PHYSIC 5 TEST 3 REVIEW
Part I- Scantron
Multiple choice: choose the single best response to each question

1. A skier standing (at rest) on a hilltop has _____ energy
   a. only kinetic   b. both kinetic and potential   c. only potential

2. A skier sliding down the hillside has _____ energy
   a. only potential b. both kinetic and potential   c. only kinetic

3. A skier sliding on level snow at the bottom of the hill has _____ energy
   a. only potential b. only kinetic.   c. both kinetic and potential

A 1,500 kg car is coasting at 10 m/s along the top of a hill 40 m high. Use this information to answer numbers 4 through 12.

v = 10 m/s
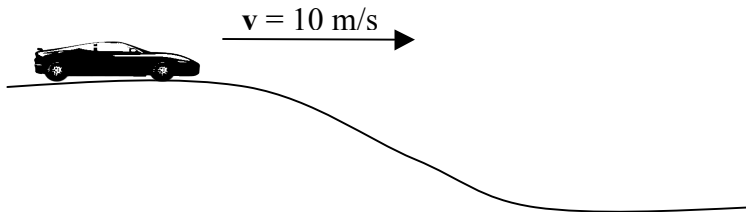
4. Find the momentum in SI units of the car at the top of the hill.
   a. 1,530 b, 15,000   c. 147,000   d. 588,000   e. 600,000

5,6 Find the kinetic energy of the car in J at the top of the hill
   a. 7,500 b. 15,000   c. 75,000   d. 150,000   e. 600,000

7. Find the potential energy of the car in Joules at the top of the hill
   a. 7,500 b. 60,000   c. 147,000   d. 588,000   e. 600,000

8. Find the potential energy of the car in J at the bottom of the hill
   a. 0   b. 135,000   c. 588,000   d. 663,000   e. 738,000

9,10. Find the kinetic energy of the car in J at the bottom of the hill
   a. 0   b. 135,000   c. 588,000   d. 663,000   e. 738,000

11,12. Find the speed of the car in m/s at the bottom of the hill
   a. 0   b. 13.4   c. 28.0   d. 29.7   e. 31.4

13. Two cars collide at an intersection, causing extensive damage to both cars. The collision caused the total kinetic energy of the two cars to _____
   a. increase   b. decrease   c. remain unchanged

14. Two cars collide at an intersection, causing extensive damage to both cars. The collision caused the total momentum of the two cars to _____
   a. increase   b. decrease   c. remain unchanged

15. A rifle fires a bullet. The firing caused the total kinetic energy of the rifle and bullet to _____.
    a. increase   b. decrease   c. remain unchanged

16. A rifle fires a bullet. The firing caused the total momentum of the rifle and bullet to _____.
    a. increase   b. decrease   c. remain unchanged

A 3,000 kg car traveling to the left at 25 m/s collides head on with a 2,000 kg car traveling to the right at 30 m/s as shown. Use this information to answer numbers 17 through 22.

30 m/s   25 m/s

2,000 kg   3,000 kg

17,18. Find their total momentum before the collision in units of kg, m and s
    a. -15,000   b. -1,530   c. 0   d. 13,800   e. 135,000

19. Find their total momentum after the collision in units of kg, m and s.
    a. -15,000   b. -1,530   c. 0   d. 13,800   e. 135,000

20,21. Find their speed in m/s if they stick together after the collision
    a. 2.74   b. 3.00   c. 5.00   d. 19.2   e. 270

22. After the collision they are traveling to the _____
    a. left   b. right   c. neither, they are at rest

A 40,000 kg space freighter is at rest in deep space. The crew sends the 30,000 kg cargo section away from the ship with a speed of 2 m/s. leaving behind the 10,000 kg crew module. Use this information to answer numbers 23 through 26.

23. Find the total momentum in units of kg, m, and s of the 40,000 kg freighter before the cargo section is sent away from the ship.
    a. 0   b. 20,000   c. 60,000   d. 80,000   e. 100,000

24,25,26. Find the speed of the 10,000 kg crew module in m/s after the separation
    a. 0.500   b. 0.667   c. 1.50   d. 3.46   e. 6.00

27. Air bags make cars safer than ones without airbags because they
    a. are softer   d. all of these
    b. lessen impulse due to their "give"   e. none of these
    c. extend the time during which the momentum of an occupant is reduced

28. You're driving down the highway and a bug spatters into your windshield. Which undergoes the greater change in momentum?
    a. the bug
    b. you car
    c. both the same

29. A rifle recoils from the bullet it fires. The speed of recoil is small because the
    a. force against the rifle is relatively small
    b. speed is mainly concentrated in the bullet
    c. rifle is relatively massive
    d. momentum of the rifle is unchanged
    e. impulse against the rifle is conserved

30. In an elastic collision of 2 bodies
    a. only the total kinetic is conserved
    b. only the total momentum is conserved
    c. both total energy and momentum are conserved
    d. the energy is shared in the ratio of the masses
    e. the momentum is shared in the ration of the masses

31. In order for momentum to be conserved in a collision of 2 bodies
    a. both must come to rest   d. all reaction forces must equal action forces
    b. no external forces can act   e. velocities must relate directly to the masses
    c. energy must also be conserved

32. Negative work is a concept which implies
    a. kinetic energy is reversed
    b. the force causing motion is decreasing
    c. the force is perpendicular to the line of movement
    d. the applied force is opposite to the displacement
    e. the object moves below ground level

A 5,000 lb car is traveling down a hill as shown. The components of the weight of the car are 3,000 lb parallel to the hill and 4,000 lb perpendicular to the hill. Use this information to answer numbers 33 through 36.

$W_{\|} = 3,000$ lb

$W = 5,000$ lb

$W_{\perp} = 4,000$ lb
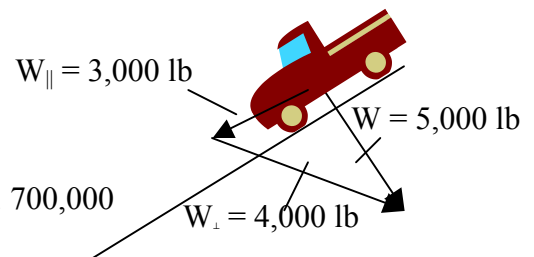
33. find the work done in ft·lb done by the component of the weight parallel to the hill as the car travels 100ft. down
    a. 0   b. 300,000   c. 400,000   d. 500, 000   e. 700,000

34. find all the work in ft·lb done by the component of the weight perpendicular to the hill as the car travels 100 ft down the hill
    a. 0   b. 300,000   c. 400,000   d. 500,000   e. 700,000

35. Find the work in ft·lb done by the (total) weight as the car travels 100 ft. down the hill
    a. 300,000   b. 400,000   c. 500,000   d. 700,000   e. 800,000

36. Find the work in ft·lb dine by a person holding the car at rest 200 ft from the bottom of the hill.
   a. 0   b. 600,000   c. 800,000   d. 1,000,000   e. 1,400,000

A 0.050 kg bullet is traveling 200 m/s. the bullet strikes a target and is brought to a stop in 12 centimeters (0.12 m). Use this information to answer numbers 37 through 40.

37. Find the kinetic energy of the bullet in joules
   a. 0.00600   b. 0.490   c. 0.600   d. 5.00   e. 1,000

38. Find the magnitude of the work in joules done to stop the bullet
   a. 0.00600   b. 0.490   c. 0.600   d. 5.00   e. 1,000

39,40. Find the average force in newtons exerted on the bullet while it was being brought to a stop
   a. 0.0500   b. 0.490   c. 5.00   d. 41.7   e. 8,330

1. Padded dashboards in cars are safer than non-padded ones because they
   a. are softer
   b. lessen impulse due to their "give"
   c. extend the time during which the momentum of an occupant is reduced
   d. all of these
   e. none of these

2. You're driving down the highway and a bug spatters into your windshield. Which undergoes the greater change in momentum?
   a. the bug   b. your car   c. both the same

3. A rifle recoils from the bullet it fires. The speed of recoil is small because the
   a. force against the rifle is relatively small
   b. speed is mainly concentrated in the bullet
   c. rifle is relatively massive
   d. momentum of the rifle is unchanged
   e. impulse against the rifle is conserved

4. The velocity of a bullet will be equal and opposite to the velocity of the recoiling gun
   a. because momentum is conserved
   b. because velocity is conserved in this case
   c. because both momentum and velocity are conserved in all cases
   d. if the weight of the bullet equals the weight of the rifle

5. 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 keeps the moon up
   c. the moon has a sufficiently large orbital speed

d. the moon has less mass than the earth
e. none of these

6. For an object to move in a circle at a uniform speed the required condition is
   a. zero acceleration
   b. zero force
   c. zero net force
   d. tangential acceleration less than centripetal acceleration
   e. constant acceleration inward normal to its direction of motion

7. The main reason that ocean tides exist is that
   a. the sun and moon pull in conjunction at high tides and opposition at low
      tides
   b. the moon's pull on oceans closer to the moon is larger than its pull on
      oceans farther from the moon
   c. the moon is closer to the earth than is the sun
   d. the moon and the sun pull in opposite directions on the oceans
   e. none of these

8. In order for momentum to be conserved in a collision of 2 bodies
   a. both must come to rest
   b. no external force can act
   c. energy must also be conserved
   d. all reaction forces must be equal action forces
   e. velocities must relate directly to the masses

9. Negative work is a concept which implies
   a. kinetic energy is reversed
   b. the force causing motion is decreasing
   c. the force is perpendicular to the line of movement
   d. the applied force is opposite to the displacement
   e. the object moves below ground level

10. A ball is projected into the air with 100 J of kinetic energy which is transformed
    to gravitational potential energy at the top of its trajectory. When it returns to its
    original level after encountering air resistance, its kinetic energy is
    a. less than 100 J   c. 100 J
    b. more than 100 J   d. not enough information given

11. An arrow is drawn so that it has 40 J of potential energy. Neglecting air
    resistance, when fired, the arrow will have a kinetic energy of
    a. less than 40 J   b. more than 40 J   c. 40 J

12. In an elastic collision of 2 bodies
    a. only the total kinetic energy is conserved
    b. only the total momentum is conserved

    c. both total energy and momentum are conserved
    d. the energy is shared in the ratio of the masses
    e. the momentum is shared in the ratio of the masses

13. A 1000 kg car and a 2000 kg car are hoisted the same distance in a gas station. Raising the more massive car requires
    a. less work   d. four times as much work
    b. as much work   e. more than 4 times as much work
    c. twice as much work

14. An object that has kinetic energy must be
    a. moving   b. falling c. at an elevated position   d. at rest   e. none of these

Answers:

1. C	7. B	13. C
2. C	8. B	14. A
3. C	9. D	
4. D	10. A	
5. C	11. C	
6. E	12. C	