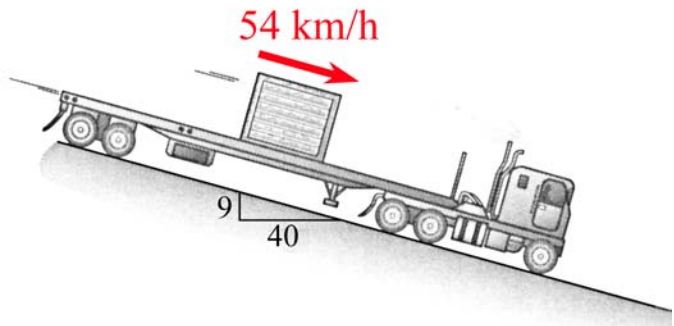


MEEG 2013 Quiz #2.m05.072

A truck is traveling at a constant speed of 54 km/h down a hill as shown. If $\mu_s = 0.5$ between the crate and the flatbed trailer, determine the shortest distance in which the truck can be brought to a stop without causing the crate to shift on the flatbed.



$$\mu_s = 0.5 \quad v_0 = 54 \text{ km/h} = 15 \text{ m/s} \quad \textcircled{1}$$

$$\text{FBD of crate} = \text{EFD of crate} \quad \textcircled{2}$$

$$\text{which yields } N_c = \frac{40}{41}mg \quad \text{and} \quad a = \frac{11}{41}g = 2.632 \text{ m/s}^2. \quad \textcircled{2}$$

$$\therefore a_c = -2.632 \text{ m/s}^2 \quad \textcircled{1}$$

$$v^2 = v_0^2 + 2a_c(\Delta x): \quad 0 = (15)^2 + 2(-2.632)(\Delta x) \quad \textcircled{3}$$

$$\Delta x = 42.74 \quad \Delta x = 42.7 \text{ m} \quad \textcircled{1}$$