Kinematics - Uniform Acceleration - Quiz 3.0 (B)

1. A stone is dropped from rest from a cliff. It strikes the ground 3.4s later. How high is the cliff?

2. A VW "bug" starts from rest and hits a wall 35m later. If it moved with a constant acceleration of 9.8m/s^2, what was its "final" velocity?

Anti-memorization List

$x(t) = \frac{1}{2} at^2 + v_0 t + x_0$

$v(t) = at + v_0$

$a(t) = a$ (constant)

$v_f^2 = v_0^2 + 2a\Delta x$

$v_{AVG} = \frac{v_0 + v_f}{2}$

3. A feather is thrown downward in a vacuum with an initial speed (careful!) of 10m/s. It strikes the ground 2.5s later. How high above the ground was the feather originally?

4. A car is traveling at 40m/s when the driver applies the brakes. If the car decelerates uniformly at 5.8m/s^2, what is the car's stopping distance?

5. A hammer is thrown upward with an initial velocity of 15m/s. How high is the cliff from which it was thrown, if it remains in the air for 5 seconds?

6. Calvin's red wagon accelerates down the hill at a constant 4m/s^2. Its velocity at the top of the hill was 6m/s, and its velocity at the bottom of the hill was 27.6m/s. How long (distance) a ride did Calvin and Hobbes have before they got to the bottom of the hill?

7. A baseball is thrown upward with a velocity of 60mph (88 ft/s). How long is it in the air? What is it's maximum height?

8. An object moves northward at 120m/s. It experiences a constant acceleration of 8m/s^2 in the southward direction. How much time elapses before it returns to its starting point?

9. Wylie Coyote is moving vertically when his Acme jet pack runs out of fuel at t = 0s . The following is his position function: $y(t) = -4.9t^2 + 12t + 42$ (m)
   (a) How high is Wylie when his jet pack runs out of fuel?
   (b) Is Wylie's initial velocity positive or negative?
   (c) What is his velocity function, v(t) ?
   (d) How much time passes before he reaches his maximum height?
   (e) What is that maximum height?
   (f) What is Wylie's "final" velocity?!?

10. Now our coyote friend is moving on roller skates with $x(t) = 20t^2 - 10t$ (m)
   (a) What is the initial position and velocity of our coyote?
   (b) In what direction is the Acme jet pack powering him?
   (c) What is his velocity function, v(t), and when will he come to rest?
   (d) How far will the coyote travel before he turns around and returns?
   (e) If there is a cliff at x = 0m, what will Wylie's "final" velocity be?