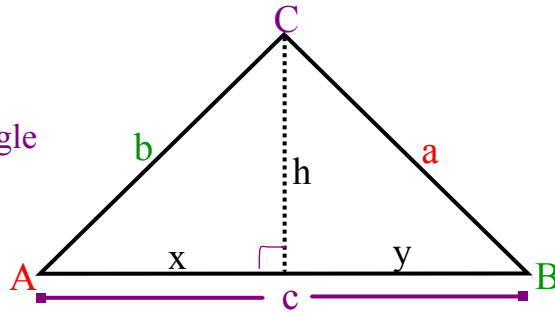


Section 9.1 #32  
 Prove the following...

a) Find the height of the triangle in terms of sine.

$$\sin A = \frac{h}{b} \quad \text{OR} \quad \sin B = \frac{h}{a}$$

$$h = b(\sin A) \quad h = a(\sin B)$$



b) What is the area of the triangle ABC?

$$A = \frac{1}{2}(\text{base})(\text{height})$$

$$= \frac{1}{2}(c)(b \sin A) \quad \text{OR} \quad \frac{1}{2}(c)(a \sin B)$$

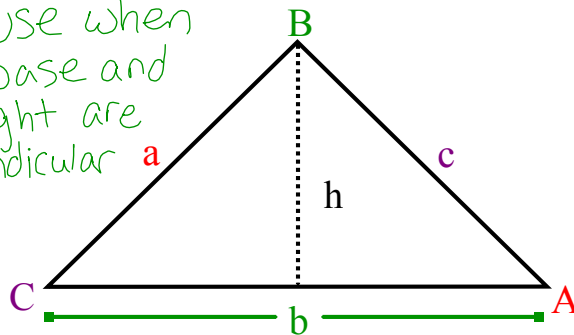
$$A = \frac{1}{2} c \cdot b \cdot \sin A \quad \text{OR} \quad A = \frac{1}{2} c \cdot a \cdot \sin B$$

**Section 9.2**  
**The Area of a Triangle**

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

$K = \frac{1}{2} bh$

Use when base and height are perpendicular



$K = \frac{1}{2} bc \sin A$

$K = \frac{1}{2} ac \sin B$

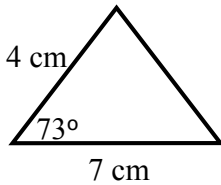
$K = \frac{1}{2} ab \sin C$

All the same area formula

\*Note: the angle is "included"  
 $\angle C$  is between side a and side b

Find the area of the triangles.

**Example 1**

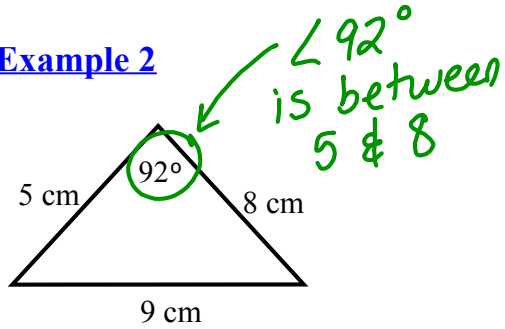


$$A = \frac{1}{2}(4)(7)\sin(73^\circ)$$

\*  $\angle 73^\circ$  is between sides 4 & 7

$$A = 13.4 \text{ cm}^2$$

**Example 2**

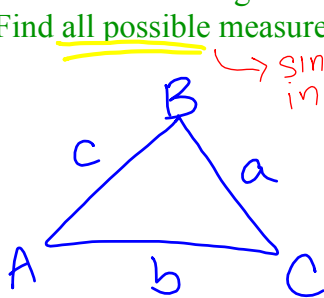


$$A = \frac{1}{2}(5)(8)\sin(92^\circ)$$

$$A = 19.99 \text{ cm}^2$$

**Example 3**

The area of a triangle is  $42 \text{ cm}^2$ . The sides are  $a=10$  and  $b=12$  inches. Find all possible measures of angle C.



$\angle A$  is opposite side a  
 $\angle B$  is opp. of b  
 $\angle C$  is opp. of c

→ sine is pos in two quadrants

$\angle C$  between

$$A = \frac{1}{2} a \cdot b \cdot \sin C$$

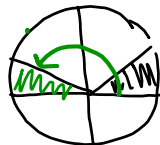
$$42 = \frac{1}{2}(10)(12)\sin C$$

$$42 = 60 \cdot \sin C$$

$$\underline{60} \quad \underline{60}$$

$$.7 = \sin C$$

$$\sin^{-1}(.7) = m\angle C = 44.4^\circ$$



\* sin positive in Q1 & Q2

$$180 - 44.4$$

$$m\angle C = 135.6^\circ$$

**Example 4**

The area of  $\Delta PQR$  is  $10 \text{ cm}^2$  and the sides are  $q = 10$  and  $r = 4 \text{ cm}$ . Find all possible measures of angle P.

$$A = \frac{1}{2} \cdot q \cdot r \cdot \sin P$$

$$10 = \frac{1}{2} (10)(4) \sin P$$

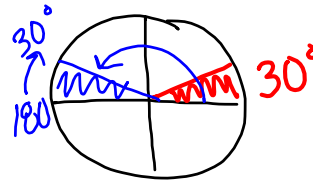
$$10 = \frac{20}{20} \cdot \sin P$$

$$.5 = \sin P$$

$$\sin^{-1}(.5) = m\angle P = 30^\circ$$

$$\text{OR } 180 - 30 = 150^\circ$$

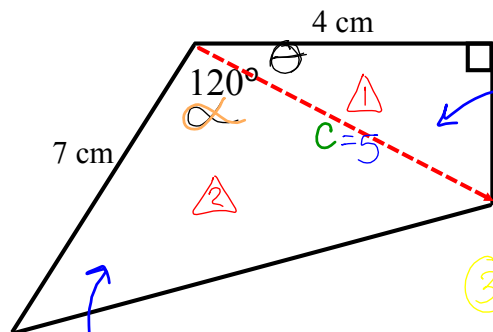
create  $\angle P$



**Example 5**

Find the area of the polygon.

\* A Quadrilateral is made up of two triangles



①  $\text{Area}(\Delta 1) = \frac{1}{2} (4)(3) = 6 \text{ cm}^2$

②  $4^2 + 3^2 = c^2$   
 $c^2 = 25 \rightarrow c = 5$

③  $\tan \theta = \frac{\text{Opp}}{\text{Adj}} = \frac{3}{4}$

④  $\theta = \tan^{-1}(3/4) = 36.87^\circ$

⑤  $\alpha = 120^\circ - \theta = 120 - 36.87$   
 $\alpha = 83.13^\circ$

⑥  $\text{Area} = \frac{1}{2} (5)(7) \sin(83.13^\circ)$   
 $= 17.37 \text{ cm}^2$

⑦  $\text{Area}(\Delta 1) + \text{Area}(\Delta 2)$   
 $6 + 17.37 = 23.37 \text{ cm}^2$