

PRACTICE MIDTERM EXAM 1
(Closed Book)

NAME: _____
(Given) (Family)

1. **DO NOT OPEN THE EXAM UNTIL TOLD TO DO SO.**

2. For the problems, write clearly and neatly and be sure to show your work. Answers without a supporting method will receive little or no credit. Put the final answer in the box provided; be sure to include **units** as needed and **directions** for vectors.

3. Useful formulae and constants are given on the formula sheet at the back of the exam. (This is the Equation Sheet 1 that was distributed in class and is posted on the web page.)

Section A (35) _____

Problem 1 (36) _____

Problem 2 (30) _____

TOTAL (101) _____

PHYSICS 111.01 PRACTICE MIDTERM 1

A. MULTIPLE-CHOICE QUESTIONS. CIRCLE THE BEST ANSWER (7 Pts. each):

1. Which of the following is **not** possible:

- a) A body has zero velocity and non-zero acceleration
- b) A body travels with a northward velocity and a northward acceleration
- c) A body travels with a northward velocity and a southward acceleration
- d) A body travels with a constant velocity and a time-varying acceleration
- e) A body travels with a constant acceleration and a time-varying velocity

2. An airplane is flying relative to the air at 100 m/s in the direction East. The wind velocity relative to the ground is 30 m/s at an angle of 45° North of East. What is the speed of the plane relative to the ground?

- a) 130 m/s
- b) 123 m/s
- c) 102 m/s
- d) 78.8 m/s
- e) 70 m/s

3. You place a mass of 10 kg on one end of a spring of original length 1.0 m whose other end is attached to the floor. The mass comes to rest 0.75 m above the floor. What is the spring constant?

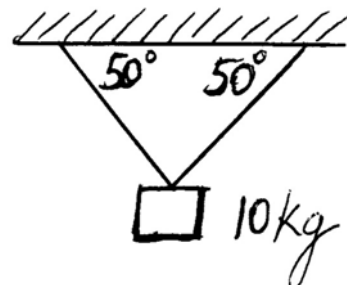
- a) 13 N/m
- b) 40 N/m
- c) 98 N/m
- d) 130 N/m
- e) 390 N/m
- f) 980 M/m

4. The speed of an object in uniform circular motion in a circle of radius 5m is doubled, but the centripetal force on the object is not changed. Which value below best gives the new radius?

- a) 20.0 m
- b) 10.0 m
- c) 5.00 m
- d) 2.50 m
- e) 1.25 m

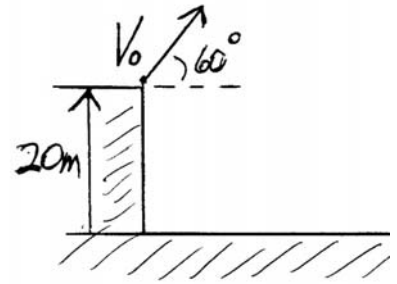
5. A box of mass 10 kg is supported by two ropes which each make an angle of 50° with the ceiling, as shown. What is the tension in each of the ropes?

- a) 49N
- b) 64 N
- c) 76 N
- d) 98 N
- e) 128 N
- f) 152 N



PROBLEMS. BE SURE TO **SHOW YOUR METHOD CLEARLY**. (6 points for each problem part.)

1. A ball is thrown from the top of a hill with a velocity of magnitude 6 m/s at an angle of 60° from horizontal. The hill is 20 m high. Neglect air resistance.



a) What is the acceleration of the ball when it reaches maximum height?

a =

b) What is the velocity of the ball when it reaches maximum height?

v =

c) How long does it take for the ball to reach maximum height?

t =

d) How long does it take for the ball to hit the ground?

t =

e) How far from the bottom of the hill is the ball when it hits the ground?

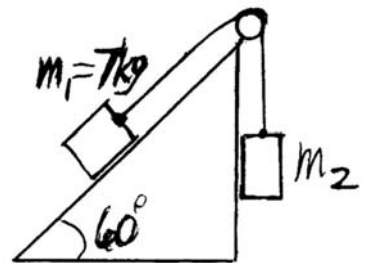
x =

f) What is the speed of the ball just as it hits the ground?

v =

2. A mass m_1 of 7 kg on an inclined plane (no friction) of angle $\theta=60^\circ$ is connected to a mass m_2 (unknown value) by a rope running over a pulley as shown in the diagram. It is found that the tension in the rope is 80N. Neglect the mass of the rope.

a) Draw a free body diagram for mass m_1 and for mass m_2 . Show all relevant forces.



FBD for m_1

FBD for m_2

b) What will be the magnitude of the acceleration of m_1 ?

a=

c) What is the mass of m_2

$m_2 =$

d) What is the normal force exerted by the plane on mass m_1 ?

$F_N =$

e) What would be the size of the force of friction on m_1 if the plane had friction coefficients $\mu_s = 0.4$ and $\mu_k = 0.3$?

F =