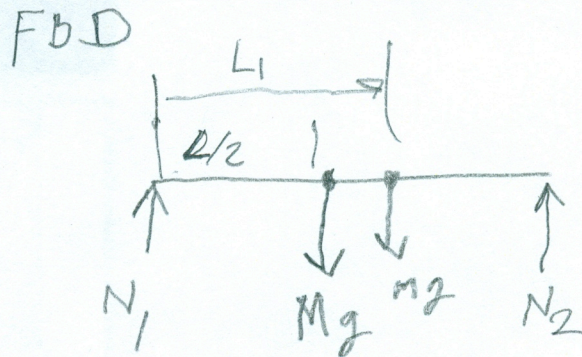
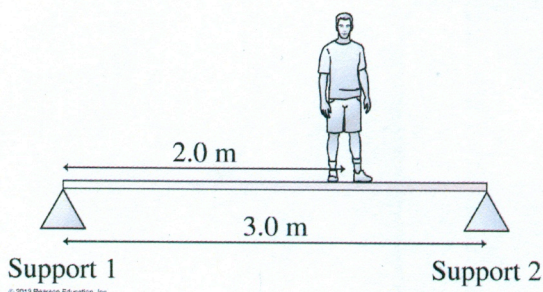


2. The 3.0-m-long, 100 kg rigid beam shown in the figure is supported at each end. A 80 kg student stands 2.0 m from Support 1. How much upward force does each support exert on the beam? (30 points)



$$\sum F_y = N_1 + N_2 - Mg - mg = 0$$

$$N_1 = (M + m)g - N_2$$

$$\sum \tau = 0 \quad \text{about left end}$$

$$N_2 L - Mg \frac{L}{2} - mg L_1 = 0$$

$$N_2 = \frac{Mg \frac{L}{2} + mg L_1}{L} = g \left( \frac{M}{2} + m \frac{L_1}{L} \right)$$

$$= (9.8 \frac{m}{s^2}) \left[ \frac{100}{2} + 80 \frac{2}{3} \right] = 1012.7 \text{ N} = \boxed{1010 \text{ N}}$$

$$N_1 = (100 + 80)(9.8) - 1012.7 = 751.3 = \boxed{751 \text{ N}}$$