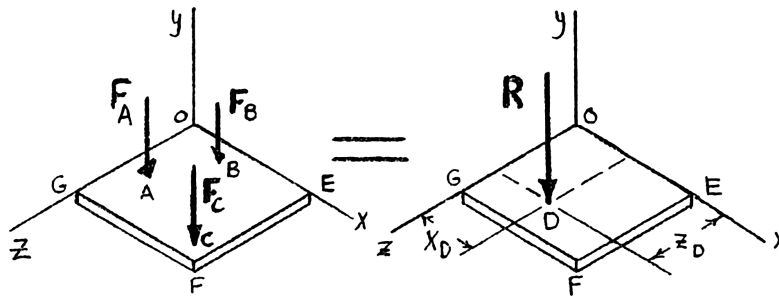


PROBLEM 3.127

Three children are standing on a 5×5-m raft. If the weights of the children at Points A, B, and C are 375 N, 260 N, and 400 N, respectively, determine the magnitude and the point of application of the resultant of the three weights.

SOLUTION



We have

$$\begin{aligned}\Sigma \mathbf{F}: \quad \mathbf{F}_A + \mathbf{F}_B + \mathbf{F}_C &= \mathbf{R} \\ -(375 \text{ N})\mathbf{j} - (260 \text{ N})\mathbf{j} - (400 \text{ N})\mathbf{j} &= \mathbf{R} \\ -(1035 \text{ N})\mathbf{j} &= \mathbf{R}\end{aligned}$$

$$\text{or } R = 1035 \text{ N} \quad \blacktriangleleft$$

We have

$$\begin{aligned}\Sigma M_x: \quad F_A(z_A) + F_B(z_B) + F_C(z_C) &= R(z_D) \\ (375 \text{ N})(3 \text{ m}) + (260 \text{ N})(0.5 \text{ m}) + (400 \text{ N})(4.75 \text{ m}) &= (1035 \text{ N})(z_D) \\ z_D &= 3.0483 \text{ m} \quad \text{or } z_D = 3.05 \text{ m} \quad \blacktriangleleft\end{aligned}$$

We have

$$\begin{aligned}\Sigma M_z: \quad F_A(x_A) + F_B(x_B) + F_C(x_C) &= R(x_D) \\ 375 \text{ N}(1 \text{ m}) + (260 \text{ N})(1.5 \text{ m}) + (400 \text{ N})(4.75 \text{ m}) &= (1035 \text{ N})(x_D) \\ x_D &= 2.5749 \text{ m} \quad \text{or } x_D = 2.57 \text{ m} \quad \blacktriangleleft\end{aligned}$$