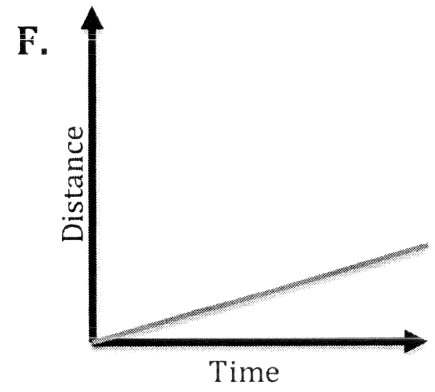
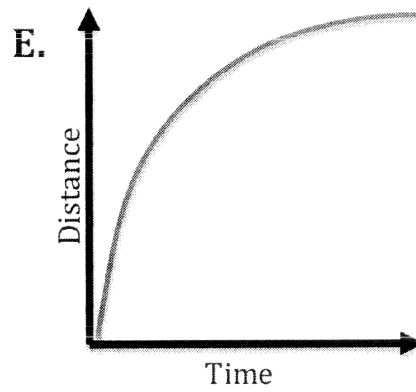
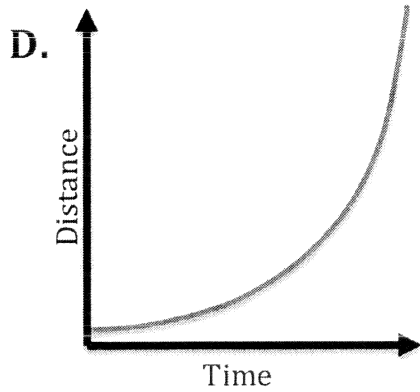
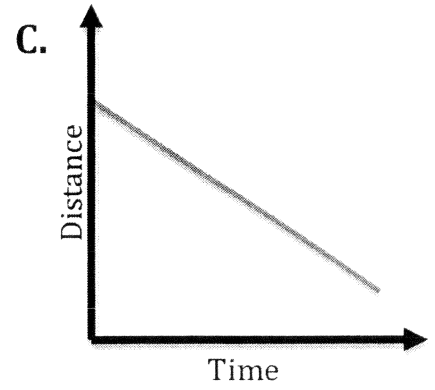
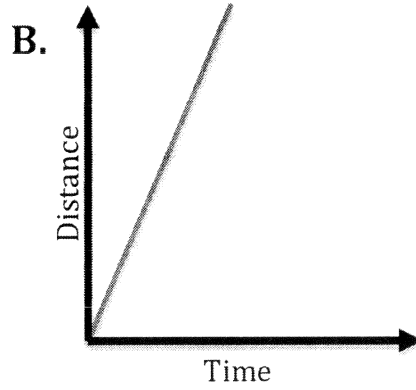
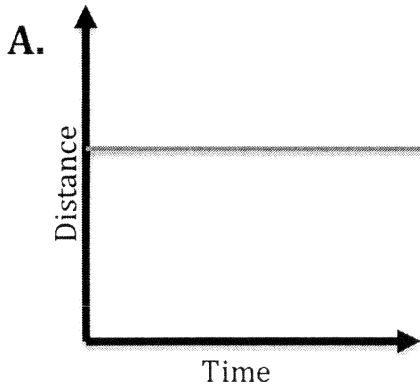


Summary of the formulas that you NEED to know!

Topic	Formula/s	Topic	Formula/s
Horizontal Motion		Vertical Motion	
Momentum		Impulse	
Law of Acceleration		Conservation of Momentum	
Normal Force			
Potential Energy			
Kinetic Energy		Work	
Potential Energy of Spring		Conservation of Energy	
Universal Gravitation		Force of electric	
Centripetal Acceleration		Power	
Heat gain/loss		Vector	

Motion Graph Analysis

Name _____ Per _____



Descriptions of Motion

1. Acceleration
2. Constant Speed (high rate of speed)
3. Constant Speed (low rate of speed)
4. Negative Acceleration (deceleration)
5. No Motion (stopped)
6. Moving Backwards (constant velocity in reverse)

Graph A matches description _____ because _____.

Graph B matches description _____ because _____.

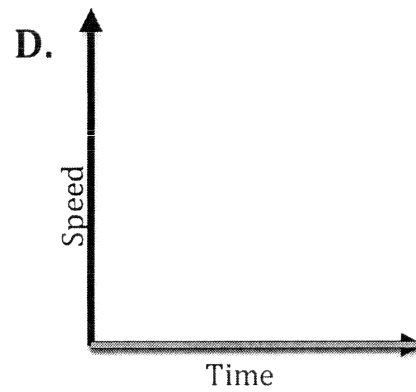
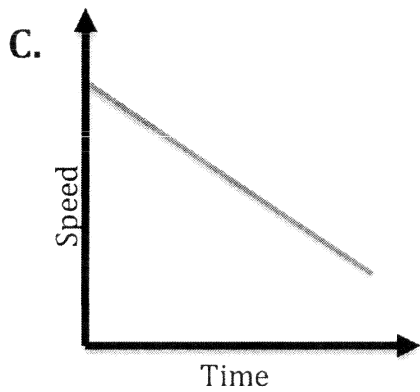
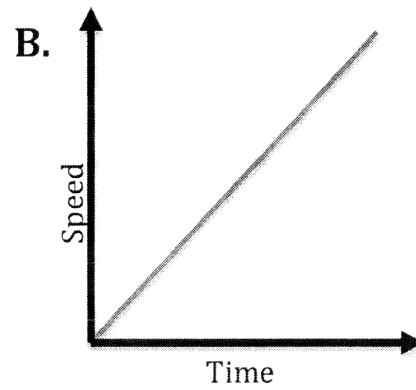
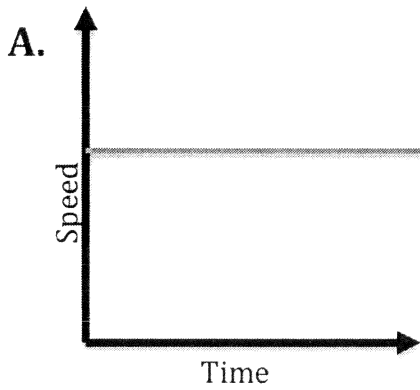
Graph C matches description _____ because _____.

Graph D matches description _____ because _____.

Graph E matches description _____ because _____.

Graph F matches description _____ because _____.

Motion Graphs - Part 2



Descriptions of Motion

1. No Motion (stopped)
2. Constant Speed
3. Acceleration
4. Negative Acceleration (deceleration)

Graph A matches description _____

Graph B matches description _____

Graph C matches description _____

Graph D matches description _____

Use the graph to the right to answer the questions below.

Which runner won the race? _____

Which runner stopped for a break? _____

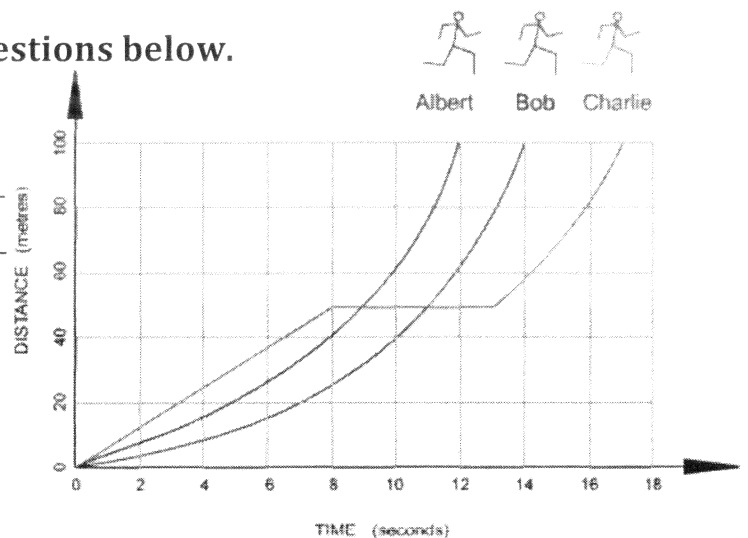
How long was the stop? _____

Calculate each racer's average speed over the race.

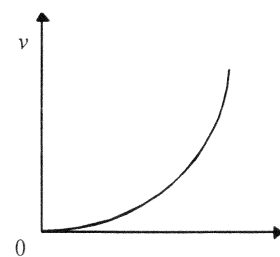
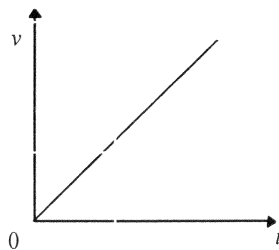
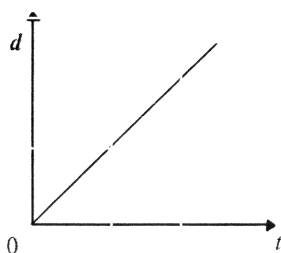
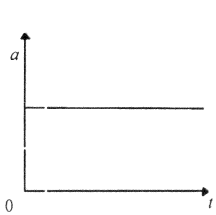
Albert - _____

Bob - _____

Charlie - _____



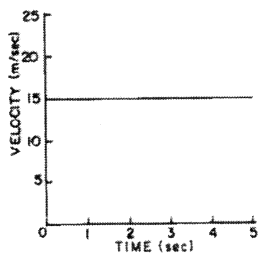
1) The four graphs below depict different types of motion.



Which graphs depict constant non-zero acceleration?

- a. 1 and 4 b. 2 and 3 c. 1, 2 and 3 d. 1, 2 and 4

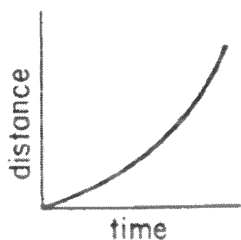
The graph below represents the relationship between velocity and time for an object moving in a straight line. What is the acceleration of the object?



What is the acceleration of the object?

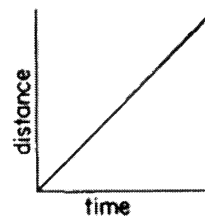
- (1) 0 m/sec^2
 (2) 5 m/sec^2
 (3) 3 m/sec^2
 (4) 15 m/sec^2

The graph at the right represents the relationship between distance and time for an object moving in a straight line. According to the graph, the object is



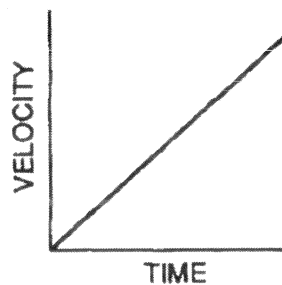
- (1) motionless
 (2) moving at a constant speed
 (3) decelerating
 (4) accelerating

The graph at the right represents the motion of a body that is moving with



- (1) increasing acceleration
 (2) decreasing acceleration
 (3) increasing speed
 (4) constant speed

The graph below represents the motion of a body moving along a straight line.



According to the graph, which quantity related to the motion of the body is constant?

- (1) speed (3) acceleration
 (2) velocity (4) displacement

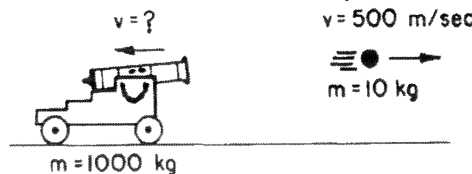
1. A plane traveling at 190 m/s accelerate to a velocity of 280 m/s and cover a distance of 1080 m, determine the acceleration of the plane.

2. What is the acceleration of an object initially traveling at 20 m/s and gain a new velocity of 40 m/s in 120s?

3. A car traveling 42 m/s accelerates at a constant rate of 1.8 m/s^2 for 3.1 s. What is the car's final velocity?

4. What is the momentum of a 30-kilogram cart moving with a speed of 10 meters per second?
 - (1) 20 kg-m/sec
 - (2) 40 kg-m/sec
 - (3) 3 kg-m/sec
 - (4) 300 kg-m/sec

5. In the diagram below, a 10-kilogram ball is fired with a velocity of 500 meters per second from a 1,000-kilogram cannon. What is the recoil velocity of the cannon?
 - (1) 5 m/s
 - (2) 10 m/s
 - (3) 2 m/s
 - (4) 500 m/s

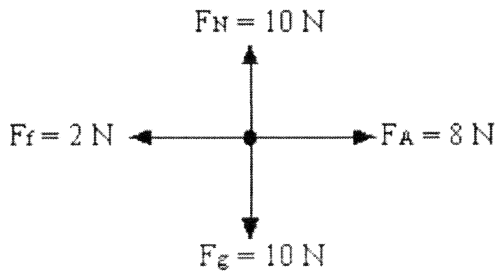


6. What is the impulse on a 2 kg object moving at a 3 m/s when it has increased its velocity to 12 m/s?
 - a. 18 kg m/s
 - b. 24 kg m/s
 - c. 6 m/s
 - d. 30 m/s

7. What is the difference between distance and displacement?

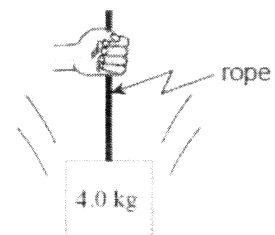
8. What is the acceleration due to gravity if a ball from a 135 m building it's the ground upon release after 5 s?
9. What is the normal force of a 25 kg object at rest on top of the table?

10. Study the free body diagram below and choose the best statement that best describes the dynamics of the object;



- a. There is no net horizontal force
 b. The net force acting is 30N
 c. The net horizontal force is 10N
 d. The net force acting is 6N
 e. The net force acting is 26N
11. Draw a free body diagram of an object on a frictionless surface moving at a constant speed. Use a box to represent your object. There should be four forces acting on the object.

12. Draw a free body diagram of this suspended object.
 Label your forces. Should the arrow larger on the top or should they be equal?



13. A student lifts a bucket with a 98 N force in 30 seconds out of a well. If the bucket is lifted 30 m:

a. How much work is done on the bucket by the student?

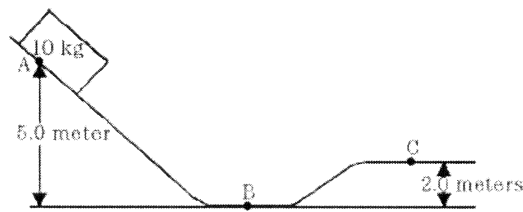
b. How much power is exerted by the student?

14. An object with a kinetic energy of 2160J has a mass of 120kg. What is its velocity?

- a. 36 m/s b. 8 m/s c. 6 m/s d. 18 m/s

The diagram shown represents a frictionless track.

A 10-kilogram block starts from rest at point A and slides along the track.



What is the approximate potential energy of the block at point C?

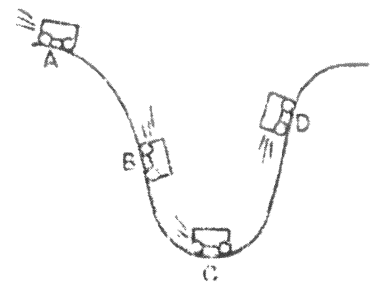
- A. 20J B. 200J C. 300J D. 500J

As the block moves from point A to point B, the total amount of gravitational potential energy changed to kinetic energy is approximately

- A. 5J B. 20J C. 50J D. 500J

17. The diagram shows a cart at four positions as it moves along its track. At which position is the sum of the potential energy and kinetic energy of the cart the same?

- a. A and B b. B and C c. C and D d. All positions, A through D



18. If the force to stretch a spring is given as $k = (56 \text{ N/m})$, then what is the potential energy of the spring if it is stretched 0.32 meters from rest?

19. What is the velocity of a 5 kg object with a 650 J of energy? Express your answer to the nearest tenth.

20. Which of the following has the greatest kinetic energy?

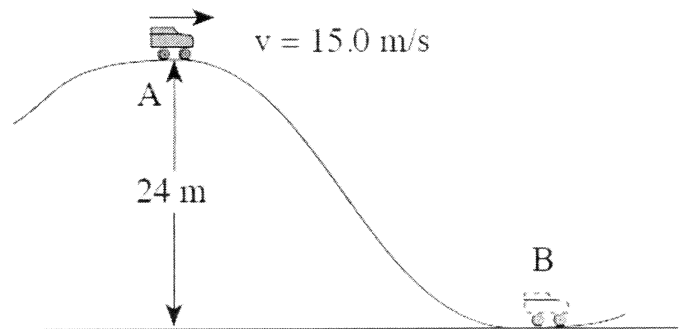
A. an object of mass m with a velocity of $4v$

B. an object of mass $4m$ with a velocity of v

C. an object of mass $3m$ with a velocity of $2v$

D. an object of mass $2m$ with a velocity of $3v$

21. A 150 kg roller coaster car passes the crest of a hill at 15.0 m/s. What is the speed of the car at point **B** at the bottom of the hill?



22. What is the normal force exerted by a 1500 kg car parked on the ground?

a. 1500 N

b. 14700 N

c. 14700 kg

d. 1500 N

23. A car of mass 1200 kg is travelling 8.33 m/s around a bend of radius 100 m. What is its centripetal acceleration?

a. 9996 m/s^2

b. 0.69 m/s^2

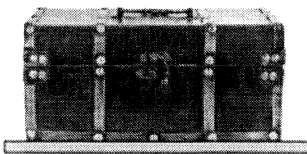
c. 12 m/s^2

d. 8.33 m/s^2

24. What is the tangential velocity of a planet that goes around its orbit of 2400 m radius at a rate of 52 m/s^2 ?

25. A 0.52 kg mass is hit with a net force of 4.5 newtons. How fast would it accelerate? Round your answer to the nearest tenth.
- a. 8.65 m/s² b. 8.6 m/s² c. 8.7 m/s² d. 9 m/s²
26. A 1500 kg roller coaster is located 25 meters above the ground. What is the kinetic energy of the roller coaster at the very bottom of its track?
- a. 37500 J b. 60 J c. 367500 J d. 0.02 J
27. If a woman runs 100 meters north and then 70 meters south, her total displacement is
- a. 170 m south b. 170 m north c. 30 m north d. 30 m south
28. Draw a free body diagram of a car accelerating to the right. Use a box to represent the object and use arrows to denote your forces.

29. Is energy lost in a vacuum? _____
30. What happens to the kinetic energy of a roller coaster going down the ramp? _____
31. What is the normal force of a 250 kg object that is at rest?



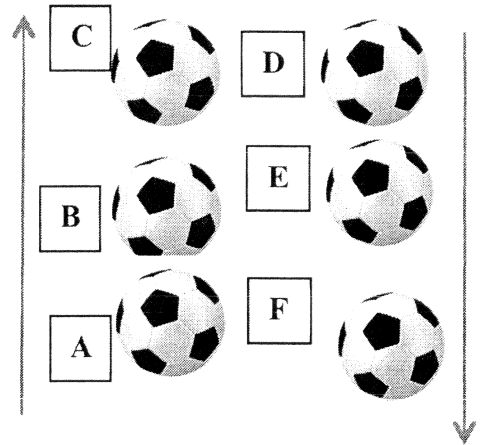
32. A force
- a. is expressed in newtons.
 b. can cause an object to speed up, slow down, or change direction.
 c. is a push or a pull.
 d. All of the above
33. Acceleration of an object
- a. decreases as the mass of the object increases.
 b. increases as the force on the object increases.
 c. is in the same direction as the force on the object.
 d. All of the above
34. If the forces on an object are balanced, the object will
- a. remain at rest if initially at rest.
 b. continue moving in a straight line if initially moving in a straight line.
 c. both A and B
 d. neither A nor B

35. A ball is thrown vertically upward at the top of its trajectory its acceleration is ___

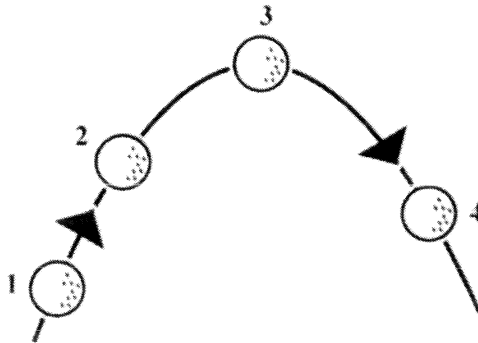
- a. Upward b. Downward c. To the right d. To the left

36. Which of the following statements is NOT true about the ball in free fall?

- a. The velocity of the ball at point C is zero.
 b. The acceleration of the ball at point B is downward.
 c. The acceleration of the ball at point B is -9.8 m/s^2
 d. The time it takes for the ball to go from A to C is different when it comes back down from D to F.



Use the diagram below to answer questions 37-38



37. What is the direction of acceleration of the ball at point 1?

- a. Upward b. Downward c. West

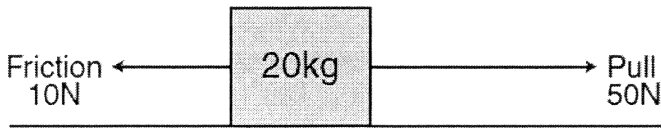
38. What is the acceleration of the ball at point 3?

- a. Zero b. -9.8 m/s^2 c. Undefined

39. What is the velocity of an object going around a radius of 7 m and has an acceleration of 3 m/s^2 ?

40. What is the mechanical energy in the system if the potential energy is 250 J and the kinetic energy is 750 J?

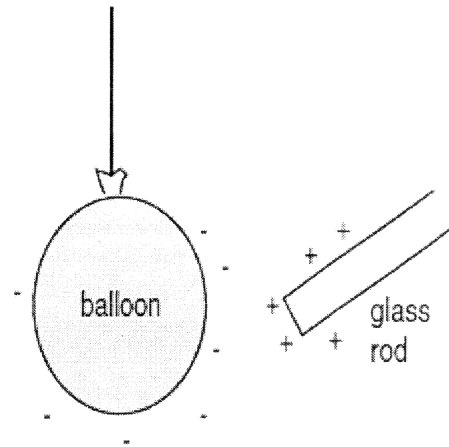
41. Draw a free body diagram of an object hanging from the ceiling. Use a box to represent the object. What forces are acting on the object? Use arrows to represent your forces. Be mindful of the length of the arrow. Should it be the same or should it be different in length?
42. From a certain planet X, an object is dropped at 15 m above the ground. If it reaches the ground within 5 s, what is the acceleration due to gravity on the planet X?
43. A 3.5 kg object is released from a certain height, if it has a velocity of 5 m/s just before it hits the ground, what is the initial potential energy of the object?
44. What is the impulse on a 2 kg object when it changes its velocity from 8 m/s to 12 m/s?
45. An object travelling at 5 m/s accelerate and reach a new speed of 12 m/s after covering a 250 m distance. What is the acceleration of the object?
46. What is the normal force of a 235 kg object on the floor?



The figure shows a block that is being pulled along the floor. According to the figure, what is the acceleration of the block?

- A $2 \frac{m}{s^2}$
- B $3 \frac{m}{s^2}$
- C $4 \frac{m}{s^2}$
- D $6 \frac{m}{s^2}$

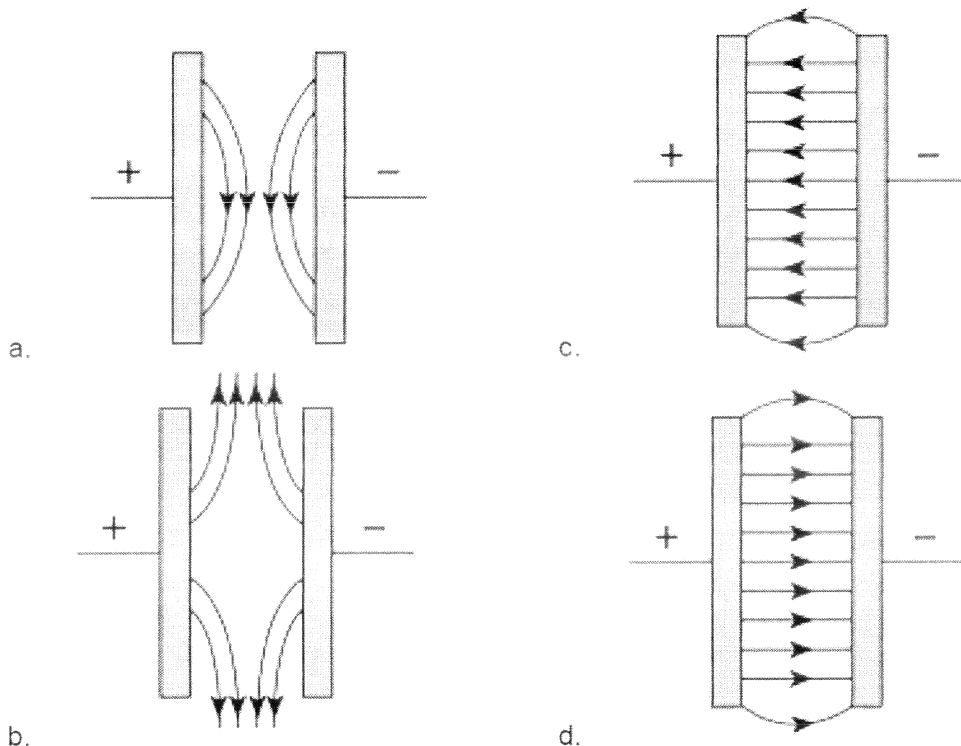
A balloon has a negative charge. A glass rod has a positive charge.



What will happen when the glass rod is brought near the balloon?

- A The balloon will be attracted to the rod.
- B The balloon will be repelled by the rod.
- C The balloon will remain in place.
- D The balloon will spin in circles.

Which diagram best illustrates the electrical field between oppositely charged parallel plates?



50. Object A has a mass of 870 kg while object B has a mass of 2210 kg. If they are separated by a 84 km distance what is the magnitude of the force of attraction between them?
51. What is the magnitude of the force of attraction between two objects if both masses are doubled? What about if one mass is doubled and the other mass is tripled?
52. What is the magnitude of the force of attraction between two objects if the distance between them is doubled? How about if the distance is quadrupled?

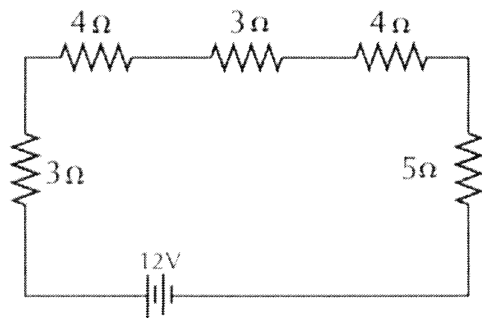
A 12 Ω resistor and a 15 Ω resistor are connected in series across a 9.0 V potential difference. What is the current in the circuit?

- A 1.56 A
- B 1.34 A
- C 0.99 A
- D 0.33 A

What potential difference is required to pass 1.5 A of current through a 2.0 Ω resistor?

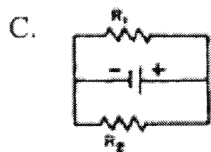
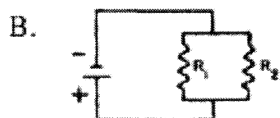
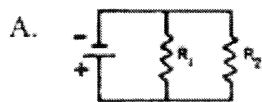
- A 3.0 V
- B 4.5 V
- C 6.0 V
- D 9.0 V

What is the equivalent resistance in the circuit pictured here?



- A** 15 Ω
- B** 19 Ω
- C** 24 Ω
- D** 31 Ω

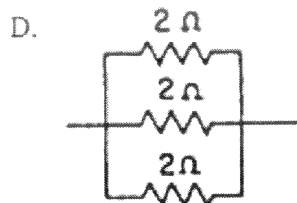
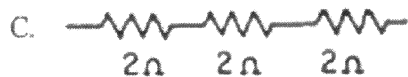
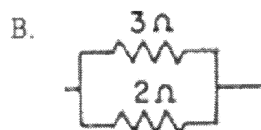
Which diagram represents resistances connected in series?



57. Which of the following represents increasing entropy?

- a. gas to liquid
- b. liquid to solid
- c. solid to gas
- d. gas to solid

Which circuit segment has an equivalent resistance of 6 ohms?



59. Which statement describes the direction of spontaneous heat flow?

- a Heat flows between two objects at the same temperature.
- b Heat flows in a vacuum by conduction.
- c Heat flows from an object at high temperature to one at low temperature.
- d Heat flows from an object at low temperature to one at high temperature.

60. A balloon with a charge of $4.0 \times 10^{-5} \text{ C}$ is held a distance of 0.10 m from a second balloon having the same charge. Calculate the magnitude of the repulsive force.

61. A $+5.0 \text{ C}$ charge and a -6.0 C charge experience an attractive force of -0.72 N ("-" means attractive). Determine their separation distance.

62. A negatively charge rod is brought near to a neutral electroscope. What will happen to the leaves of this electroscope? Explain this by illustration.

63. Law of charges states that, like charges will _____ and
unlike charges will _____

64. Illustrate here the electric field lines created by an electron, which is negatively charge and a proton which is positively charge.

