

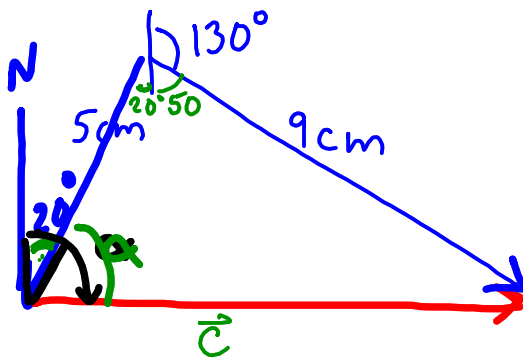
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**Vectors Using the
Law of Sines
and
Law of Cosines**

WARM UP:

Given $\vec{a} = [5, H20^\circ]$ and $\vec{b} = [9, H130^\circ]$,
find the magnitude and heading of the resultant $\vec{a} + \vec{b}$.

Ex#1: Use the Law of Cosines to find the values
 correct to three decimal places.



$$c^2 = 5^2 + 9^2 - 2(5)(9)\cos 70^\circ$$

$$c \approx 8.673 \text{ cm}$$

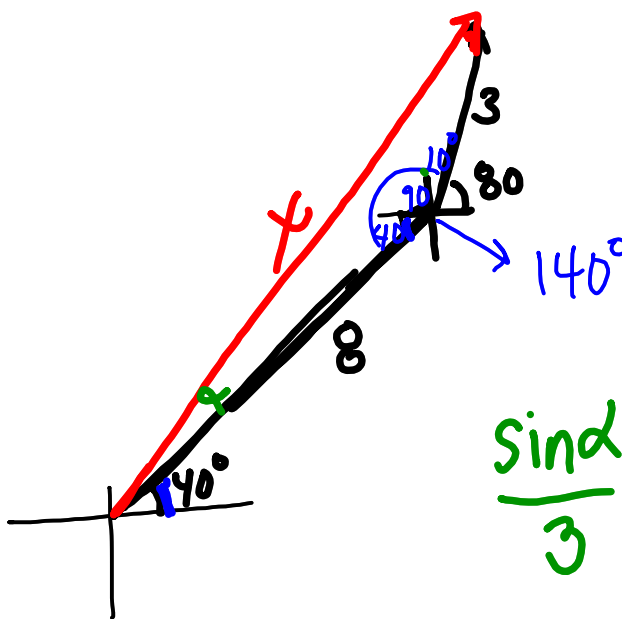
$$\cos \alpha = \frac{9^2 - 5^2 - (8.673)^2}{-2(9)(5)} \quad \frac{\sin \alpha}{9} = \frac{\sin 70}{8.673}$$

$$\alpha \approx 77.670^\circ$$

$$20 + \alpha = 97.670^\circ$$

$$[8.673 \text{ cm}, H97.670^\circ]$$

Ex#2: Given $\vec{c} = [8, D40^\circ]$ and $\vec{d} = [3, D80^\circ]$,
 find $\vec{c} + \vec{d}$.



$$x^2 = 3^2 + 8^2 - 2(3)(8) \cdot \cos(140)$$

$$x \approx 10.477$$

$$\frac{\sin \alpha}{3} = \frac{\sin 140^\circ}{10.477}$$

$$\alpha = 10.606^\circ$$

Ex#3: A plane travels with a speed of 350 mph and a heading of 150° . The wind is blowing at 25 mph with a heading of 40° .

Determine how far and at what heading the plane travels in one hour.

