Physics 1020 Practice Exam 1

While doing this exam, also try to define each term. Better understanding of the material comes from complete understanding of terms given.

Chapter 1

1. Which of the following is not part of the three fundamental physical quantities?
   a) Time    b) Mass    c) Volume    d) Distance

2. A vector contains __________ as well as __________, while scalar contains __________ but not __________.

3. Designate the following terms as either Scalar (with an S beside it) or Vector (with a V beside it).
   Mass__  Weight__  Speed__  Velocity__  Force of friction__
   Distance__  Acceleration__  Gravity__  Time__  Displacement__

4. A) A graph is plotted with distance over time; the slope gives the __________ of the object.
   B) A graph is plotted with velocity over time; the slope gives the __________ of the object.

5. A person who has traveled eight kilometer was wondering how many meters they have traveled. What is the answer? The same person is also wondering how many miles they have traveled. What is the answer? How much feet has this person traveled?

6. The moon orbits around the earth every 27.3 days. What is the frequency of which the moon does a complete cycle? (answer in SI Units for frequency)

7. For a car speeding on a highway, its tire has a period of 0.05s, what is the frequency?

8. On a very large ruler, a duck starts off at the 20m mark, and then rushes to the 83m mark in 3s. What is the duck’s velocity?

9. According to the graph below:

   What are the velocities for the:
   a) Turtle b) Human c) Horse
   d) For the rocket, what is currently happening to its velocity? What is this called?
   e) For the rolling ball, what is currently happening to its velocity? What is this called? What is the ball’s velocity between 4 and 5 seconds?
10. Draw the resulting vectors of the following:

11. An object goes from 42m/s to 12m/s in 10s, what is its acceleration?
12. A ball is spinning on a string horizontally, and the diameter of the string is 24m. The velocity of the ball is 6m/s. What is the centripetal acceleration of the ball?
13. A boy, who’s on top of the building staring straight down, spits out his bubble gum. After 5s his gum hits the ground. How high did the boy spit his gum from?

Chapter 2
Match the following:
A. Newton’s First Law       __ A car hits a wall, and the heavier and faster the car is accelerating, the stronger the force
B. Newton’s Second Law     __ An object is currently floating in space, and nothing is acting upon it. This object is stationary
C. Newton’s Third Law      __ A person punches a wall, and feels tremendous amount of pain in the fist.

1. An object which would normally weigh 63lbs at the surface of the Earth, of which is 6,000 miles away from the center of the Earth, would weigh how much if the object was placed on a pillar 18,000 miles away?
2. A gold bar, 10kg, is floating in space and is not near any object, planet, star, or black hole. What is the gold bar’s weight if it were to somehow triple in mass?
3. A cement block is placed upon a tilted ramp, but does not move. What could be the reason for the block not to move? What value must be overcome for it to move?
4. For an object to remain at constant velocity,
   a. it must move in an orbit.
   b. there must be no friction acting upon it.
   c. the net force on it must be zero.
   d. a constant force must act on it.
5. A person applies a certain value of force to object A which weighs 100kg. Then he applies the same amount of force to object B which weighs 50kg. Which object would have a greater acceleration?
6. A rock is dropped straight down, and when it hits the ground it exerts a force of 735N. What is the rock’s mass? (in metric units)

7. A car is going around a bend at 10m/s, which has a radius of 30m. If the car weighs 500kg, what is the centripetal force exerted?

8. A shotgun is able to fire a bullet and dispose its empty shell simultaneously. If the gun was fired at 2m above ground, and the bullet traveled 30m at the speed of 896m/s. Ignoring air resistance, would the:
   a) bullet hit the ground before the shell?
   b) shell hit the ground before the bullet?
   c) both the bullet and the shell would hit the ground at the same time?
   d) bullet be traveling too fast to determine accurately when it will hit the ground?

9.  a) At what point in our Moon’s orbit around the Earth, and our Earth’s orbit around the Sun, produce maximum tidal waves? Bonus: What body of water experiences the most drastic change in tides?
   b) In regards to the Moon and the Earth, which points on the earth would have the greatest gravitational effect on the Moon?
      i) A point closest to the moon, which is on the surface of the Earth closest to the moon.
      ii) A point lying in the center of the Earth.
      iii) A point furthest away from the moon, lying on the surface of the Earth.

Chapter 3

1. A car goes from 10m/s to 34m/s in 4s. If the car weighs 500kg, how much work has it done?

2. A 1200kg Shelby going at 72m/s, crashes into a BMW that has a mass of 1600kg which bounces it forward leaving the Shelby at rest. How fast did the BMW end up going after the collision?

3. What would be the new velocity if the car in the above problem hit the second car and hooked onto each other?

4. A 600g (0.6kg) basketball is launched towards the net but the player misses and only manages to hit the backboard. Its speed was 5m/s, and the impact time between the ball and the board was 9ms (0.009s). What is the force exerted by the ball onto the board?

5. An old pirate ship is 2km below ground level sitting at the bottom of the sea. Would its potential energy be:
   a. positive relative to the ground.
   b. zero relative to the ground.
   c. negative relative to the ground.
   d. …Not enough information provided to complete the problem.

6. A person running would be going four times faster than a person walking. These two individuals have the same mass. The person running would have:
   a. the same kinetic energy as the person walking, since kinetic energy is not dependent on speed or velocity.
   b. double the kinetic energy than the person walking.
   c. four times the kinetic energy than the person walking.
   d. sixteen times the kinetic energy than the person walking.

7. A person is carrying a 5kg bucket of water 1m above the ground, and walks 10m across a room traveling at 3m/s². What is the work done on the box?
8. An eagle hovering 150m above ground level drops its 10kg wallet (full of cash and coins). How fast would the wallet be traveling right before it hits the ground?

9. In an open system, where energy can be expelled in various forms, a 20kg object traveling at 15m/s hits a 10kg object at rest. The two objects combine to form one, of which is now traveling at 10m/s. What is the kinetic energy lost in this inelastic collision? Name the various forms of which this energy can be lost in.

10. An 18kg bowling ball is rolled up a hill at 7m/s starting at ground level. What is the kinetic energy and how high does the ball roll before coming to a stop?

11. In 16s, a 100kg amateur rocket travels 1000m accelerating at 4m/s². What is the power output by this rocket?

Do the practice problems assigned, Learning Checks within the book, as well as going over notes covered in class. Good luck!