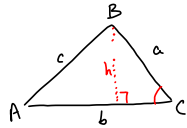


Area of a Triangle



We know  $\angle C$  and sides  $a$  and  $b$

Area =  $\frac{1}{2} b h$   
*base height*  
 need an expression for  $h$

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

$\sin C = \frac{h}{a}$

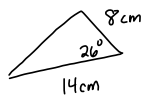
$h = a \sin C$

Area =  $\frac{1}{2} b (a \sin C)$

Area =  $\frac{1}{2} ab \sin C$

angle is formed by sides  $a$  and  $b$

Example

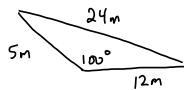


Area =  $\frac{1}{2} ab \sin C$

Area =  $\frac{1}{2} (8 \text{ cm})(14 \text{ cm}) \sin 26^\circ$

Area =  $24.5 \text{ cm}^2$

Example



Area =  $\frac{1}{2} ab \sin C$

Area =  $\frac{1}{2} (5 \text{ m})(12 \text{ m}) \sin 100^\circ$

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

Example



Triangle A  
 $c^2 = a^2 + b^2$   
 $x^2 = 18^2 + 12^2$   
 $x = 21.6 \text{ m}$

Area<sub>A</sub> =  $\frac{1}{2} b h$

Area<sub>A</sub> =  $\frac{1}{2} (12 \text{ m})(18 \text{ m})$

Area<sub>A</sub> =  $108 \text{ m}^2$

Triangle B

Area<sub>B</sub> =  $\frac{1}{2} ab \sin C$

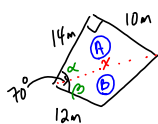
Area<sub>B</sub> =  $\frac{1}{2} (21.6 \text{ m})(14 \text{ m}) \sin 25^\circ$

Area<sub>B</sub> =  $64.0 \text{ m}^2$

TOTAL =  $108 \text{ m}^2 + 64 \text{ m}^2$

TOTAL =  $172 \text{ m}^2$   
 AREA

Example



Find  $x$ :

$c^2 = a^2 + b^2$   
 $c^2 = (4 \text{ m})^2 + (10 \text{ m})^2$   
 $c = 17.2 \text{ m}$

Triangle A

Area<sub>A</sub> =  $\frac{1}{2} b h$

Area<sub>A</sub> =  $\frac{1}{2} (10)(14 \text{ m})$

Area<sub>A</sub> =  $70 \text{ m}^2$

We need to find  $\alpha$ :

$\tan \theta = \frac{\text{opp}}{\text{adj}}$   
 $\tan \alpha = \frac{10 \text{ m}}{14 \text{ m}}$

$\alpha = \tan^{-1} \left( \frac{10}{14} \right)$   
 $\alpha = 35.5^\circ$

$\beta = 70^\circ - 35.5^\circ$   
 $\beta = 34.5^\circ$

Triangle B

Area<sub>B</sub> =  $\frac{1}{2} ab \sin C$

Area<sub>B</sub> =  $\frac{1}{2} (17.2 \text{ m})(12 \text{ m}) \sin 34.5^\circ$

Area<sub>B</sub> =  $58.5 \text{ m}^2$

TOTAL AREA =  $70 \text{ m}^2 + 58.5 \text{ m}^2$

Area =  $128.5 \text{ m}^2$