PHYSICS 5 TEST 2 REVIEW

1. A car slows down as it travels from point A to B as it approaches an "S" curve shown to the right. It then travels at constant speed through the turn from point B to C. Select from the choices below the arrow that shows the direction of the acceleration vector for each numbered point. The point number is the question number on the scantron form.
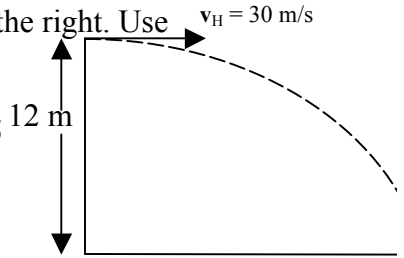
a. ←   b. ↖   c. ↗   d. →   e. ↘
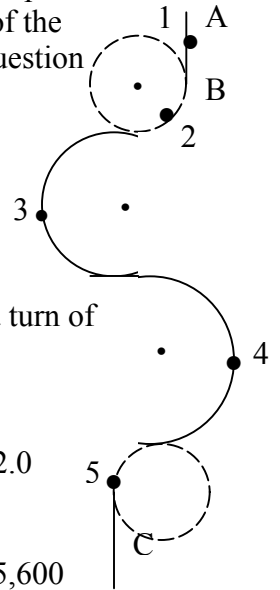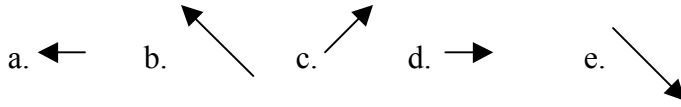
A 2,000 kg car carries a 50 kg driver at a constant speed of 15 m/s around a turn of radius 75 m. Use this information to answer numbers 6 though 11.

6. Find the centripetal acceleration of the car in m/s²
    a. 0.200   b. 3.00   c. 9.80   d. 16.9   e. 32.0

7. Find the total centripetal force in newtons on the car and driver.
    a. 410   b. 6,150   c. 20,100   d. 34,600   e. 65,600

8. What object exerts the centripetal force on the car?
    a. car   b. driver   c. engine   d. road   e. tires

9. The centripetal force causes the car's _____ to change
    a. speed   b. direction of travel   c. nothing

10. Find the centripetal force in newtons on the driver alone
    a. 10.0   b. 150   c. 490   d. 845   e. 1,600

11. What object exerts the centripetal force on just the driver?
    a. car   b. driver   c. engine   d. road   e. tires

12. If you double the mass of the sun, the gravitational force of the sun on the earth will be changed to _____ times its original value.
    a. 0.25   b. 0.50   c. 1   d. 2   e. 4

13. If you double the mass of the earth, the gravitational force of the sun will be changed to _____ times its original value
    a. 0.25   b. 0.50   c. 1   d. 2   e. 4

14. A 70 kg skydiver is found to have a downward acceleration of 7.3 meters per second squared shortly after stepping out of an airplane. Find the net force in newtons on the skydiver.
    a. -52.1   b. -175   c. -511   d. -686   e. -1,197

A planet has a mass of two times the earth's mass and a radius three times the earth's radius. Use this information to answer problems through 19.

15,16,17. Find g_p on the surface of this planet in terms of g on the earth's surface, g_e.
   In other words, if $g_p = x \, g_e$, find x.
       a. 0.22   b. 1.22   c. 0.667   d. none of these

18. Find the acceleration in m/s^2 of an object in free fall near the planet's surface.
       a. 2.18   b. 6.54   c. 7.35   d. 13.0   e. 14.7

19. Find the weight in newtons of a 4 kg object on the planet's surface.
       a. 8.72   b. 26.2   c. 29.4   d. 52.0   e. 58.8

An arrow is shot horizontally with a speed of 30 m/s from a cliff meters above the level ground. The arrow lands a distance from the base of the cliff as shown to the right. Use this information to answer numbers 20 through 23. $v_H = 30$ m/s
   20,21. How many seconds is the arrow in the air?
       a. 0.400   b. 0.752   c. 0.866   d. 1.56   e. 2.45 12 m

22,23. Find the horizontal distance in meters shown in the figure that
   the arrow lands from the bottom of the cliff
       a. 12.0   b. 22.5   c. 26.0   d. 45.8   e. 73.5

24. Tides in the earth's oceans are caused by
       a. only the earth's gravity b. only the moon's gravity
       c. only the sun's gravity   d. both the sun and the moon's gravity
       e. both earth and moon's gravity

25. While in low earth orbit, the apparent weight of a 90 kg astronaut is
       a. 0   b. 882 N   c. 90 kg   d. 10 N   e. 2,240 N

26. While in low earth orbit, the true weight of a 90 kg astronaut is
       a. 0   b. 882 N   c. 90 kg   d. 10 N   e. 2,240 N

27. Which force is responsible for holding a car in an unbanked curve?
       a. car's weight
       b. force of friction
       c. reaction force to the car's weight
       d. vertical component of the normal force
       e. horizontal component of the normal force

28. A boy is whirling a stone around his head by means of a string. The string makes one revolution in a second. The boy then speeds up the stone, keeping the radius of the circle unchanged, so that the string makes two complete revolutions every second. What happens to the tension in the string?
       a. it remains unchanged
       b. it is reduced to half is original value
       c. it is increased to twice its original value
       d. it is increased to four times its original value
       e. it is reduced to one-fourth of its original value

29. A football is kicked at an angle with respect to the horizontal. Which statement best describes the acceleration of the football during this event if air resistance is neglected.
   a. it is zero at all times
   b. it is 9.8 m/s^2 at all times
   c. it is zero when the football has reached the highest point in its trajectory
   d. it is positive as the football rises, and it is negative as the football falls
   e. it starts at 9.8 m/s^2 and drops to some steady but lower value as the ball approaches the ground.

30. A racing car is traveling at a constant speed around a circular track. What happens to the centripetal acceleration of the car if the speed is doubled?
   a. it remains the same.
   b. it increases by a factor of 2.
   c. it increases by a factor of 4.
   d. it is decreases by a factor of one-half.
   e. it is decreases by a factor if one-fourth.

31,32,33. A satellite of earth feels a gravitational force by the earth of 45 N when at a distance of four times the earth's radius. What gravitational force will it feel at a distance of three times the earth's radius?
   a. 80 N   b. 240 N   c. 60 N   d. 120 N   e. 160 N

34. Which statement best explains why the weight of an object of mass m is different on Mars than it is on earth?
   a. the constant G is different on Mars
   b. the mass m will be different on Mars
   c. the mass of Mars is different from that of Earth
   d. the masses and radii of Mars and Earth are not the same
   e. the mass m is farther from the Earth's center when it is on Mars

35. As a projectile moves along its parabolic path near the surface of the earth, the horizontal component of its velocity (neglecting the effects of air friction)
   a. gradually decreases to zero   c. gradually increases
   b. remains constant   d. decreases as the projectile climbs to the top of its trajectory and in creases as it falls to earth.

36. Consider the motion of a projectile which is fired straight up in the presence of negligible air friction.
   a. the time in the air is directly proportional to the maximum altitude reached
   b. the maximum altitude reached is directly proportional to the initial speed.
   c. the projectile is accelerating all the time it is in the air.
   d. the maximum altitude reached depends on the weight of the projectile.
   e. the time rising and the time falling are not equal.

37. The reason the Moon does not fall into the earth is that
   a. the Earth's gravitational field is weak at the moon.
   b. the gravitational pull of other planets keep the moon up.
   c. the moon has less mass than the Earth.
   d. none of these.

38. During an eclipse of the sun, when the moon comes between the Sun and the Earth, the ocean tide nearest the Moon would be
     a. extra high   b. extra low   c. the same as always

39. It takes approximately 28 days for the Moon to complete one orbit around the earth. If the Moon were farther from the Earth than it is now, it would take
     a. more than 28 days   b. less than 28 days   c. 28 days

40. There would still be two ocean tides per 24 hours if the
     a. Earth and Moon had equal masses.
     b. Moon had more mass than Earth.
     c. Sun's influence on the tides was negligible.
     d. all of these
     e. none of these

Part II
1. Resolve the vector into its x and y components
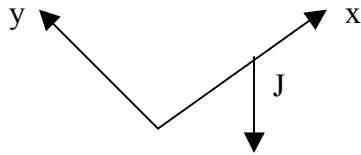
2. Indicate the following At pt. 1
     a. **a** = acceleration
     b. vertical velocity component
     c. horizontal velocity component
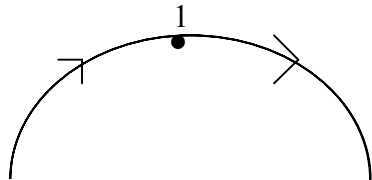
Answers

1) c	2) b	3) d	4) a	5) e	6) b	7) b	8) d	9) b	10) b
11) a	12) d	13) d	14) c	15,16,17) a		18) a	19) a	20,21) d	
22,23) d	24) d	25) a	26) b	27) b	28) d	29) b	30) c	31, 32, 33) a	
34) a	35) b	36) c	37) d	38) a	39) a	40) d			

PHYSICS
5 TEST 2 REVIEW
Instructions:
Part II- do on page 4 of scantron mini blue book

Part I – Scantron
Multiple Choice: Choose the single best response to each question.
1. Tides in the earth's oceans are caused by
    a. only the earth's gravity
    b. only the moon's gravity
    c. only sun's gravity
    d. both sun and moon's gravity
    e. both earth and moon's gravity

2. If you double the mass of the earth, the gravitational force of the sun on the earth will be changed to _____ times its original value
    a. 0.25   b. 0.50   c. 1   d. 2   e. 4

3. A planet is in orbit around a star. The value for g of the star at the orbit of the planet is 5 m/s^2. The star suddenly collapses to a new diameter that is one half of its original diameter. The mass of the star does not change during the collapse. The value of g at the planet's orbit after collapse is_____m/s^2.
    a. 1.25   b. 25.0   c. 5.00   d. 10.0   e. 20.0

You have arrived at a planet that has a radius the same as the earth's radius and a mass that is three times the mass of the earth. Use this information to answer numbers 4 through 6.

4,5. Find the value for g, the acceleration due to gravity on the planet's surface, for this planet in terms of g on earth. In other words $g_p = xg_E$. Find x.
    a. 1/9   b. 1/3   c. 1   d. 3   e. 9

6. Find the value for g, the acceleration due to gravity on the planet's surface in m/s^2
   a. 1.09   b. 3.27   c. 9.80   d. 29.4   e. 88.2

The next planet on your trip has a radius 2 times the Earth's radius and a mass the same as the mass of earth. Use this information to answer numbers 7 through 9.

7,8. Find the value for g, the acceleration due to gravity on the planets' surface, for this planet in terms of g on earth. In other words $g_p = xg_E$. Find x.
    a. ¼   b. ½   c. 1   d. 2   e. 4

9. Find the weight in newtons of a 5 kg object on the planet's surface.
    a. 12.3   b. 24.5   c. 49.0   d. 98.0   e. 196

10. People in orbit around the earth in the space shuttle appear to be weightless because they
    a. are above the air
    b. are far from earth
    d. are in free fall
    e. don't feel the gravitational force in orbit

c.   are moving rapidly

11. Bullet 1 is dropped (by hand) at the same time that bullet 2 is fired horizontally from a rifle. Which bullet lands first? Neglect air resistance.
    a. 1   b. 2   c. neither, they land at the same time

12. A baseball is thrown horizontally with a speed of 15 m/s. Once the ball has left the thrower's hand, the horizontal acceleration of the ball is _____ m/s^2. neglect air resistance
    a. 0   b. 5.2   c. 9.8   d.15.0   e. 24.8

13. A baseball is thrown horizontally with a speed of 15 m/s. Once the ball has left the thrower's hand, the vertical acceleration of the ball is _____ m/s^2. neglect air resistance
    a. 0   b. 5.2   c. 9.8   d. 15.0   e. 24.8

A 0.2 kg arrow is shot horizontally with a speed of v from a cliff 15 meters above the level ground below the cliff. The arrow lands 75 m from the base of the cliff as shown to the right. Use this information to answer numbers 14 through 17.

14,15. How many seconds is the arrow in the air?
        a. 1.75   b. 2.17   c. 3.06   d. 3.91   e. 15.3

16,17. Find the speed v in m/s of the arrow when it leaves the bow.
        a. 4.90   b. 19.2   c. 24.5   d. 34.6   e. 42.9
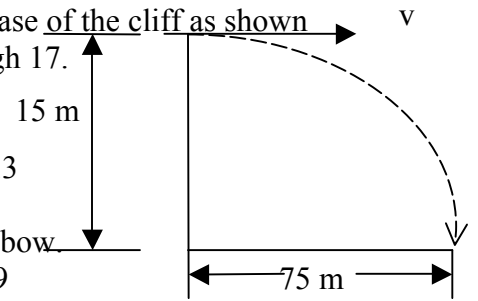
A car is following a curved path from point 1 to point 3 as shown to the right. Use this information to answer numbers 18 through 23.

18. The car's speed is increasing at point 1 Which arrow shows the direction of the car's velocity vector?

19. The car's speed is constant at point 2. Which arrow shows the direction of the car's velocity vector?

20. The car's speed is decreasing at point 3. Which arrow shows the direction of the car's velocity vector?

21. The car's speed is increasing at point 1. Which arrow shows the direction of the car's acceleration vector?

22. The car's speed is constant at point 2. Which arrow shows the direction of the car's acceleration vector?
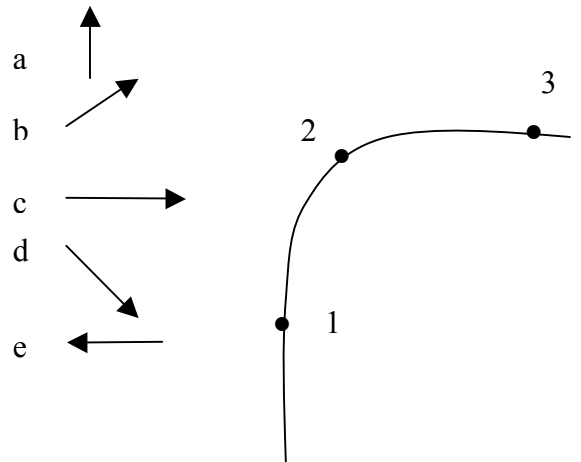
23. The car's speed is decreasing at point 3. Which arrow shows the direction of the car's acceleration vector?

24. The centripetal force causes an object's _____ to change.
    a. direction of travel   b. speed of travel   c. nothing

25,26. If your car goes around a turn with a speed v_1, it takes a centripetal force F_1 to keep the car going around the turn. What force F_2 is required if you go around the curve with a speed v_2 that is 1.5 times v_1?
    a. F_1 b. $1.50\ F_1$ c. $2.25\ F_1$ d. $3.00\ F_1$ e. $4.00\ F_1$

A 0.3 kg rock is being whirled at the end of a string in a circle of radius 2.0 m. the rock makes 4 revolutions every second. Use this information to answer numbers 27 though 30.

27,28. Find the speed of the rock in m/s.
    a. 2.00   b. 3.14   c. 6.28   d.12.6   e. 50.3

29. Find the centripetal acceleration of the rock in m/s^2.
    a. 2.00   b. 4.93   c. 19.7   d. 79.4   e. 1,260

30. Find the centripetal force in N on the rock
    a. 0.600   b. 1.48   c. 5.91   d. 23.8   e. 378

31. The net force on a skydiver is greatest when she
    a. first steps out of the airplane
    b. has reached terminal velocity
    c. is halfway between a. and b.

32. The acceleration of a skydiver is least when she
    a. first steps out of the airplane
    b. has reached terminal velocity
    c. is halfway between a. and b.

Use the following information to work problems 33 though 38. A man is measuring the acceleration of an express elevator in the Empire State Building by reading his old bathroom scale that he is standing on while riding the elevator. Before the elevator starts moving, the scale reads 185 lb.

33,34,35. While starting to move, the scale reads 165 lb. find the magnitude acceleration of the elevator in ft/s^2.
    a. 0.289   b. 3.46   c. 5.78   d. 28.5   e. 32.0

36. What is the direction of the acceleration?
    a. up.   b. down   c. there is no way to tell

37,38. Later the elevator is traveling at a constant speed of 15 ft/s. Find the reading on the scale in pounds.

a. 165   b. 170   c. 185   d. 200   e. 205

39,40,41. How many feet in altitude would a skydiver have to be in order to be able to
        fall through the air for 25 seconds? Neglect air resistance.
        a. 123   b. 400   c. 800   d. 37,062   e. 10,000

42. Which of the following statements is correct?
        a. 1 kg isn't related to 2.2 lb   d. 1 kg equals 2.2 lb
        b. 1kg has a mass of 2.2 lb   e. none of these
        c. 1 kg weighs 2.2 lb

Identify the following as either: free fall (mark a) of not free fall (mark b)

43. A feather dropped from two meters above the earth

44. A rock dropped from two meters above the earth

45. A satellite in orbit around the earth

46. The space shuttle during re-entry through the earth's atmosphere

Part 2
    1. An object weighs 15 N when on the surface of the earth. It is then moved to a
        distance 3.5 times the earth's radius, (measured from the center of the earth).
        Find: the weight of the object at this distance.
        Ans: 1.22 N

    2. The mass of Venus is 4.90×10^{24} kg and its distance from the sun is 1.08×10^{11} m. It
        takes 1.94×10^{7} s to complete an orbit.
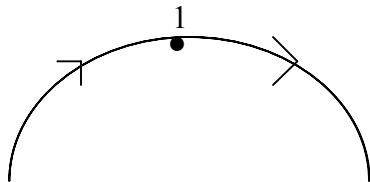   Find: the gravitational force exerted on Venus by the Sun.
        Ans: 5.54×10^{22} N

    3. Reproduce the following drawing on page 4 of your scantron mini
            blue book and indicate the vectors for the following at points 1 and
            2 on the projectile path provided.
            a. acceleration   b.   vertical velocity component
            c. horizontal velocity component

ANSWERS TO MULTIPLE CHOICE

1) d 2) d 3) c 4,5) d 6) d 7,8) a 9) a 10) d 11) c 12) a 13) c
14,15) a 16,17) e 18) a 19) b 20) c 21) a 22) d 23) e 24) a 25, 26) c
27,28) e 29) e 30) e 31) a 32) b 33,34,35) b 36) b 37,38) c 39,40,41) e
42) c 43) b 44) a 45) a 46) b