Foundations of Physics: Fundamental Principles Part II

Name:
Date:

1. If a rectangle has sides of length 4.04 ± 0.03 m and 3.18 ± 0.04, what is the percentage uncertainty in its perimeter?

2. A solid cylinder has a diameter of 2.00 ± 0.02 cm, length 4.00 ± 0.02 cm and mass 106.81 ± 0.01 g. What is the density and uncertainty of the solid cylinder?

12. Two objects are thrown from the top of a tall building. One is thrown up, and the other is thrown down, both with the same initial speed. What are their speeds just before they hit the ground?

A) The one thrown up is traveling faster.
B) The one thrown down is traveling faster.
C) They are traveling at the same speed.
D) It is impossible to tell because the height of the building is not given.

13. A jet fighter plane is launched from a catapult on an aircraft carrier. It reaches a speed of 42 m/s at the end of the catapult, and this requires 2.0 s. Assuming the acceleration is constant, what is the length of the catapult?
    a) 16 m
    b) 24 m
    c) 42 m
    d) 84 m

14. At the instant a traffic light turns green, a car that has been waiting at the intersection starts ahead with a constant acceleration of 2.00 m/s^2. At that moment a truck traveling with a constant velocity of 15.0 m/s overtakes and passes the car.
    (a) Calculate the time necessary for the car to reach the truck.
    (b) Calculate the distance beyond the traffic light that the car will pass the truck.
    (c) Determine the speed of the car when it passes the truck.

17. A soccer ball is kicked with a velocity is 25.0 ms^{-1} at an angle of 30° above the horizontal ground.
    (a) How long will it take the ball to return to the ground?

    (b) How far does the ball travel horizontally before striking the ground?

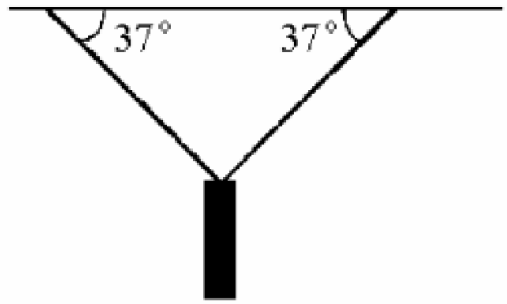
21. A hammer (mass 0.5 kg) and a stone (1 kg) are dropped from a height of 2 m. Which of the following statement is correct? Assume no air resistance.
    a. The stone easily reaches the ground first.
    b. The hammer easily reaches the ground first.
    c. both reach the ground at the same time.
    d. It is not possible tell which will reach the ground first.

25. A person on a scale rides in an elevator. If the mass of the person is 60.0 kg and the elevator accelerates upward with an acceleration of 4.90 m/s^2, what is the reading on the scale?
    A) 147 N
    B) 294 N
    C) 588N
    D) 882N

26. An object of mass 6000 kg rests on the flatbed of a truck. It is held in place by metal brackets that can exert a maximum horizontal force of 9000 N. When the truck is traveling 15 m/s, what is the minimum stopping distance if the load is not to slide forward into the cab?
    A) 15 m
    B) 30 m

28. A traffic light of weight 100 N is supported by two ropes as shown in the following Figure. What are the tensions in the two ropes?

A) 50 N
B) 63 N
C) 66 N
D) 83 N



29. What is the correct unit of work expressed in SI units?
A) kg m/s^2
B) kg m^2/s
C) kg m^2/s^2
D) kg^2 m/s^2

30. If you walk 5.0 m horizontally forward at a constant velocity carrying a 10-N object, the amount of work you do is
A) more than 50 J
B) equal to 50 J
C) less than 50 J, but more than 0 J
D) zero.

31. A child's swing is pulled back to a height of 1.28 m above the lowest position. If the swing is released and mechanical energy is conserved then it will reach a maximum speed of
A) 5 ms^{-1}
B) 9.8 ms^{-1}
C) 19.6 ms^{-1}
D) 25 ms^{-1}
E) none of these

33. A skier, of mass 40 kg, pushes off the top of a hill with an initial speed of 4.0 m/s. Neglecting friction, how fast will she be moving after dropping 10 m in elevation?
A) 7.3 m/s
B) 15 m/s
C) 49 m/s
D) 196 m/s