

Name _____

Physics 111 Quiz #1, September 8, 2025

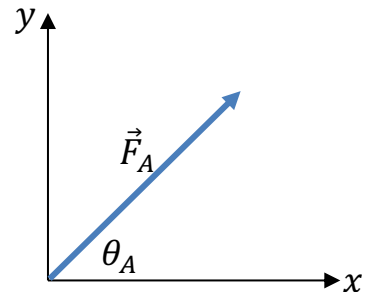
Please show all work, thoughts and/or reasoning to receive partial credit. The quiz is worth 10 points total, and all parts may not be of equal weight.

I affirm that I have carried out my academic endeavors with full academic honesty.

1. Suppose you have the vector $\vec{F}_A$ shown below. The vector has magnitude $|\vec{F}_A| = 10N$ and points at an angle $\theta_A = 30^\circ$ measured with respect to the positive x-axis. What are the x- and y-components of vector $\vec{F}_A$?

$$F_{Ax} = F_A \cos \theta_A = 10N \cos 30 = 8.66N$$

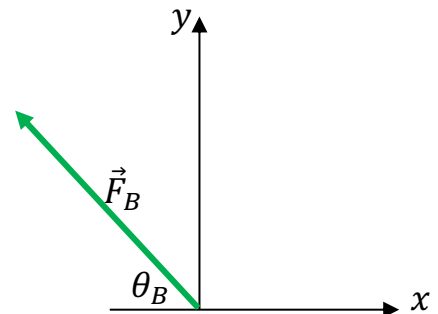
$$F_{Ay} = F_A \sin \theta_A = 10N \sin 30 = 5N$$



2. Suppose you have the vector $\vec{F}_B$ shown below. The vector has magnitude $|\vec{F}_B| = 10N$ and points at an angle $\theta_B = 40^\circ$ measured with respect to the negative x-axis. What are the x- and y-components of vector $\vec{F}_B$?

$$F_{Bx} = -F_B \cos \theta_B = 10N \cos 40 = -7.66N$$

$$F_{By} = F_B \sin \theta_B = 10N \sin 40 = 6.43N$$



3. Suppose that vector $\vec{F}_C = \vec{F}_A + \vec{F}_B$. What is the magnitude of vector $\vec{F}_C$?

$$F_{Cx} = F_{Ax} - F_{Bx} = 8.66N - 7.66N = 1.00N$$

$$F_{Cy} = F_{Ay} + F_{By} = 5.00N + 6.43N = 11.43N$$

$$F_c = \sqrt{F_{Cx}^2 + F_{Cy}^2} = \sqrt{(1.00N)^2 + (11.43N)^2} = 11.47N$$

4. With respect to the positive x-axis, at what angle does vector $\vec{F}_C$ make?

$$\tan \phi = \frac{F_{Cy}}{F_{Cx}} \rightarrow \phi = \tan^{-1} \left(\frac{F_{Cy}}{F_{Cx}} \right) = \tan^{-1} \left(\frac{11.43N}{1.00N} \right) = 85^\circ$$

5. Suppose that you have the following situation. A block of mass m and charge $-Q$ (assumed to be point-like) is held at rest on the frictionless inclined plane as shown below. A second point-charge of mass m and charge $+Q$ is placed at the bottom of the incline. On the diagram below, label the forces that act on point-charge $-Q$ located on the ramp. The magnitudes do not have to be drawn to scale, but the directions need to be accurate to earn full credit.

