Phys11 Dynamics : W.S. - 20

1) State Newton's Three Laws of motion.

2) a) A mass of 1.5 kg has a force of 7.5 N acting on it. Find the acceleration.

b) A mass of 75 kg accelerates [left] at 30. m/sec^2. The force in Newton's is _____ .

3) A 35 kg box rests on the floor.

      a) The acceleration is _____

      b) The net force is _____

      c) The weight is _____

      d) The reaction (or normal) force is _____

4) An object falls to Earth under the influence of gravity.

      a) The acceleration is _____
      b) If the force of gravity is 150 N [down] find the mass.
      _____ kg

5) A 270 kg box is pulled along the floor at a constant speed. If the pulling force is 55 N, find the force of friction.
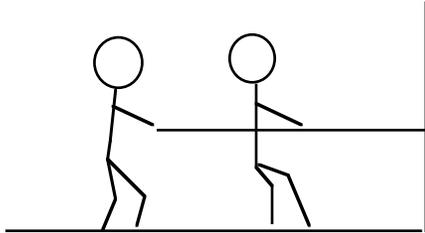
6) If the pulling force in question #5 is increased to 82 N find the acceleration. Assume the friction force is unchanged.

7) A 18.0 kg object is suspended by a string. Find the tension in the string.
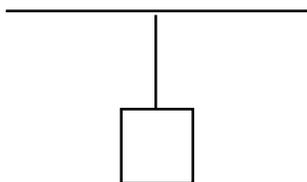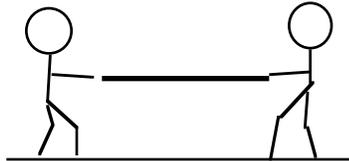
8) A boy pulls on a rope attached to a wall with a force of 150 N [left]. The wall pulls back with a force of _____.

9) The boy in question 8 and his twin brother pull on the wall below with a force of _____

10) The two boys in question 9 pull on a rope as shown below. The magnitude of the tension is _____

11) a) Find the force a motor must exert on a 1200 kg car in order to accelerate it at 0.40 m/s^2. (Assume no friction)

b) Do question 11)a) if we assume friction is 120 N [left]

12) How much force is required to accelerate a 3.0 gram (1.0 g = 0.0010 kg) bullet from rest to 850 m/s over a distance of 70. cm (1.0 cm = 0.010 m). (hint : use $V_f^2 - V_i^2 = 2ad$)

13) A 3500 kg elevator is supported by a steel cable. The maximum tension can be 36000 N. Find the maximum upward acceleration.

14) Find the acceleration of a 55 kg sky-diver if the air resistance is 210 N [up].

Answers : 2)a) 5.0 m/s^2, b) -2.3x10^3 N, 3)a) 0.0 m/s^2, b) 0.0 N, c) -3.4x10^2 N, d) +3.4x10^2 N, 4)a) -9.8 m/s^2, b) 15 kg, 5) -55 N, 6) 0.10 m/s^2, 7) 176 N, (note : tension is a scalar unless the tension force is indicated), 8) +150 N, 9) -3.0x10^2 N, 10) 150 N, 11)a) 480 N, b) 6.0x10^2 N, 12) 1.5x10^3 N, 13) 0.49 m/s^2, 14) -6.0 m/s^2.