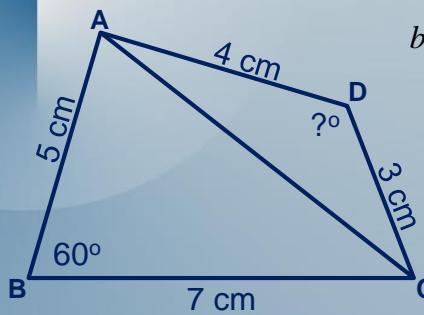


Warm Up

Find $m\angle ADC$.



$$b^2 = a^2 + c^2 - (2ac \cos B)$$

$$b^2 = 7^2 + 5^2 - (2 * 7 * 5) \cos 60^\circ$$

$$b^2 = 49 + 25 - 35$$

$$\Rightarrow b = \sqrt{39} = 6.245$$

$$\Rightarrow \angle D = \cos^{-1} \left(\frac{d^2 - a^2 - c^2}{-2ac} \right)$$

$$\angle D = \cos^{-1} \left(\frac{6.245^2 - 3^2 - 4^2}{-2(3)(4)} \right)$$

$$\therefore \angle D \approx 125.7^\circ$$

Lesson 5³⁷

Trigonometry – Area of Triangles

Area of a Triangle

There are 3 methods of calculating the area of a triangle:

1- General Formula $A = \frac{bh}{2}$

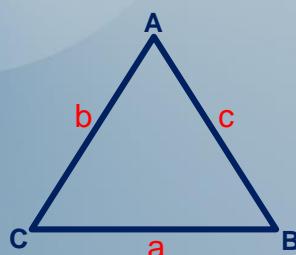
2- Hero's Formula $A = \sqrt{p(p-a)(p-b)(p-c)}$

where $p = \frac{a+b+c}{2}$

Area of a Triangle

If two sides of a triangle and the angle in between are given we can find the area using:

3- Trigonometric Formula (Sandwich)



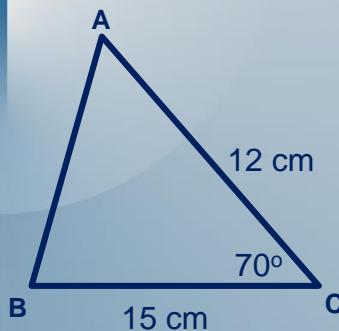
$\text{Area } A = \frac{bc \sin A}{2}$

$\text{Area } A = \frac{ac \sin B}{2}$

$\text{Area } A = \frac{ab \sin C}{2}$

Example 1

Find the area of this triangle.



$$A = \frac{ab \sin C}{2}$$

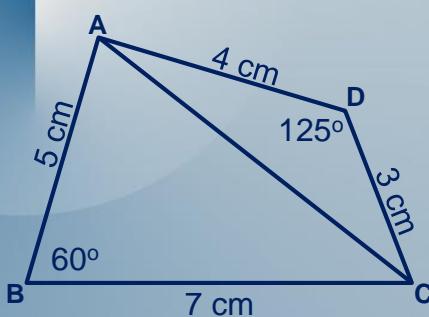
$$A = \frac{15 * 12 * \sin 70}{2}$$

$$A = \frac{169.14}{2}$$

$$\therefore A \approx 84.6 \text{ cm}^2$$

Example 2

Find the area of ABCD.



$$\text{Area } A = \frac{ac \sin B}{2}$$

$$A = \frac{5 * 7 * \sin 60}{2}$$

$$A = \frac{30.31}{2}$$

$$\therefore A \approx 15.16 \text{ cm}^2$$

$$A = \frac{ac \sin D}{2}$$

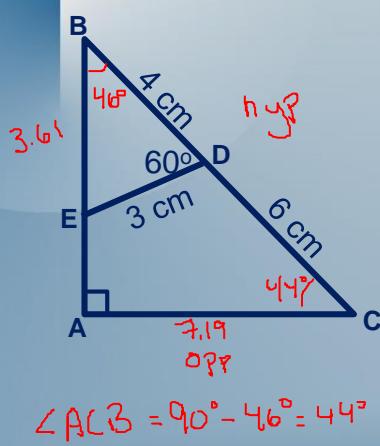
$$A = \frac{3 * 4 * \sin 125}{2}$$

$$A = \frac{9.83}{2}$$

$$\therefore A \approx 4.91 \text{ cm}^2$$

Example 3

Find the area of the triangle.



$$d^2 = b^2 + e^2 - (2be \cos D)$$

$$d^2 = 3^2 + 4^2 - (2(3)(4) \cos 60^\circ)$$

$$\therefore d \approx 3.61$$

$$\Rightarrow \angle B = \cos^{-1} \left(\frac{3^2 - 4^2 - 3.61^2}{-2(4)(3.61)} \right)$$

$$\therefore m\angle ABC \approx 46^\circ$$

$$\therefore m\overline{AC} \approx 7.19$$

$$\sin 46^\circ = \frac{\overline{AC}}{10}$$

$$\therefore m\overline{AB} \approx 6.95$$

$$\therefore A \approx 25 \text{ cm}^2$$

Homework

Workbook

P. 247 #1 – 5

&

Take Home Quiz