

1. A stopwatch is used to time a runner in a race. The diagrams show the stopwatch at the start and at the end of the race.



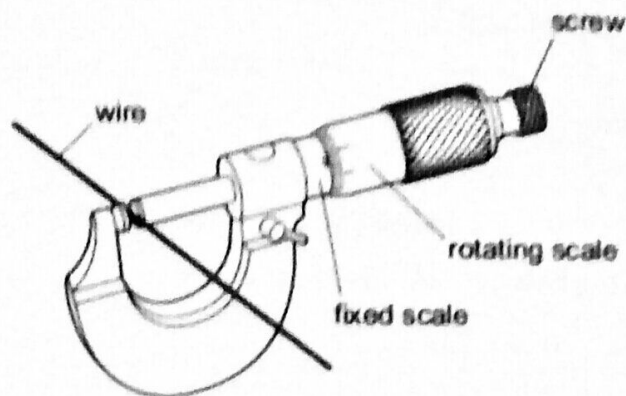
How long did the runner take to run the race?

- A. 70.00 seconds
  - B. 110.00 seconds
  - C. 115.20 seconds
  - D. 155.20 seconds
2. A student is weighed on laboratory scales.

Which row about weight and mass is correct?

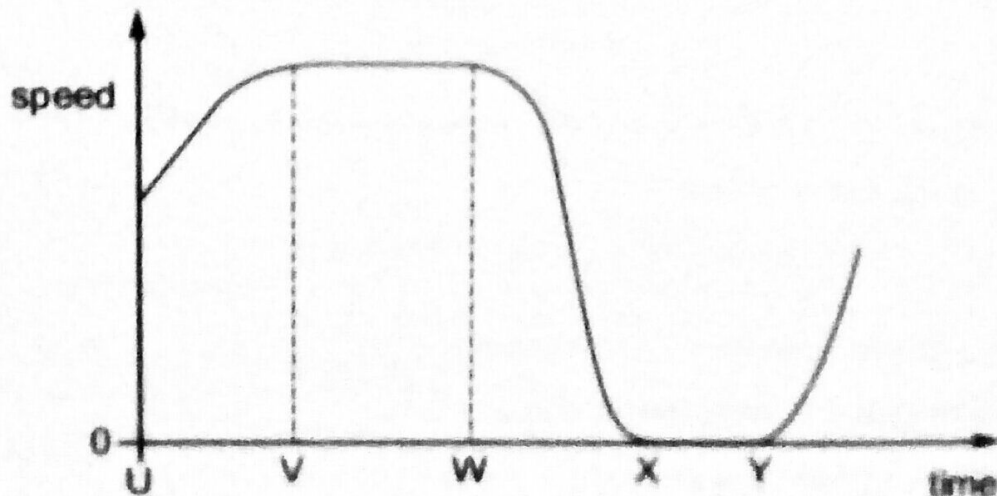
	unit of weight	unit of mass
A.	kg	kg
B.	kg	N
C.	N	kg
D.	N	N

3. A micrometer is used to measure the diameter of a uniform wire.



What is done to obtain an accurate answer?

- A. Make the micrometer horizontal and then use the scales to find the reading.
  - B. Subtract the fixed-scale reading from the rotating-scale reading.
  - C. Subtract the rotating-scale reading from the fixed-scale reading.
  - D. Use the scales to find the reading and add or subtract any zero error.
4. Which list contains only scalar quantities?
- A. Acceleration, displacement, velocity
  - B. Distance, force, speed
  - C. Force, length, time
  - D. Length, mass, speed
5. The graph shows how the speed of a car changes with time.



Between which two times is the car stationary?

- A. U and V
- B. V and W
- C. W and X
- D. X and Y

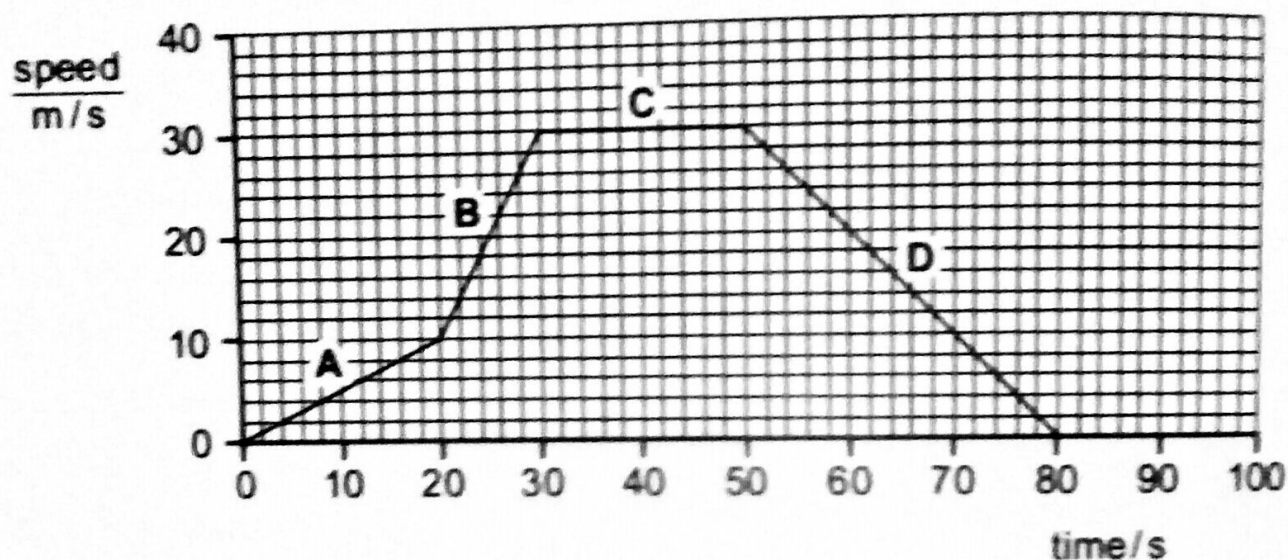
6. In a race, a car travels 60 times around a 3.6 km track. This takes 2.4 hours.

What is the average speed of the car?

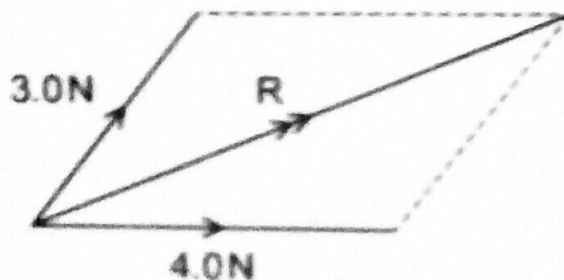
- A. 1.5 km / h      B. 90 km / h      C. 144 km / h      D. 216 km / h

7. The speed-time graph represents a motorcycle journey.

In which part of the graph is the acceleration equal to zero?



8. The diagram shows the resultant  $R$  of a 3.0 N force and a 4.0 N force acting at a point.



The angle between the 3.0 N force and the 4.0 N force can be any value from  $0^\circ$  to  $90^\circ$ .

Which value of  $R$  is not possible?

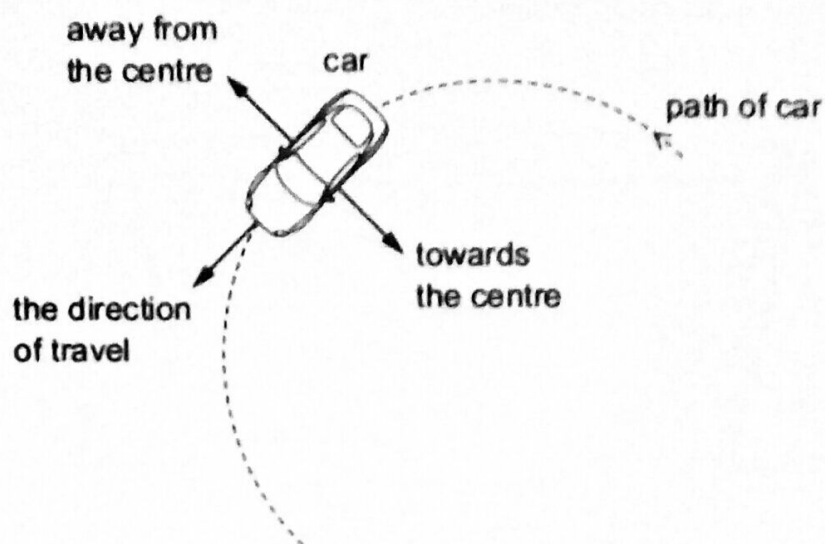
- A. 4.0 N      B. 5.0 N      C. 6.0 N      D. 7.0 N

9. A satellite is orbiting the Earth in a circular orbit.

Which two quantities are always in the same direction as each other?

- A. The acceleration of the satellite and the displacement of the satellite  
B. The acceleration of the satellite and the velocity of the satellite  
C. The resultant force on the satellite and the acceleration of the satellite  
D. The resultant force on the satellite and the velocity of the satellite

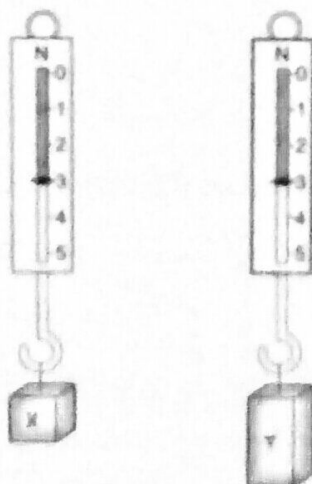
10. A car travels at a constant speed along a circular, horizontal path.



Which statement describes the forces acting on the car?

- A. They are balanced as the car is moving at constant speed.
- B. They are unbalanced with a resultant in the direction away from the centre.
- C. They are unbalanced with a resultant in the direction of travel of the car.
- D. They are unbalanced with a resultant in the direction towards the centre.

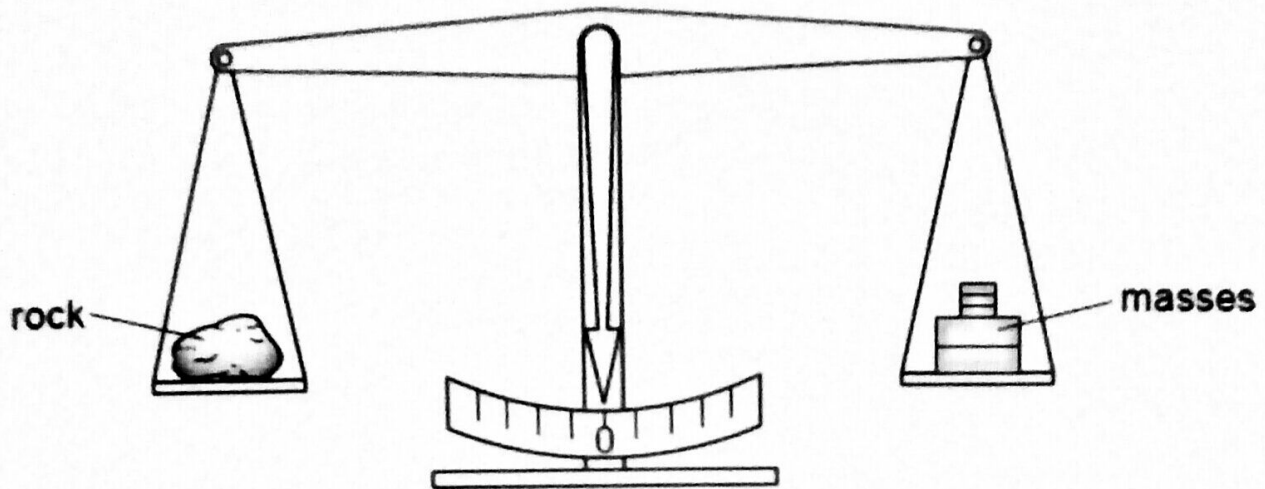
11. Two blocks of metal X and Y hang from spring balances, as shown in the diagrams.



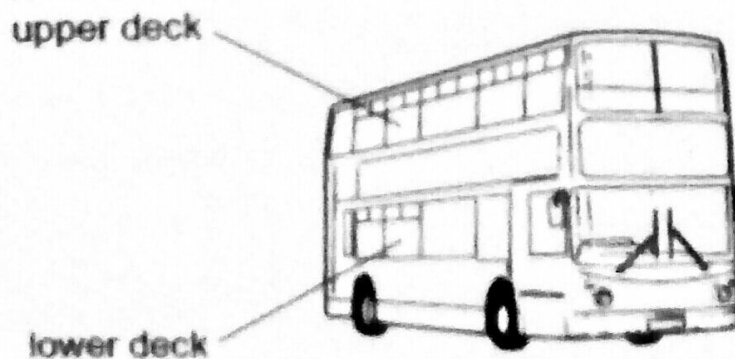
What does the diagram show about X and Y?

- A. They have the same mass and the same volume but different weights.
- B. They have the same mass and the same weight but different volumes.
- C. They have the same mass, the same volume and the same weight.
- D. They have the same weight and the same volume but different masses.

12. A geologist places a small rock on the left-hand pan of a balance. The two pans are level as shown when masses with a total weight of 23 N are placed on the right-hand pan. Take the weight of 1.0 kg to be 10 N.



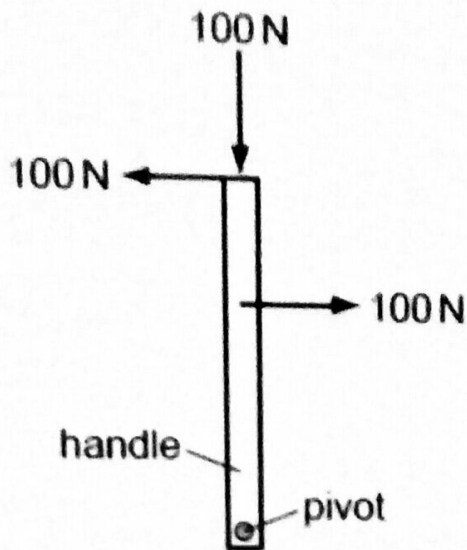
- What is the mass of the small rock?
- A. 0.023 kg      B. 2.3 kg      C. 23 kg      D. 230 kg
13. A stone has a volume of  $0.50 \text{ cm}^3$  and a mass of 2.0 g. What is the density of the stone?
- A.  $0.25 \text{ g/cm}^3$   
B.  $1.5 \text{ g/cm}^3$   
C.  $2.5 \text{ g/cm}^3$   
D.  $4.0 \text{ g/cm}^3$
14. Passengers are not allowed to stand on the upper deck of double-decker buses.



Why is this?

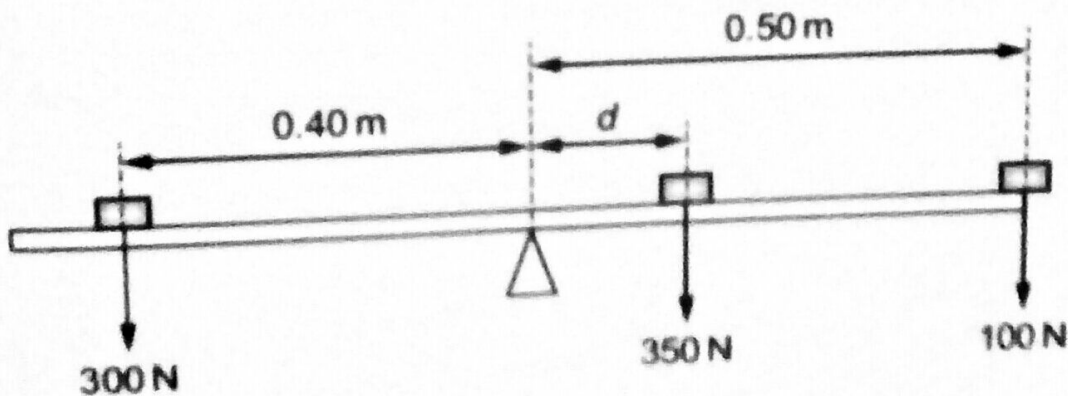
- A. They would cause the bus to become less stable.  
B. They would cause the bus to slow down.  
C. They would increase the kinetic energy of the bus.  
D. They would lower the centre of mass of the bus.

15. The diagram shows a handle with three forces, each 100 N, applied to it. The handle is free to move.



What is the effect of the forces on the handle?

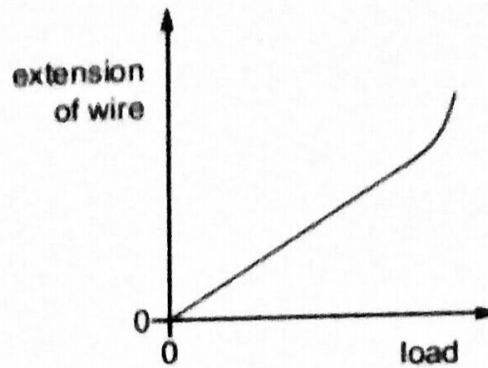
- A. The handle will move downwards.
  - B. The handle will not move.
  - C. The handle will turn anticlockwise (to the left).
  - D. The handle will turn clockwise (to the right).
16. A uniform beam is pivoted at its centre. The beam is balanced by three weights in the positions shown.



What is the length  $d$ ?

- A. 0.020 m
- B. 0.050 m
- C. 0.20 m
- D. 0.48 m

17. The graph shows the extension of a piece of copper wire as the load on it is increased.



What does the graph show?

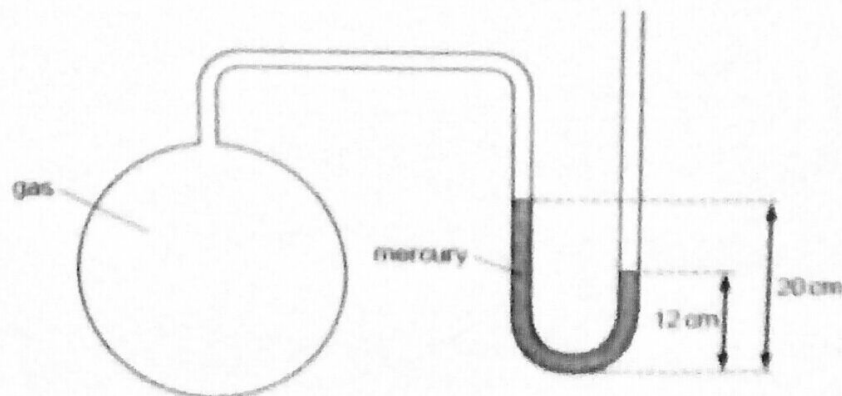
- A. At a certain load, the wire becomes easier to extend.
- B. At a certain load, the wire becomes harder to extend.
- C. The load and the extension are directly proportional for all loads.
- D. The load and the extension are inversely proportional for all loads.

18. Which statement is explained by reference to pressure?

- A. Objects with greater mass have greater weight.
- B. One kilogram of water occupies more volume than one kilogram of lead.
- C. Spikes on running-shoes sink into the ground.
- D. Water cooled to a low enough temperature turns to ice.

19. The diagram shows a mercury manometer used to measure the pressure of gas in a container.

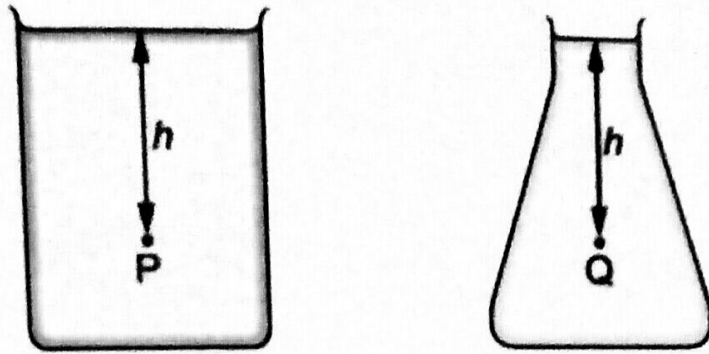
Atmospheric pressure is 76 cm of mercury.



What is the pressure of the gas?

- A. 56 cm of mercury
- B. 68 cm of mercury
- C. 84 cm of mercury
- D. 96 cm of mercury

20. Two glass containers filled with different liquids are placed next to each other. Point P is a distance  $h$  below the surface of the liquid in one container. Point Q is a distance  $h$  below the surface of the liquid in the other container.

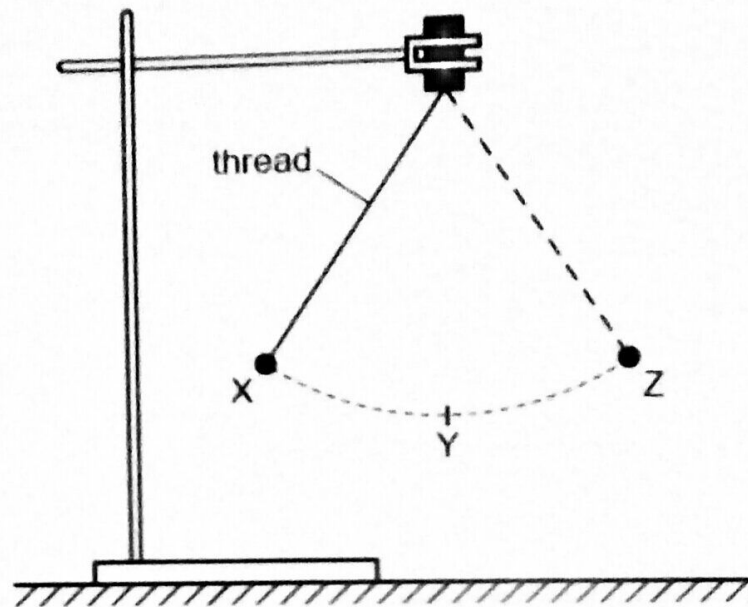


Why is the pressure at P different from the pressure at Q?

- A. The atmospheric pressure is different at P.
  - B. The densities of the liquids are different.
  - C. The gravitational field strength is different at P.
  - D. The shapes of the containers are different.
21. In which pair of energy sources are both sources renewable?
- A. Oil and coal
  - B. Oil and tidal
  - C. Tidal and geothermal
  - D. Tidal and nuclear fission



22. An object on a thread is swinging between X and Z, as shown in the diagram. It is momentarily at Rest at X and at Z.



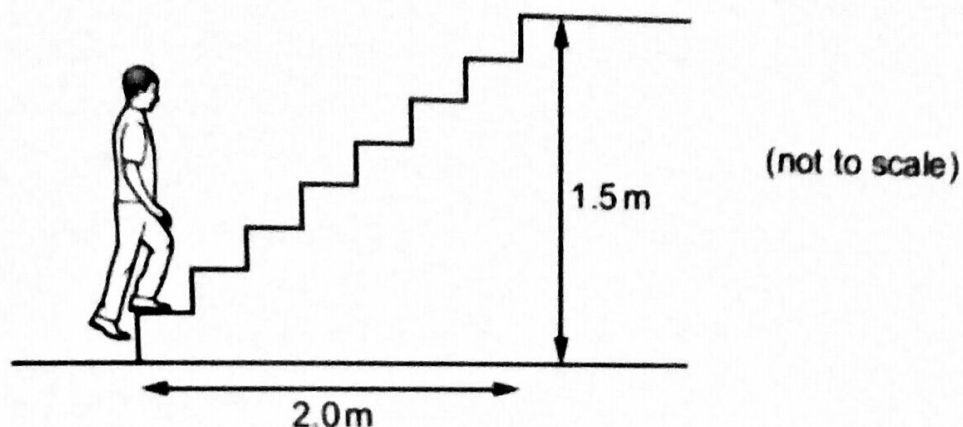
An incomplete word equation about the energy of the object is shown below.

**gravitational potential energy at X = kinetic energy at Y + ..... energy at Y + energy losses**

Which form of energy is needed to complete the word equation?

- A. Chemical
  - B. Gravitational potential
  - C. Internal
  - D. Strain
23. A car travels a distance of 200 m in 20 s. The engine of the car provides a driving force of 1000 N.
- What is the power output of the engine?
- A. 0.25 W                      B. 4.0 W                      C. 100 W                      D. 10 000 W

24. A student of mass 60 kg climbs some steps. He travels a horizontal distance of 2.0 m and a vertical distance of 1.5 m. The gravitational field strength  $g$  is 10 N / kg.



What is the work done against the force of gravity?

- A. 90 J
  - B. 120 J
  - C. 900 J
  - D. 1200 J
25. Why does convection take place in a liquid when it is heated?
- A. Liquids expand when they are heated.
  - B. Liquids start to bubble when they get close to boiling point.
  - C. Molecules in the liquid expand when they are heated.
  - D. Molecules near to the surface of the liquid escape into the air.
26. In which substance is the conduction of thermal energy mainly due to the movement of electrons?
- A. Air
  - B. Ice
  - C. Iron
  - D. Water

27. Four similar metal plates are the same distance from a heater that emits infra-red radiation. The plates are painted dull black, dull white, shiny black and shiny white.

Which plate absorbs the most radiation and which plate reflects the most radiation?

	Absorbs most radiation	Reflects most radiation
A.	Dull black	Dull white
B.	Dull black	Shiny white
C.	Shiny black	Dull black
D.	Shiny white	Dull black

28. Brownian motion is observed when looking at smoke particles in air using a microscope.

What causes the smoke particles to move at random?

- A. Smoke particles are hit by air molecules.
- B. Smoke particles are moved by convection currents in the air.
- C. Smoke particles have different weights and fall at different speeds.
- D. Smoke particles hit the walls of the container.

29. The molecules of a substance become more closely packed and move more quickly.

What is happening to the substance?

- A. A gas is being heated and compressed.
- B. A gas is being heated and is expanding.
- C. A liquid is boiling.
- D. A liquid is evaporating at room temperature.

30. Scientists believe that some lakes are shrinking because of evaporation.

What increases the rate of evaporation?

- A. a decrease in the surface area
- B. a fall in water temperature
- C. an increase in the depth of the lake
- D. wind blowing across the surface