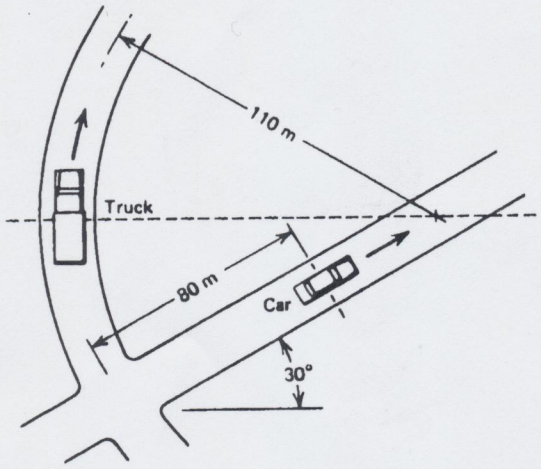
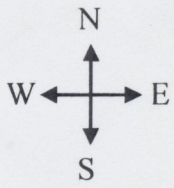
Department of Mechanical Engineering
University of California at Berkeley
ME 104 Engineering Mechanics II
Spring Semester 2012

Instructor: F. Ma
Midterm Examination No. 1 Feb 24, 2012

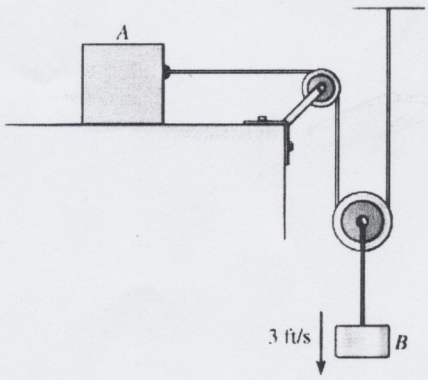
The examination has a duration of 50 minutes.
Answer all questions.
All questions carry the same weight.

1. At the instant represented the truck rounds a 110-meter circular path with a constant speed of 60 km/h. The car travels on the straight road with a speed of 80 km/h and an acceleration of 1.5 m/s^2. (a) Determine the velocity and acceleration of the truck as observed from the car. (b) Is the velocity of the car as observed from the truck equal and opposite the velocity found in part (a)? Explain.

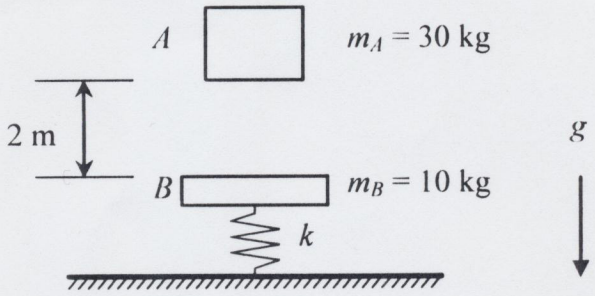




2. Block A weighs 10 lb and block B weighs 3 lb. If B is moving downward with an initial velocity of 3 ft/sec at $t = 0$, determine the velocity of A and the tension in upper cord when $t = 1$ sec. The coefficient of kinetic friction between the horizontal plane and block A is $\mu_k = 0.1$. Neglect the mass of the pulleys and cords.



3. A 30-kg block is dropped from a height of 2 m onto the 10-kg pan of a spring scale with stiffness $k = 20$ kN/m. Assume that the 30-kg block sticks with the 10-kg pan after impact, determine the maximum deflection of the pan.


A
$m_A = 30$ kg
2 m
g
B
$m_B = 10$ kg
k