Physics 103 Exam 1 October 7, 2004

Name_____ ID #_____

Section #_____ TA Name_____

Fill in your name, student ID # (not your social security #), and section # (under ABC of special codes) on the Scantron sheet. Fill in the letters given for the first 5 questions on the Scantron sheet. These letters determine which version of the test you took, and it is very important to get this right. Make sure your exam has questions 6–25.

1. A
2. E
3. B
4. D
5. C

6. Which of the following is NOT true of physics?

    a. Physics involves a study of matter and energy.
    b. Physics uses a lot of mathematics.
    c. There are only a small number of basic principles.
    d. Physics is the most basic of the sciences.
    e. There are many things to memorize.

7. How many milli-seconds are there in two micro-hours?

    a. 0.139
    b. 7.2
    c. 0.12
    d. 1.8
    e. 8.33

8. Given the precision of the data, what is the best way to express the quantity $(7.320\times10^{-3} \times 2.14\times10^{2}) + 9.1\times10^{-3}$?

    a. 1.58
    b. 1.6
    c. 1.5756
    d. 1.576
    e. 1.57558

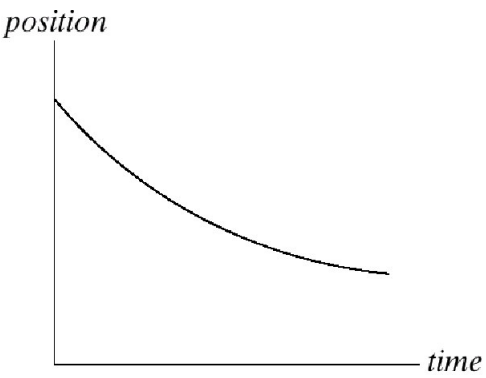
9. A cereal box has the dimensions of 0.19 m × 0.28 m × 0.070 m. If there are 3.28 feet per meter, then what is the volume of the box in cubic feet?

    a. 0.040 cubic feet
    b. 0.012 cubic feet
    c. 0.13 cubic feet
    d. 0.0037 cubic feet
    e. 0.0011 cubic feet

10. A right triangle has sides 5.0 m, 12 m, and 13 m. The smallest angle of this triangle is nearest

    a. 23^{o}
    b. 21^{o}
    c. 43^{o}
    d. 9^{o}
    e. Not attainable since this is not a right triangle.

11. In the graph at the right, which one of the following is negative?



    a. velocity only
    b. velocity and acceleration
    c. displacement and acceleration
    d. displacement and velocity
    e. displacement, velocity, and acceleration

12. Maria throws two stones at the same time

from the top edge of a building with a speed of 20 m/s. She throws one straight down and the second straight up. How much later does the second stone hit than the first?

a. 5 s
b. 2 s
c. They hit at the same time.
d. Not enough information is given to work this problem.
e. 4 s

13. You throw a ball straight up into the air. When the ball reaches its highest point, which of the following is true?

a. Velocity is zero but acceleration is downward.
b. Velocity and acceleration are both zero.
c. Velocity is not zero but acceleration is zero.
d. Neither velocity nor acceleration is zero.
e. Velocity is zero but acceleration is upward.

14. A ball is thrown vertically upwards with an initial speed of 19.6 m/s. For its complete trip (up and back down to the starting position), its average speed is

a. 9.80 m/s
b. 19.6 m/s
c. 4.90 m/s
d. 2.45 m/s
e. zero

15. A drag racer starts from rest and accelerates at 10 m/s^2 for the entire distance of 400 m. What is the velocity of the race car at the end of the run?

a. 45 m/s
b. 89 m/s
c. 130 m/s
d. 180 m/s
e. 63 m/s

16. An ant on a picnic table travels 30 cm eastward, then 25 cm northward and finally 15 cm westward. What is the magnitude of the ant's total displacement?

    a. 70 cm
    b. 57 cm
    c. 52 cm
    d. 42 cm
    e. 29 cm

17. You walk six miles in a straight line in a direction north of east and end up two miles east and several miles north of where you started. How many degrees north of east did you walk?

    a. 18°
    b. 71°
    c. 45°
    d. 60°
    e. 30°

18. Two projectiles are launched at the same speed, the angle of elevation for the first being 30° and for the second 60°. Which one of the following statements is false?

    a. The first projectile reaches its maximum altitude quickest.
    b. Both projectiles have the same acceleration while in flight.
    c. Both projectiles have the same range.
    d. Both projectiles have the same speed when they return to the level from which they were launched.
    e. The first projectile has the lower speed at maximum altitude.

19. The highest mountain on Mars rises 22 000 meters above the surface. If you were to throw an object horizontally off the mountain top, how long would it take to reach the surface? (Ignore air resistance and use $g = 3.72\ \text{m/s}^2$.)

    a. 1.8 minutes
    b. 2.4 minutes
    c. 3.0 minutes
    d. 0.79 minute
    e. 1.1 minutes

20. A ball is launched from ground level at 30 m/s at an angle of 35° above the horizontal. How far does it go horizontally before it is at ground level again?

    a. 14 m
    b. 86 m
    c. 21 m
    d. 43 m
    e. 129 m

21. It is late and Carlos is sliding down a rope from his third floor window to meet his friend Juan. As he slides down the rope faster and faster, he becomes frightened and grabs harder on the rope, increasing the tension in the rope. As soon as the upward tension in the rope becomes equal to his weight:

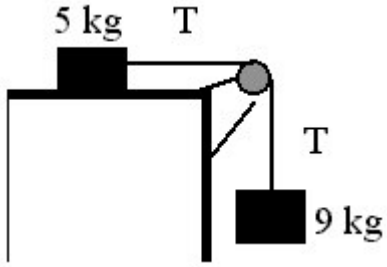
    a. Carlos will stop.
    b. Carlos will slow down.
    c. Carlos will have reached the ground.
    d. the rope will break.
    e. Carlos will continue down at a constant velocity.

22. As a 3.0-kg bucket is being lowered into a 10-m-deep well, starting from the top, the tension in the rope is 9.8 N. The acceleration of the bucket will be:

    a. 9.8 m/s^2 downward
    b. 6.5 m/s^2 downward
    c. 3.3 m/s^2 upward
    d. 3.3 m/s^2 downward
    e. zero

23. A 9.0-kg hanging weight is connected by a string over a pulley to a 5.0-kg block sliding on a flat table. If the coefficient of sliding friction is 0.20, find the tension in the string.

    a. 19 N
    b. 24 N
    c. 32 N
    d. 38 N
    e. 88 N



24. A 100-kg box is placed on a ramp. As one end of the ramp is raised, the box begins to move downward just as the angle of inclination reaches 15°. What is the coefficient of static friction between box and ramp?

    a. 0.15
    b. 0.77
    c. 0.95
    d. 0.97
    e. 0.27

25. As a car goes up a hill, there is a force of friction between the road and the tires rolling on the road. The maximum force of friction is equal to:

    a. the weight of the car times the coefficient of kinetic friction.
    b. the normal force of the road times the coefficient of static friction.
    c. the normal force of the road times the coefficient of kinetic friction.
    d. The weight of the car times the coefficient of static friction.
    e. zero.