

Composition/Resolution of Forces

Two forces often act simultaneously on a body at the same point. The angle between the two points is between 0 and 180°. The resultant of the two forces is a single force that could be substituted for the components without altering their effect. The opposite of this force is called the equilibrant force because it puts the components and their effect (resultant) into a state of equilibrium. This equilibrant is equal in magnitude and opposite (180°) to the resultant force.

Objective: After completing this lab you better be able to calculate the equilibrant of a series of forces (vectors) acting on an object.

Procedure: Arrange the force board (force bar) so that the three spring scales have at least 1/3 extension. Place a blank piece of paper under the scales and secure it firmly (tape would be better than nails!) Mark the center of the three forces and draw a vector carefully in the direction of each of the three forces (make sure you have an origin, xy coordinate, so you can measure angles). Mark the force vectors A, B and C (Maybe you should take a break cuz this was really hard- not!) Circle C and consider it your *equilibrant*. Remove the paper and extend the lines until they intersect at a single point (If they don't- do it again until they do). Carefully measure the angles (and record them) and construct a point diagram using these angles and scale values.

Calculations:

1. Draw (graphically) a vector diagram (applying the rules of vector addition) using the A and B values as components and then draw your resultant.
2. Construct an equilibrant and record its value.
3. Determine the resultant mathematically and record its value. Record the value of the equilibrant (same magnitude as the resultant but 180° opposite).
4. Compare (Absolute and Relative Error) the "C" scale value of your equilibrant to your graphically and mathematically (both magnitude and angle) values. Consider the scale value to be accepted value.

DATA TABLE

Trial	"A" scale	"B" scale	"C" scale	Resultant graphical	Resultant math.	Equilibrant graphical	Equilibrant math.

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Kansas State College



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