

Matter Practice

- 1 What happens if new evidence is discovered about atom that current theories about atoms do not explain?
- (A) Nothing. Current theories about atoms are hypotheses and don't need to be supported by new evidence.
 - (B) Nothing. Current theories about atoms are scientists' best ideas, so those theories remain valid.
 - (C) Current theories about atoms will be modified considering the new evidence.
 - (D) Current theories about atoms will be abandoned for a new theory.
- 2 Which is too small to view with a microscope?
- (A) an atom
 - (B) a cell
 - (C) one bacteria
 - (D) a single virus
- 3 Which of the following physical states has particles that vibrate in place and do not move past their neighbors?
- (A) gas
 - (B) liquid
 - (C) molecule
 - (D) solid
- 4 Which answer below best describes the future of models of the structure of atoms?
- (A) Models will probably change because scientists like to change things.
 - (B) Models will probably change because new technology will provide better information about the structure of atoms.
 - (C) Models will probably stay the same because scientists have learned all there is to know about the structure of atoms.
 - (D) Models will probably stay the same because scientists don't like to create new models.

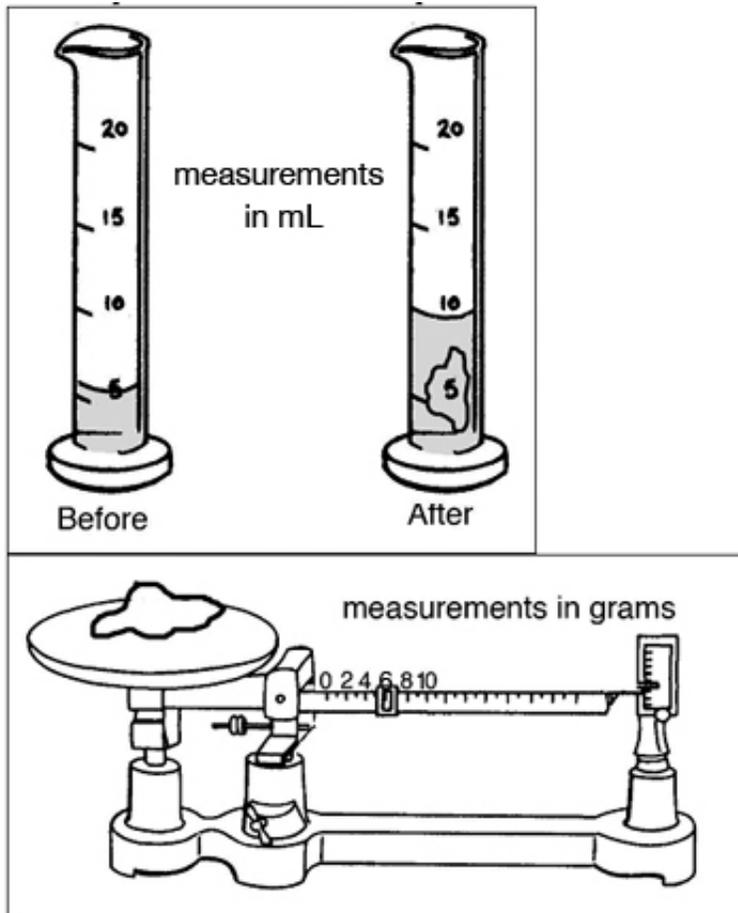
- 8 What happens if new evidence is discovered about atoms that current theories about atoms do not explain?
- (A) Nothing. Current theories about atoms are hypotheses and don't need to be supported by new evidence.
 - (B) Nothing. Current theories about atoms are scientists' best ideas, so those theories remain valid.
 - (C) Current theories about atoms will be modified in light of the new evidence.
 - (D) Current theories about atoms will be abandoned for a new theory.
- 9 Which of the following ways are solids and gases alike?
- (A) Both have particles that move very fast
 - (B) Both have particles that move very slow
 - (C) Both are made of particles
 - (D) Both have particles that are very close together
- 10 Which of the following physical states has particles that move to take the shape of whatever container they are in?
- (A) gas
 - (B) liquid
 - (C) molecule
 - (D) solid
- 11 What happens to particles of liquid water when the water is heated?
- (A) No change takes place
 - (B) They speed up and the space between them increases
 - (C) They speed up and the space between them decreases
 - (D) They slow down and the space between them increases
 - (E) They slow down and the space between them decreases

- 17 Which of the following physical states has particles that vibrate in place and do not move past their neighbors?
- (A) gas
 - (B) liquid
 - (C) molecule
 - (D) solid
- 18 Models are used to represent atoms. The model used today is not the same as the model used 200 years ago. Which statement is the most accurate explanation for the change in the atomic model?
- (A) Scientists conducted further experiments on atomic structure and science conclusions may change as new evidence is found.
 - (B) Scientists in the past did not have modern equipment used to study atoms; therefore, the conclusions were automatically flawed.
 - (C) Scientists conducted further experiments and were then able to make the modern, completely correct model.
 - (D) Scientists in the past could not see atoms, but now that scientists have seen the atom, they have been able to develop the correct, final model.
- 19 You have two rocks, rock A and rock B. Rock A is bigger but has the same mass as rock B. How will the density of the two rocks compare?
- (A) The density of rock B is greater because its volume is greater.
 - (B) The density of rock B is greater because its volume is less.
 - (C) The density of rock B is less because its volume is greater.
 - (D) The density of rock B is less because its volume is less.
- 20 Your teacher gives you a small, jagged stone and asks you to calculate its mass and volume. Which instruments would you use in order to make the measurements?
- (A) microscope and graduated cylinder
 - (B) graduated cylinder and triple beam balance
 - (C) triple beam balance and ruler
 - (D) ruler and microscope
- 21 Knowing that antifreeze is less dense than water, how could you use this fact to find out if your family car had any antifreeze in the radiator?
- (A) Drain some radiator liquid and record its temperature to see if it is cooler than water.
 - (B) Drain some radiator liquid and pour it on iron to see if the iron rusts faster than without the liquid.
 - (C) Drain some radiator liquid, smell it, and compare the smell to oil.
 - (D) Drain some radiator liquid and compare its weight to the weight of the same amount of water.

25 Which formula is correctly used to measure density?

- (A) width x length x height
- (B) weight x cubic centimeters
- (C) mass divided by volume
- (D) height x radius squared

26 What is the volume of the rock in the pictures below?



- (A) 4 mL
- (B) 10 mL
- (C) 6 g
- (D) 12 g

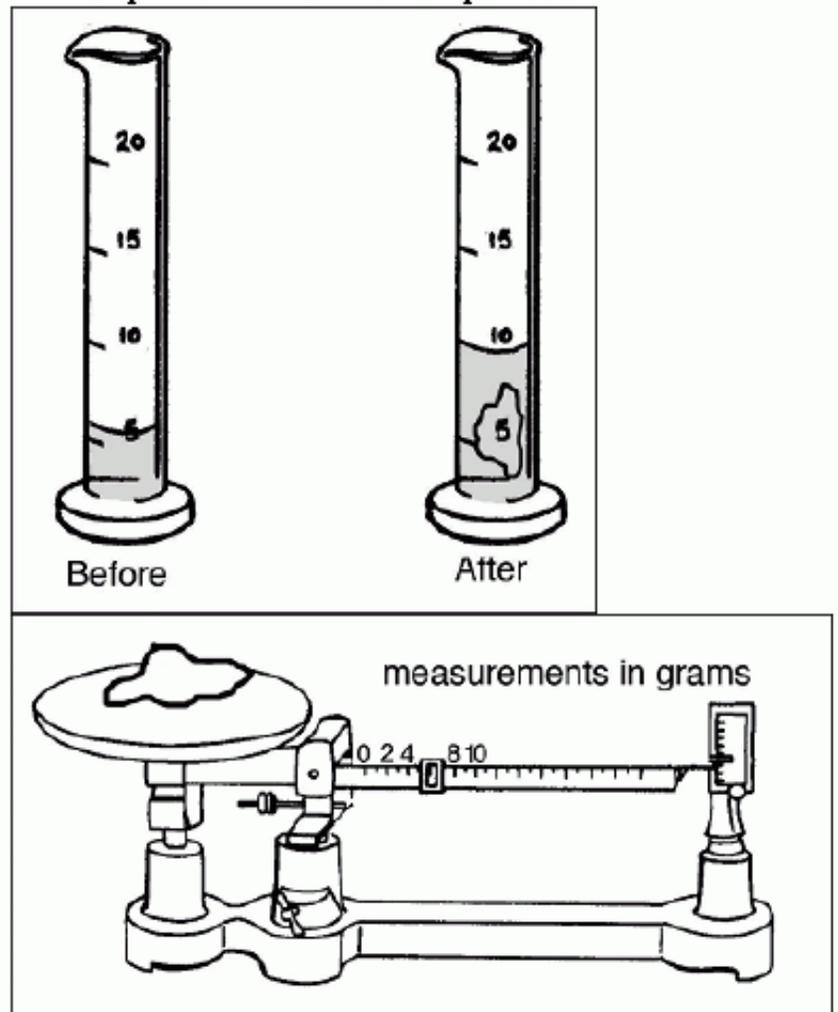
- 27 Density can be calculated by dividing the mass of an object by its volume. Water has a density of 1 g/ml. If an object's density is greater than 1 g/ml it will sink and if its density is less than 1 g/ml it will float.

Object A has a mass of 40 g and a volume of 30 ml and object B has a mass of 15 g and a volume of 20 ml. What will happen when both objects are placed in water?

- (A) Object A will float because its density is less than water
 (B) Object B will sink because its density is greater than water
 (C) Object A will sink because its density is greater than water
 (D) Objects A and B will both float because their density is the same as water

28

Use the pictures to answer the question.



What is the density of the rock?

- (A) 0.5 g/mL
 (B) 0.66 g/mL
 (C) 10 g/mL
 (D) 24 g/mL

29 Pretend that you are expected to measure the mass of a glass cube. You are given the following equipment: metric ruler, triple beam balance, magnifying lens, microscope, water and beaker.

What equipment should you use to measure the mass?

- (A) beaker, magnifying lens and ruler
- (B) magnifying lens and ruler
- (C) triple beam balance
- (D) beaker and water

30 How does the density of ice compare to the density of liquid water?

- (A) Ice is more dense than liquid water.
- (B) Ice and water are the same density.
- (C) Ice is more dense; liquids do not have density.
- (D) Ice is less dense than liquid water.

31 The formula for density is density=mass/volume ($D=M/V$). What is the density of a rock with a volume of 5 cubic centimeters and a mass of 3 grams?

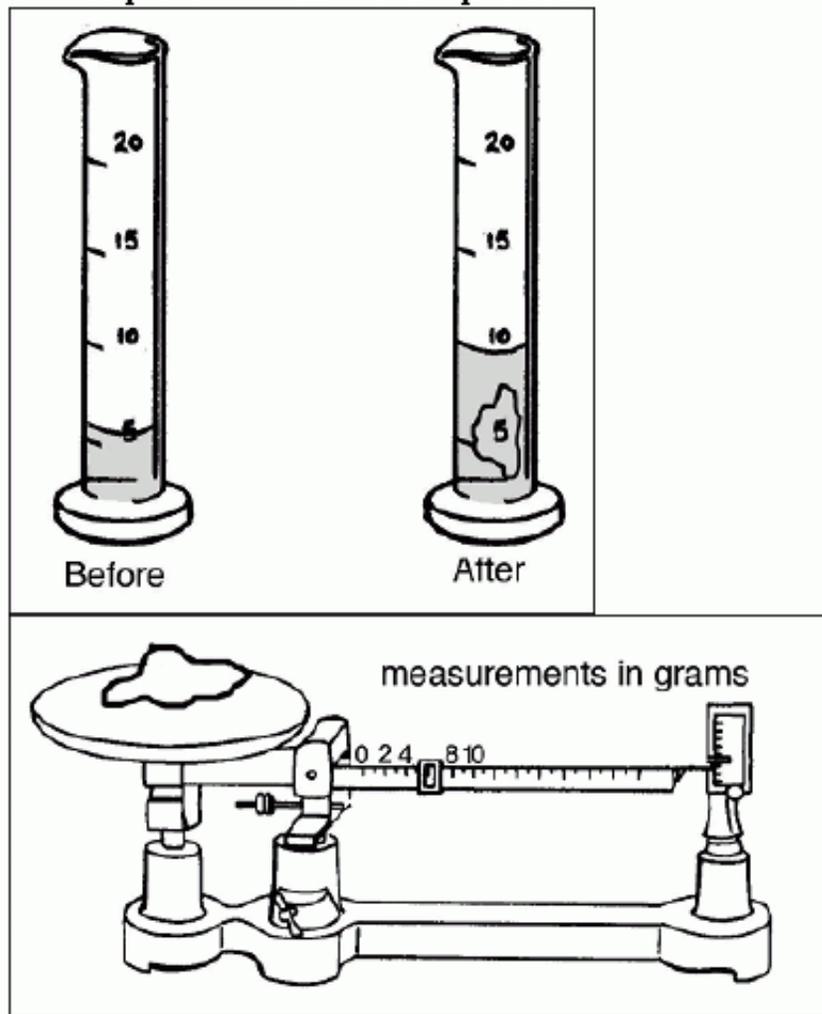
- (A) 0.60 g/cm³
- (B) 1.50 g/cm³
- (C) 15 cm/g³
- (D) 41.67 cm/g³

32 Why does oil float on water?

- (A) Oil is less dense than water
- (B) Water is less dense than oil
- (C) Oil and water don't mix
- (D) Oil is more dense than water

33

Use the pictures to answer the question.



What is the volume of the rock?

- (A) 4 mL
- (B) 6 mL
- (C) 10 mL
- (D) 12 mL

34 If you went to a medical clinic to find out your body volume, how would they do this?

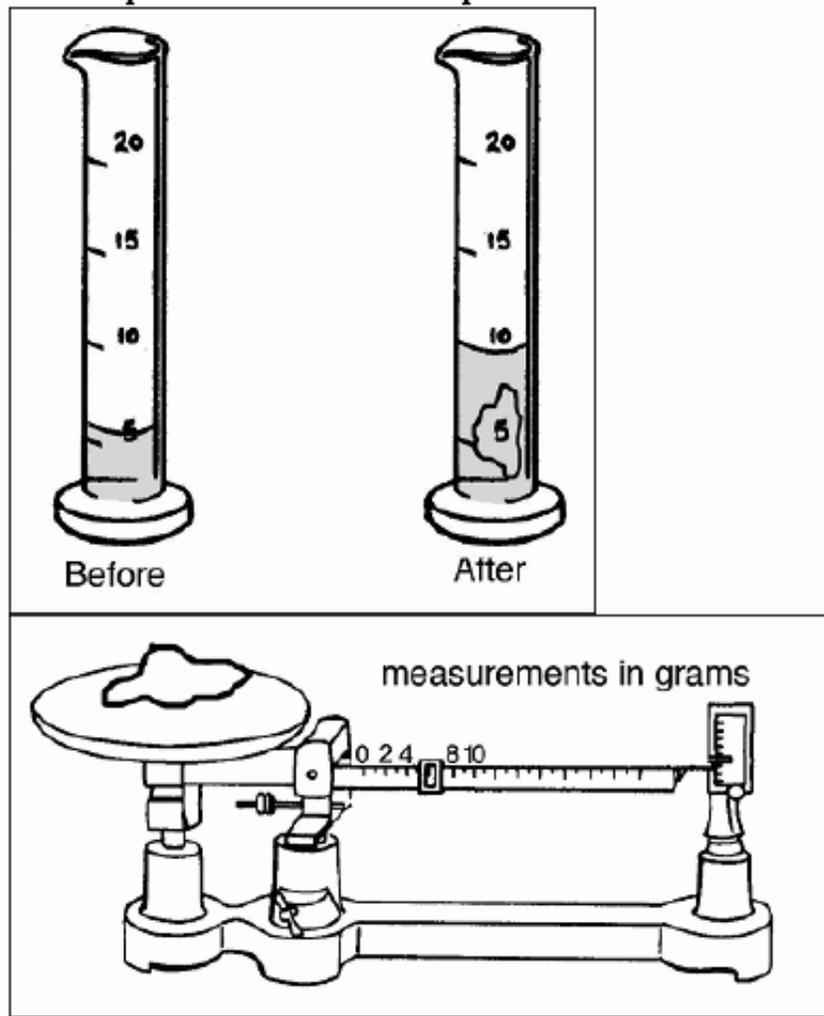
- (A) With a tape measure, they would measure your arms, stomach and thighs.
- (B) They would have you stand on scales and read your weight.
- (C) They would put you in a tank to determine how much water you displace.
- (D) Have you keep a monthly record of increase or decrease in your clothes sizes.

35 A student has two objects. Object 1 has a mass of 10 g and a volume of 5 cm³. Object 2 has a mass of 100 g and a volume of 200 cm³. If both objects are placed in water, which will float and why?

- (A) Object 2 will float because it is less dense than water
- (B) Object 2 will float because it has more mass than object 1
- (C) Object 1 will float because it is less dense than object 2
- (D) Object 1 will float because it has less mass than object 2

36

Use the pictures to answer the question.



What is the mass of the rock?

- (A) 5 g
- (B) 6 g
- (C) 7 g
- (D) 8 g

- 37 You have two rocks, rock A and rock B. Rock A is bigger but has the same mass as rock B. How will the density of the two rocks compare?
- (A) The density of rock B is greater because its volume is greater.
 - (B) The density of rock B is greater because its volume is less.
 - (C) The density of rock B is less because its volume is greater.
 - (D) The density of rock B is less because its volume is less.
- 38 Your friend is building a model boat but is having problems getting it to float. You know that the density of water is about 1.0 g/ml. Together with your friend you find the mass of the boat to be 500 g and the volume to be 450 ml. Based on these measurements you tell your friend that he must reduce the mass of his boat by at least 50 grams. He reduces the mass by 80 grams and his boat now floats.
- Which of these statements relates to this situation?
- (A) Science can be used by many people, not just scientists
 - (B) Science can be used by scientists but not by most people
 - (C) Science is too complicated to be used to solve problems
 - (D) Science is not useful in everyday life
- 39 Which statement best explains why a solid block of wood floats in water while a solid block of iron does not?
- (A) Iron sinks because it is less dense than wood.
 - (B) Iron sinks because it is less dense than water.
 - (C) Wood floats because water is less dense than wood.
 - (D) Wood floats because it is less dense than water.
- 40 Why would a bridge builder construct a large steel bridge with 1-inch cracks or spaces every 50 feet along the roadway of the bridge?
- (A) To save steel and paving material.
 - (B) So that when the wind blows the bridge will not crack.
 - (C) So that in the winter as the ice melts it can easily drain off the bridge's surface.
 - (D) To allow for the expansion and contraction of the structure of the bridge.

41 A student measured the circumference of an inflated balloon and then put it into a freezer. After 30 minutes, the student took the balloon out of the freezer and measured the circumference again. The student found the circumference was smaller. The student concludes that volume is affected by temperature. Which answer best describes the conclusion made by the student?

- (A) Volume is affected by temperature is a good conclusion because it is based on observable evidence
- (B) Volume is affected by temperature is a good conclusion because it can't be proven
- (C) Volume is affected by temperature is a bad conclusion because it could not be observed in this experiment
- (D) Volume is affected by temperature is a bad conclusion because results can vary depending on what the student wants his answer to be

42 Who would most directly benefit from the study of the motion of particles and how it affects the expansion and contraction of materials?

- (A) an engineer designing a bridge
- (B) a botanist studying trees in a rainforest
- (C) a doctor studying cancer cells
- (D) a tailor sewing a man's suit

43 The theory that explains the movement of particles suggests that

- (A) particles do not move
- (B) only particles of a gas move
- (C) only particles of a liquid move
- (D) particles of solids, liquids, and gases move

44 A metal lid was very tightly screwed onto a glass jar. To get the jar open, Kelly held the lid under hot water. Why was Kelly able to remove the lid?

- (A) Metal particles move more rapidly when heated so the particles moved further apart, and the lid became looser
- (B) Metal particles move less rapidly when heated so the particles moved closer together, and the lid became looser
- (C) The metal particles did not move. The water loosened the lid
- (D) The metal particles melted because the water was so hot

- 48 Why does a balloon full of air pop when it is left by a heater?
- (A) The rubber material of the balloon itself melts with a loud bang.
 - (B) The molecules of air inside move faster and further apart as they take on heat energy, causing the air to expand, which pops the balloon.
 - (C) The air inside takes on heat energy, which pops the balloon like a bolt of lightning.
 - (D) When the air in the balloon is heated, molecules of oxygen in the air greatly increase in number. When there are too many the balloon pops.

- 49 One of the best ways to weaken the bonds holding particles together is by

- (A) heat
- (B) grinding
- (C) movement
- (D) pressure

50

| Beaker | Temperature in Celsius | Time until mixed |
|--------|------------------------|----------------------|
| A | 3 degrees | 3 minutes 45 seconds |
| B | 20 degrees | 2 minutes 10 seconds |
| C | 90 degrees | 1 minute 15 seconds |

Students conducted an experiment testing the time it takes food coloring to mix with water. The results of the experiment are summarized in the table above. Which of the following best explains the results:

- (A) The coloring mixed faster in A because the molecules in cold water move faster
 - (B) The coloring mixed faster in C because the molecules in hot water move faster
 - (C) The coloring mixed slower in A because the molecules in cold water move faster
 - (D) The coloring mixed slower in C because the molecules in cold water move slower
- 51 Two students performed investigations to explore the hypothesis that particles of matter are continually in motion. The students' experiments are as follows: (1) Student one opened a bottle of perfume in a classroom and the aroma could soon be smelled in distant parts of the classroom. (2) Student two shined a flashlight in a dark classroom and noticed many particles moving through the beam of light.

Which best describes the investigations, conclusions and methods?

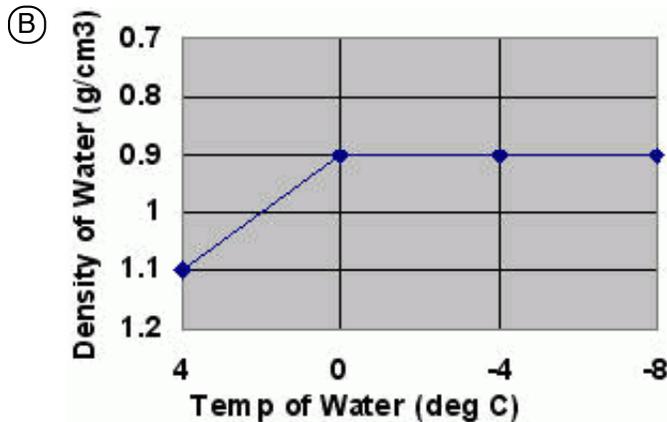
- (A) Neither students found evidence to support the hypothesis that particles of matter continually move
- (B) Both students did find evidence to support the hypothesis that particles of matter continually move
- (C) Both students found evidence that particles are not constantly moving
- (D) Student one found evidence to support the hypothesis, while student two did not

- 52 Two students performed investigations to explore the hypothesis that particles of matter are continually in motion. The students' experiments are as follows: (1) Student one opened a bottle of perfume in a classroom and the aroma could soon be smelled in distant parts of the classroom. (2) Student two shined a flashlight in a dark classroom and noticed many particles moving through the beam of light. Which sentence best describes the investigations, conclusions and methods?
- (A) Neither experiment provided evidence to support the hypothesis that particles continually move.
 - (B) Both experiments provided evidence to support the hypothesis that particles continually move.
 - (C) Both experiments provided evidence that particles are not constantly moving.
 - (D) Experiment one provided evidence to support the hypothesis, while experiment two did not.
- 53 You are asked to demonstrate that the volume of a gas expands when heated and contracts when cooled. You do an experiment using a balloon. First you inflate and tie off a balloon, then measure the circumference at room temperature. Then you put the balloon in a freezer for an hour, measure the circumference, and find that it has contracted. When you put the balloon in a warm room for a time, the balloon expands and the circumference increases. What is the independent variable in this experiment?
- (A) The balloon
 - (B) The volume of air in the balloon
 - (C) The temperature of the air in the balloon
 - (D) The time of day the experiment is performed
- 54 Kim opened a bottle of flowery perfume in the back of the classroom. After a minute, Pat, in the front of the classroom, remarked that she smelled flowers. Which of the following statements best explains Pat's observations?
- (A) Particles move through diffusion so Pat smelled the perfume
 - (B) The particles of perfume did not move because not everyone could smell the perfume when Pat did
 - (C) Pat smelled the perfume because she was told she should be able to
 - (D) Pat was mistaken. There could not have been a perfume smell

- 55 Which data best supports the fact that with increased temperature the particles of a substance move faster?

(A)

| Balloon | |
|---------------|-------------|
| Internal Temp | Volume |
| 10°C | 13 liters |
| 15°C | 14.5 liters |
| 20°C | 16 liters |
| 25°C | 17.8 liters |



(C)

| Wooden Board | |
|----------------|-----------------|
| Temp. of board | Length of board |
| 20°C | 15 cm |
| 30°C | 15 cm |
| 40°C | 15 cm |
| 50°C | 15 cm |

(D)

| Physical states of matter at 30°C | |
|-----------------------------------|-----------------------------------|
| Stone | Solid |
| Water | Liquid |
| Steel rod | Solid |
| Gasoline | Part liquid, part gas |
| Onion | Part solid, part liquid, part gas |

59

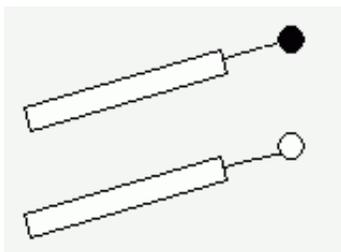
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- (D) The coloring mixed slower in C because the molecules in cold water move slower.

60

A teacher does a demonstration in class using a steel ball and a steel ring (see illustration below).



The teacher heats the steel ball over a Bunsen burner and then cools the steel ball in a glass of ice water. Based on what you know about the relationship between temperature and motion of particles, choose the best explanation for this experiment.

- (A) The steel ball will not fit because it was heated, causing the molecules to expand
- (B) The steel ball will not fit because it was cooled, causing the molecules to contract
- (C) The steel ball will fit because it was heated, causing the molecules to contract.
- (D) The steel ball will fit because it was cooled, causing the molecules to expand

61

Which answer below best describes the future of building materials for roads and other structures?

- (A) Building materials will probably change because new technology will provide better information and new materials.
- (B) Building materials will probably change because scientists like to change things.
- (C) Building materials will probably stay the same because scientists have learned all there is to know about the materials.
- (D) Building materials will probably stay the same because there are no new materials to discover.