1.   If you have a mass of 64.0 kg on the surface of the earth, how much would you weigh if you were 8000 km **above** the earth's surface?

(a) 12.6 N   (b) 1.24x 10^2 N   (c) 12.6 kg   (d) 1.24 x 10^2 kg

2.   A block is supported by a spring that has a total length of 10.0 cm, and its spring constant is 5.00 N/m. If the spring without the block is 8.00 cm long, then the mass of the block is :

(a) 1.02 x 10^{-2} kg   (b) 10.0 kg   (c) 1.00 x 10^{-2} kg   (d) 1.02 kg

3.   What would be the spring constant for a 4.00 cm piece of rubber if a force of 5.00 N causes its length to double?

(a) 1.28 x 10^{-1} N/m   (b) 1.25 N/m   (c) 1.25 x 10^2 N/m   (d)   12.8 N/m

5.   The force of gravity between two 200.0 kg refrigerators whose centers are 1.00 m apart is:

(a) 1.96 x 10^3 N   (b) 3.92 x 10^5 N   (c) 2.67 x 10^{-6} N   (d) 1.34 x 10^{-8} N

7.   The force of friction:

(a) depends on the speed of the object
(b) depends on the amount of area in contact with the surface
(c) depends on the weight of the object
(d) is measured in N/kg

8.   Find the force of attraction between the sun and the earth.

(a) 3.60 x 10^{18} N   (b) 7.20 x 10^{18} N   (c) 3.60 x 10^{22} N   (d) 6.67 x 10^{-11} N

9.   The value of acceleration due to gravity at any distance from the center of the earth varies:

(a) directly as the distance from the center of the earth
(b) directly as the square of the distance from the center of the earth
(c) inversely as the square of the distance from the center of the earth
(d) inversely as the distance from the center of the earth

11.   The strength of the earth's gravitational field at a point in space at which a 10.0 kg mass is attracted to the earth by a force of 90.0 N is:

(a) 0.11 N/kg   (b) 9.0 N/kg   (c) 9.8 N/kg   (d) 90 N/kg

12.   Find the weight loss experienced when a 56.0 kg student moves from the surface to 4 earth radii away from the center of the earth.

(a) 549 N   (b) 3.5 kg   (c) 34 N   (d) 515 N

13. An 800 g mass is suspended from a spring. The spring changes its length from 25 cm to 38 cm. Find the spring constant.

   (a) 603 N/m   (b) 60 N/m   (c) 61.5 N/m   (d) 6154 N/m

14. A nylon fishing line is stretched 3.00 m when a fish pulls on it and then it returns to its original length when the force is removed. What is the spring constant of the fishing line if the fish pulls on it with a force of 153 N?

   (a) 459 N/m   (b) 51 N/m   (c) 5.2 N/m   (d) 17 N/m

15. How much will the same line as in question # 14 stretch if the fish pulls with only a 50 N force?

   (a) 51 m   (b) 1.0 m   (c) 0.98 m   (d) 5.7 m

16. How much would a 1.0 kg bag of chocolate chip cookies weigh if it were to move away from the center of the earth to a distance equal to Jupiter's radius $(r = 7.0 \times 10^4$ km):

   (a) 5.7×10^9 N   (b) 8.1×10^4 N   (c) 8.1×10^{-2} N   (d) 8.9×10^{-1} N

17. If you want to make a profit buying precious materials by weight at an altitude, and selling them at another altitude for the same price (per unit of weight), then you should:

   (a) buy at the high altitude and sell at the low altitude
   (b) buy at the low altitude and sell at the high altitude
   (c) it makes no difference whatsoever
   (d) give the money to your teacher

18. Some people place bags of sand in the trunk of their car to increase the traction between the car and the road. This causes the coefficient of friction to:

   (a) increase   (b) decrease   (c) it has no effect on the coefficient of friction

19. If the mass of the earth somehow increased, but the dimensions remained the same, your weight would:

   (a) remain the same   (b) increase   (c) decrease

20. The force of gravity on a 700 N man standing on the earth's surface is:

   (a) 9.8 N   (b) 350 N   (c) 700 N   (d) 71 kg

21. If the radius of the earth somehow decreased, with no change in mass, your weight would:

   (a) increase   (b) decrease   (c) not change   (d) decrease in direct proportion to the radius

28. The net force on an object being pulled east by a 27.0 N force, west by a 53.0 N force, east by a 54.0 N force, east by a 29.0 N force and west by a 63.0 N force is:

   (a) 6.00 N [W]   (b) 6.00 N [E]   (c) 62.0 N [W]   (d) 62.0 N [E]

29. The force needed to make an upward force of 87.0 N and two downward forces, both of 19.0 N, have a net upward force of 13.0 N is:

    (a) 36.0 N [down]   (b) 36.0 N [up]   (c) 49.0 N [down]   (d) 49.0 N [up]

30. The coefficient of friction for rubber on concrete is 1.02 and for rubber on asphalt the coefficient of friction is 0.400. This means that a car, while breaking quickly, is more likely to skid on :

    (a) concrete   (b) asphalt   (c) it would be just as likely to skid on concrete as on asphalt.

31. A certain block of wood requires a force of 24 N to pull it along the floor. If the block is placed on a side that has half the surface area of the base, then the force needed to pull the block would be :

    (a) 48 N   (b) 12 N   (c) 24 N   (d) 6.0 N

32. What would be the coefficient of friction between a 50.0 kg sofa and a carpet if a force of 15.0 N is needed to move the sofa at a constant speed?

    (a) 0.300   (b) 3.06×10^{-2} (c) 3.33   (d) 32.7

33. If a spring with a spring constant of 40.0 N/m will stretch 4.0 cm when a 50.0 kg mass is suspended from it on planet X, then the gravitational field strength on that planet must be :

    (a) 3.2 N/kg   b) 1.6 N/kg   c) 3.1×10^{-1} N/kg   (d) 3.2×10^{-2} N/kg

34. A force of 45 N acts on a cabbage of mass 1.2 kg. What is the acceleration of the cabbage?

35. A box of cumquats, moving to the right at 13 m/s, is pushed along the floor with a horizontal force of 26 N to the right. If the mass of the box is 25 kg, and the coefficient of friction is 0.75, what is the size and direction of the acceleration of the box?

36. Bob pushes on the wall with a force of 22 N, to the right. He is wearing roller skates. What will be the size and direction of his acceleration, if he has a mass of 80 kg?

37. Sylvester is standing in an elevator. He has a mass of 70 kg.

    a) What is the normal force on his feet when the elevator is accelerating upward at 2.5 m/s^2?

b) What is the normal force on his feet when the elevator is accelerating downward at 2.5 m/s^2?

c) What is the normal force on his feet when the elevator is traveling upward at a constant 12.5 m/s?

38.   Two masses, 35 kg and 25 kg, are tied together with a rope. A force of 120 N pulls on the 25 kg mass, towards the left. There is a total force of friction of 25 N acting on the two masses.

   a) What is the net force on the two boxes?

   b) What is the acceleration of the two boxes?

   c) What is the tension in the rope?