Multiple choice questions (5 points each)

1. The average velocity of an object is equal to its instantaneous velocity. This statement is:
   a) always true
   b) never true
   c) is true only when the velocity is constant
   d) is true only when the velocity is increasing at a constant rate
   e) is true only when the object is moving in a straight line

2. A runner runs halfway around a circular path of radius 10 m. The magnitude of the displacement of the runner is:
   a) 0
   b) 10m
   c) 20m
   d) 31m
   e) 62m

3. A plane traveling north at 200 m/s turns and then travels south at 200 m/s. Its change in velocity is:
   a) zero
   b) 200 m/s south
   c) 200 m/s north
   d) 400 m/s north
   e) 400 m/s south

4. A golf ball is hit from the ground with a velocity of 20 m/s at an angle of 30° to the vertical. Neglect air resistance. The speed of the ball at its maximum height is:
   a) 10 m/s
   b) 17.3 m/s
   c) 9.8 m/s
   d) 0 m/s
   e) 20 m/s
5. A brick is dropped with zero initial velocity from the top of a building. A second brick is thrown straight down with an initial velocity of 9.8 m/s from the same building. They are released at the same time. Neglect air resistance. On comparing the accelerations of the two bricks one would find:

a) the first brick accelerates faster  
b) the second brick accelerates faster  
c) the two bricks accelerate at the same rate  
d) there is insufficient information provided to make a comparison  
e) the difference in the acceleration of the two bricks will be 9.8 m/s²

6. Three books (X, Y and Z) rest on a table. The weight of each book is indicated. The force of book Z on book Y is:

a) 0  
b) 5N  
c) 9N  
d) 14 N  
e) 19 N

7. A motorist travels 30 miles at 60 mph and another 60 miles at 30 mph. The average speed of the motorist for the entire trip is:

a) 32 mph  
b) 36 mph  
c) 40 mph  
d) 45 mph  
e) 55 mph

8. A 50kg suitcase is lying at rest on a horizontal floor. The coefficient of static friction between the suitcase and the floor is 0.90 and the coefficient of kinetic friction is 0.70. You push on the suitcase with a horizontal force of 75 N. During this time the force of friction on the suitcase is:

a) 75N  
b) 441N  
c) 343N  
d) 50N  
e) 490N
9. Referring to the figure shown, which of the following vector equations is correct?

a) \( A = B + C \)
b) \( C = A + B \)
c) \( B = C + A \)
d) \( A + B + C = 0 \)
e) None of these

10. One 5.0kg bucket is hanging by a massless cord from another 5.0kg bucket also hanging by a massless cord as shown. If the two buckets are pulled upward with an acceleration of 1.8 m/s\(^2\) by the upper cord, the tension in the lower cord is:

a) 116N
b) 40N
c) 49N
d) 98N
e) 58N
A skier is going down hill on a snow covered slope that is tilted at an angle $\theta = 30^\circ$. Take the mass of the skier including all of his gear to be 90 kg. The coefficient of kinetic friction between the skies and the slope is 0.41.

a) (6 pts) Draw a free body diagram for the skier showing all forces acting on him. Clearly indicate the direction of these forces in your diagram.

b) (6 pts) The skier starts from rest and travels 50m along the plane when he is found to have a velocity of 12 m/s. Find the acceleration of the skier down the incline.

Acceleration: __________

c) (7 pts) What is the magnitude of the net force acting on the skier parallel to the ski slope?

Net Force: __________

d) (6 pts) What is the magnitude of the net force acting on the skier normal to the ski slope?

Net Force: __________
Physics 111 Practice Midterm Name:______________________________

Show work problem 2 (25 points)

A 100 kg package is dropped from a rescue aircraft that is traveling horizontally at a speed of 40 m/s. The pilot is attempting to drop the package to isolated mountain climbers on a ridge 200 m below. [use back of this page if extra space is needed]

40 m/s

200m

climbers

a) (10 pts) How far in advance (horizontal distance) must the package be released, so as to ensure it will reach the climbers?

Distance:_____________________

b) (7 pts) When the package reaches it target (the climbers), locate the position of the aircraft with respect to the climbers. Explain.

Location:_____________________

c) (8 pts) If the pilot had decided to release a single larger package of mass 200 kg (made up of two 100 kg packages), how far in advance (horizontal distance) must the package be now released to reach the climbers?

Distance:_____________________