Phys11 Dynamics : W.S. - 10

1) Write down Newton's three laws.

2) What is inertia ?

3) If the velocity of an object is constant, what is the net force on the object?

4) If an object moves in a circle at a constant speed, is there a net force on it ? Explain.

5) A 3.5 kg object accelerates downward at 9.8 m/s^2. The force of gravity is _____. What is the force exerted by the object on the Earth ? _____

6) If the force on an object is 15 N, and the acceleration is 5.0 m/s^2, find the mass. _____ . If the force is increased to 20. N, find the new acceleration ____ .

7) If the force on a 4.5 gram object is 0.023 N, Find the acceleration. _____ .

8) Find the force on a 72 gram object if the acceleration is 5.0 cm/s^2 _____ . Find the force if the acceleration is -3.8 cm/s^2 ____

9) A 9.0 kg box is pulled to the right with a force of 55 N at a constant speed. The force of friction is _____ . The net force is _____ .

10) The box (in question # 9) is pulled to the right with a force of 83 N. The force of friction is ____ . The net force is ____ . The acceleration is ____ .

11) An object is pulled along a floor with a force of -34 N. The force of friction is +21N. The net force is _____ . If the mass is 6.5 kg then the acceleration is _____ .

12) If a 6.2 kg box rests on the floor, the weight is _____. The reaction (or normal) force is _____ .

13) A 13 kg object is suspended by a string. The weight is _____ . The force exerted by the string on the object is _____ .

14)a) A box rests on the floor. It has a string attached to the top. If the box has a mass of 5.0 kg, the weight is _____ . The normal force is ____ . Suppose someone pulls up on the string with a force of 23 N. The weight is ____ . The normal force is _____ .

b) If someone pulls up on the string so that the box moves upward at a constant speed, find the tension in the string _____ . What is the net force on the box ? _____

c) If someone pulls on the string with a force such that the box accelerates upward at 1.5 m/s², find the tension _____ . Find the net force on the box. _____ .

15) Find the force on a 1500 kg truck if the velocity increases from 5.0 m/s to 12 m/s in 14 s. Assume friction is zero. F = _____ .

16)

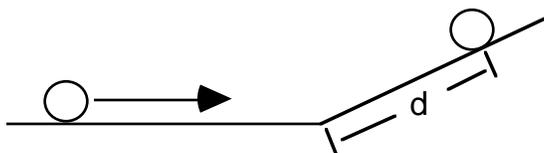d=5.0m

h=2.0m
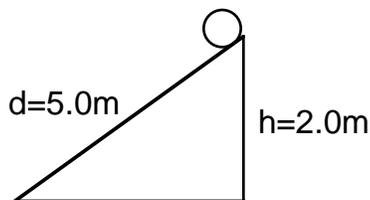
a) A 0.50 kg ball starts rolling down the incline above. The acceleration is _____ . The force on the ball is _____ . (hint : use a=[h/d] g, where g = 9.8 m/s)

b) Find the velocity of the ball when it reaches the bottom of the incline. (hint : use V_f^2 - V_i^2 = 2ad), V = _____ .

17)

d

The force on the 0.50 kg ball (shown above) as it moves up the incline is 0.40 N [down the incline]. If the initial speed is 2.0 m/s, find the maximum distance d that the ball moves up the incline. (hint : use the formula $V_f^2 - V_i^2 = 2ad$), d = _____ .

18) An 800. kg car (including the driver) has a maximum acceleration of 1.5 m/s². Find the new acceleration after three passengers with a total mass of 200. kg get into the car. a = _____ .

19) A 3.0×10^6 kg rocket with a thrust of 4.1×10^7 N accelerates upward. The net force is _____ . The acceleration is _____ .

20) A 2100 kg truck travels at 72 km/hr. The brakes are applied and the truck comes to rest in a distance of 16 m. Find the force exerted by the brakes. (hint : use $V_f^2 - V_i^2 = 2ad$), F = _____ .

21) A 2.5×10^5 kg airplane accelerates from 0.0 km/hr to 500. km/hr in 45 s. Find the force on the airplane. F = _____ .

22) a) An 800. kg elevator moves upward with a constant speed of 2.0 m/s. The tension in the support cable is _____ .

b) If the elevator accelerates upward at 0.50 m/s², find the tension in the cable. T = _____ .

c) If the elevator accelerates downward at 0.50 m/s², find the tension in the cable. T = _____ .

23) An electron with a mass of 9.0×10^{-31} kg passes through an electric field. It experiences a force of 1.0×10^{-18} N. Find the acceleration. a = _____ .

Answers : 1)i) If the net force on a body is zero, the body remains at rest, or continues to move in a straight line at a constant speed, ii) The net force on a body equals the mass multiplied by the acceleration of the body, iii) For every action, there is an equal and opposite reaction, 2) Inertia is the tendency of an object to resist a change in its motion. 3) 0.0 N, 4) Yes. The velocity is changing, therefore, by Newton's first law, the net force is not zero. 5) -34 N, +34 N, 6) 3.0 kg, 6.7 m/s², 7) 5.1 m/s², 8) 3.6×10^{-3} N, -2.7×10^{-3}, 9) -55 N, 0.0 N, 10) -55 N, 28 N, 3.1 m/s², 11) -13 N, -2.0 m/s², 12) -61 N, +61 N, 13) -130 N, +130 N, 14)a) -49 N, +49 N, -49 N, +26 N, b) 49 N, 0.0 N, c) 57 N, +7.5 N, 15) 750 N, 16)a) 3.9 m/s² [down], 2.0 N [down], b) 6.3 m/s

[down], 17) 2.5 m, 18) 1.2 m/s^2, 19) 1.2×10^7 N, 3.9 m/s^2, 20) -2.6×10^4 N, 21) 7.7×10^5 N, 22)a) 7.8×10^3 N, b) 8.2×10^3 N, c) 7.4×10^3 N, 23) 1.1×10^{12} m/s^2.