

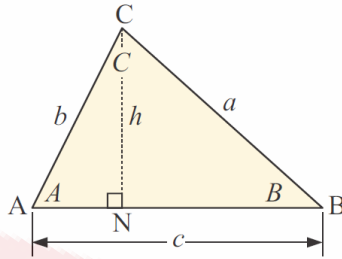
Area of a Triangle using Sine

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## Area of a triangle using sine



If we consider the triangle above, let's find a formula for its area. We know that the area of a triangle is

$$\text{area of triangle} = \frac{1}{2} \text{ base} * \text{height}$$

Using the notation above we have,

$$\begin{aligned} \text{area } \triangle ABC &= \frac{1}{2}ch \\ &= \frac{1}{2}c(b \sin A), \quad \text{since } \sin A = \frac{h}{b} \end{aligned}$$

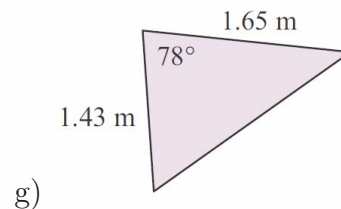
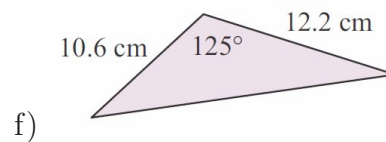
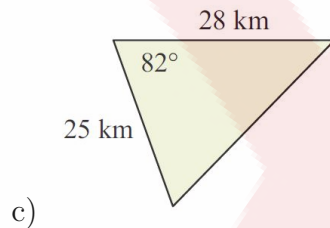
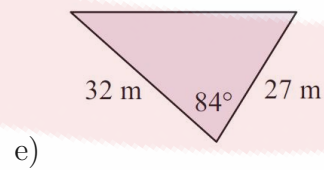
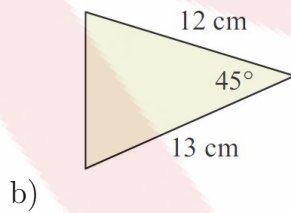
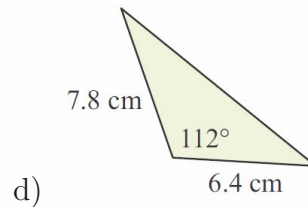
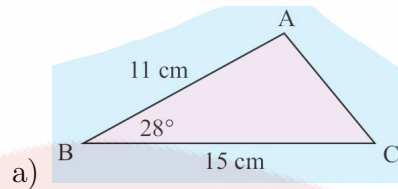
Notice that  $h$  in the triangle above is the altitude drawn from C.

If we were to draw the altitude from A and then the altitude from B we would get the following formulas for the area of  $\triangle ABC$ , respectively, as well:

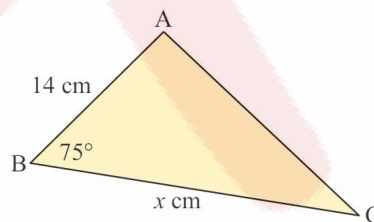
$$\text{area } \triangle ABC = \frac{1}{2}ac \sin B \quad \text{and} \quad \text{area } \triangle ABC = \frac{1}{2}ab \sin C$$

## Exercises

1. Find the area of the triangles below.



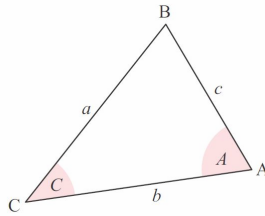
2. If triangle  $\triangle ABC$  has area  $150\text{cm}^2$ , find the value of  $x$ .



3. Given the triangle below

- Find the area of  $\triangle ABC$  using (i) Angle A (ii) Angle C
- Show that

$$\frac{a}{c} = \frac{\sin A}{\sin C}$$



4. Find the area of a parallelogram with sides 6.4 cm and 8.7 cm and one interior angle  $64^\circ$ .
5. Triangle  $PQR$  has  $\angle PQR = \theta$ ,  $PQ = 10m$ ,  $QR = 12m$  and the area of the triangle is  $30m^2$ . Find the possible values of  $\theta$ .
6. Triangle  $ABC$  has  $AB = 13cm$ , and  $BC = 17cm$  and area is  $73.4cm^2$ . Find the value of  $\angle ABC$ .