

EQUILIBRIUM: CONCURRENT FORCES

Objective: To demonstrate the conditions necessary for equilibrium
To practice resolving force vectors into components and calculating the resultant and equilibrant forces

Materials: Force table, string or strong thread, several weights, meter stick, spring scale

Procedure: Consider two forces, 2.45 N, 50° N of E, and 0.98 N, 47° S of E, which act on a single point. Set this up using the force table by suspending two weights from the center of the table over the side. First tie the weights to three strings which are tied to a metal ring. The ring can fit over the vertical post at the center of the table.

Predict through calculations the magnitude of a third force that would be required for equilibrium.

After calculating the magnitude of this equilibrant force, experimentally verify it by suspending a weight of the calculated magnitude at the angle you calculated.

Next, consider three forces, 2.45 N, 45° N of E, 0.98 N due E, and 1.96 N, 20° W of N, which act on a single point. This time first find the equilibrant force on the force table. Then calculate the equilibrant mathematically and determine your percent error.