General Physics I
Classnotes

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1 Vector

Definition: A vector is a quantity with both magnitude (size) and direction.
Definition: A vector is a quantity with magnitude only.

Vectors	Scalars
10 ft left	10 ft
Displacement	Distance
70 mi/h south	70 mi/h
Velocity	Speed
18 m/s^2 down	18 m/s^2

(1)

Let:

$$\vec{A} = \text{vector } A$$

Book uses boldface:

$$\mathbf{A} = \text{vector } A$$

$$A = |\vec{A}| = \text{magnitude of } \vec{A} \tag{2}$$

$$\vec{A} + \vec{B} = \vec{B} + \vec{A} \tag{3}$$

Vector addition is commutative.

Two vectors are equal if they have the same magnitude and direction. Location does not matter.

$$\vec{A} - \vec{B} = ?$$
$$\vec{A} - \vec{B} = \vec{A} + \left(-\vec{B}\right)$$

$$A_x = x\text{-component of } \vec{A}$$
$$A_y = y\text{-component of } \vec{A}$$

$$\cos\theta_A = \frac{\text{adj}}{\text{hip}} = \frac{A_x}{A} \rightarrow A_x = A\cos\theta_A$$
$$\sin\theta_A = \frac{\text{opp}}{\text{hip}} = \frac{A_y}{A} \rightarrow A_y = A\sin\theta_A$$

If we know A_x and A_y. What are A and θ_A?

$$\tan\theta_A = \frac{\text{opp}}{\text{adj}} = \frac{A_y}{A_x}$$

$$A^2 = A_x^2 + A_y^2$$
$$A = \sqrt{A_x^2 + A_y^2}$$