
PHY 140Y
FOUNDATIONS OF PHYSICS
1998-99

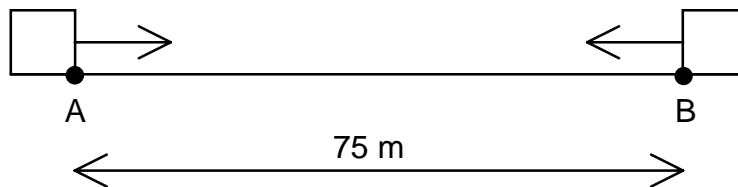
Term Test #1
Tuesday, November 3, 1998
6:30 PM - 8:30 PM

INSTRUCTIONS:

*Please give your name, student number, and TA's name on the examination booklet(s).
Answer ALL questions. Total marks = 100.
Marks, shown in brackets, will be given for workings and units as well as for final answers.
Non-programmable calculators may be used. No aid/crib sheets are allowed.*

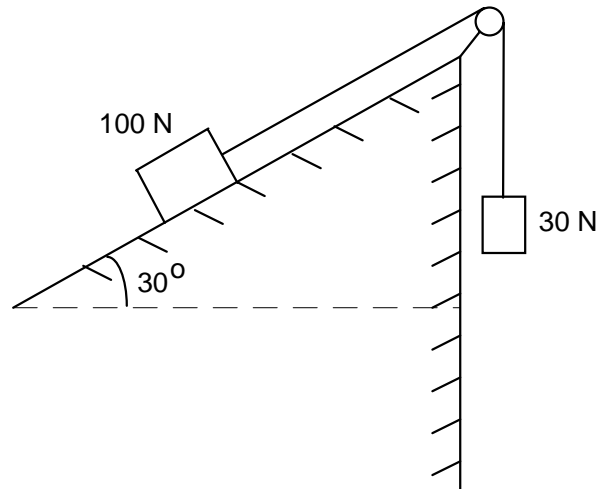
QUESTIONS:

1. Define and briefly explain the difference between the following. **[12 marks]**
 - (a) average and instantaneous velocity
 - (b) uniform and non-uniform circular motion
 - (c) kinetic and static friction
2. State Newton's three Laws of Motion. Briefly explain the significance of each one. **[6 marks]**
3. One car starts out from point A with initial velocity 10.0 m/s to the right but is decelerating at the rate of 2.0 m/s^2 . A second car starts out from rest at point B (75 m from A) and accelerates towards A at 4.0 m/s^2 . **[18 marks]**
 - (a) When do the two cars collide?
 - (b) Where are the two cars when they collide?
 - (c) How fast is each car going when they collide?



4. A ball is thrown at a speed of 25.0 m/s and at an angle of 53° above the horizontal. **[18 marks]**
 - (a) What is the height of the ball when it strikes a wall 30.0 m away from where it was thrown?
 - (b) Is the ball on its way up or down when it hits the wall?
 - (c) At what time is the ball half as high above the ground as it is in part (a)?

5. Two blocks are connected by a string as shown below. The inclined plane is frictionless. Neglect the mass of the string and pulley and any friction in the pulley. **[18 marks]**
- (a) What is the acceleration of the two blocks? In which direction do they move?
- (b) What is the tension in the string?
- (c) If there were a friction force between the block and the incline, what minimum coefficient of static friction would be required to keep the system from moving?



6. A car drives around a flat circular track of radius 100 m. The speedometer shows its constant speed to be 108 km/hr. **[18 marks]**
- (a) What is the car's acceleration? (both magnitude and direction)
- (b) What is the smallest coefficient of friction necessary to provide the centripetal force?
- (c) What is the angular velocity of the car?
7. A person is standing against the inner wall of a rotating cylinder of radius R as shown below. The rotation proceeds at a uniform angular velocity ω . The floor of the cylinder drops a distance L . Consider the coefficient of kinetic friction to be μ_k and the maximum coefficient of static friction to be μ_s . **[10 marks]**
- (a) Under what condition(s) will the person slide downwards?
- (b) How long does it take for the person to slide down the distance L ?

