**Mockery of a Final (Do 1 and 2, and then (3 or 4), and (5 or 6) for a total of 4 pages)**

**1. A 3.4 kg object hangs on a string.**

a. What is the tension in the string if the velocity is zero? What if the velocity is a constant 1.2 m/s up? (33.32 N, 33.32 N)

b. What is the tension in the string if the mass is accelerating at 1.8 m/s/s down? (27.2 N)

c. If there is a tension of 38 N in the string, what is its acceleration? (1.38 m/s/s up)

**2. A 2.7 kg box has a kinetic and static coefficient of friction with the floor of 0.12 and 0.35.**

a. What force is needed to start it moving, and what to keep it moving at a constant speed? (3.18 N, 9.26 N)

b. What force would be necessary to accelerate the box once it is moving at 5.2 m/s/s in the direction it is moving? (17.2 N)

c. What is the acceleration of the box if it is moving to the right, and there is a force of 2.6 N to the right? (-0.213 m/s/s – it is slowing down)

**3. A car decelerates from 34 m/s to 12 m/s in 15 seconds.**

A) What was the average velocity? (23 m/s)

B) What was the acceleration of the car? (-1.4666 ≈ -1.5 m/s/s)

C) What distance did the car take to do this? (345 m)

D) Assuming it has the same acceleration (deceleration?) how much further will it go after it reaches 12 m/s to stop? (49.1 m)

**4. An airplane lands at 84 m/s and slows to a stop uniformly over a distance of 410 m.**

A) What was the average velocity of the plane on the ground? (42 m/s)

B) What time was the plane on the ground? (9.76 s) What is the acceleration of the plane on the ground? (-8.6 m/s/s)

C) What was the velocity of the plane when it was halfway through the 410 m? (i.e. at 205 m) (59.4 m/s)

D) Draw a qualitative graph of the position v time, and the velocity v time for the time airplane was on the runway:

|  |  |  |  |
| --- | --- | --- | --- |
| X + |  | V + |  |
|  - |  |  - |  |

**5. George runs 5.0 m/s horizontally off the edge of a 9.2 m tall cliff and lands in the water.**

a. What time is he in the air? (1.37 s)

b. What distance from the bottom of the cliff

does he land? (6.85 m)

c. What is his speed of impact? (14.3 m/s)

**6. Simone fires a flaming digital projectile at a speed of 13 m/s at an angle of 71o above the horizontal on a long level firing range.**

a. What are the initial horizontal and vertical components of velocity? (4.232 m/s x + 12.29 m/s y)

b. What time is the projectile in the air, and what distance

does it go before hitting the ground?

(2.51 s, 10.6 m)

c. What is the greatest height the projectile reaches, and what

 is its velocity at that height? (7.71 m, 4.23 m/s)