Physics – Tuckey
Semester 1 Final Examination: January 2002

Multiple Choice – Chose the one best answer and mark it on your scantron sheet. (2 points each)

For questions #1 – 3, use the following information: vector \( \mathbf{A} = 2.0 \text{ cm}, 45^\circ \) and vector \( \mathbf{B} = 8.0 \text{ cm}, 30^\circ \).

1. The magnitude of \( \mathbf{B} \) is
   a. –7.9 cm   b. 1.2 cm   c. 6.9 cm   d. 4.0 cm   e. 8.0 cm

2. The magnitude of \( \mathbf{A} + \mathbf{B} \) is
   a. 12 cm   b. 10 cm   c. 9.9 cm   d. –9.9 cm   e. 6.0 cm

3. The direction of \( \mathbf{A} + \mathbf{B} \) is
   a. 45°    b. 30°    c. 15°    d. 65°    e. 33°

4. About how much does a 2 kg bag of nails weigh?
   a. 20kg    b. 20 N    c. 8N    d. 10N    e. about a pound

5. A package on the seat of a bus appears to slide backwards when the bus begins to accelerate quickly from rest. Which of the following best describes what's happening?
   a. the package slides backwards by its own force   b. the package is still as the bus slides forward under it   c. the bus pushes the package backwards   d. the weight of the package pushes it backwards

6. When you hang from a chin up bar by you hands, and your arms go straight up, the tension in each arm
   a. is equal to your weight    b. is equal to your mass    c. is half your mass    d. is half your weight

7. If you were to hang on the bar so that your arms and body made a ‘Y’ shape, the tension in each arm
   a. is less than half your weight    b. is equal to your mass    c. is more than half your weight

8. Accelerations are produced by
   a. velocities    b. forces    c. masses    d. small fairies    e. Republicans

9. The vertical changes in position of an object that is dropped and that of an identical object that is thrown completely horizontally from the same height...
   a. are less for thrown object    b. are the same    c. are greater for thrown object    d. depend upon the initial velocities of the objects.

10. A cyclist finishes a 100-km race in 2.7 hrs. The average velocity
    a. equals the greatest speed divided by the total time    b. equals the time divided by the displacement
    c. equals the displacement divided by the total time    d. cannot be determined from the information given

For # 11 - 22, use:   a. true    b. false
11. The combination of all the forces that act on an object is called the net force.
12. The amount of matter in an object is called its weight.
13. If a hockey puck is pushed on an infinite, horizontal, perfectly frictionless surface, it will eventually slow down because of its inertia.
14. Newton’s Laws are true everywhere.
15. A quantity that has both magnitude and direction is called a scalar.
16. A quantity that has both magnitude and direction is called a vector.
17. The sum of two or more vectors is called a resultant.
18. Any two vectors can be added together with no attention paid to their directions.
19. Any vector can be broken down into components that are perpendicular to each other.
20. In the absence of air resistance, the vertical component of a projectile’s velocity doesn't change as the projectile moves.
21. In the absence of air resistance, the horizontal component of a projectile’s velocity doesn't change as the projectile moves.
22. Using the tip-to-tail method, you can multiply any number of vectors.
For #23 - 25, use the following projectile trajectory to indicate the answers. A marshmallow is launched from a catapult.

23. At what point is the vertical velocity zero.
   a. A          b. none of these          c. C          d. D          e. E

24. At what point is the horizontal velocity zero?
   a. A          b. none of these, it’s constant          c. C          d. D          e. E

25. At what point is the acceleration due to gravity equal to zero?
   a. A          b. none of these          c. C          d. D          e. E

26. A force acting on an object of mass, M, an acceleration of A. The same force acting on an object of mass, 2M, an acceleration of
   a. A/2          b. A          c. 2A          d. A/4

27. At the instant a ball is thrown completely horizontally with a large force, an identical ball is dropped from the same height. Which ball will hit the ground first?
   a. the ball thrown horizontally          b. the dropped ball          c. neither - they hit at the same time

28. At which firing angle should you set a catapult to get the greatest range? [Disregard air resistance.]
   a. 0°          b. 90°          c. 45°          d. 75°

29. At which firing angle should you set a catapult to get the greatest height? [Disregard air resistance.]
   a. 0°          b. 90°          c. 45°          d. 75°

30. For a projectile moving along a trajectory, its horizontal acceleration _______ as its position changes.
   a. is constant          b. decreases          c. increases

31. Convert 2.543 km into centimeters.
   a. 2.543 x 10^3 cm          b. 2.543 x 10^4 cm          c. 2.543 x 10^5 cm          d. 2.543 x 10^3 cm          e. 2.543 x 10^5 cm

32. In projectile motion, the rising and falling times of an object are equal if the launch position is _______ the landing position.
   a. above          b. at the same height as          c. below          d. related to (on the mother’s side)

33. A block slides down an incline with friction equaling the component of its weight that is parallel to the plane. Which of the following statements is correct?
   I. Its velocity is constant.
   II. Its acceleration is zero.
   III. The net force on it is zero.
   a. I only          b. I and II only          c. I and III only          d. II and III only          e. I, II and III

34. An object is released from rest on a planet that has no atmosphere. The object falls freely for 3.0 meters in the first second. What is the magnitude of the acceleration due to gravity on the planet?
   a. 1.5 m/s^2          b. 3.0 m/s^2          c. 6.0 m/s^2          d. 10.0 m/s^2          e. 12.0 m/s^2

35. When you read the number on the speedometer in a moving car, you are finding the car's:
   a. instantaneous acceleration          b. average speed          c. instantaneous speed
   d. average velocity          e. acceleration          f. go ahead, try to answer “f”, I dare you

36. Using a distance-time graph, a person can find the speed of an object if they calculate the _______ of the line graphed.
   a. the y-intercept          b. the x-intercept          c. undefined          d. slope

37. If an object is speeding up in the positive direction then its acceleration is
   a. positive          b. negative          c. neat-o          d. boffo-keen
38. If an object is slowing down in the positive direction then its acceleration is
a. positive    b. negative    c. groovy    d. boffo-keen    e. itchin’ for a fight

39. If a ball is fired straight up at a speed of 100 m/s, about how long will it take to get to the top of its path?
a. 1 second    b. 2 seconds    c. 10 seconds    d. 20 seconds    e. huh?

40. If a ball is fired straight up at a speed of 100 m/s, about how long will it take to return to you?
a. 1 second    b. 2 seconds    c. 10 seconds    d. 20 seconds    e. Oh, no she DIDN’T!!

41. If a ball is fired straight up at 100 m/s, what will be its speed at the top of its path?
a. 10 m/s    b. 20 m/s    c. 100 m/s up    d. 100 m/s down    e. 0 m/s

42. If a ball is fired straight up at a speed of 100 m/s, what speed will it return to you with?
a. 10 m/s    b. 20 m/s    c. 100 m/s up    d. 100 m/s down    e. 0 m/s

43. A ball is thrown straight up. At the top of its path its acceleration is
a. 0 m/s/s    b. about -5 m/s/s    c. about -10 m/s/s    d. about 20 m/s/s    e. 0 m/s

44. A song can be scientifically compared to others based on the consistency of its beat.
a. true    b. false    c. like, um, I totally don’t know, ya’know

45. A bullet is fired at 150 m/s, 45° above the horizon. How high does it go above its launch height?
a. 11 m    b. 1600 m    c. 570 m    d. 75 m    e. 574 m

46. Regarding the same bullet as above, what is its range?
a. 570 m    b. 1600 m    c. 574 m    d. 2293 m    e. 2300 m

47. If you win a tug-o-war contest, it is mostly because
a. you pulled the hardest    b. you had the least friction    c. you weighed most    d. you had more friction

48. An object is projected horizontally at 4.0 x 10^2 m/s. If the object falls freely to the ground in 2.0 seconds, at what height did it begin?
a. 4.9 m    b. 19.6 m    c. 9.8 m    d. 8.0 x 10^2 m    e. 2.0 x 10^2 m

49. An unbalanced force of 10 N acts on a 20 kg mass for 5 seconds. The acceleration of the mass is
a. 0.5 m/s^2    b. 40 m/s^2    c. 2 m/s^2    d. 200 m/s^2    e. 2.5 m/s^2

50. An 800 N person is standing in an elevator. If the normal force acting on the person is 600 N, they are
a. at rest    b. accelerating downward    c. accelerating upward    d. at a constant speed

51. This class has been
a. interesting    b. exciting    c. invigorating    d. some other “-ing” word

Congratulations, you have made it through the first semester of physics. I am very proud of your efforts and would hope that you continue in your efforts, as it makes teaching you so much more fun!

- The Management -