Name: _____ **(Show all your workings, use g = 9.8 m/s^2)**

1. If a block of ice sliding down a ramp accelerates at a constant rate its _____ will increase by the same amount each second. (1 point)

2. A ball is thrown up in the air, reaches its maximum height and falls back. Its acceleration is: (1 point)

   A. less on the way up than on the way down
   B. less on the way down than on the way up
   C. the same up and down but zero at the top
   D. the same at all points in the motion.

3. A 10-kg object dropped from a 20 m high window strikes the ground in 2.0 s. Neglecting air resistance, a 5-kg object dropped from the same window will strike the ground in: (1 point)

   A. 1.0 s.
   B. 2.0 s.
   C. 4.0 s.
   D. 8.0 s.

4. A rifle bullet is fired horizontally at the same instant another bullet is allowed to drop from rest at the same height. Which bullet strikes the earth first? (1 point)

   A. The bullet from the rifle
   B. The bullet allowed to drop
   C. Both strike at the same instant

5. In order to go from rest to 100 m/s in 20 s, a jet must be able to accelerate at: (2 points)

   A. 5 m/s^2.
   B. 10 m/s^2.
   C. 20 m/s^2.
   D. 100 m/s^2.

6. In order to find the depth of a well, you drop a stone and time its fall. It hits the water after falling for 3 s. The height of the bridge is about: (2 points)

   A. 10 m.
   B. 15 m.
   C. 30 m.
   D. 45 m.

7. A football player throws the ball vertically upwards at a speed of 5 m/s. After one second the ball is: (2 points)

   A. Rising upwards at 5 m/s.
   B. Still rising upwards but at a lower speed.
   C. Neither rising or falling.
   D. Falling downwards at 5 m/s.

Name: _____ **(Show all your workings, use g = 9.8 m/s^2)**

8. A spacecraft arrives at an asteroid and fires its retro engines decelerating at the rate of 3 km/s^2. If its initial speed was 66 km/s, how long will it take the spacecraft to come to a complete stop in space? (2 points)

A. 2.2 s
B. 22 s
C. 220 s

9. In one sentence explain why a skier racing down Beaver Mountain experiences a larger acceleration when she makes a tight turn rather than a shallow turn at the same speed. Using a vector diagram sketch these two situations. Indicate the relative magnitude and direction of acceleration in each case. (3 points)

10. Make a clear sketch of the acceleration vs. time, velocity vs. time and distance vs. time, for a drag car that accelerates from rest at a constant rate of 80m/s^2. Neglecting air resistance, determine the speed of the vehicle at 1.5 sec. If its top speed is 360 m/s determine how long it takes to reach this speed and how far it traveled? (5 points)

Name: _____ **(Show all your workings, use g = 9.8 m/s^2)**

Additional (optional) question (worth up to a total of 6 points).

A. Galileo used a ball on an inclined plane to "slow down the action" when measuring the acceleration due to gravity. For inclined planes of 10º, and 45º resolve the gravitational acceleration vector to determine the downward component parallel to the plane in each case. If a ball that is initially at rest is released at the top of the inclined plane determine the time it takes to move 1.0 m down the slope in each case. Compare your results with time it would take to "free fall" the same distance (i.e. 1 m) vertically under gravity.