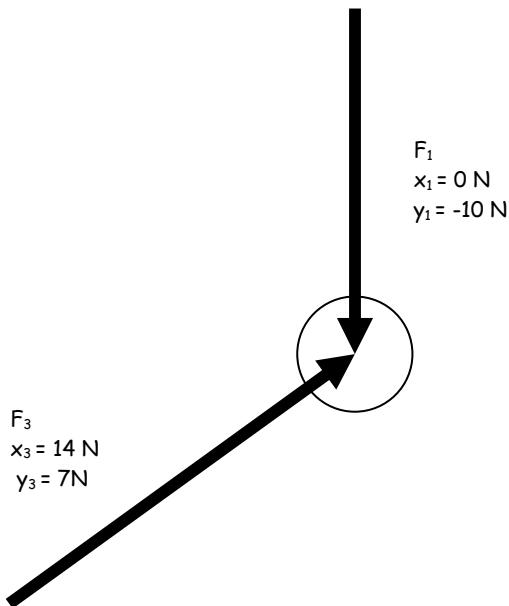


Forces Lab

Purpose - to reinforce vector concepts using computer simulated forces.

Procedure -

- 1.) Using the interactive physics player program in the library open sim 12. This represents a puck with three forces acting upon it. Acceleration in x and y directions as well as the components of each force vector are shown at the top.
- 2.) Run the simulation and sketch the observed motion of the object.
- 3.) Using vector principles find and record
 - a.) net force in x-direction (by adding x-comp of each force)
 - b.) net force in y-direction (by adding y-comp of each force)
 - c.) magnitude and direction of net force (by adding x and y-comps)
- 4.) Calculate and record the mass of the puck using Newton's Second Law.
- 5.) Change the values of F_1 (x & y comp) so that $F_{net} = \text{zero}$. Record the values. Run the experiment to verify your calculations.
- 6.) Change the y-comp of F_2 to zero and run the simulation, record the motion of the puck.
- 7.) Calculate and record a new y-comp of F_1 to return the puck to equilibrium. Run the experiment to verify your calculation.
- 8.) Change the initial velocity to $+3.00 \frac{m}{s}$ and run the experiment again, record the accelerations.
- 9.) Copy the diagram below, and solve it graphically to find a missing force that would create equilibrium.



10.) Alter the components of the force you calculated to arrive at an acceleration of $+2.23 \frac{m}{s^2}$, with

$\vec{a}_x = +1.00 \frac{m}{s^2}$ and $\vec{a}_y = +2.00 \frac{m}{s^2}$. Use the mass found in step 4.

11.) Verify your calculations using the simulation.

Discussion -

- 1.) Can an object be in motion and have a net force of zero? Explain.
- 2.) Explain how to calculate the magnitude and direction of a (force) vector given its x and y components.
- 3.) Define the word EQUILIBRANT in reference to forces and F_{net} .

Conclusion - Do a meaningful conclusion relating vector components, adding vectors, and F_{net} .