SECOND MIDTERM

Name (print) % Paul Name (signed)

Discussion Instructor (circle one): Hamed / Hari / Molina / Nott / Paul / Reeve / Zhang

Discussion Section #________

REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

(a) Convert 375 kg to slugs.

\[ 375 \text{ kg} = 375 \text{ kg} \times \frac{0.6242 \text{ slugs}}{1 \text{ kg} \times 1} = 25.7 \text{ slugs} \]

(b) Find the weight in Newtons of a 256 slug mass.

\[ 256 \text{ slugs} = 256 \text{ slugs} \times \frac{9.8 \text{ m/s}^2}{1 \text{ slug}} \Rightarrow \text{Weight} = 3.66 \times 10^3 \text{ N} \]

(c) The block is at rest on the plane. Its mass is 12.0 kg. The coefficients of friction are \( \mu_s = 0.75 \) and \( \mu_k = 0.60 \). Calculate the frictional force on it.

\[ N = mg \cos \theta = 12.0 \times 9.8 \cos 10^\circ \approx 114 \text{ N} \]
\[ F_f = mg \sin \theta = 20.42 \text{ N} (< 86.9 \text{ N}) \]

(d) A car travels at 55.0 mi/hr around a curve of radius 400 ft. Calculate the inward acceleration in ft/s^2.

\[ 55 \text{ mi/hr} = \frac{55 \times 1 \times 1.22 \text{ ft}}{3600 \text{ sec}} = 80.711 \text{ ft/sec} \Rightarrow \alpha = \frac{v^2}{R} = 16.31 \text{ ft/sec}^2 \]

(e) A 3000 lb car is acted on by a horizontal force of 15.0 lb. If it starts at rest and there is no friction. Calculate how far it moves in 7.00 s.

\[ a = \frac{F}{m} = \frac{15}{3000/22 \text{ lb}} = 0.161 \text{ ft/sec}^2 \Rightarrow x = \frac{1}{2} at^2 = 3.94 \text{ ft} \]