ME 2120 Recitation 2

Questions Taken from 9ᵗʰ Edition

Useful Equations

$$sin\theta = \frac{opposite}{hypotenuse} \qquad cos\theta = \frac{adjacent}{hypotenuse} \qquad tan\theta = \frac{opposite}{adjacent}$$

$$\Delta x = x_f - x_0 \qquad \Delta y = y_f - y_0 \qquad \Delta z = z_f - z_0$$

$$F = \sqrt{F_x^2 + F_y^2 + F_z^2}$$

$$F_x = \frac{Fd_x}{d} \qquad F_y = \frac{Fd_y}{d} \qquad F_z = \frac{Fd_z}{d}$$

$$d = \sqrt{d_x^2 + d_y^2 + d_z^2}$$

$$\cos\theta_x = \frac{R_x}{R} \qquad \cos\theta_y = \frac{R_y}{R} \qquad \cos\theta_z = \frac{R_z}{R}$$

$$\sum F = 0 \qquad \sum F_x = 0 \qquad \sum F_y = 0 \qquad \sum F_z = 0$$

$$\sum M = 0$$

2.80 Determine the magnitude and direction of the force $\mathbf{F} = (240\ N)\mathbf{i} - (270\ N)\mathbf{j} + (680\ N)\mathbf{k}$.
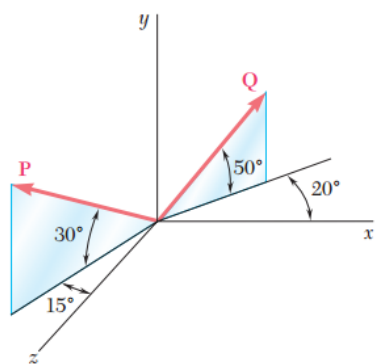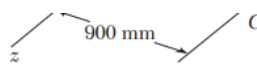
900 mm   C

z

Fig. P2.89 and P2.90

2.90 Knowing that the tension in cable AC is 2130 N, determine the components of the force exerted on the plate at C.

2.91 Find the magnitude and direction of the resultant of the two forces shown knowing that $P = 300$ N and $Q = 400$ N.

2.92 Find the magnitude and direction of the resultant of the two forces shown knowing that $P = 400$ N and $Q = 300$ N.

Fig. P2.91 and P2.92

$$F_y = F \cos \theta_y$$

$$F_H = F \sin \theta_y$$

$$F_x = F_H \cos \varphi = F \sin \theta_y \cos \varphi$$

$$F_z = F_H \sin \varphi = F \sin \theta_y \sin \varphi$$

2.135 In order to move a wrecked truck, two cables are attached at A and pulled by winches B and C as shown. Knowing that the tension is 10 kN in cable AB and 7.5 kN in cable AC, determine the magnitude and direction of the resultant of the forces exerted at A by the two cables.
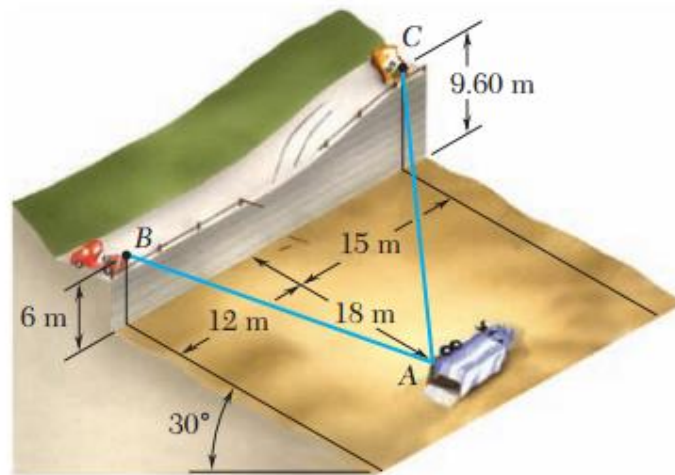

Fig. P2.135

2.104 A crate is supported by three cables as shown. Determine the weight of the crate knowing that the tension in cable *AD* is 616 lb.
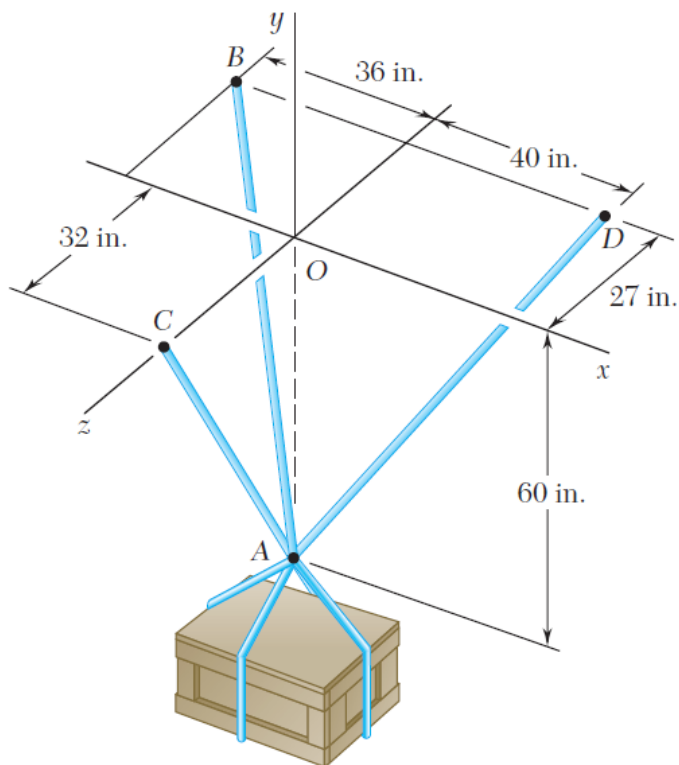

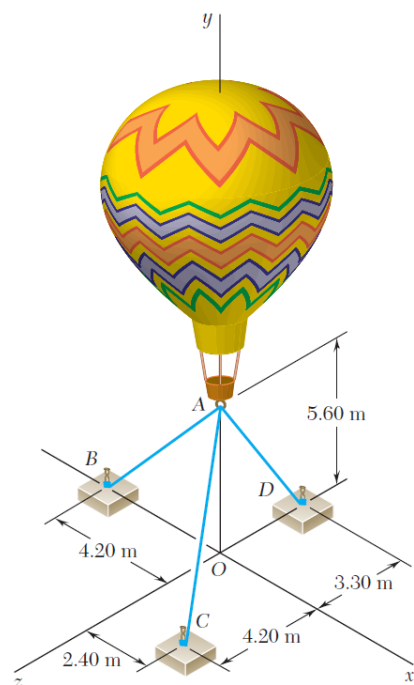**Fig. P2.103, P2.104, P2.105, and P2.106**

Fig. P2.99, P2.100, P2.101, and P2.102

2.99 Three cables are used to tether a balloon as shown. Determine the vertical force **P** exerted by the balloon at A knowing that the tension in cable AB is 259 N.

2.100 Three cables are used to tether a balloon as shown. Determine the vertical force **P** exerted by the balloon at A knowing that the tension in cable AC is 444 N.

2.101 Three cables are used to tether a balloon as shown. Determine the vertical force **P** exerted by the balloon at A knowing that the tension in cable AD is 481 N.

2.102 Three cables are used to tether a balloon as shown. Knowing that the balloon exerts an 800-N vertical force at A, determine the tension in each cable.

2.103 A crate is supported by three cables as shown. Determine the weight of the crate knowing that the tension in cable AB is 750 lb.

2.104 A crate is supported by three cables as shown. Determine the weight of the crate knowing that the tension in cable AD is 616 lb.