## Composition of Forces

**The Aim:** ---------------------------------------------------------------------------------

## Introduction:

Even though this experiment deals with forces, the methods used can be applied to any vector quantity. The resultant of two or more vectors can be determined graphically, i.e., by a scale drawing, by mathematical method, as well as by experiment with actual forces. In these cases, both the magnitude and the direction of the resultant must be expressed for a complete solution.

## Setup and procedure:

1. Screw the clamp stand rods into the outer right and left holes on the base plate! Use the double sleeves to attach the horizontal clamp stand rods at the same height, as shown in figure 1.

2. Suspend both dynamometers on the horizontal clamp stand rods and suspend one end of the double thread into the small hook on the left dynamometer and the other end of the thread into the small hook on the right dynamometer.

3. Now suspend the 100-g mass on the thread! Move one of the double sleeves until both angles are the same. Measure the angles which are formed by the dynamometers and the vertical line. Figure 2.

4. Read the forces acting on the two dynamometers and enter their values and the angles in the table.

5. Now reduce the distance between the clamp stand rods by approaching the right clamp stand rod toward the left one. Repeat the measurement.

6. Repeat the measurement after further reducing the distance between the clamp stand rods.

7. Add the vectors using the graphical method and sketch the resultant.

8. Describe the result.

| Variables | Weight $F_W$/N | $F_1$/N | $F_2$/ N | Angle 1/degrees | Angle 2/degrees |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |

$F_1 \sin \Phi_1$
$F_2 \sin \Phi_2$

$F_1$

$F_2$

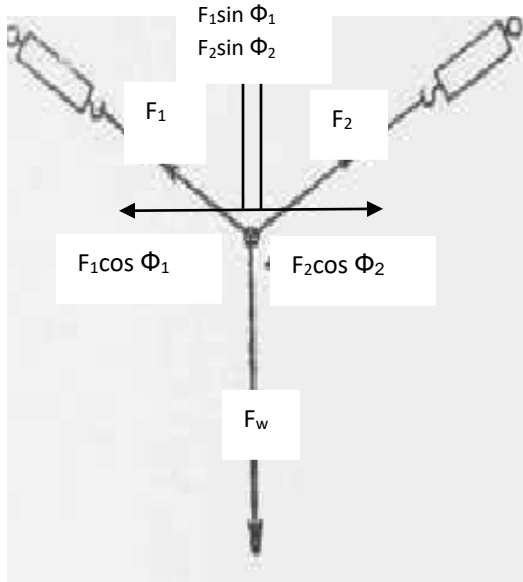$F_1 \cos \Phi_1$
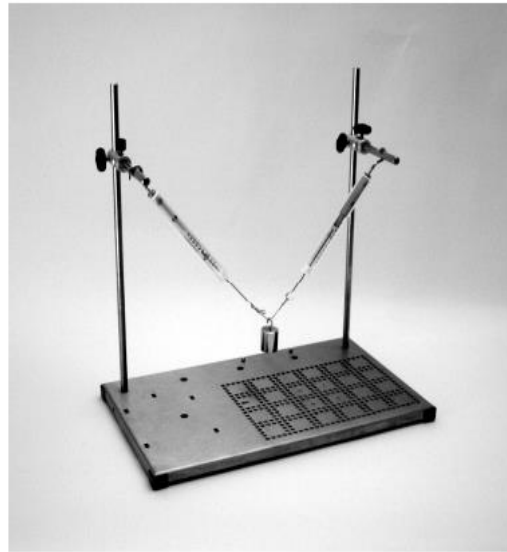
$F_2 \cos \Phi_2$

$F_w$

**Figure 2**



**Figure 1**

## Post lab Questions

1. Forces with different lines of influence can be composed by two or three?

2. Compare the angles and the respective forces! What do you conclude?

3. Give one example for composing forces.