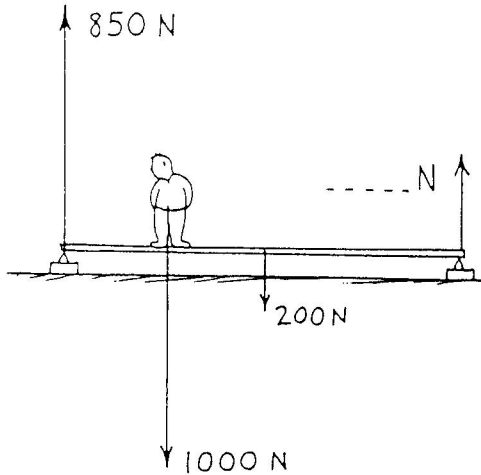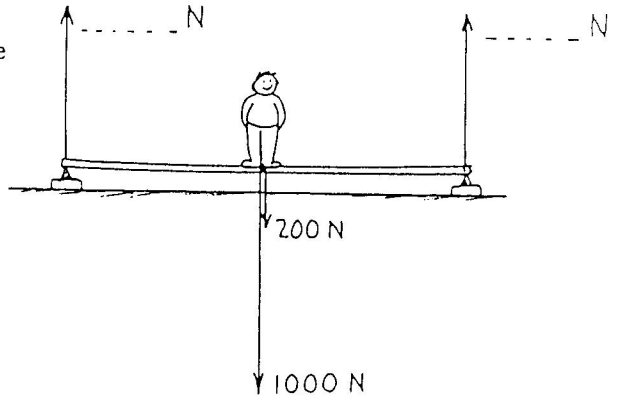# Chapter 1: Patterns of Motion and Equilibrium
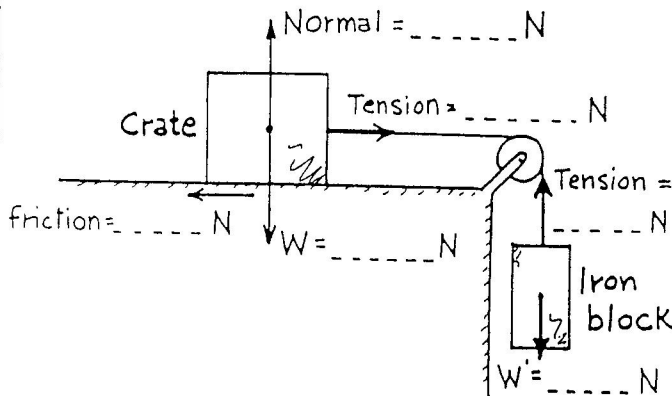## *The Equilibrium Rule: ΣF = 0*

1. Manuel weighs 1000 N, and stands in the middle of a board that weighs 200 N. The ends of the board rest on bathroom scales. (We can assume the weight of the board acts at its center). Fill in the correct weight reading on each scale.

_ _ _ _ _ N   _ _ _ _ _ N

200 N

1000 N

850 N

_ _ _ _ _ N

200 N

1000 N

2. When Manuel moves to the left as shown, the scale closest to him reads 850 N. Fill in the weight reading for the far scale.
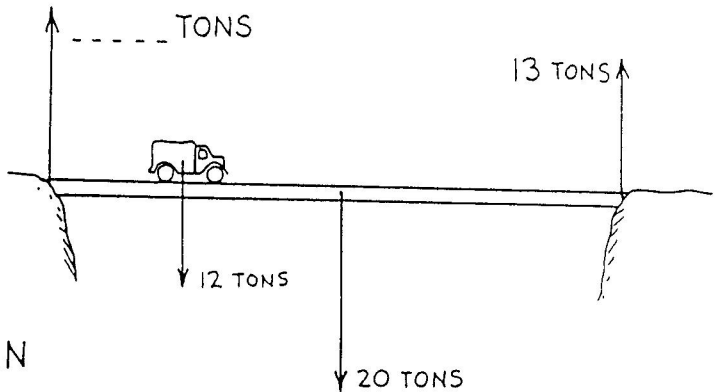
_ _ _ _ _ TONS

13 TONS

3. A 12-ton truck is one-quarter the way across a bridge that weighs 20 tons. A 13-ton force supports the right side of the bridge as shown. How much support force is on the left side?

12 TONS

20 TONS

Normal = _ _ _ _ _ _ N

Crate

Tension = _ _ _ _ _ _ N

friction = _ _ _ _ N   W = _ _ _ _ _ _ N

Tension = _ _ _ _ _ N

Iron block

W' = _ _ _ _ _ N

4. A 1000-N crate resting on a horizontal surface is connected to a 500-N iron block through a frictionless pulley as shown. Friction between the crate and surface is enough to keep the system at rest. The arrows show the forces that act on the crate and the block. Fill in the magnitude of each force.

5. If the crate and block in the preceding question move at constant speed, the tension in the rope (is the same) (increases) (decreases).

The sliding system is then in (static equilibrium) (dynamic equilibrium).