PHYS-1800 **Homework 3** **Due: Fri 5 Feb, 2010**

Name:_____ **(Use g = 9.8 m/s^2 and show all workings)**

1. Assuming no air resistance for a cannon ball fired horizontally, its horizontal _____ will remain a constant non-zero value until it hits the target (1 point)

2. The acceleration of a body is in the direction of the _____ _____ acting on the body (two words) (1 point)

3. The weight of an oxygen tank of the Moon is 10 N. On the Earth, the same oxygen tank would have a weight of:
   A. less then 10 N.
   B. equal to 10 N.
   C. more than 10 N. (1 point)

4. A certain force causes a 50-kg person to accelerate at 2.0 m/s^2. The same force applied to a 75-kg person would cause:
   A. a smaller acceleration.
   B. the same acceleration.
   C. a greater acceleration. (1 point)

5. A block of mass 5.0 kg is acted upon by a single force producing an acceleration of 2.0 m/s^2. The force has a value of:
   A. 5.0 N
   B. 10 N
   C. 2.5 N
   D. 0.5 N (1 point)

6. A person parachuting from an airplane reaches a terminal velocity when the force of air resistance is 490 N. The mass of the person is:
   A. 490 kg
   B. 9.8 kg
   C. 40 kg
   D. 50 kg
   E. 80 kg (2 points)

7. Ball A is thrown upward with a velocity of 19.6 m/s. Two seconds later ball B is thrown upward with a velocity of 9.8 m/s. In terms of the order of arriving back at the thrower's hands:
   A. A will arrive first
   B. B will arrive first
   C. A and B will arrive at the same time. (2 points)

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8. An arrow is fired horizontally from a bow at a target 20 m away. The velocity of the arrow as it leaves the bow is 100 m/s. How much, approximately, will the arrow drop in that distance?

A. 0.1 m
B. 0.2 m
C. 0.3 m
D. 0.4 m
E. 0.5 m (3 points)

9. A tennis ball is projected upwards with an initial velocity of 30 m/s at an elevation angle of 30º. Make a sketch of the situation. (a) resolve the velocity vector into its horizontal and vertical components, to determine (b) the time to maximum height, and (c) the horizontal range of the ball on striking the ground. (4 points)

10. Two forces act on block of mass 25 kg sitting on a smooth frictionless horizontal surface. The forces are directed at right angles and have values of 40 N and 60 N as show in the figure below. Determine the magnitude and direction of (a) the resultant force vector, (b) the acceleration vector, and then (c) the velocity vector after 2 s. (4 points)

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Additional (optional) question (worth up to 5 extra points).

A. A bullet of mass 0.002 kg is fired from a handgun of mass 1.5 kg with an initial acceleration of 1000 m/s^2. (a) Calculate the reaction force, (b) determine the acceleration of the handgun and in which direction it will occur, and (c) state how you could reduce the effects of the gun's recoil.