PhysicsLab-015	Force Table	No.	Class	Name

Objective To obtain the net force made from several forces in equilibrium by using a force table.

Hypothesis The net force of all the tensional forces acting on three (or four) wires is zero.

Apparatus Force Table, Cords, Pulleys, Hangers、Ring, Graph paper, Ruler

1）Assemble a force table, as shown in the figure.

2）Put different amount of weights in **three hangers**.

3）One cord is set on 0˚.

4）Three forces are balanced by trial and error.

5）Record the angles and the mass of weights.

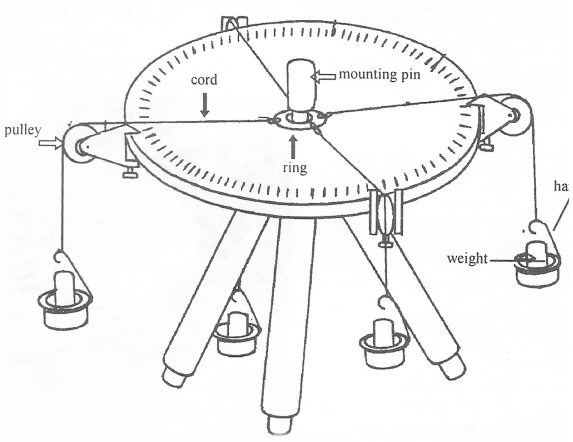
6）Calculate forces in N. Obtain the length of an arrow expressing the magnitude of each force vector.

7）On graph paper, net force is obtained using the parallelogram method and using head-to-tail method. (Exp. 1)

8）Repeat the above using **four hangers**. (Exp. 2)

9）Repeat the above but the four forces are **slightly off the balance**. Obtain the net force. （Exp. 3）

10）Perform the math method and compare the results with the graph method. （Exp. 1～3）



Set No.:

Length of an arrow 1 N = cm

Exp. 1	Mass of Weight kg	Force N	Arrow cm	Angle °
A				
B				
C				

Exp. 2	Mass of Weight kg	Force N	Arrow cm	Angle °
A				
B				
C				
D				

Exp. 3	Mass of Weight kg	Force N	Arrow cm	Angle °
A				
B				
C				
D				

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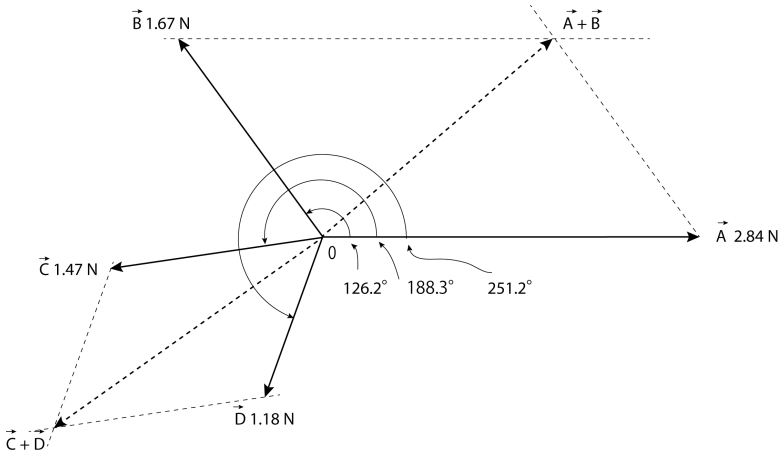
An Example of Analysis

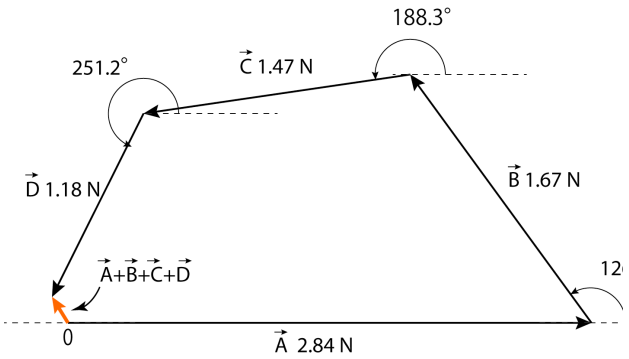
Experimental Data

	N	Angle
A	2.84	0°
B	1.67	126.2°
C	1.47	188.3°
D	1.18	251.2°

1. Graph methods



Parallelogram method



Head-to-tail method

2. Math method

Example

	F	θ	Fx = Fcos θ	Fy= Fsin θ
	[N]	[°]	[N]	[N]
A	2.84	0	2.84	0
B	1.67	126.2	-0.986	1.348
C	1.47	188.3	-1.455	-0.212
D	1.18	251.2	-0.380	-1.117
		Σ Fx, Σ Fy	0.019	0.019

The magnitude and direction of the net force $F = \sqrt{(\sum F_x)^2 + (\sum F_y)^2}$ $\theta = \tan^{-1}\frac{\sum F_y}{\sum F_x}$

= 0.028 N = 45°

	F	θ	Fx = Fcos θ	Fy= Fsin θ
	[N]	[°]	[N]	[N]
A				
B				
C				
		Σ Fx, Σ Fy		

F = θ =

	F	θ	Fx = Fcos θ	Fy= Fsin θ
	[N]	[°]	[N]	[N]
A				
B				
C				
D				
		Σ Fx, Σ Fy		

F = θ =

	F	θ	Fx = Fcos θ	Fy= Fsin θ
	[N]	[°]	[N]	[N]
A				
B				
C				
D				
		Σ Fx, Σ Fy		

F = θ =

	F	θ	Fx = Fcos θ	Fy= Fsin θ
	[N]	[°]	[N]	[N]
A				
B				
C				
D				
		Σ Fx, Σ Fy		

F = θ =