

(PHYS 101)
Lab. Exercise No.

Name:	Marks Obtained:	
Student's ID:	Section:	Date:

Vectors

PERFORMANCE OBJECTIVES

After completion of this laboratory exercise the student will be able to:

1. Determine the resultant of two force vectors using both graphical and algebraic methods.
2. Study the equilibrium of a point under three non- collinear forces using both graphical and algebraic methods.
3. Analyze the force vectors along two perpendicular axes.
4. Use the force triangle, the force parallelogram and the force polygon.

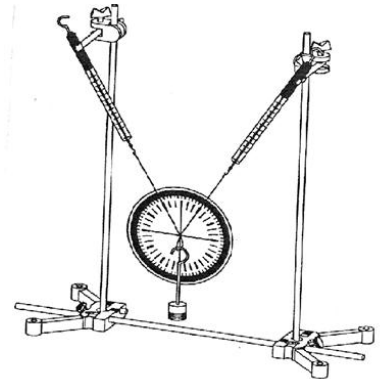
MATERIALS AND EQUIPMENT

One weight holder (10 g), four slotted weights (10g each), one slotted weight (50g), one spring balance (1N), one spring balance (2N), and one fish line piece (40 cm).

THEORY

The magnitude of resultant R' of two force vectors \vec{A} and \vec{B} by the rectangular components is given by

$$R' = \sqrt{R_x^2 + R_y^2 + 2R_xR_y \cos\theta}$$

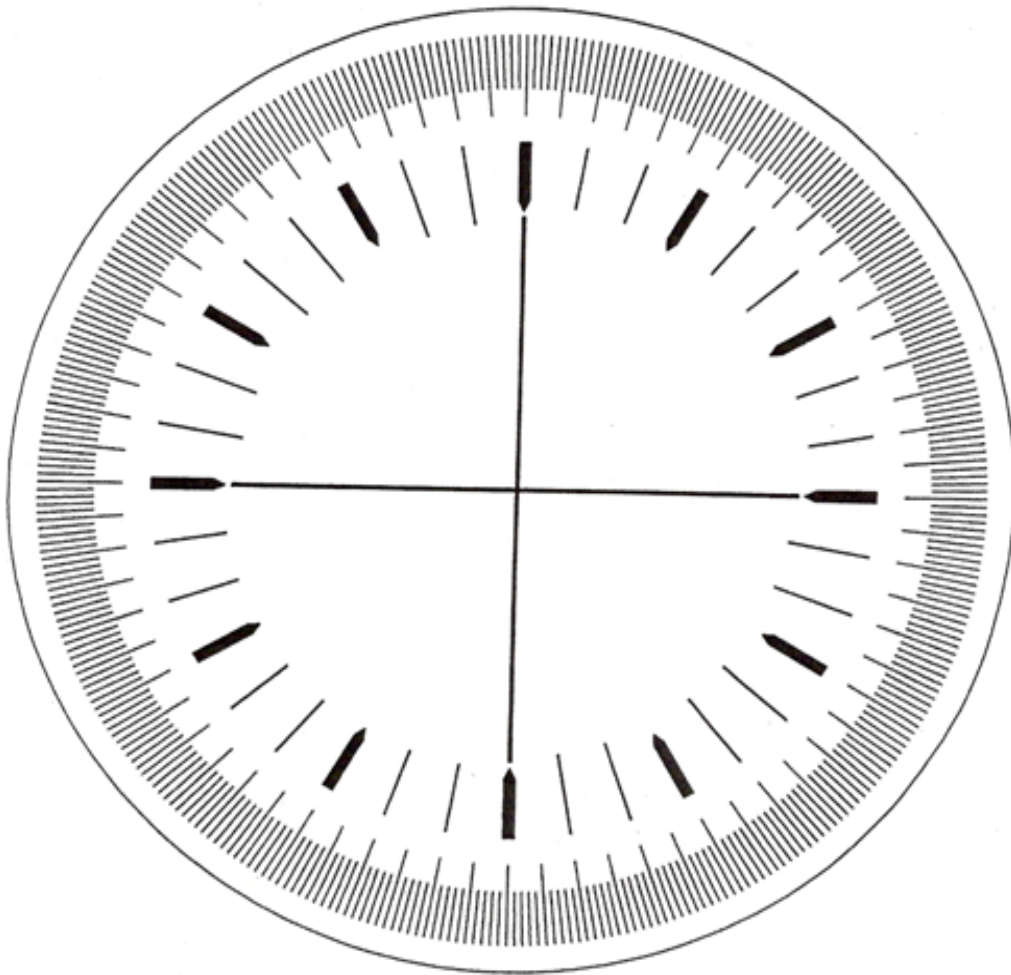


PROCEDURE

1. Set the zero points of the two spring balances in their normal working positions and place them in their spring balance holders.
2. Tie small loops at each end and in the middle of the given piece of the fish line.
3. Hang each end of the loop on the hook of one of the balance and the weight holder in the middle loop of the fish line and place slotted weights until the total mass becomes 100 grams.
4. Set the double clamps holding the spring balances at the same height.
5. Hold the protractor sheet so that the center of the circle is exactly behind the suspension point and that the direction of the weight coincides with one of the protractor major axes. A copy of the protractor sheet is shown in Figure.
6. Adjust the spring balance in its holder so that both angles formed by the forces A and B with the vertical direction are equal.
7. Read the angles, and the forces A and B. Note the values in Table.
8. Starting at the original position, move the 1N spring balance progressively higher:
9. Draw two force parallelograms for the measured values of A and B as obtained in the Table using an appropriate scale (e.g., 0.1 N = 1 cm).
10. Determine the resultant force or graphic from the diagram and record the value in the Table using the given protractor sheet.

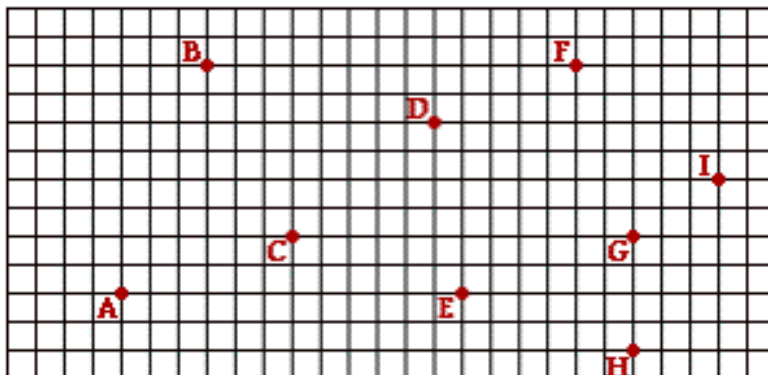
Table: For Graphical and Analytical value of R

Obs. No.	Weight suspended N			Mass hanged gm	Mass hanged kg	$W = R = mg$ N	$R = \sqrt{A^2 + B^2 + 2AB \cos\theta}$
	A	B	R				
1							
2							



Review Questions

Consider the diagram below. Nine unique, labeled locations are provided with a grid. Use the grid in answering the next few questions.



1. Suppose that a person starts at position A and walks to position E and then to position G. Fill in the table below.

Vector	East-West Component
A to E	
E to G	
Resultant A to G	

Magnitude of Resultant: _____

Direction of Resultant: _____

End of the lab Exercise