Homework Chapter 2.

Problem 2-1: Determine the magnitude and angle θ of **F** so that the particle is in equilibrium.

Given :

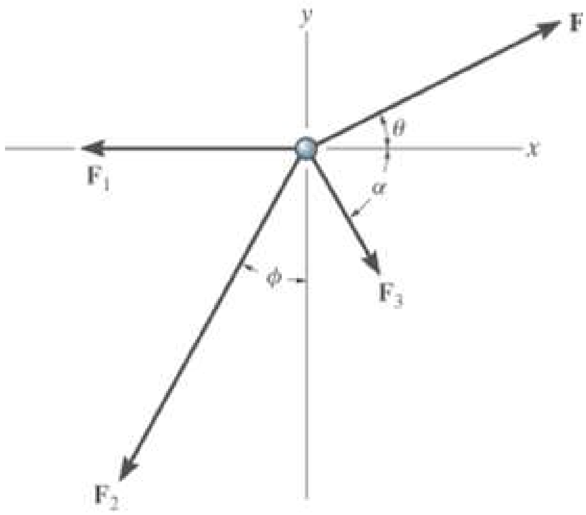
$F_1 = 4.5\,kN$

$F_2 = 7.5\,kN$

$F_3 = 2.25\,kN$

$\alpha = 60^\circ$

$\phi = 30^\circ$



Problem 2-2: The gusset plate is subjected to the forces of four members. Determine the force in member B and its proper orientation θ for equilibrium. The forces are concurrent at point O.

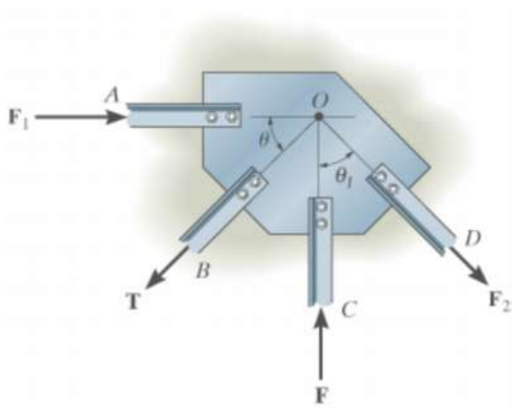
Given:

$F = 12\text{ kN}$

$F_1 = 8\text{ kN}$

$F_2 = 5\text{ kN}$

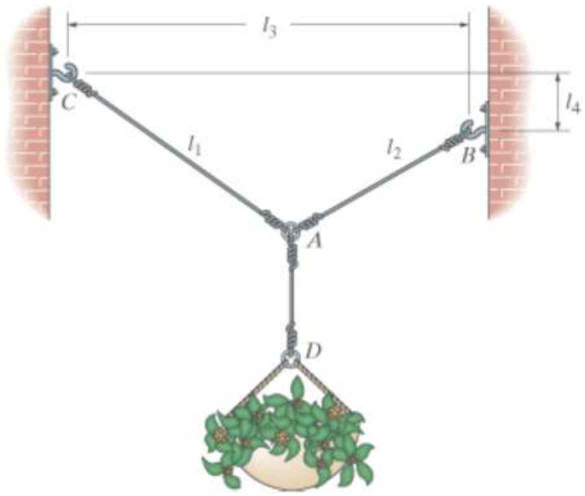
$\theta_1 = 45°$



Problem 2-3: The flowerpot of mass M is suspended from three wires and supported by the hooks at B and C. Determine the tension in AB and AC for equilibrium.

Given:

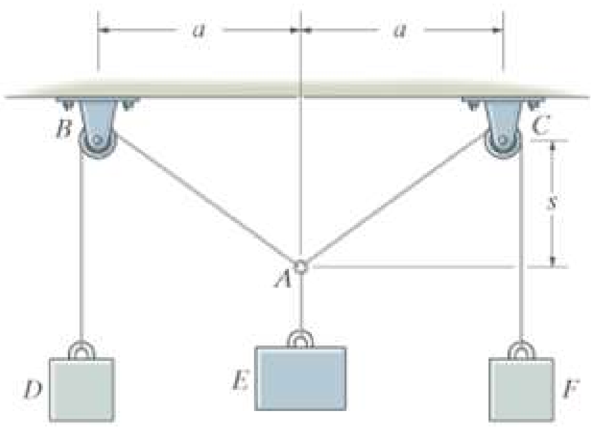
$$M = 20\ \text{kg}$$
$$l_1 = 3.5\ \text{m}$$
$$l_2 = 2\ \text{m}$$
$$l_3 = 4\ \text{m}$$
$$l_4 = 0.5\ \text{m}$$
$$g = 9.81\text{m/s}^2$$



Problem 2-4: Blocks D and F weigh W1 each and block E weighs W2. Determine the sag s for equilibrium. Neglect the size of the pulleys.

Given:

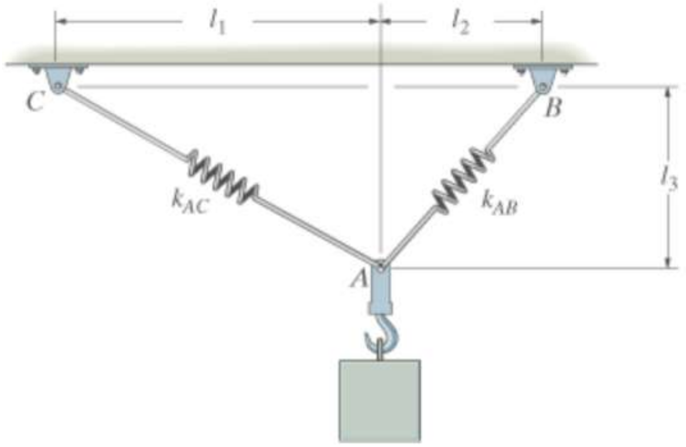
$$W_1 = 50\ \text{N}$$
$$W_2 = 80\ \text{N}$$
$$a = 1.2\ \text{m}$$



Problem 2-5: The block of mass *M* is supported by two springs having the stiffness shown. Determine the unstretched length of each spring.

Given:

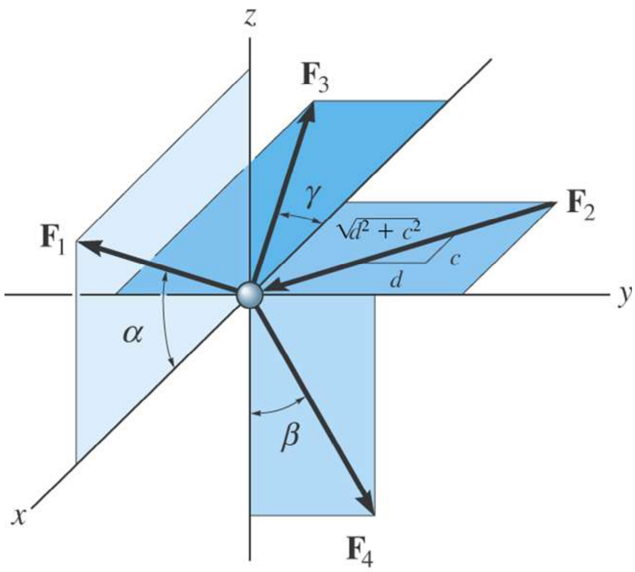
$$M = 30\ \text{kg}$$
$$l_1 = 0.6\ \text{m}$$
$$l_2 = 0.4\ \text{m}$$
$$l_3 = 0.5\ \text{m}$$
$$K_{AC} = 1.5\ \text{kN/m}$$
$$K_{AB} = 1.2\ \text{kN/m}$$
$$g = 9.81\ \text{m/s}^2$$



Problem 2-6: Determine the magnitudes of $\mathbf{F}_1$, $\mathbf{F}_2$, and $\mathbf{F}_3$ for equilibrium of the particle.

Given:

$$F_4 = 800\ \text{N}$$
$$\alpha = 60°$$
$$\beta = 30°$$
$$\gamma = 30°$$
$$c = 3$$
$$d = 4$$



Problem 2-7: Determine the magnitudes of $\mathbf{F}_1, \mathbf{F}_2$, and $\mathbf{F}_3$ for equilibrium of the particle $\mathbf{F} = \{-9\mathrm{i} - 8\mathrm{j} - 5\mathrm{k}\}$.

Given:

$F = (-9\mathrm{i} - 8\mathrm{j} - 5\mathrm{k})\ \mathrm{kN}$

$a = 4\ \mathrm{m}$

$b = 2\ \mathrm{m}$

$c = 4\ \mathrm{m}$

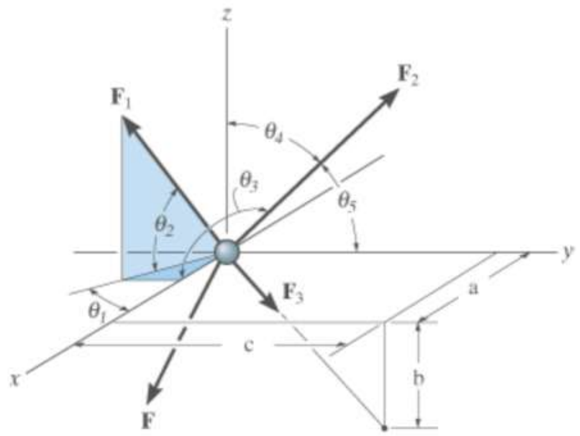
$\theta_1 = 30°$

$\theta_2 = 60°$

$\theta_3 = 135°$

$\theta_4 = 60°$

$\theta_5 = 60°$



Problem 2-8: If the bucket and its contents have a total weight *W*, determine the force in the supporting cables *DA, DB*, and *DC*.

Given:

$W = 100\ \mathrm{N}$

$a = 0.9\ \mathrm{m}$

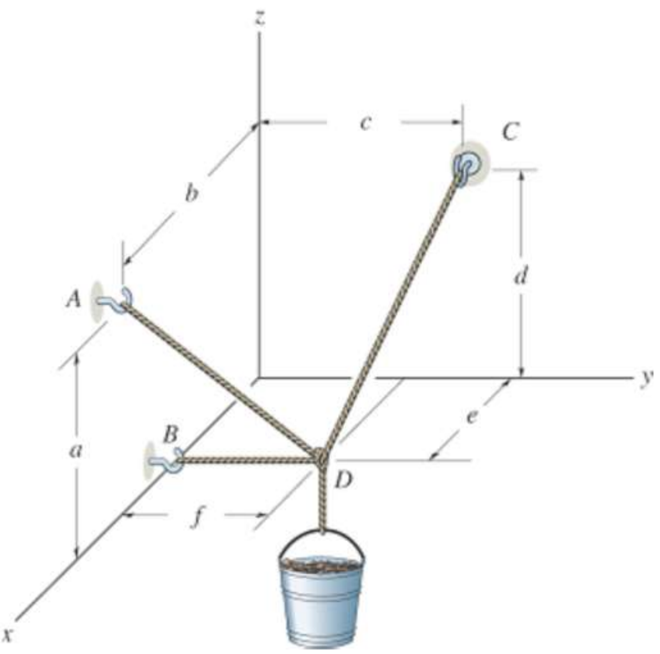
$b = 1.35\ \mathrm{m}$

$c = 0.75\ \mathrm{m}$

$d = 0.9\ \mathrm{m}$

$e = 0.45\ \mathrm{m}$

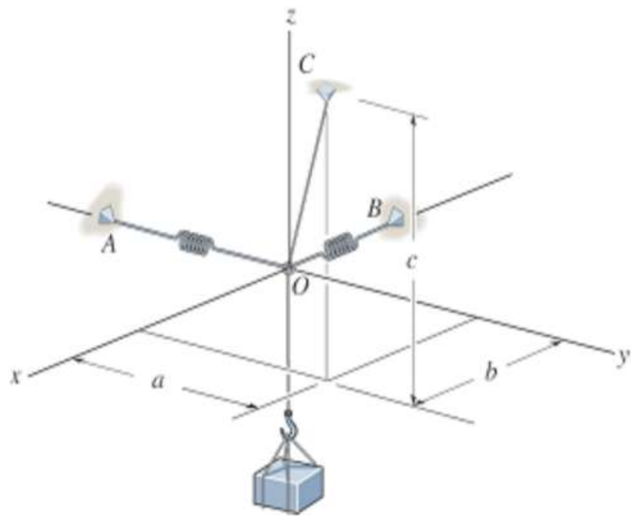
$f = 0.45\ \mathrm{m}$



Problem 2-9: Determine the stretch in each of the two springs required to hold the crate of mass m_c in the equilibrium position shown. Each spring has an unstretched length δ and a stiffness k.

Given:

$$m_c = 20\,\text{kg}$$
$$\delta = 2\,\text{m}$$
$$k = 300\,\text{N/m}$$
$$a = 4\,\text{m}$$
$$b = 6\,\text{m}$$
$$c = 12\,\text{m}$$



Problem 2-10: The flowerpot has weight W. Determine the tension developed in each cord for equilibrium.

Given:

$$W = 100\ \text{N}$$
$$a = 0.6\ \text{m}$$
$$b = 0.6\ \text{m}$$
$$c = 2.4\ \text{m}$$
$$d = 2.1\ \text{m}$$
$$e = 0.9\ \text{m}$$
$$f = a$$