

Experiment 3: Resolving & Adding Vectors

Student Name: _____

Section Number: _____

PRELAB

PRE-LAB Instructions:

Print out this page. Feel free to refer to the lab Instructions and other materials, your physics textbook, other students, etc. to help you to ponder, understand, and work out answers to the following question(s). Show your work & answers in the space(s) provided.

PRE-LAB Questions

Three children are struggling and pulling on a single toy. Two of the children, Abe and Barry, are EACH (individually) pulling with a force of 60 Newtons. The third child, Eric, is pulling with enough force to exactly balance Abe and Barry (no child is winning the tug-o-war for the toy). We can label our forces **A**, **B**, and **E** (from each child's name). These three forces are in equilibrium.

If Abe is pulling toward the North and Barry is pulling toward the East, what is the total force **R** due to Abe and Barry (the Resultant of their forces)? Note: in THIS case the two forces and **R** form a right-triangle (with **R** as the hypotenuse) - as seen using graphical vector addition.

As a convention let's have NORTH upward and EAST rightward on this page.

- 1) Sketch an ACCURATE free-body diagram (three arrows outward from a point showing LABELLED forces **A**, **B**, and **E** - each arrow a reasonable length and correct direction):

- 2) Sketch a labelled diagram for graphical addition of **A** and **B** to get **R**:

- 3) Show the calculation of the magnitude of **R** from the magnitudes of **A** and **B**:

- 4) Give the magnitude of force **E** (in units of Newtons):

- 5) Describe the direction of force **E** in terms of the "cardinal" directions (north, east, south, and/or west):