

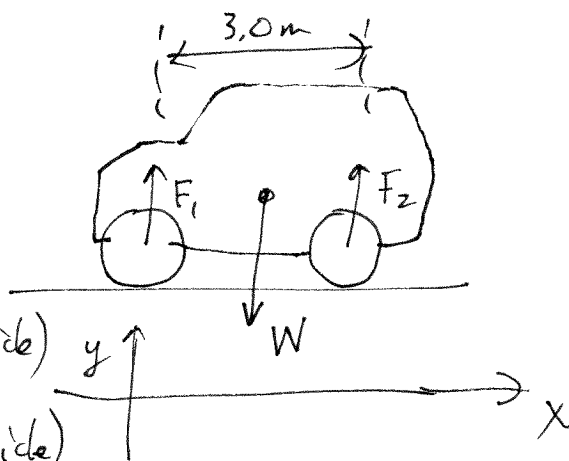
Chapter 12

Problem 30

60% of the weight is on the front wheels

$$F_1 = 0.60mg \hat{j} \quad (\text{Ground support } 60\% \text{ weight of vehicle})$$

$$F_2 = 0.40mg \hat{j} \quad (\text{Ground supports } 40\% \text{ weight of vehicle})$$



Place pivot at the origin, then

$$\vec{r}_1 = 0$$

$$\vec{r}_{cm} = x \hat{i}$$

$$\vec{r}_2 = (3.0 \text{ m}) \hat{i}$$

SUV is in static equilibrium, then

$$\sum \vec{\tau} = 0 = \vec{r}_1 \times \vec{F}_1 + \vec{r}_{cm} \times \vec{W} + \vec{r}_2 \times \vec{F}_2$$

$$0 = 0 \cdot (0.60mg) \hat{j} + (x \hat{i}) \times (-mg \hat{j}) + (3.0 \text{ m } \hat{i}) \times (0.40mg \hat{j})$$

$$0 = 0 - xmg \hat{k} + 1.20mg \hat{k}$$

$$xmg \hat{k} = 1.20mg \hat{k}$$

$$x = \frac{1.20mg \hat{k}}{mg \hat{k}} = \boxed{1.20}$$

1.20 meters behind the front wheels of the SUV