**Mock Spring Final (2 of first 4, 2 of last 4)**

**1. 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? (-1.47 m/s/s)

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

**2. 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)

**3. A 467 gram air track glider rests on a frictionless surface. A force of 2.1 N is exerted on it for a distance of 35 cm.**

a. What is the glider’s acceleration and final velocity? (4.50 m/s/s, 1.77 m/s)

b. What force would accelerate the glider from rest to 3.1 m/s in 0.12 seconds? (12.1 N)

c. If there had been a force of 0.7 N opposing the 2.1 N force, what would have been the final velocity? (1.45 m/s)

**4. 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)

**5. Random Energy Questions:**

A. What **time** will it take a 34.0 W heater to evolve 1250 J of Heat? How much **heat** would it put out in 1.8 minutes? (36.8 s, 3670 J)

B. A 1260 kg car going 6.7 m/s on the top of an 8.0 m tall hill is brought to rest at the bottom by a force of 34,500 N in what **distance**? (3.68 m)

C. A 62.0 kg cart is going 6.17 m/s at the bottom of a hill. A force of 272 N acts for a distance of 5.80 m to speed it up. What is the **height** of the hill if the cars are going 3.78 m/s after this at the top of the hill? (3.81 m)

**6. Momentum and Impulse**

A. What speed does a 0.145 kg baseball have if it has 5.8 kg m/s of momentum? (40. m/s)

B. If you exert 1.2 N on a 0.347 kg air track glider for 3.2 seconds, what is its change in velocity if there is no friction? (11.1 m/s)

C. A 4.50 g bullet going 415 m/s is going 312 m/s after passing cleanly through a 670 g block of wood that is initially at rest. What is the velocity of the block of wood just after this? (0.692 m/s)

**7. A 3.78x1025 kg planet has a 5.89x1022 kg moon in orbit 4.9x108 m from its center.**

A. What is the force of gravity between the moon and the planet? (6.19x1020 N)

B. What is the orbital speed of the moon? (2270 m/s)

C. What is the acceleration of the moon? (0.0105 m/s/s)

**8. Waves!!!**

A wave has a frequency of 118 Hz, and a velocity of 343 m/s. What is its period? What is its wavelength?

(.0085 s, 2.9 m)

B. What is the fundamental frequency of a panpipe (one end open, one end closed) that is 0.135 m long? (Use 343 m/s as the wave speed) (635 Hz)

C. You run away from the mime clown parade at 6.7 m/s and hear them playing 653 Hz. What frequency are they actually playing? (666 Hz)