**Physics Study Practice**

**Name:** _____ **Date:** _____

1. An incomplete energy transformation diagram is shown below.

   **X** ⟶ **Y** ⟶ electrical energy

   Wind turns a turbine and creates electricity. Which types of energy complete this energy transformation diagram for the turbine?

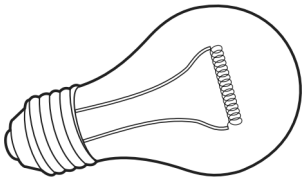
   A. X: solar energy Y: mechanical energy

   B. X: mechanical energy Y: nuclear energy

   C. X: chemical energy Y: solar energy

   D. X: nuclear energy Y: chemical energy

2. An incandescent light bulb is shown below.

   A typical incandescent light bulb has an energy efficiency of about ten percent. What is the meaning of this statement?

   A. Ten percent of the bulb's light energy becomes heat energy.

   B. Ten percent of the energy used by the bulb becomes light energy.

   C. The bulb uses ten percent less electrical energy than other bulbs.

   D. The bulb will save ten percent on electrical energy costs per year.

3. The temperature at which all molecular motion stops is

   A. $-460^\circ$ C. B. $-273$ K.

   C. 0 K. D. $0^\circ$ C.

4. When a steel block at $100^\circ$ C is placed on top of a copper block at $20^\circ$ C, the thermal energy of the copper begins to increase. Which of the following is the source of this increase in energy?

   A. the work done by the molecules within the copper

   B. the work done by the interaction of the two metals

   C. heat flowing by means of conduction

   D. heat flowing by means of radiation

5. A container of cold water is dumped into a larger container of hot water. It is mixed and then left alone for a long time interval. The water temperature is found to

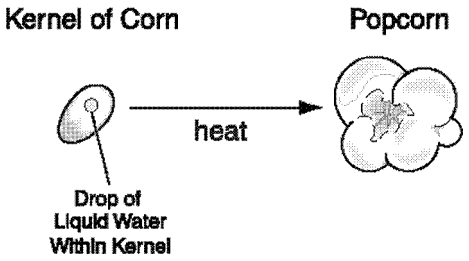
   A. randomly vary from region to region in the container.

   B. be uniform throughout the container.

   C. fluctuate at all positions in the container.

   D. be greater at the bottom of the container.

6. **Popcorn and Cola**




The drawing above shows a kernel of corn that is heated to make popcorn. Which of the following *best* explains what happens to the drop of liquid water inside the kernel of corn during this process?

A. The liquid water is destroyed by the heat.

B. The liquid water is converted into heat.

C. The liquid water undergoes a physical change into steam.

D. The liquid water undergoes a chemical change into hydrogen and oxygen.

7. **Recreation Center Pool**

A local recreation center has received funding to build a swimming pool. After construction, the center will be responsible for all costs associated with pool operation. As a result, the center must consider a variety of design options, including pool size, location and heating.

What happens to water molecules in a pool as they absorb energy?

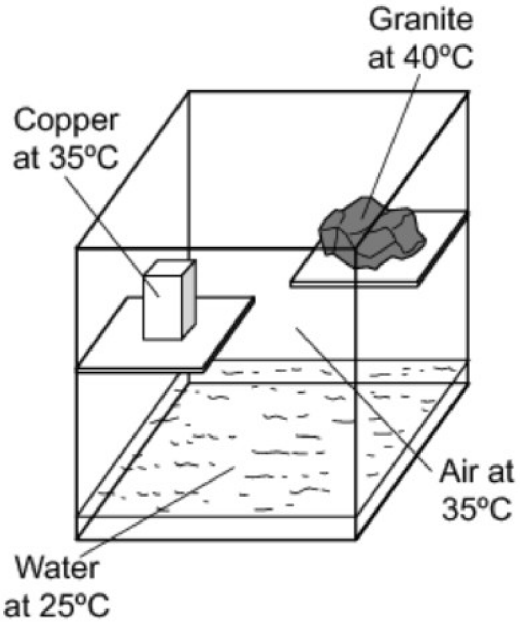
A. The molecules occupy less volume.

B. The molecules begin to move more slowly.

C. The kinetic energy of the atoms decreases.

D. The rate of collision between molecules increases.

8. The diagram shown represents a closed energy system. The system contains equal masses of air, copper, granite, and water in a perfectly insulated container. The temperatures were taken at the time the materials were placed in the closed system.




**Closed Energy System**

How will the temperatures of the materials change over an extended period of time?

A. The temperature of each material will decrease.

B. The temperature of each material will remain constant.

C. Warmer materials will get warmer and cooler materials will get cooler.

D. All of the materials will reach the same temperature.

9. Dee adds five grams of a chemical to one liter of liquid and observes a reaction. If the reaction is **endothermic**, what will happen?

A. The volume of the liquid will increase.

B. The volume of the liquid will decrease.

C. The temperature of the liquid will increase.

D. The temperature of the liquid will decrease.

10. When a light bulb is turned on, energy changes from one form to another. Which of the following *best* describes this change?

A. sound energy to light energy

B. nuclear energy to light energy

C. electrical energy to light energy

D. magnetic energy to light energy

11. Which two forms of energy could *best* be used to increase the temperature of a sheet of copper?

A. heat and light

B. heat and sound

C. light and magnetism

D. electricity and sound

12. A student in a laboratory transfers a beaker containing a hot solution from the lab table to a cool water bath.

Which of the following parts of the system experiences an increase in heat energy?

A. beaker B. lab table

C. solution D. water bath

13. Which statement *correctly* describes both gases and liquids?

A. Their shapes stay the same in any container.

B. Their shapes change when they are in different containers.

C. Their volumes stay the same in any container.

D. Their volumes change when they are in different containers.

14. On a warm sunny afternoon, ocean water splashed onto a rock. A short time later, the rock was dry. Which statement *best* explains what happened to the water on the rock?

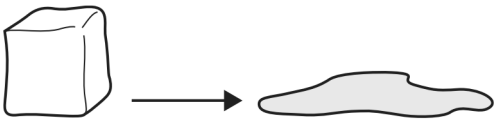
A. Heat caused the water to become a gas.

B. Heat melted the water and it disappeared.

C. Salt caused the water to become a gas.

D. Salt melted the water and it disappeared.

15. The picture below shows the melting of an ice cube.



before after

The ice cube changed because it

A. cooled. B. warmed.

C. hardened. D. evaporated.

16. Four materials are put into small containers. These materials are then moved from the small containers into larger containers. Which material will spread out to *completely* fill a larger container?

A. air B. ice C. sand D. water

17. A glass of ice water is placed on a table. After 10 minutes, there are drops of water on the outside surface of the glass. Which change in phase caused the drops of water?

A. Liquid water in the air evaporated into a gas.

B. Liquid water in the air condensed into a solid.

C. Water vapor from the air evaporated into a liquid.

D. Water vapor from the air condensed into a liquid.

18. A teacher places an item in a box. The item takes the shape of the entire container. This item is *most likely*

A. air. B. milk. C. water. D. paint.

19. Bromine (Br) is a liquid at room temperature. Oxygen (O) is a gas at room temperature. Room temperature is 25°C.

Which of the following statements is true?

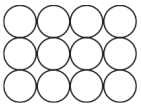
A. The boiling point of oxygen is colder than room temperature.

B. The boiling point of bromine is colder than room temperature.

C. The melting point of oxygen is warmer than room temperature.

D. The melting point of bromine is warmer than room temperature.

20. A scientist uses an instrument to observe the pattern of molecules in a substance. The picture below shows what the scientist sees.



What state of matter is the scientist *most* likely observing?

A. gas B. liquid C. vapor D. solid

21. As a sample of water turns to ice,

A. new molecules are formed.

B. the mass of the sample is increased.

C. the arrangement of the molecules changes.

D. energy is absorbed by the molecules.

22. Solids have a definite shape and volume. This is because

A. the molecules in solids move past each other easily.

B. the molecules in solids stay in a definite location and vibrate.

C. the molecules in solids move freely in all directions.

D. the molecules in solids do not move at all.

23. A scientist observed changes in the gas pressure of one mole of a gas in a sealed chamber with a fixed volume. To identify the source of the changes, the scientist should check for variations in the

A. air pressure outside the chamber.

B. molecular formula of the gas.

C. temperature of the chamber.

D. isotopes of the gas.

24. When a cold tire is inflated to a certain pressure and then is warmed up due to friction with the road, the pressure increases. This happens because the

A. air molecules hit the walls of the tire less frequently.

B. rubber in the tire reacts with oxygen in the atmosphere.

C. air molecules speed up and collide with the tire walls more often.

D. air molecules diffuse rapidly through the walls of the tire.

25. Methane ($CH_4$) gas diffuses through air because the molecules are

A. moving randomly. B. dissolving quickly.

C. traveling slowly. D. expanding steadily.

26. The volume of 400 mL of chlorine gas at 400 mm Hg is decreased to 200 mL at constant temperature. What is the new gas pressure?

A. 400 mm Hg
B. 300 mm Hg
C. 800 mm Hg
D. 650 mm Hg

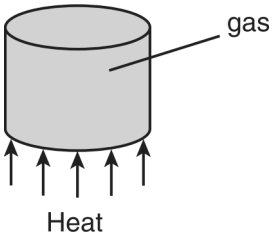
27. Under what circumstance might a gas decrease in volume when heated?

A. The gas is held constant at STP.
B. The gas remains under uniform temperature.
C. The gas is placed under increasing pressure.
D. The gas undergoes a decrease in pressure.

28. Theoretically, when an ideal gas in a closed container cools, the pressure will drop steadily until the pressure inside is essentially that of a vacuum. At what temperature should this occur?

A. 0°C
B. −460°C
C. −273 K
D. 0 K

29. A gas in a sealed cylinder is heated.



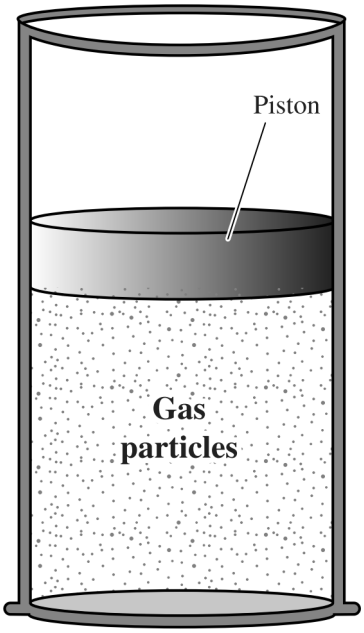

Which of the following does *not* increase as the gas is heated?

A. the average number of gas moleculeshitting the cylinder walls per second
B. the average kinetic energy of the gas molecules
C. the average speed of the gas molecules
D. the average distance between the gas molecules

30. A closed container of gas may explode when heated mainly because heating the gas causes the pressure to increase. Which statement *best* explains why the pressure increases when the gas is heated?

A. The gas molecules expand.
B. The gas molecules chemically react.
C. The gas molecules become electrically charged.
D. The gas molecules collide more often with the container.

31. The picture below shows a gas at standard conditions in a container with a moveable piston.

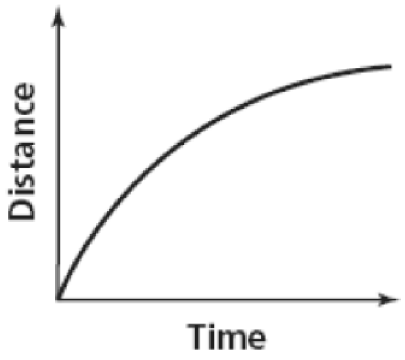



According to Charles's law, what will happen to the piston when the gas is heated?

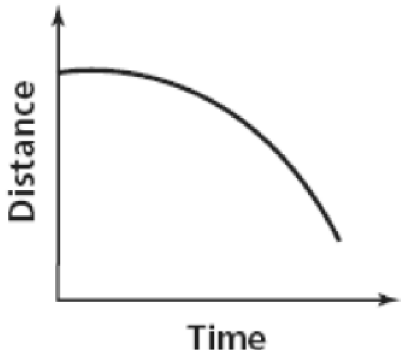
A. The piston will move up because the gas particles get larger.
B. There will be no change because heat will not affect the system.
C. The piston will move up because the gas particles move faster and get farther apart.
D. The piston will move down because the gas particles move slower and get closer together.

32. After a baseball is thrown up into the air, it will eventually fall back down to Earth. Which graph *best* demonstrates the relationship between time and distance from Earth as the baseball falls?

A.

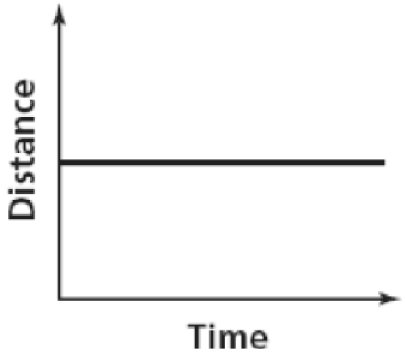



B.

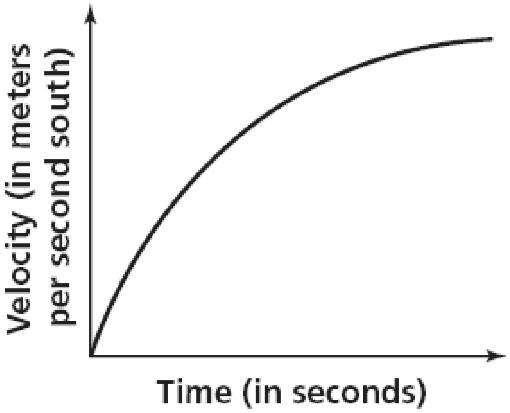



C.


D.




33. Look at the velocity-time graph below.




According to the graph, the acceleration of the object is

A. constant.
B. decreasing.
C. increasing.
D. zero.

34. Which of the following represents the velocity of a moving object?

A. 40
B. 40 m north
C. $40\frac{\text{m}}{\text{s}}$
D. $40\frac{\text{m}}{\text{s}}$ north

35. Which characteristic of motion could change without changing the velocity of an object?

A. the speed
B. the position
C. the direction
D. the acceleration

36. Use the graph below to answer the question.


A student drew a graph that shows the motion of a car as it traveled down a street. When was the car stopped at a stoplight?

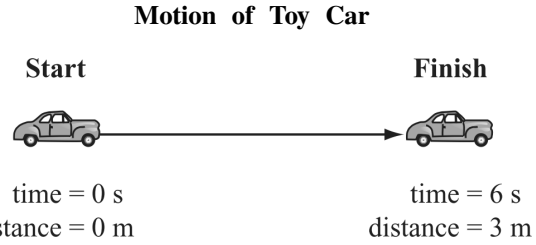
A. between 1 and 3 minutes

B. between 3 and 5 minutes

C. between 5 and 8 minutes

D. between 8 and 10 minutes

37. The diagram below shows information about the motion of a toy car between two points on a track.




Which of the following can be determined using the information shown in the diagram?

A. the car's position after the first two seconds

B. the car's mass as it moves away from the start

C. the car's average speed between the two points

D. the car's total acceleration within the first meter

38. Which of the following is certain to change as a ball accelerates?

A. mass of the ball

B. inertia of the ball

C. velocity of the ball

D. force acting on the ball occasionally

39. Which of the following is an example of a vector quantity?

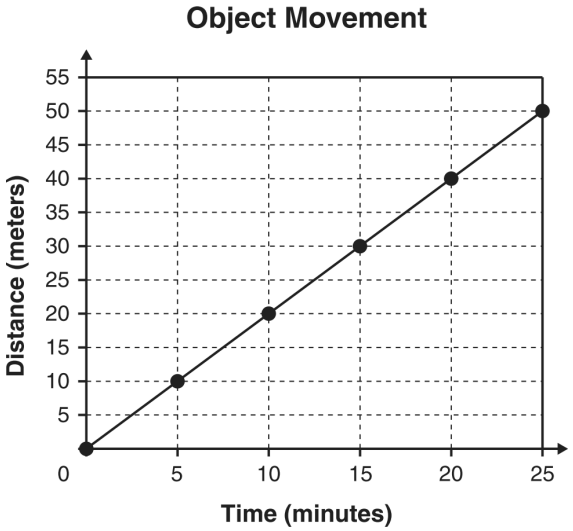
A. A student walks 2.0 km north.

B. An object has a mass of 10.5 kg.

C. A 1.0 kg object moves at 18 m/s.

D. A ball has an instantaneous speed of 15 m/s.

40. The graph below shows the movement of an object at several points in time.




What is the average speed of the object?

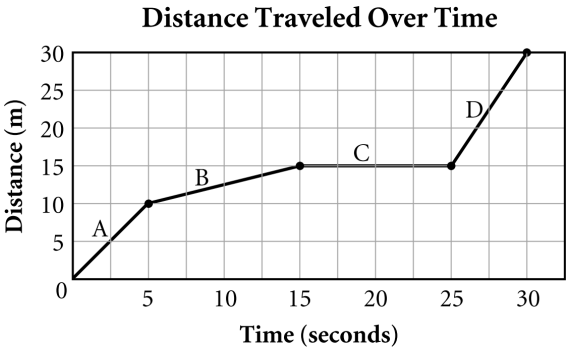
A. $\frac{0.5 \text{ meters}}{\text{minute}}$ B. $\frac{2 \text{ meters}}{\text{minute}}$

C. $\frac{25 \text{ meters}}{\text{minute}}$ D. $\frac{50 \text{ meters}}{\text{minute}}$

41. How much time is required for a bicycle to travel a distance of 100 m at an average speed of $2 \frac{\text{m}}{\text{s}}$?

A. 0.02 s B. 50 s C. 100 s D. 200 s

42. The graph below shows the distance a student walks down a hall over time. Use the information shown on the graph to answer the following question(s).



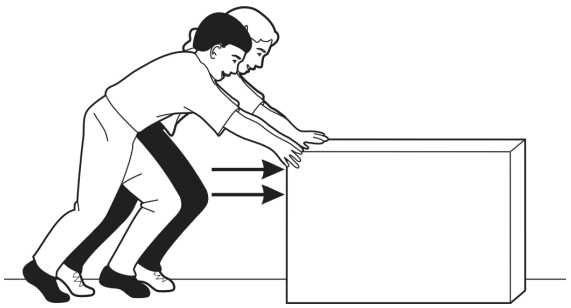

During which time interval was the student moving the fastest?

A. A B. B C. C D. D

43. An escalator at a shopping mall is 10 m long and moves at a constant speed of 0.5 m/s. If José steps onto the escalator at the bottom while it is moving, how long will it take him to travel the 10 m?

A. 5 s B. 10 s C. 15 s D. 20 s

44. Two people are trying to push a large box across a floor. Each person pushes with an equal amount of force.



The total amount of force they exert on the box is 500 newtons. Despite their efforts, the box will not move. What is the amount of force exerted by the box on each person?

A. 0 newtons B. 250 newtons

C. 500 newtons D. 1,500 newtons

45. A piece of pine wood floats on the surface of a lake because the water exerts

A. an upward force equal to the weight of the wood.

B. a downward force equal to the weight of the wood.

C. an upward force equal to the weight of the displacement water.

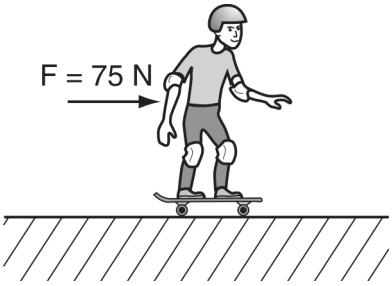
D. a downward force equal to the weight of the displacement water.

46. A student holds a book at rest in an outstretched hand. The force exerted on the book by the student is equal to the book's

A. mass. B. weight.

C. volume. D. density.

47. A 50-kg child on a skateboard experiences a 75-N force as shown.




What is the expected acceleration of the child?

A. $0.67 \frac{m}{s^2}$ B. $1.50 \frac{m}{s^2}$

C. $6.70 \frac{m}{s^2}$ D. $25.00 \frac{m}{s^2}$

48. A soccer player kicks a 0.5-kilogram stationary ball with a force of 50 newtons. What is the force on the player's foot?

A. 0 N B. 25 N C. 50 N D. 100 N

49. **Driving Home Newton's Laws of Motion**

Automobiles, baseballs, skateboards and bicycles — the world is full of things that are in motion. Centuries ago the British physicist Sir Isaac Newton stated three laws that describe the ways in which things move. These are Newton's three laws of motion:

> **The first law**: Unless acted upon by an outside force, a body at rest tends to stay at rest, and a body in motion tends to stay in motion.
>
> **The second law**: Acceleration is equal to the net force acting on a body divided by its mass.
>
> **The third law**: For every action force there is an equal and opposite reaction force.

A driver starts her car and steps on the gas pedal. The car gradually accelerates to 50 km/hr. A few minutes later, the driver suddenly slams on the brakes to avoid hitting a box in the road. As the car comes to a stop, the driver's body appears to lurch forward in the seat until it is restrained by the seatbelt.

What law *best* explains why the driver's body appears to lurch forward when the brakes are suddenly applied?

A. Newton's first law

B. Newton's second law

C. Newton's third law

D. The law of gravity

50. A 70-kg skier leaves a ski jump at a velocity of $14\frac{\text{m}}{\text{s}}$. What is the skier's momentum at that instant?

A. 5 N · s B. 50 N · s

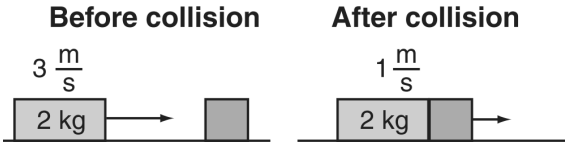
C. 980 N · s D. 9800 N · s

51. A child is on a sled moving down a hill at $20\frac{\text{meters}}{\text{second}}$. The combined mass of the sled and child is 100 kilograms. The momentum of the child and sled is

A. 5 kilogram $\cdot\frac{\text{m}}{\text{s}}$ B. 20 kilogram $\cdot\frac{\text{m}}{\text{s}}$

C. 1000 kilogram $\cdot\frac{\text{m}}{\text{s}}$ D. 2000 kilogram $\cdot\frac{\text{m}}{\text{s}}$

52. The diagram depicts a 2-kg mass colliding with and sticking to a second box.




What is the mass of the second box?

A. 4 kg B. 6 kg C. 8 kg D. 9 kg

53. A bowling ball with a mass of 8.0 kg rolls down a bowling lane at 2.0 m/s. What is the momentum of the bowling ball?

A. 4.0 kg · m/s B. 6.0 kg · m/s

C. 10.0 kg · m/s D. 16.0 kg · m/s

54. A 600 g basketball, a 57 g tennis ball, a 46 g golf ball, and a 2.7 g table tennis ball are moving with the same velocity. Which ball has the *greatest* momentum?

A. golf ball B. basketball

C. tennis ball D. table tennis ball

55. The momentum of an object in space is

A. dependent on its mass.

B. independent of its inertia.

C. independent of its velocity.

D. dependent on its potential energy.