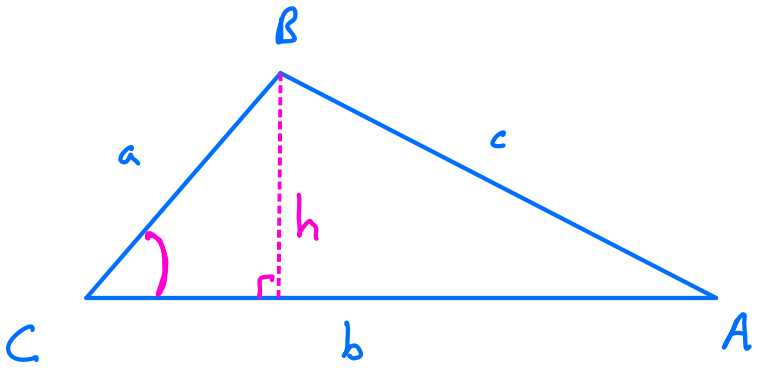
Area of a Triangle by Trigonometry



Area = $\frac{1}{2}$ base x height

Area = $\frac{1}{2}bh$ *

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

$$\Rightarrow \quad a \sin C = h$$

Sub for h in *

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

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or $\frac{1}{2} bc \sin A$ or $\frac{1}{2} ac \sin B$

Basically the formula for the area of any triangle is $\frac{1}{2}$ x any side x any other side x the sine of the angle between those two sides

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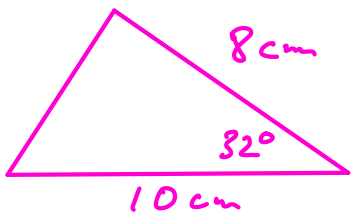
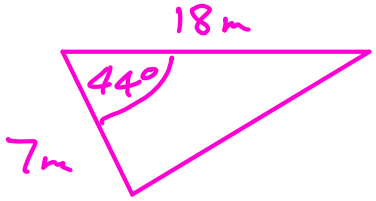
Examples

1)



$$\text{Area} = \frac{1}{2} \times 8 \times 10 \times \sin 32^\circ$$

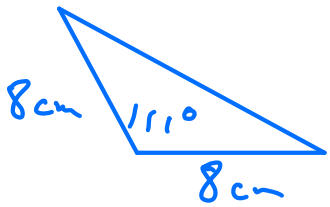
$$= 21.2 \text{ cm}^2$$

2) 

$\text{Area} = \frac{1}{2} \times 7 \times 18 \times \sin 44^\circ$

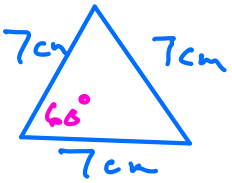
$= 43.8\ cm^2$

Exercise Find Area

1) 

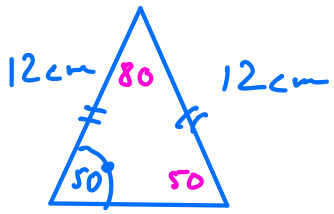
$A = \frac{1}{2} \times 8 \times 8 \times \sin 111^\circ$

$= 29.9\ cm$

2) 

$A = \frac{1}{2} \times 7 \times 7 \sin 60$

$= 21.2\ cm^2$

3) 

$A = \frac{1}{2} \times 12 \times 12 \times \sin 80^\circ$

$= 70.9\ cm^2$

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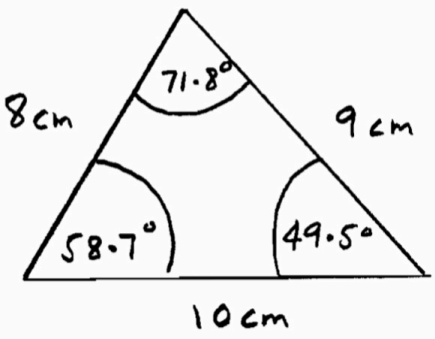
4) 

Find area of triangle 3 different ways.

$A = \frac{1}{2} \times 8 \times 10 \times \sin 58.7^\circ \quad = 34.2\ cm^2$

$A = \frac{1}{2} \times 8 \times 9 \times \sin 71.8^\circ \quad = 34.2\ cm^2$

$A = \frac{1}{2} \times 10 \times 9 \times \sin 49.5^\circ \quad = 34.2\ cm^2$
