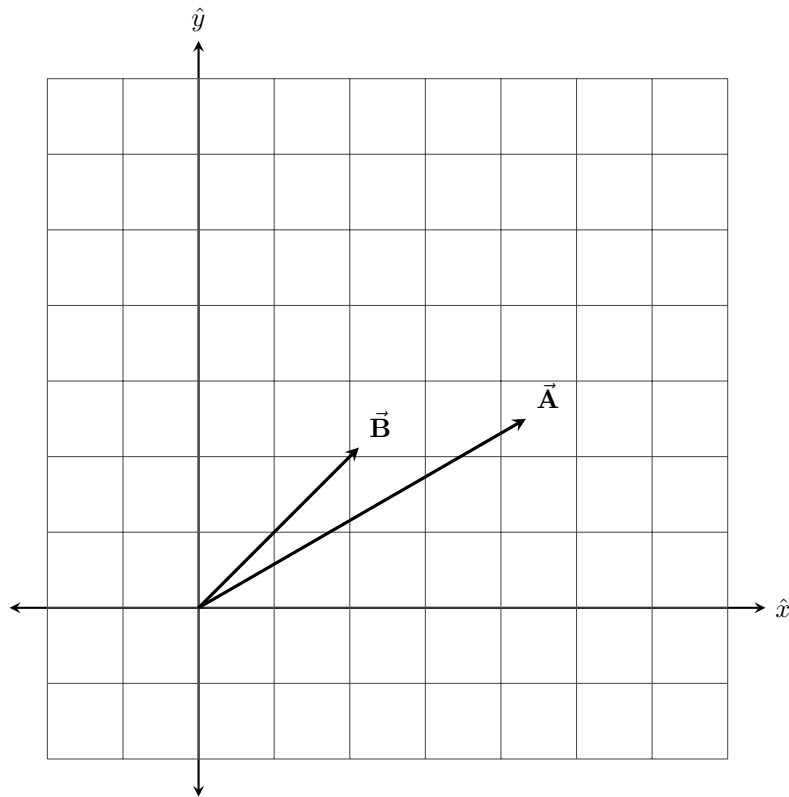


PHY 211 Recitation 4

January 24, 2020

1 Adding vectors

Add the following two vectors $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ graphically (assume each grid spacing is 1 m long).



Estimate the components of $\vec{\mathbf{C}} = \vec{\mathbf{A}} + \vec{\mathbf{B}}$ from your picture.

$$C_x = \underline{\hspace{2cm}} \quad C_y = \underline{\hspace{2cm}}$$

The vector $\vec{\mathbf{A}}$ has magnitude 5, and angle 30° from the x -axis. What are its components?

$$A_x = \underline{\hspace{2cm}} \quad A_y = \underline{\hspace{2cm}}$$

The vector $\vec{\mathbf{B}}$ has magnitude 3, and angle 45° from the x -axis. What are its components?

$$B_x = \underline{\hspace{2cm}} \quad B_y = \underline{\hspace{2cm}}$$

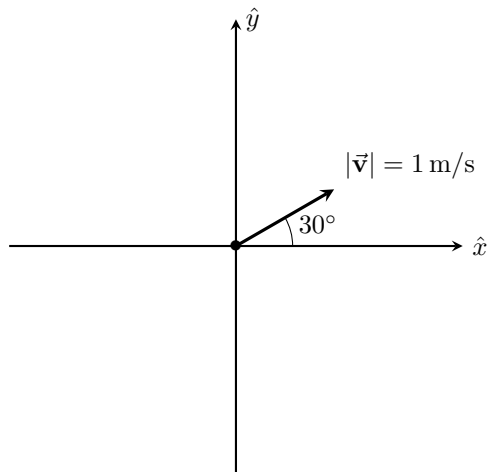
Find the components of $\vec{\mathbf{C}}$ by adding the components of $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$.

$$C_x = \underline{\hspace{2cm}} \quad C_y = \underline{\hspace{2cm}}$$

How does your answer compare to what you found graphically?

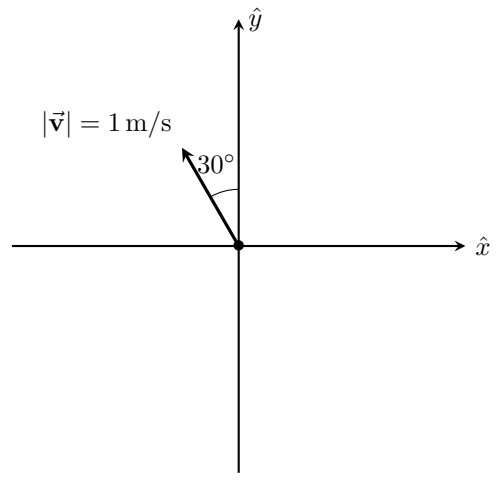
2 Vector components

Calculate the components for each vector below. Write out the calculation in terms of sin or cos.



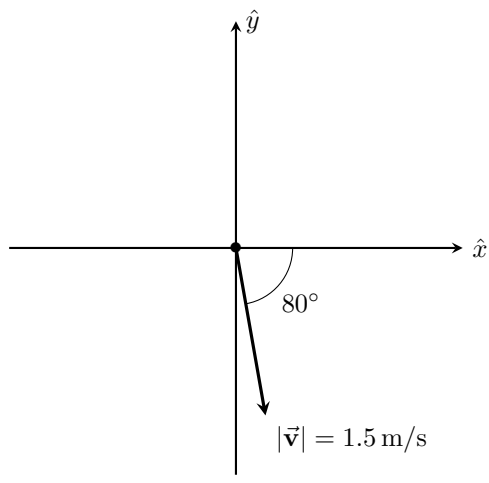
$$v_x = \underline{\hspace{2cm}}$$

$$v_y = \underline{\hspace{2cm}}$$



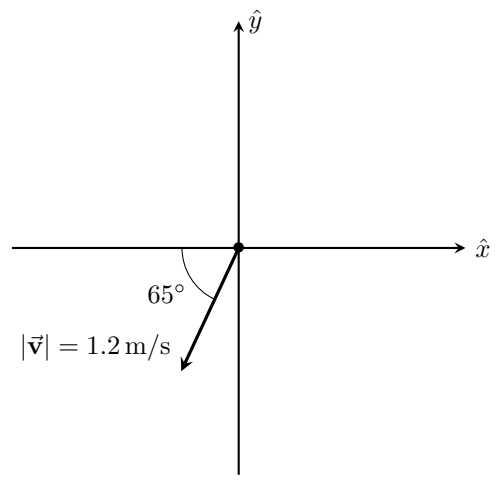
$$v_x = \underline{\hspace{2cm}}$$

$$v_y = \underline{\hspace{2cm}}$$



$$v_x = \underline{\hspace{2cm}}$$

$$v_y = \underline{\hspace{2cm}}$$

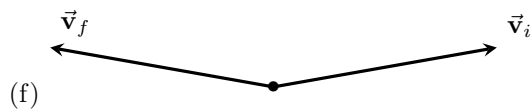
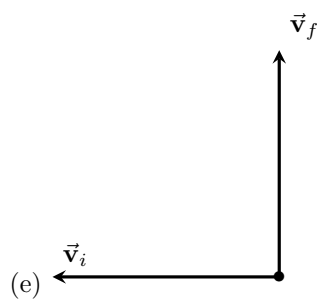
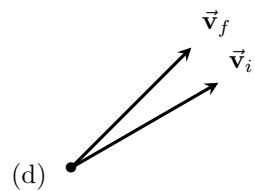
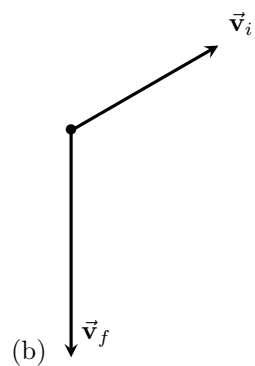
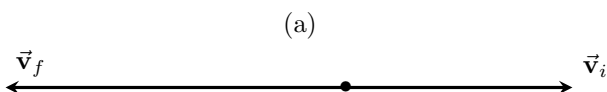


$$v_x = \underline{\hspace{2cm}}$$

$$v_y = \underline{\hspace{2cm}}$$

3 Vector differences

A lot of physics involve the *change* in some vector (displacement, velocity, etc.). Find graphically $\Delta \vec{v} = \vec{v}_f - \vec{v}_i$ for the following velocities:



4 Motion in 2D

A boat leaves the dock at $t = 0$ and heads out into a river with an acceleration of $2.0 \text{ m/s}^2 \hat{\mathbf{i}}$. The current gives it an initial velocity of $2.0 \text{ m/s} \hat{\mathbf{i}} + 1.0 \text{ m/s} \hat{\mathbf{j}}$. To describe the motion in 2D, you need equations of motion for both x and y directions.

(a) Write down the equations for the x and y directions.

(b) What is the velocity of the boat at $t = 10 \text{ s}$?

(c) What is the position of the boat at $t = 10 \text{ s}$?

(d) Draw a sketch of the trajectory of the boat in x and y as a function of time.