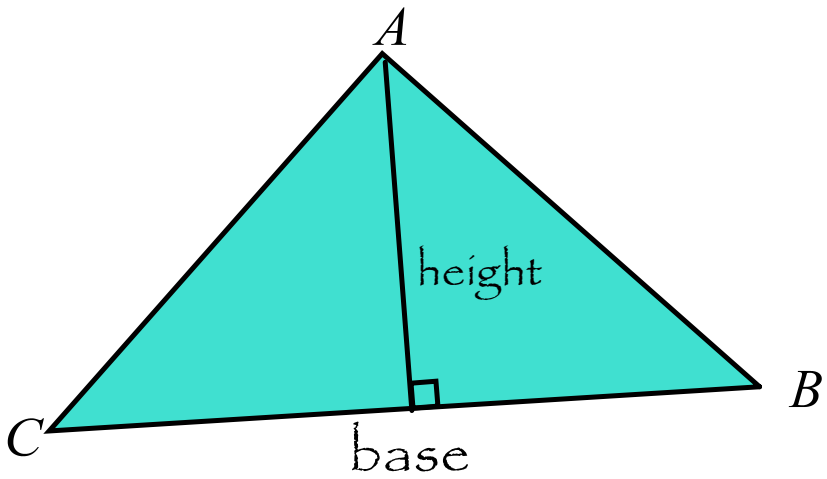
Area of a Triangle

Recall:

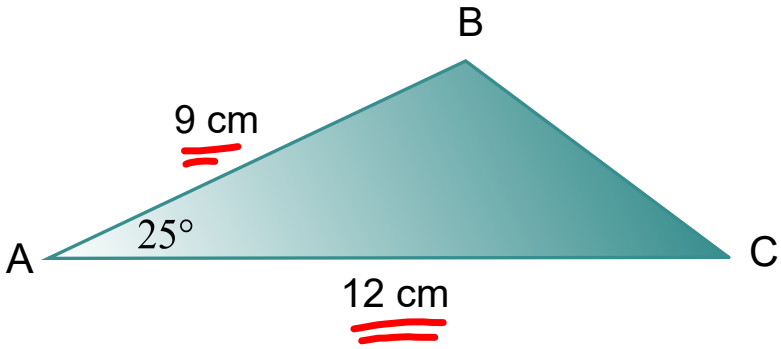


$$Area = \frac{base \times height}{2}$$

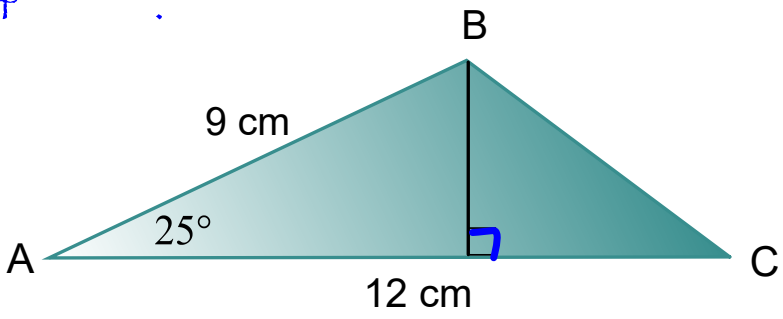
Trigonometric Formula

(given an angle and two sides SAS)

Example:



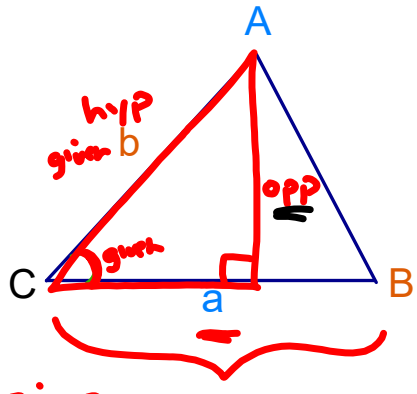
We can use trigonometry to calculate the height of $\triangle ABC$.



Trigonometric Formula

$$Area = \frac{a \times b \times \sin C}{2}$$

base, height

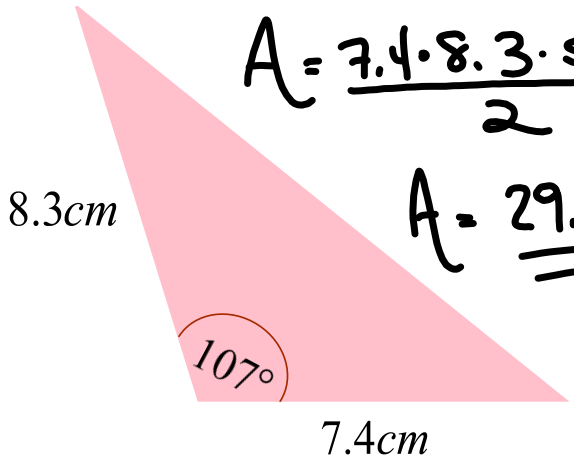


$\sin C = \frac{opp}{b}$

$b \cdot \sin C = opp = height$

Example: $Area = \frac{(12) \times 9 \times \sin 25°}{2} = 22.82 cm^2$

Example: Calculate the area of $\triangle MNP$.

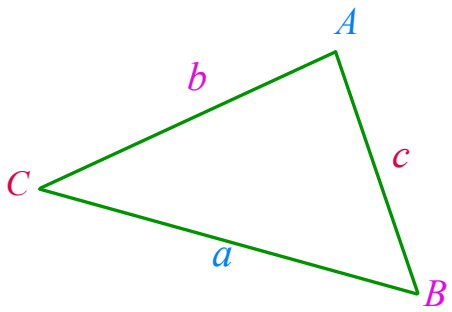


$$A = \frac{7.4 \cdot 8.3 \cdot \sin 107°}{2}$$

$$A = 29.34\,cm^2$$

Hero's Formula

For finding the area of a triangle, given the lengths of its sides (SSS).



$a + b + c$

1. Calculate the semi-perimeter: $s = \dfrac{Perimeter}{2}$

2. Calculate the area using the formula ...

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Example: Calculate the area.

① $P = 59 + 86 + 39$
$= 184$

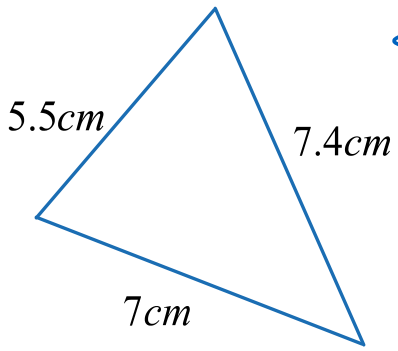
② $s = 184 \div 2$
$s = 92$

③ $A = \sqrt{92(92-59)(92-39)(92-86)}$

$A = \sqrt{92(33)(53)(6)}$

$A = \sqrt{965\,448} = 982.57\text{cm}^2$

Example: Calculate the area of the triangle.



$P = 19.9$

$s = 9.95$

$$A = \sqrt{9.95(9.95-5.5)(9.95-7.4)(9.95-7)}$$

$$= \sqrt{9.95(4.45)(2.55)(2.95)}$$

$$= \sqrt{333.0774938}$$

$$= 18.25\ cm^2$$