

Physics 101Rec
 Quiz# 9-Sect 06
 Chapter 12

Name: Key Id: _____

1. A man weighting 720 N stands halfway up a 5.0 m long ladder of negligible mass. The base of the ladder is 3.0 m from the wall as shown in the figure. Assume the wall is frictionless; find the force of the wall on the ladder.

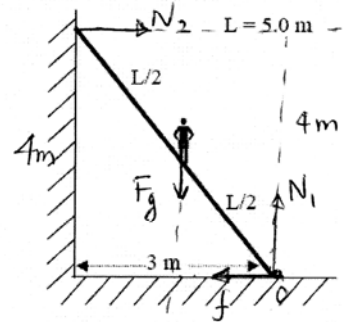
$$\sum \bar{F}_x = 0 \Rightarrow N_2 - f = 0 \Rightarrow N_2 = f$$

$$\sum F_y = 0 \Rightarrow N_1 - F_g = 0 \Rightarrow N_1 = F_g$$

$$\Rightarrow N_1 = mg = 720 \text{ N}$$

$$\sum \tau_o = 0 \Rightarrow -N_2 \times 4 + F_g \times 1.5 = 0$$

$$\Rightarrow N_2 = \frac{F_g \times 1.5}{4} = \frac{720 \times 1.5}{4} = \boxed{270 \text{ N}}$$



2. A 500 kg mass is hung from the ceiling with a steel wire. The wire has a length of 45.0 cm, a radius of 4.00 mm and has a negligible mass. Calculate the change in length of the wire. Young modulus of steel is $11 \times 10^{11} \text{ N/m}^2$.

$$\frac{F}{A} = E \frac{\Delta L}{L}$$

$$\frac{mg}{A} = E \frac{\Delta L}{L}$$

$$\frac{500 \times 9.8}{\pi (4 \times 10^{-3})^2} = 11 \times 10^{11} \frac{\Delta L}{0.45} \Rightarrow \boxed{\Delta L = 4.0 \times 10^{-5} \text{ m}}$$

