

Physics I Lab

Lab Title: Equilibrium of 2-Dimensional Concurrent Forces

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Setup Data:

The first step in the procedure was to set up two different weights at differing angles, the following vectors were chosen:

$$\begin{aligned} &1.962\text{N @ } 40^\circ \\ &4.905\text{N @ } 170^\circ \end{aligned}$$

Which can then be resolved into X-Y vector components (all in Newtons)

$$\begin{aligned} F_{1x} &= 1.5029 i \\ F_{1y} &= 1.2611 j \\ F_{2x} &= -4.8304 i \\ F_{2y} &= 0.8517 j \end{aligned}$$

Now the magnitude and direction of the resultant force was calculated to be the following values:

$$\begin{aligned} R_x &= -3.3275 i \\ R_y &= 2.1128 j \end{aligned}$$

or, in polar form

$$R = 3.9416\text{N @ } 147.5864^\circ$$

With this information, the magnitude and direction of the equilibrium force was found to be

$$F_{\text{eq}} = 3.9416\text{N @ } 327.5864^\circ$$

And with this information, the system successfully tested at equilibrium.

Repeating these steps by adding a third weight at

$$0.981\text{N @ } 130^\circ$$

The resultant equilibrium force is now located at

$$4.8858\text{N @ } 324.1084^\circ$$

And successfully tested at equilibrium.