

Introduction to vectors

"Scalar" quantities have only magnitude (\$5, 10 feet, etc.)

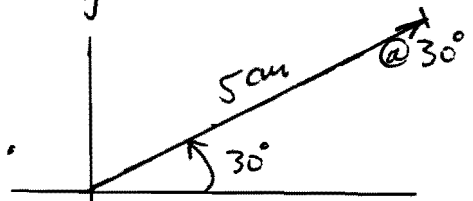
"Vectors" have both magnitude and direction.

(30 $\frac{\text{miles}}{\text{hr}}$, NE), etc.

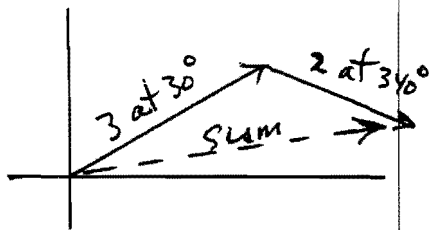
To sketch a vector, set its direction and then draw its magnitude (to scale) in the given direction.

Example: 5 cm at 30°

Notice the use of an arrowhead.



Vectors can be added or subtracted from one another, connecting "tip to tail."



Vector notation

$$\vec{A} = \langle 3 \cos 30^\circ, 3 \sin 30^\circ \rangle$$

$$\vec{B} = \langle 2 \cos 340^\circ, 2 \sin 340^\circ \rangle$$

$$\vec{R} = \vec{A} + \vec{B} = \langle 3 \cos 30^\circ + 2 \cos 340^\circ, 3 \sin 30^\circ + 2 \sin 340^\circ \rangle$$

$$\vec{R} \approx \langle 4.48, 0.82 \rangle \approx \langle R_x, R_y \rangle$$

$$\text{OR } \vec{R} = R_x \hat{i} + R_y \hat{j} \Rightarrow$$

$$\|\vec{R}\| = \sqrt{R_x^2 + R_y^2} \approx 4.55$$

$$\theta = \tan^{-1}\left(\frac{R_y}{R_x}\right) \approx 10.3^\circ$$

