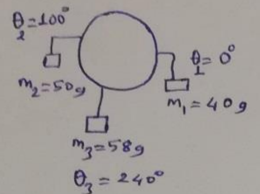
Force Table

Example



→ Let's suppose that our experimental data is;

$\theta_1 = 0°, \quad m_1 = 40g$

$\theta_2 = 100°, \quad m_2 = 50g$

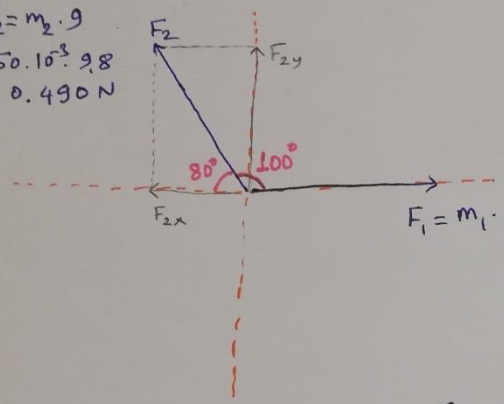
$\theta_3 = 240°, \quad m_3 = 58g$

Component Method

$F_2 = m_2 \cdot g$

$= 50 \cdot 10^{-3} \cdot 9.8$

$F_2 = 0.490 \, N$



$F_1 = m_1 \cdot g = 40 \cdot 10^{-3} \cdot 9.8 = 0.392 \, N$

$F_{1x} = F_1 = 0.392 \, N$

$F_{1y} = 0$

$F_{2x} = F_2 \cdot \cos 80°$

$F_{2x} = 0.490 \cdot \cos 80°$

$F_{2x} = 0.085 \, N$

$F_{2y} = F_2 \cdot \sin 80°$

$F_{2y} = 0.490 \cdot \sin 80$

$F_{2y} = 0.482 \, N$

R: Resultant Force

$R_x = F_{1x} - F_{2x}$

$R_x = 0.392 - 0.085$

$R_x = 0.307 N$

$R_y = F_{2y} = 0.482 \, N$

$R = \sqrt{(R_x)^2 + (R_y)^2}$

$R = \sqrt{(0.307)^2 + (0.482)^2}$

$R = 0.571 \, N$

θ_R: Angle of the resultant force.

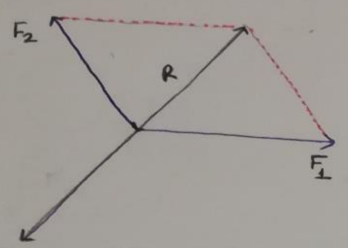
$\tan\theta_R = \frac{R_y}{R_x}$

$\theta_R = \tan^{-1}\left(\frac{R_y}{R_x}\right) = \tan^{-1}\left(\frac{0.482}{0.307}\right)$

$\theta_R = 57.5°$

Equilibrant (balancing) Force

2



F_3: Equilibrant Force

F_3: Equilibrant (balancing) Force

$|\vec{F_3}| = |\vec{R}|$

$R = 0.571$

$F_3 = 0.571$

The angle of the equilibrant force: $\theta_3 = \theta_R + 180°$

$\theta_3 = 57.5° + 180°$

$\boxed{\theta_3 = 237.5°}$

This value is your theoretical value and may differ from your experimental value.

Let's calculate % Error

$$\% \text{Error} = \left| \frac{\text{Theoretical Value} - \text{Experimental Value}}{\text{Theoretical Value}} \right| \times 100$$

$$\% \text{ Error} = \left| \frac{237.5° - 240°}{237.5°} \right| \times 100$$

$$= 1.05$$