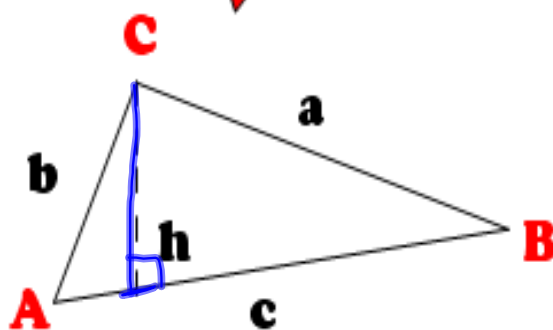


$$\text{Area} = \frac{1}{2} \text{ base} \times \text{height}$$

In this triangle, the base is “c”, so



Area = $\frac{1}{2} ch$



**Replace the “h” with
an expression using
sin A:**

$$\sin A = \frac{\text{opp}}{\text{hyp}}$$

$$\sin A = \frac{h}{b}$$

Solving for h: $h = b \sin A$

If we fill $h = b \sin A$ into our formula, we get:

$$\text{Area} = \frac{1}{2} c (b \sin A)$$

$$A \frac{1}{2} c h$$

OR


$$\text{Area} = \frac{1}{2} bc \sin A$$

This formula is used to calculate the area of all oblique (non-right) triangles.

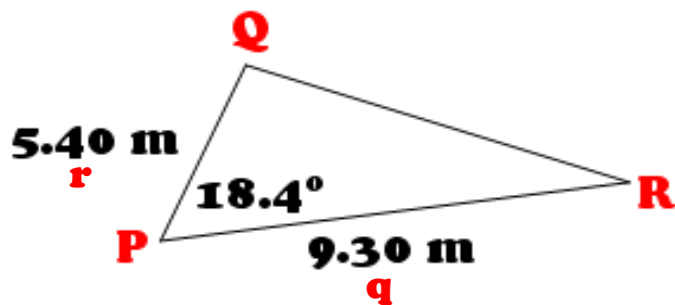
Sometimes finding the area of a right triangle can be done more efficiently using this area formula as well.

To use this formula to find area, you need any 2 sides and the included angle measure of any triangular shape. (You do not need the height!**)**

When the area of a triangular shape is given, you can use the formula to find any of the missing three measures (b, c, sin A**) as long as the other two measures are given.**

Example 1:

What is the area of the following triangle?



Solution:

$$\begin{aligned} A &= \frac{1}{2} qr \sin P \\ &= \frac{1}{2} (9.30)(5.40)\sin 18.4^\circ \\ &= \frac{1}{2} (9.30)(5.40)(0.3156) \\ &= \frac{1}{2} (15.8494) \\ &= 7.92 \text{ m}^2 \text{ (Watch Units !)} \end{aligned}$$

Example 2:

If the area of a triangular region on a stage was to be carpeted with 37 m² of carpet, and two adjacent sides measured 12.0 m and 6.7 m, what is the angle between the two sides.

Solution:

$$A = \frac{1}{2} bc \sin A$$

$$37 \text{ m}^2 = \frac{1}{2} (12.0 \text{ m})(6.7 \text{ m})\sin A$$

$$37 \text{ m}^2 = 40.2 \text{ m}^2 \sin A$$

$$\underline{37 \text{ m}^2} = \underline{40.2 \text{ m}^2 \sin A}$$

$$40.2 \text{ m}^2 \quad \cancel{40.2 \text{ m}^2}$$

$$0.9204 = \sin A$$

$$\sin^{-1}(0.9204) = A$$

$$67^\circ = A$$

Example 3

