

**TEST NAME: CMS SCI PHYSICS Practice Final Exam**  
**TEST ID: 618784**  
**GRADE: 09 - Ninth Grade - 12 - Twelfth Grade**  
**SUBJECT: Life and Physical Sciences**  
**TEST CATEGORY: District Benchmark**

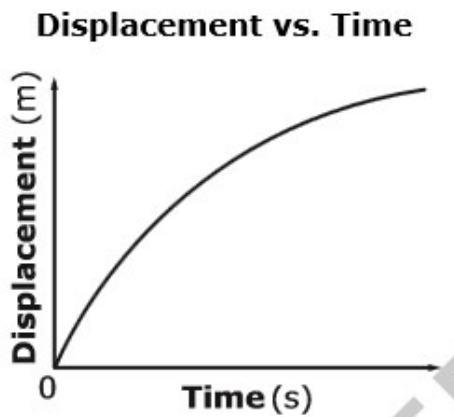
## 08/24/15, CMS SCI PHYSICS Practice Final Exam

Student: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

1. The graph below represents the displacement of an object over time. Which best describes the velocity of the object?



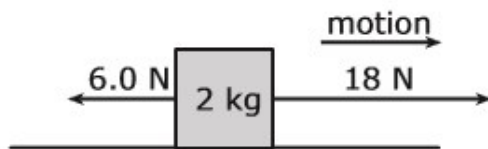
- A. The velocity increases at a constant rate.
- B. The velocity remains the same.
- C. The velocity decreases at a constant rate.
- D. The velocity remains at zero.
2. What can be concluded about the shape of an acceleration vs. time graph when the instantaneous acceleration of an object and its average acceleration are the same?
- A. It is a curved line.
- B. It is a zigzag line.
- C. It is a straight line parallel to the time axis.
- D. It is a straight line parallel to the acceleration axis.
3. A car traveling at 6.1 m/s increases its speed to 36.5 m/s in 9.9 s. What assumption can be made about the acceleration of the car?
- A. The instantaneous acceleration of the car is 2.2 m/s/s.
- B. The average acceleration of the car is 3.1 m/s/s.
- C. The instantaneous acceleration of the car is 3.7 m/s/s.
- D. The average acceleration of the car is 4.3 m/s/s.

4. A stone is dropped into water from a bridge 52 m above the water's surface. What can be determined about the stone when it reaches the water?
- A. Its mass is 16 kg.
  - B. Its velocity is  $-45$  m/s.
  - C. Its speed is 32 m/s.
  - D. Its acceleration is  $-23$  m/s/s.
5. This table shows the relationship between the force on an object and the object's resulting acceleration. What is the mass of the object?

**Force vs. Acceleration**

| Force (N) | Acceleration (m/s/s) |
|-----------|----------------------|
| 0         | 0                    |
| 4         | 2                    |
| 8         | 4                    |
| 12        | 6                    |

- A. 0.2 kg
  - B. 0.5 kg
  - C. 1 kg
  - D. 2 kg
6. Two different forces act on an object moving on a frictionless surface. What amount of force is moving the object?



- A. 6.0 N
- B. 12 N
- C. 18 N
- D. 24 N

7. A car travels around a curved track. It moves twice as fast the second time around the track, as compared to the first time. What can be concluded about the centripetal force as the car travels around the track for the second time?
- A. The centripetal force is one-fourth the original amount.
  - B. The centripetal force is one-half the original amount.
  - C. The centripetal force is twice the original amount.
  - D. The centripetal force is four times the original amount.
8. An object moves in uniform circular motion. What is true regarding the force on the object?
- A. The direction is away from the center, and its magnitude varies.
  - B. The direction is toward the center, and its magnitude varies.
  - C. The direction is away from the center, and its magnitude is constant.
  - D. The direction is toward the center, and its magnitude is constant.
9. Two objects are held close to each other with a compressed spring between them. When the objects are released, one object moves at a speed of 0.63 m/s, and the other object moves at a speed of 0.45 m/s. If the faster object has a mass of 0.035 kg, what is the mass of the slower object?
- A. less than 0.035 kg but greater than 0.0 kg
  - B. equal to 0.035 kg
  - C. greater than 0.035 kg but less than 0.070 kg
  - D. greater than 0.070 kg
10. Which could cause a decrease in the momentum of a moving object?
- A. a decrease in volume
  - B. an increase in volume
  - C. a decrease in speed
  - D. an increase in speed
11. A 0.25-kg block is traveling along a horizontal, frictionless surface at a speed of 2.8 m/s. The block hits a wall and returns in the opposite direction at a speed of 1.7 m/s. What is the approximate impulse of the block on the wall?
- A. 0.28 kg m/s
  - B. 1.1 kg m/s
  - C. 4.4 kg m/s
  - D. 18 kg m/s

12. A student riding a bicycle doubles his speed. By what factor does the kinetic energy of the student and bicycle change?

A.  $\frac{1}{4}$

B.  $\frac{1}{2}$

C. 2

D. 4

13. Spring X has a spring constant of 120 N/m and is compressed 0.23 m relative to its natural length. Spring Y has a spring constant of 150 N/m. How far does spring Y need to be compressed relative to its natural length for it to have the same amount of stored elastic potential energy as Spring X?

A. 0.21 m

B. 0.29 m

C. 0.43 m

D. 0.61 m

14. A 75-kg box dropped from rest at the top of a 33-m high tower falls freely to the ground. How much kinetic and potential energy does the box have when it reaches 15 m above the ground? (Ignore friction.)

A. The box has 3,600 J of kinetic energy and 0.0 J of potential energy.

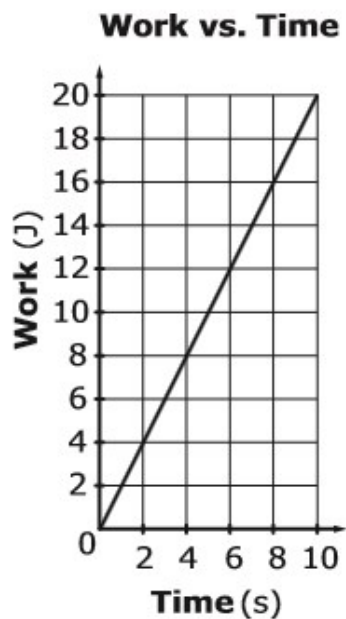
B. The box has 11,000 J of kinetic energy and 13,000 J of potential energy.

C. The box has 13,000 J of kinetic energy and 11,000 J of potential energy.

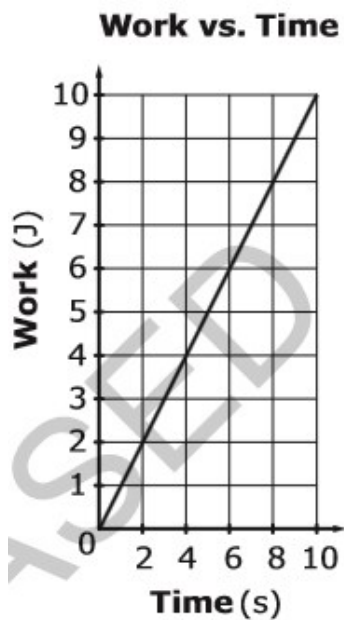
D. The box has 24,000 J of kinetic energy and 0.0 J of potential energy.

15. Machine X produces the least amount of power in a factory. Since power is determined by the amount of work done and the time it takes, which Work vs. Time graph explains the power produced by Machine X?

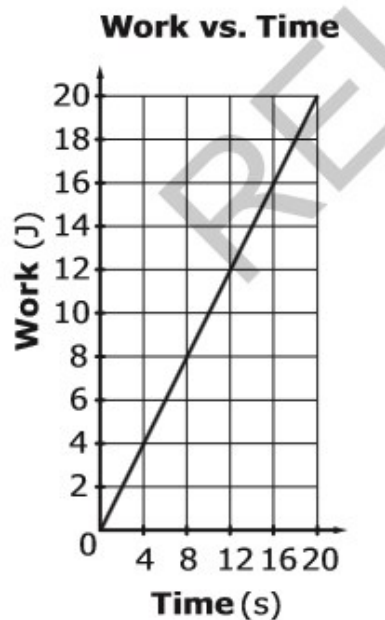
A.



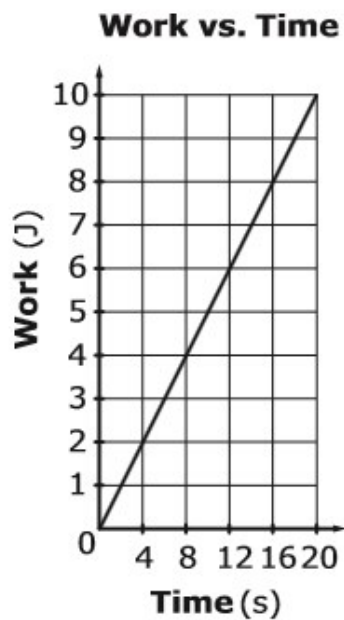
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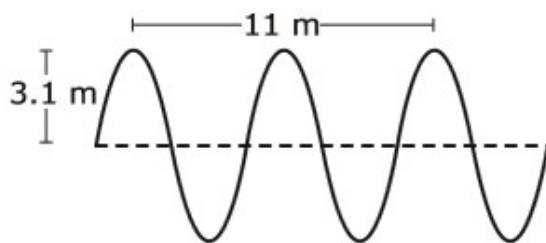
C.



D.



16. A person uses 25.0 J of kinetic energy to push an object for 11.0 s. How are work and power affected if the person uses the same amount of kinetic energy to push the object in less time?
- A. The power will increase, and the amount of work will increase.
  - B. The power will increase, and the amount of work will remain the same.
  - C. The power will decrease, and the amount of work will remain the same.
  - D. The power will decrease, and the amount of work will decrease.
17. An object produces a sound of constant frequency. If the object moves toward a student who is standing still, what happens to the pitch and the wavelength of the sound the student hears while the object is getting closer?
- A. pitch increases, and wavelength decreases
  - B. pitch increases, and wavelength increases
  - C. pitch decreases, and wavelength increases
  - D. pitch decreases, and wavelength decreases
18. The diagram below represents a wave. If its frequency is 25 Hz, what is the approximate speed of the wave?

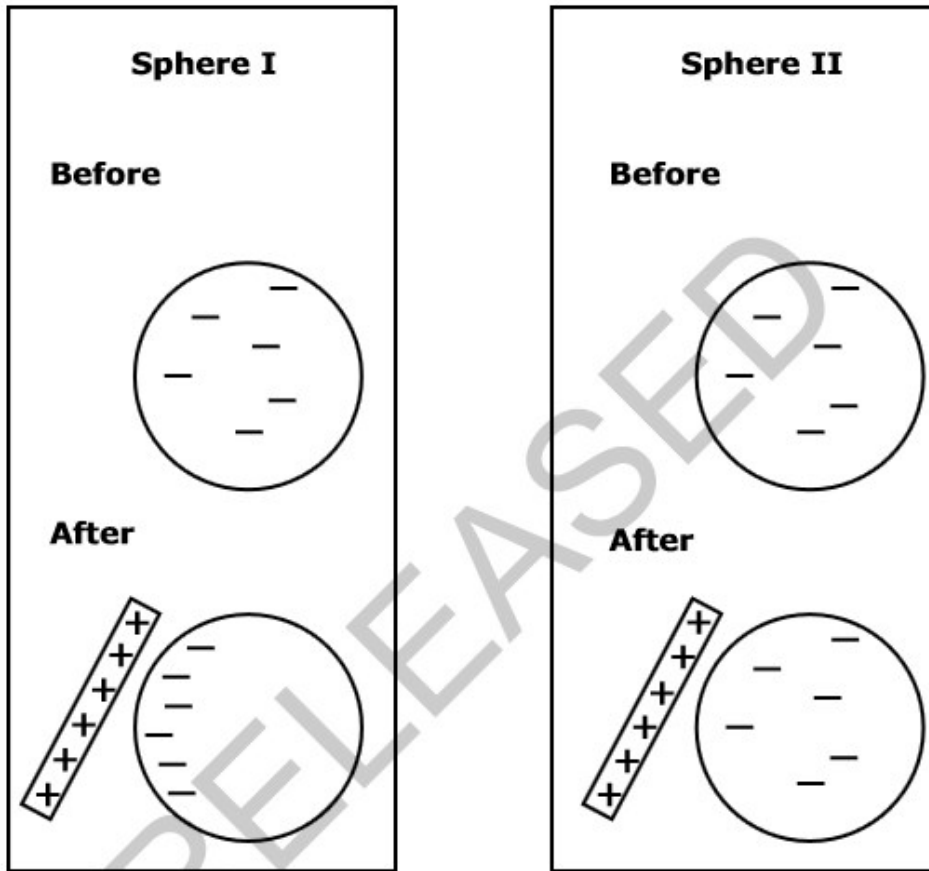


- A. 78 m/s
  - B. 138 m/s
  - C. 160 m/s
  - D. 280 m/s
19. A ray of light traveling in water enters a different medium. If the incident angle of the ray is  $47^\circ$ , and the angle of refraction bends toward the normal, what does this reveal about the index of refraction of the medium?
- A. The index of refraction of the medium is less than the index of refraction of water.
  - B. The index of refraction of the medium is the same as the index of refraction of water.
  - C. The index of refraction of the medium is greater than the index of refraction of water.
  - D. The index of refraction of the medium is not comparable to the index of refraction of water.

20. Which best describes the different mediums in which the speed of light and sound is greatest?
- A. Light travels fastest through air, while sound travels fastest through a diamond.
  - B. Light travels fastest through a diamond, while sound travels fastest through air.
  - C. Light travels fastest through water, while sound travels fastest through glass.
  - D. Light travels fastest through glass, while sound travels fastest through water.
21. A circuit has a voltage source and three identical resistors in parallel. How will removing one of the resistors affect the voltage of the circuit?
- A. The voltage will stay the same because the voltage remains constant through parallel resistors.
  - B. The voltage will increase by a factor of 2 because the voltage constantly increases through parallel resistors.
  - C. The voltage will decrease by a factor of 2 because voltage is directly proportional to the number of parallel resistors a circuit contains.
  - D. The voltage will increase by a factor of 3 because voltage is indirectly proportional to the number of parallel resistors a circuit contains.
22. A circuit contains a voltage source and four resistors connected in series. If the voltage is decreased by one-half, what will happen to the current flowing through the circuit?
- A. The current will decrease by one-fourth because current has an inverse relationship to the number of resistors that are in series.
  - B. The current will decrease by one-half because current has a direct relationship to the voltage of the circuit.
  - C. The current will double because current has an inverse relationship to the voltage of the circuit.
  - D. The current will quadruple because current has a direct relationship to the number of resistors that are in series.
23. A scientist used a material which allowed electrons to move easily from atom to atom. What can be assumed about the material the scientist used?
- A. The material was a conductor.
  - B. The material was an insulator.
  - C. The material was a thermal insulator.
  - D. The material was a semiconductor.

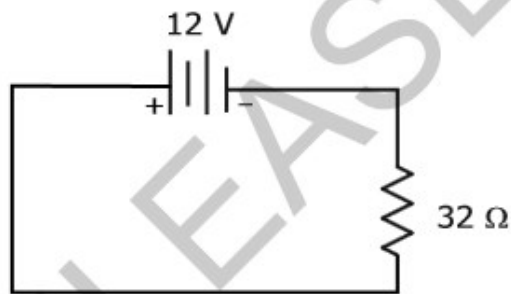


24. Two spheres, Sphere I and Sphere II, are composed of different substances. These diagrams show the distribution of the electrons in the two spheres before and after they are placed next to a positively charged rod. Which sphere is most likely composed of glass?



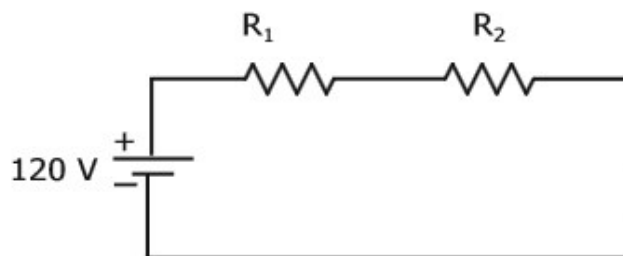
- A. Sphere I, because the electrons are tightly bound
- B. Sphere I, because the electrons are free to move
- C. Sphere II, because the electrons are free to move
- D. Sphere II, because the electrons are tightly bound

25. The diagram below is of a circuit with a resistor. How much power does the resistor use?



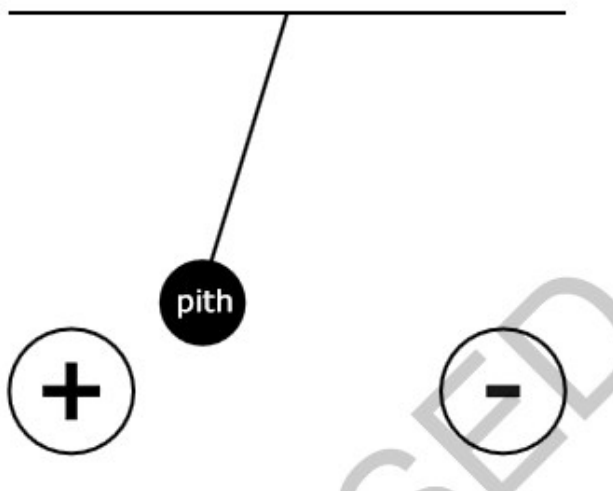
- A. 0.38 W
- B. 4.5 W
- C. 85 W
- D. 380 W

26. This diagram displays a circuit with two resistors. If the circuit produces 40 W, how much energy does it use in 20 s?



- A. 2,400 J
- B. 800 J
- C. 6 J
- D. 2 J

27. A charged pith ball is placed between two fixed charges. The pith ball swings in the direction shown. What is the charge on the pith ball?



- A. positive, because unlike charges attract
  - B. positive, because unlike charges repel
  - C. negative, because unlike charges attract
  - D. negative, because unlike charges repel
- 28.
- The magnitude of an electric field created by a charge of  $2.5 \times 10^{-9}$  C is measured at a distance of 0.04 m. How will the magnitude change if the distance is increased?
- A. The magnitude will decrease, because the electric field's strength decreases with increased distance.
  - B. The magnitude will decrease, because the electric field is directed inward toward the charge.
  - C. The magnitude will increase, because the electric field is directed outward from the charge.
  - D. The magnitude will increase, because the electric field's strength increases with increased distance.

29.

Two metal spheres (I and II) with charges of  $1 \times 10^{-6}$  C and  $2 \times 10^{-6}$  C, respectively, are separated by a distance. Sphere I experiences an electrostatic repulsion of 2.4 N from sphere II. What is the electrostatic repulsion force experienced by sphere II?

- A. Sphere II experiences half the amount of repulsion force because it is twice as large as sphere I.
- B. Sphere II experiences the same amount of repulsion force because an equal and opposite charge is needed to balance the force experienced by sphere I.
- C. Sphere II experiences double the amount of repulsion force because it is twice as large as sphere I.
- D. Sphere II experiences four times the amount of repulsion force because an equal and opposite charge is needed to balance the force experienced by sphere I.

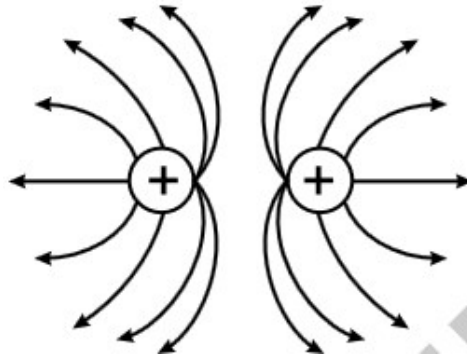
30. A student walks across a carpeted floor and acquires a static electric charge. Why is this an example of friction?

- A. Heat is transferred from the floor to the student's feet.
- B. Heat is transferred from the floor to the air under the student's feet.
- C. Resistance is produced between the student's feet and the carpeted floor.
- D. Current is produced by the student's feet and the carpeted floor.

31. The electric potential at a point is 20 V. How much work is needed to bring a charge of 0.5 C from infinity to that point?

- A. The work required to move the charge is equal to the electric potential at the point times the amount of charge being moved; therefore, 10 J of work is needed for this charge.
- B. The work required to move the charge is equal to the electric potential at the point it is being moved to because the forces are equal and opposite; therefore, 20 J of work is needed for this charge.
- C. The work required to move the charge is equal to the electric potential at the point over the amount of charge being moved; therefore, 40 J of work is needed for this charge.
- D. The work required to move the charge is equal to the electric potential at the point over the square of the amount of charge being moved; therefore, 100 J of work is needed for this charge.

32. This figure shows the electric field around two positive charges placed near each other. According to the electric field lines, how will the charges move?



- A. They will move toward each other and spin because they are unbalanced charges.
  - B. They will move apart and in the same direction because one charge is larger than the other.
  - C. They will move toward each other and collide because like charges attract each other.
  - D. They will move apart and in opposite directions because like charges repel each other.
33. Which material will create the strongest magnetic field when a current-carrying wire is wrapped around the material?
- A. a wool cloth, because wool is a thermal material
  - B. a rubber tube, because rubber is an insulating material
  - C. a glass pipe, because glass is a semi-conducting material
  - D. an iron core, because iron is a conductive material
34. Which would result in an increase in the magnetic field strength produced by an electromagnet?
- A. increasing the space between the turns in the coil
  - B. increasing the number of turns in the coil
  - C. decreasing the current in the coil
  - D. decreasing the voltage in the coil
35. The primary coil of a transformer has 400 turns; the secondary coil has 1,000 turns. An alternating current is sent through the primary coil. The voltage in the primary coil has an amplitude of 17 V. Which statement best describes the voltage amplitude in the secondary coil?
- A. between 0 V and 17 V, because transformer coils are insulators
  - B. between 17 V and 50 V, because transformer coils are conductors
  - C. between 0 V and 17 V, because the coils form a step-down transformer
  - D. between 17 V and 50 V, because the coils form a step-up transformer

36. A transformer triples its input voltage. If the current in the primary coil is 6 A, how does the current change as it moves through the secondary coil?
- A. It decreases to 2 A because this is a step-up transformer.
  - B. It remains at 6 A because transformers are used to keep current constant.
  - C. It increases to 9 A because transformers are used to keep voltage constant.
  - D. It increases to 18 A because this is a step-down transformer.