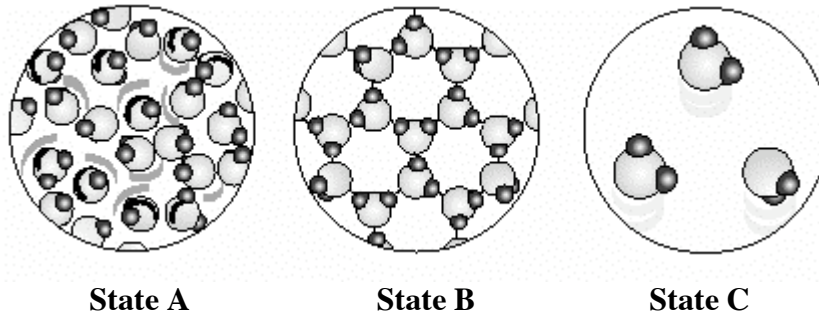


## STAR Test Review 2011 ver.2

### Short Answer

Use the diagram to answer each question.

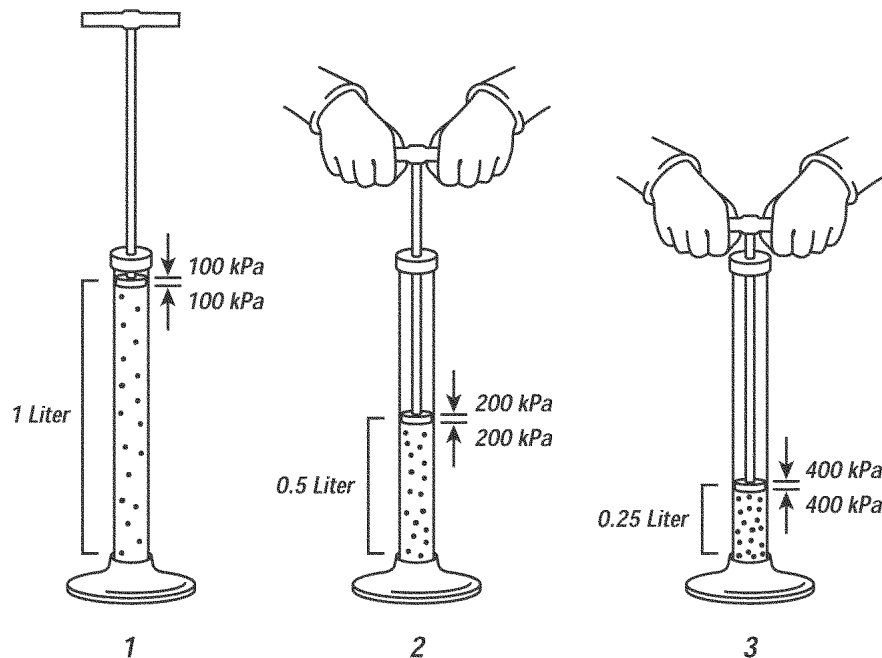
#### Three States of a Substance



1. In which state are the particles least able to move? Explain.
2. Classify each of the three states as gas, liquid, or solid.
3. Which of the three states represents a liquid? How do you know?

Use the diagram to answer each question.

#### Air Pressure and Volume



4. What pattern in the behavior of gases is shown from Step 1 through Step 3 of the figure?

- Explain what has happened to the volume and pressure of the gas in the container between Step 1 and Step 2.
- Explain what would happen in Step 2 if the cylinder was heated while the plunger was held steady.

*Use the diagram to answer each question.*

### ***Atoms of Some Common Elements***

Element	Atomic Number	Mass Number	Protons	Neutrons	Electrons
Sodium	11	?	11	12	?
Magnesium	12	24	12	?	12
Aluminum	?	27	13	14	13
Phosphorus	15	31	?	16	15

- What is the mass number of sodium?
- What is the atomic number of aluminum?
- The element silicon has been omitted from this table. It appears in Period 3 of the periodic table between aluminum and phosphorus. Given that information, which of the five columns in the chart could you fill in for silicon?
- What is the total number of electrons in an atom of sodium?
- How many neutrons are in an atom of magnesium?

*Use the diagram to answer each question.*

### ***Periodic Table of the Elements (Top Section)***

	1																18
1		2															
2																	
3			3	4	5	6	7	8	9	10	11	12					
4																	

- Which group of elements reacts violently with elements from Group 1?
- If a metal reacts violently with water, in which group is it likely to be found?
- What name is given to the elements in Groups 3 through 12? How do their properties tend to compare with the elements to the left and right of these groups?

15. Locate the box in Group 18 in the fourth period. Predict the state of matter and the chemical reactivity of the element that belongs in that box.
16. Most of the elements that form a zigzag line in the periodic table belong to one major group. What is that group, and what kinds of properties do its elements tend to have?
17. What are the two most important alkali metals? Why are they so important?

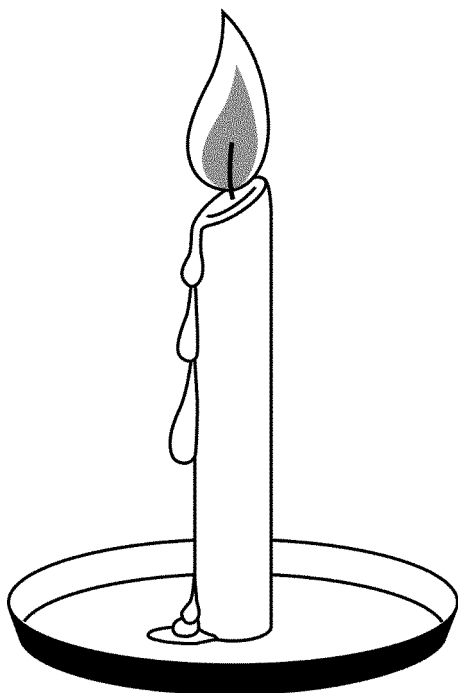
*Use the diagram to answer each question.*

**Five Groups of Elements From the Periodic Table**

1	2	13	17	18
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.012	5 <b>B</b> Boron 10.811	9 <b>F</b> Fluorine 18.998	2 <b>He</b> Helium 4.0026
11 <b>Na</b> Sodium 22.990	12 <b>Mg</b> Magnesium 24.305	13 <b>Al</b> Aluminum 26.982	17 <b>Cl</b> Chlorine 35.453	10 <b>Ne</b> Neon 20.179
19 <b>K</b> Potassium 39.098	20 <b>Ca</b> Calcium 40.08	31 <b>Ga</b> Gallium 69.723	35 <b>Br</b> Bromine 79.904	18 <b>Ar</b> Argon 39.948
37 <b>Rb</b> Rubidium 85.468	38 <b>Sr</b> Strontium 87.62	49 <b>In</b> Indium 114.82	53 <b>I</b> Iodine 126.90	36 <b>Kr</b> Krypton 83.80
55 <b>Cs</b> Cesium 132.91	56 <b>Ba</b> Barium 137.33	81 <b>Tl</b> Thallium 204.37	85 <b>At</b> Astatine (210)	54 <b>Xe</b> Xenon 131.30
87 <b>Fr</b> Francium (223)	88 <b>Ra</b> Radium (226)			86 <b>Rn</b> Radon (222)

18. List three elements from the group containing the most reactive nonmetals.
19. In each period, how does the number of electrons in each kind of atom change from left to right between Groups 1 and 2? Explain how you know.
20. Which group of elements loses electrons most easily?
21. Which group contains elements with two valence electrons?
22. How many atoms of a Group 17 element would be needed to react with one atom of a Group 2 element? Explain.

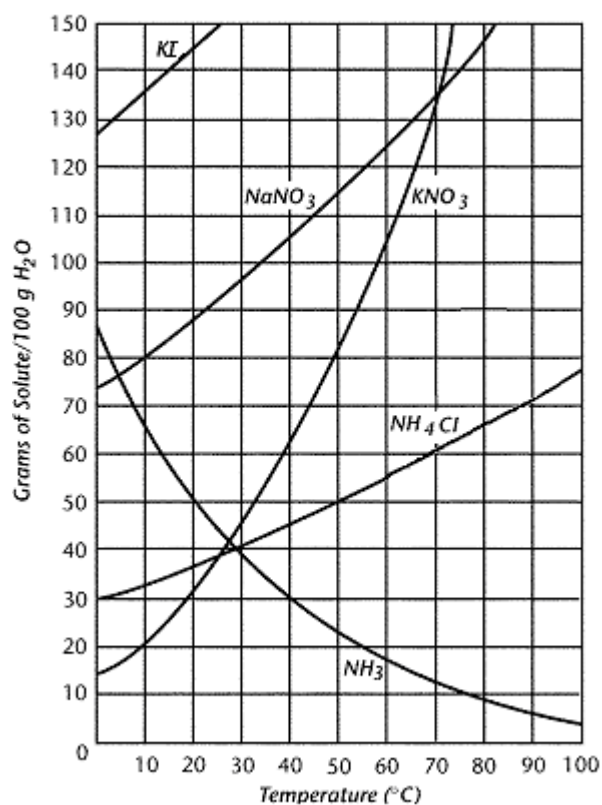
*Use the diagram to answer each question.*



23. When the candle was lit, a pool of liquid wax formed in the area around the wick, and then spilled over the side and resolidified. Does this observation refer to a physical change or a chemical change? Explain.
24. Is the reaction that occurs in the diagram endothermic or exothermic? Explain.
25. The flame from the candle gives off black smoke. Does this statement describe evidence for a physical change or a chemical change? Explain.
26. If the products formed from the burning candle are mostly carbon (C), carbon dioxide ( $\text{CO}_2$ ), and water ( $\text{H}_2\text{O}$ ), what elements were in the reactants? How do you know?
27. Is a burning candle an example of an open system or a closed system? Explain.
28. If the candle is covered by a large glass beaker, the flame will go out. How does the beaker affect the conditions described by the fire triangle?

*Use the diagram to answer each question.*

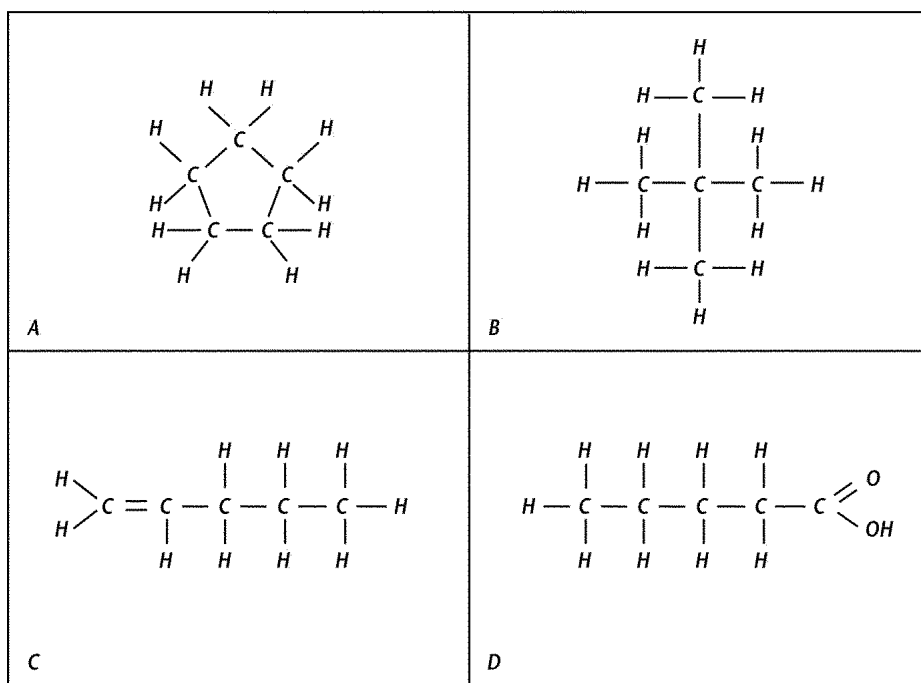
**Solubilities of Various Compounds**



29. Above 70°C, what other compounds besides ammonia (NH<sub>3</sub>) have a lower solubility than that of potassium nitrate (KNO<sub>3</sub>)?
30. What happens to the solubility of potassium nitrate (KNO<sub>3</sub>) as the temperature rises?
31. According to the graph, which of the compounds is most soluble at 0°C? Which is least soluble at 100°C?
32. Compare the solubility of sodium nitrate (NaNO<sub>3</sub>) to that of ammonia (NH<sub>3</sub>).

*Use the diagram to answer each question.*

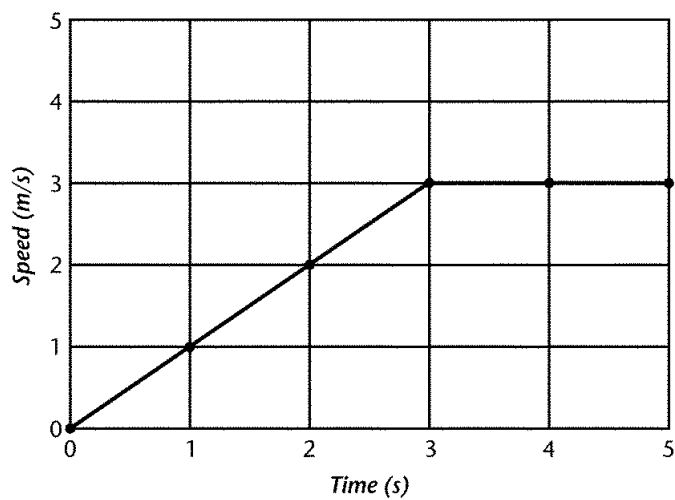
### Four Organic Molecules



33. Which molecule is a branched chain?
34. Which two structures have the same molecular formula? What is the formula?
35. Which of the four molecules are hydrocarbons?
36. Which of the four molecules is an unsaturated hydrocarbon?

*Use the diagram to answer each question.*

### Speed of a Ball Rolling Down a Ramp Onto the Floor

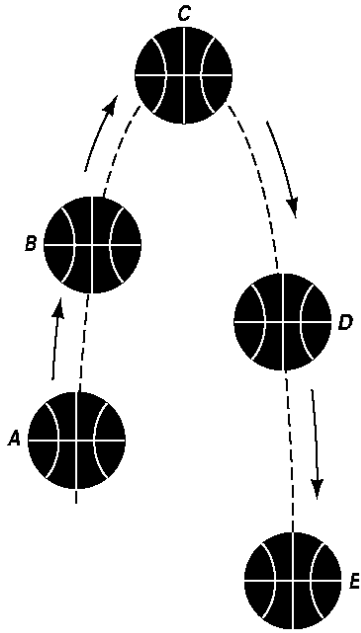


37. What two variables are plotted in the graph?
38. What does the line segment on the graph from 0 to 3 seconds represent? Explain your answer.
39. What is the acceleration of the ball between 0 and 3 seconds?

*Use the diagram to answer each question.*

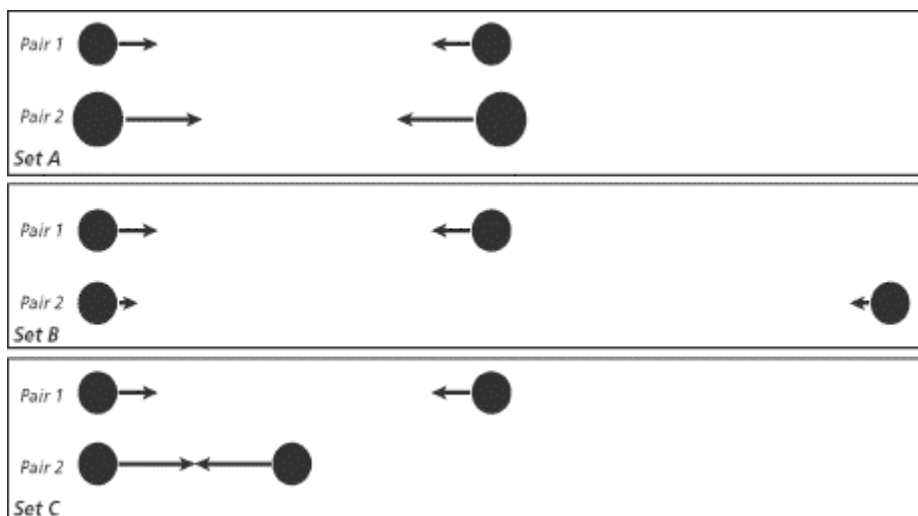
Note: The ball does not travel in an arc. It travels straight up and straight down.

**Potential and Kinetic Energy**



40. Which letter represents the position at which the basketball has the greatest potential energy? Explain.
41. Which letter represents the position at which the basketball has the greatest kinetic energy? Explain.
42. Which letter represents the position at which the basketball has the least potential energy? Explain.

*Use the diagram to answer each question.*

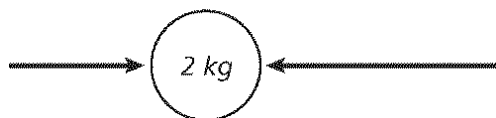
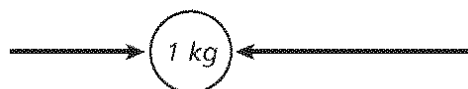


Assume that all of the objects in the diagram are solid and made of the same material. Arrows represent gravitational force.

43. Can you identify a pair of balanced forces in the diagram? Explain your answer.
44. Compare the size and direction of the gravitational force exerted by each object in pair 1 of Set A.
45. In Set A, is the gravitational force greater between the objects in pair 1 or pair 2? Explain why.
46. In Set A, what would you have to do to the objects to make the gravitational forces between the objects in pair 2 the same as the forces between the objects in pair 1?

Use the diagram to answer each question.

#### **Forces on Two Objects**



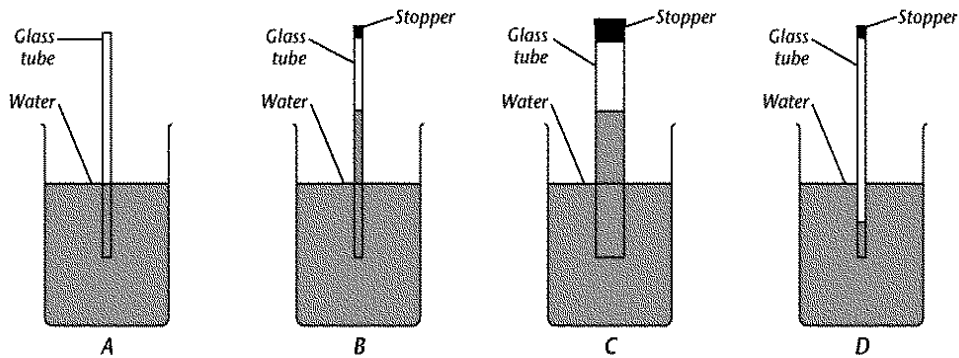
47. What does the head of each arrow indicate?
48. Compare the acceleration of the 1-kg object with that of the 2-kg object.
49. What does the length of each arrow represent?



50. In what direction is the net force acting on the 1-kg object?
51. Suppose a third force is applied to the 1-kg object in an upward direction. How will the object's acceleration change?

*Use the diagram to answer each question.*

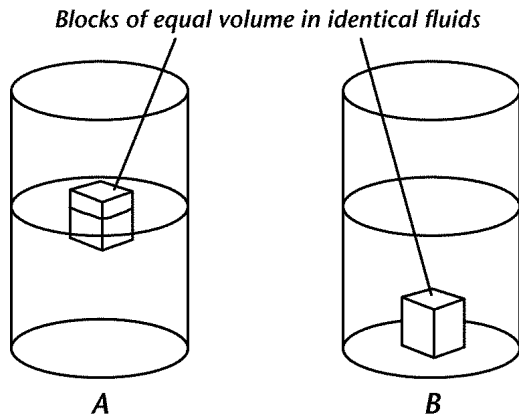
**Balanced Pressures**



52. Compare the air pressure on the surface of the water outside the glass tube in each container.
53. Compare the air pressure on the surface of the water inside the glass tube in container A with the air pressure on the surface of the water inside the glass tube in container B.
54. In which container is the air pressure inside the glass tube the greatest?
55. Compare the fluid pressure on the bottom of container A with the fluid pressure on the bottom of container B.
56. In container B, what will happen to the levels of the water in the glass tube and in the container if the stopper is removed? Explain.
57. Compare the air pressure on the surface of the water inside the glass tube in container B with that inside the glass tube in container C. Then compare the force of the air on the surface of the water inside the glass tubes in containers B and C. Explain.

*Use the diagram to answer each question.*

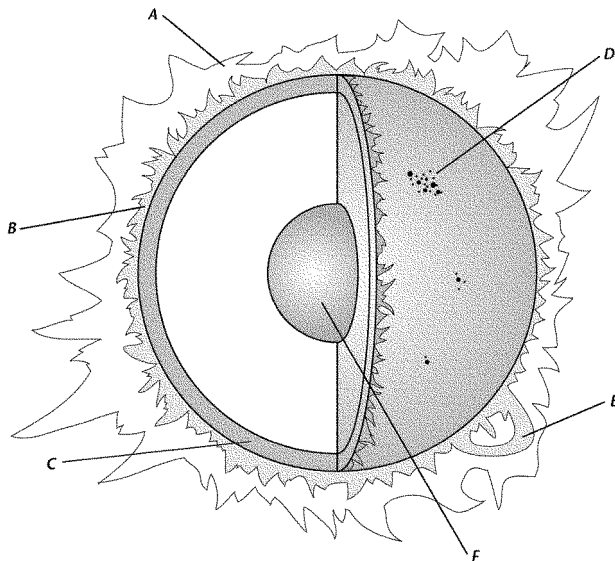
### ***Blocks in Liquid***



58. When the block was placed in the liquid in container A, the level of the liquid rose. Why?
59. In what direction is the buoyant force acting on the block in container A?
60. How is the buoyant force related to the displaced liquid in container A?
61. Compare the buoyant force on the block in container B with the weight of the block.
62. Compare the buoyant force in container A with the buoyant force in container B.
63. The fluids in both containers are identical, and both blocks are the same size. Therefore, what can we conclude about the densities of the blocks?

*Use the diagram to answer each question.*

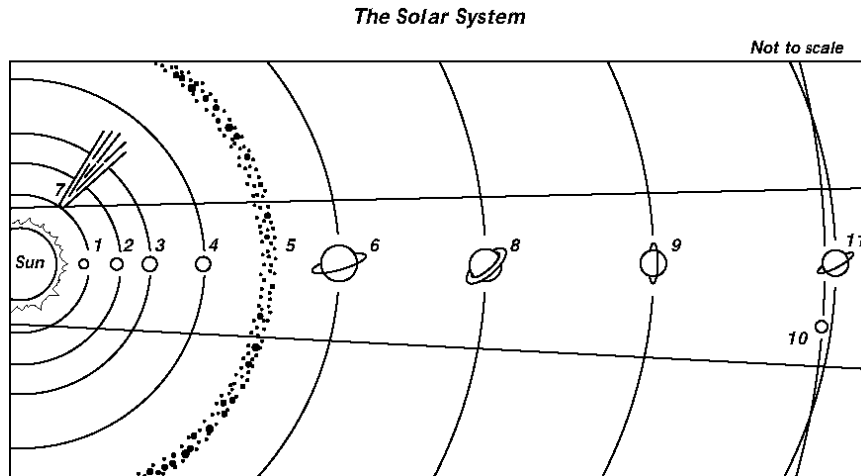
### ***Layers of the Sun***



64. Identify area F. Describe what happens in this area.

65. Identify area A. When is this area visible to the human eye?
66. Identify area B. Describe its appearance during a total solar eclipse.

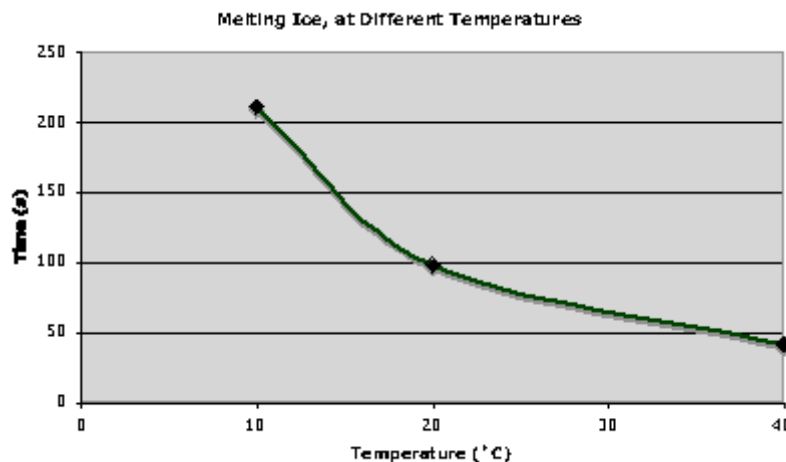
*Use the diagram to answer each question.*



67. Write the name of the planet that is labeled with each number.
- 1 \_\_\_\_\_ 2 \_\_\_\_\_ 3 \_\_\_\_\_ 4 \_\_\_\_\_
68. Which body is now classified as a dwarf planet?
69. Name object 9 and explain why it appears different from the other gas giant planets.

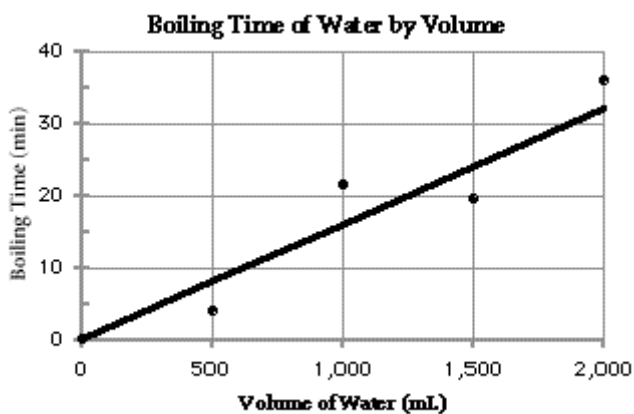
*The graph below shows the amount of time an ice cube took to melt at three different water temperatures. Distilled water was chilled or heated to three specific temperatures. 300 mL of chilled or heated water was then added to three separate 400 mL beakers. A 4 cm-by-2 cm ice cube was placed into each of the three beakers.*

*Use the graph to answer the following questions.*



70. Which variable is the manipulated variable? On which axis is it plotted?
71. Which variable is the responding variable? On which axis is it plotted?
72. What parameters were controlled in this experiment? Why are controlled parameters important for a scientific experiment?
73. What conclusion can you draw from this graph?
74. Why would a scientist decide to display data on a graph like this?

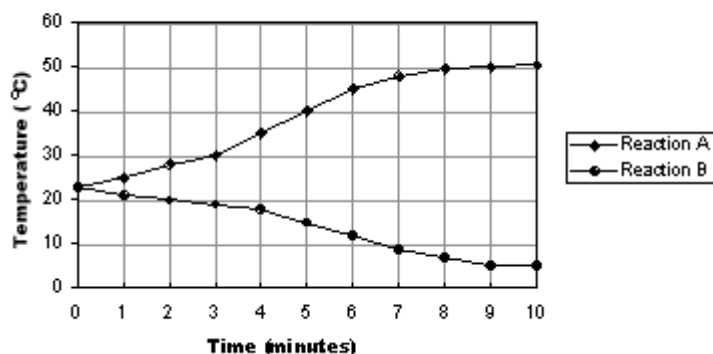
*Use the graph to answer each question.*



75. On which axis is volume shown?
76. On which axis is time shown?
77. What type of line is shown?
78. Why is it preferable to draw a line of best fit rather than to connect the dots?
79. What is each individual point called?

*Use the diagram to answer each question.*

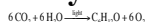
### ***Energy of Two Reactions***



80. Which reaction is more likely to involve the melting of ice? Explain your reasoning.
81. How did the temperature change in reaction A differ from that in reaction B?
82. Which reaction is more likely to involve a form of combustion? Explain your reasoning.
83. Which reaction is endothermic? Explain your reasoning.

*Use the following equation to answer each question.*

### Photosynthesis



84. Does the equation show that matter is conserved in the reaction? Explain.
85. Is photosynthesis an endothermic or exothermic reaction? Explain.
86. Water is one of the substances involved in photosynthesis. What is the ratio of hydrogen atoms to oxygen atoms in a water molecule?

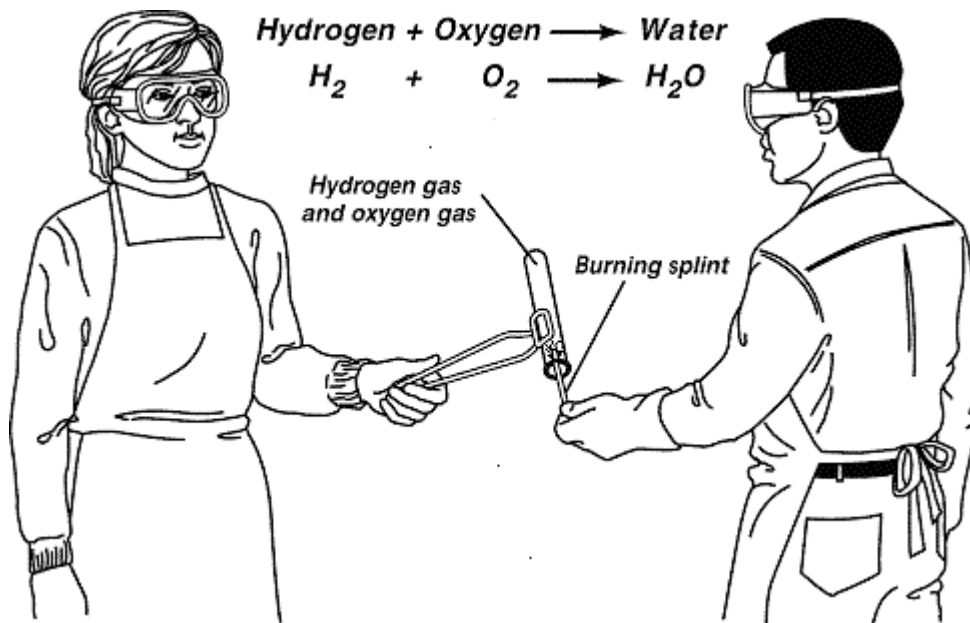
Use the table below to answer the following questions.

Ions and Their Charges

Name	Charge	Symbol or Formula
Lithium	?	$\text{Li}^+$
_____?	1+	$\text{Na}^+$
Calcium	2+	_____?
Chloride	1-	_____?
_____?	1-	$\text{NO}_3^-$
Carbonate	2-	_____?

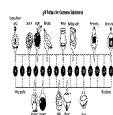
87. What is the name of the ion with the chemical formula  $\text{NO}_3^-$ ?
88. Which of these ions are polyatomic? Explain.

Use the diagram to answer each question.



89. Where does the water come from in the reaction?
90. What type of chemical reaction is represented in the diagram? Explain.

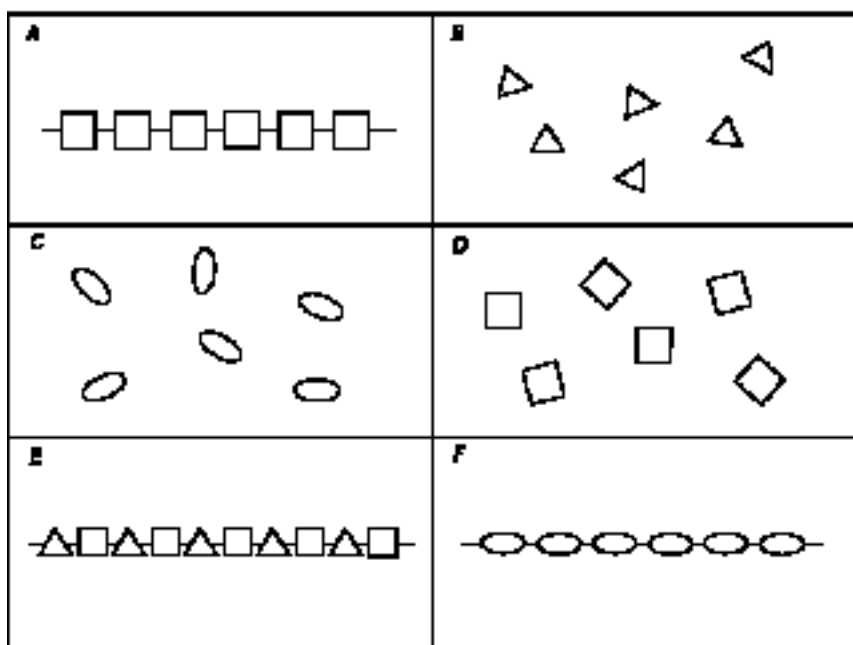
Use the diagram to answer each question.



91. Use the pH scale to compare an apple and a lemon.
92. Why would you expect soap to taste bitter?
93. What does the pH of drain cleaner tell you about the dangers of such a product?
94. What color would litmus paper turn in a solution of baking soda? Explain your answer in terms of pH.

Use the diagram to answer each question.

### **Models of Polymers and Monomers**



95. Which of the diagrams represent models of polymers?
96. How many different models of monomers are shown in the diagram, and which ones are they?

## STAR Test Review 2011 ver.2

### Answer Section

#### SHORT ANSWER

1. ANS:

State B. The figure shows that the particles are arranged in a pattern of definite, fixed positions. They can vibrate but not move around one another.

PTS: 1 DIF: L2

OBJ: CaPS.3.1.1 Describe the motion of particles in a solid. STA: S 8.3.e

BLM: analysis

2. ANS:

State A: liquid; State B: solid; State C: gas

PTS: 1 DIF: L2

OBJ: CaPS.3.1.1 Describe the motion of particles in a solid. | CaPS.3.1.2 Describe the motion of particles in a liquid. | CaPS.3.1.3 Describe the motion of particles in a gas.

STA: S 8.3.e BLM: analysis

3. ANS:

State A. The particles are not in a fixed pattern as particles in a solid are; the particles can move around one another, but they remain quite close together.

PTS: 1 DIF: L2

OBJ: CaPS.3.1.2 Describe the motion of particles in a liquid. STA: S 8.3.e

BLM: analysis

4. ANS:

The figure shows that the volume and pressure of a gas are related, and that as the volume of a gas decreases, its pressure increases.

PTS: 1 DIF: L2

OBJ: CaPS.3.3.2 Explain how the volume, temperature, and pressure of a gas are related.

STA: S 8.3.d | S 8.3.e BLM: analysis

5. ANS:

The volume was decreased by one half, from 1 liter to 0.5 liter. As a result, the pressure of the gas doubled, from 100 kPa to 200 kPa.

PTS: 1 DIF: L2

OBJ: CaPS.3.3.2 Explain how the volume, temperature, and pressure of a gas are related.

STA: S 8.3.c | S 8.3.d BLM: analysis

6. ANS:

If the cylinder was heated, the temperature of the gas would increase. With the plunger held steady, the volume of the gas would remain constant. Under those conditions (increasing temperature and constant volume), the pressure of the gas would increase.



PTS: 1 DIF: L3  
OBJ: CaPS.3.3.2 Explain how the volume, temperature, and pressure of a gas are related.  
STA: S 8.3.c | S 8.3.d BLM: synthesis

7. ANS:  
23

PTS: 1 DIF: L2  
OBJ: CaPS.4.1.2 Describe the modern model of the atom. STA: S 8.3.a  
BLM: analysis

8. ANS:  
13

PTS: 1 DIF: L2  
OBJ: CaPS.4.1.2 Describe the modern model of the atom. STA: S 8.7.a  
BLM: analysis

9. ANS:  
Silicon's atomic number is 14, and a silicon atom has 14 protons and 14 electrons. You cannot determine the number of neutrons or the mass number.

PTS: 1 DIF: L3  
OBJ: CaPS.4.2.2 Describe how elements are organized in the modern periodic table.  
STA: S 8.7.a BLM: synthesis

10. ANS:  
11

PTS: 1 DIF: L2  
OBJ: CaPS.4.1.2 Describe the modern model of the atom. STA: S 8.3.a  
BLM: analysis

11. ANS:  
12

PTS: 1 DIF: L2  
OBJ: CaPS.4.1.2 Describe the modern model of the atom. STA: S 8.3.a  
BLM: analysis

12. ANS:  
Group 17

PTS: 1 DIF: L2  
OBJ: CaPS.4.2.2 Describe how elements are organized in the modern periodic table.  
STA: S 8.7.a BLM: analysis

13. ANS:  
Group 1

PTS: 1 DIF: L2  
OBJ: CaPS.4.2.2 Describe how elements are organized in the modern periodic table.  
STA: S 8.3.f | S 8.7.a BLM: analysis

14. ANS:

Transition metals. They are less reactive than the metals in Groups 1 and 2 to their left; they tend to be more reactive than the metals to their right.

PTS: 1 DIF: L3

OBJ: CaPS.4.3.2 Explain how the reactivity of metals changes across the periodic table.

STA: S 8.7.a BLM: synthesis

15. ANS:

The element is a gas, one of the inert gases. It does not ordinarily react with other elements to form compounds.

PTS: 1 DIF: L3

OBJ: CaPS.4.4.1 Describe the properties of nonmetals and inert gases.

STA: S 8.7.a BLM: synthesis

16. ANS:

Semimetals. Semimetals have some properties of metals and some properties of nonmetals.

PTS: 1 DIF: L2

OBJ: CaPS.4.4.2 List the uses of semimetals.

STA: S 8.3.f | S 8.7.a

BLM: analysis

17. ANS:

Potassium and sodium. Sodium compounds are found in large amounts in seawater and salt beds. Both sodium and potassium are found in your diet and are important for life.

PTS: 1 DIF: L2

OBJ: CaPS.4.3.2 Explain how the reactivity of metals changes across the periodic table.

STA: S 8.6.b BLM: application

18. ANS:

Accept any three elements from Group 17: fluorine (F), chlorine (Cl), bromine (Br), iodine (I), astatine (At).

PTS: 1 DIF: L2

OBJ: CaPS.5.1.2 State what the periodic table tells you about atoms and the properties of elements.

STA: S 8.7.a BLM: analysis

19. ANS:

From Group 1 to Group 2, the number of electrons in each kind of atom increases by one in each period. This is the case because the number of protons (atomic number) increases by one from Group 1 to Group 2, and atoms have equal numbers of electrons and protons.

PTS: 1 DIF: L3

OBJ: CaPS.5.1.2 State what the periodic table tells you about atoms and the properties of elements.

STA: S 8.7.a BLM: analysis

20. ANS:

Group 1

PTS: 1 DIF: L2  
OBJ: CaPS.5.1.2 State what the periodic table tells you about atoms and the properties of elements.

STA: S 8.7.a BLM: analysis

21. ANS:

Group 2

PTS: 1 DIF: L2  
OBJ: CaPS.5.1.2 State what the periodic table tells you about atoms and the properties of elements.

STA: S 8.7.a BLM: analysis

22. ANS:

Two. Atoms of elements in Group 17 form ions with a charge of 1<sup>-</sup>, and atoms of elements in Group 2 form ions with a charge of 2<sup>+</sup>. It would take two ions of a Group 17 element to balance the charge of one ion of a Group 2 element.

PTS: 1 DIF: L3 OBJ: CaPS.5.2.1 Explain how ions form bonds.

STA: S 8.7.a BLM: synthesis

23. ANS:

A physical change. The substance was still wax, but it changed to a liquid and then back to a solid.

PTS: 1 DIF: L2  
OBJ: CaPS.6.1.1 State how changes in matter can be described. STA: S 8.5.d  
BLM: application

24. ANS:

Exothermic. Heat is released when the candle (wax) burns.

PTS: 1 DIF: L2  
OBJ: CaPS.6.1.2 Explain how you can tell when a chemical reaction occurs.

STA: S 8.5.c BLM: application

25. ANS:

A chemical change. The black smoke is evidence of the formation of a new substance, which means a chemical change occurred.

PTS: 1 DIF: L2  
OBJ: CaPS.6.1.2 Explain how you can tell when a chemical reaction occurs.

STA: S 8.5.a BLM: application

26. ANS:

Carbon, hydrogen, and oxygen. No matter is created or destroyed in a chemical reaction, and so the elements present in the products must have been present in the reactants.

PTS: 1 DIF: L2  
OBJ: CaPS.6.2.2 Explain how matter is conserved during a chemical reaction.

STA: S 8.5.b BLM: application

27. ANS:

An open system. In an open system, matter can enter from or escape to the surroundings. In a closed system, matter is not allowed to enter or leave. When a candle burns, oxygen is allowed to enter and smoke is allowed to leave, so it is an open system.

PTS: 1 DIF: L2

OBJ: CaPS.6.2.2 Explain how matter is conserved during a chemical reaction.

STA: S 8.5.b BLM: application

28. ANS:

Oxygen is needed for the candle to burn. The beaker prevents oxygen in the air from getting to the candle, so when the oxygen in the beaker is used up, the candle goes out.

PTS: 1 DIF: L3

OBJ: CaPS.6.4.1 List the three things necessary to maintain a fire.

STA: S 8.5.d BLM: synthesis

29. ANS:

sodium nitrate ( $\text{NaNO}_3$ ) and ammonium chloride ( $\text{NH}_4\text{Cl}$ )

PTS: 1 DIF: L2

OBJ: CaPS.7.2.3 Identify factors that affect the solubility of a substance.

STA: S 8.5.e BLM: analysis

30. ANS:

The solubility increases.

PTS: 1 DIF: L2

OBJ: CaPS.7.2.3 Identify factors that affect the solubility of a substance.

STA: S 8.5.d BLM: analysis

31. ANS:

KI is most soluble at  $0^\circ\text{C}$ , and  $\text{NH}_3$  is least soluble at  $100^\circ\text{C}$ .

PTS: 1 DIF: L2

OBJ: CaPS.7.2.3 Identify factors that affect the solubility of a substance.

STA: S 8.5.d BLM: analysis

32. ANS:

Ammonia ( $\text{NH}_3$ ) is more soluble than sodium nitrate ( $\text{NaNO}_3$ ) at low temperatures and less soluble than sodium nitrate ( $\text{NaNO}_3$ ) at high temperatures. (Some students may add that the two compounds have the same solubility at approximately  $5^\circ\text{C}$ .)

PTS: 1 DIF: L2

OBJ: CaPS.7.2.3 Identify factors that affect the solubility of a substance.

STA: S 8.5.d BLM: analysis

33. ANS:

B

PTS: 1 DIF: L2

OBJ: CaPS.8.1.1 Describe how carbon is able to form a huge variety of compounds.

STA: S 8.6.a BLM: analysis

34. ANS:

A and C; C<sub>5</sub>H<sub>10</sub>

PTS: 1

DIF: L2

OBJ: CaPS.8.2.2 Identify some properties of hydrocarbons.

STA: S 8.6.a

BLM: analysis

35. ANS:

A, B, and C

PTS: 1

DIF: L2

OBJ: CaPS.8.2.3 Describe the structure and bonding of hydrocarbons.

STA: S 8.6.a

BLM: analysis

36. ANS:

C

PTS: 1

DIF: L3

OBJ: CaPS.8.2.3 Describe the structure and bonding of hydrocarbons.

STA: S 8.6.a

BLM: analysis

37. ANS:

speed and time

PTS: 1

DIF: L2

OBJ: CaPS.9.3.3 Describe what graphs are used to analyze the motion of an accelerating object.

STA: S 8.1.f

BLM: analysis

38. ANS:

The segment represents constant acceleration. The speed increases by the same amount during each second.

PTS: 1

DIF: L2

OBJ: CaPS.9.3.3 Describe what graphs are used to analyze the motion of an accelerating object.

STA: S 8.1.f

BLM: analysis

39. ANS:

$$\begin{aligned} & \frac{1}{2}at^2 = \frac{(2m)(2-0m/s)}{2} \\ & = \frac{(2m)(2)}{2} \\ & = \frac{(1m)(2)}{1} \\ & = 1m/s^2 \end{aligned}$$

PTS: 1

DIF: L2

OBJ: CaPS.9.3.3 Describe what graphs are used to analyze the motion of an accelerating object.

STA: S 8.1.f

BLM: analysis

40. ANS:

C. At this point, which is the highest point, all of the ball's energy is gravitational potential energy. The ball does not have kinetic energy because it is not moving at this point.

PTS: 1 DIF: L2

OBJ: CaPS.9.4.1 Identify factors that affect an object's kinetic and potential energy.

STA: S 8 Framework

BLM: analysis

41. ANS:

E. As the ball falls from C to E, potential energy is converted to kinetic energy. The velocity of the ball increases as it falls, which means that the ball attains its greatest velocity, and thus its greatest kinetic energy, at E.

PTS: 1 DIF: L2

OBJ: CaPS.9.4.1 Identify factors that affect an object's kinetic and potential energy.

STA: S 8 Framework

BLM: analysis

42. ANS:

E. The potential energy of the ball depends on its height. Since E is the lowest point, the ball has the least amount of potential energy at this point.

PTS: 1 DIF: L2

OBJ: CaPS.9.4.1 Identify factors that affect an object's kinetic and potential energy.

STA: S 8 Framework

BLM: analysis

43. ANS:

No pair of forces in the diagram is an example of a pair of balanced forces because each force in the pair acts on a different object. Balanced forces can act on only one object.

PTS: 1

DIF: L2

OBJ: CaPS.10.1.1 Describe what a force is.

STA: S 8.2.c

BLM: analysis

44. ANS:

The gravitational forces are equal in size but opposite in direction.

PTS: 1 DIF: L2

OBJ: CaPS.10.2.2 Identify the factors that affect the gravitational force between two objects.

STA: S 8.2.d

BLM: analysis

45. ANS:

The gravitational force between the objects in pair 2 is greater because the objects have a greater mass than those in pair 1.

PTS: 1 DIF: L2

OBJ: CaPS.10.2.2 Identify the factors that affect the gravitational force between two objects.

STA: S 8.2.d

BLM: analysis

46. ANS:

Either move the objects in pair 1 closer together or those in pair 2 farther apart.

PTS: 1 DIF: L3

OBJ: CaPS.10.2.2 Identify the factors that affect the gravitational force between two objects.

STA: S 8.2.d

BLM: synthesis

47. ANS:

The head indicates the direction of the force.

PTS: 1 DIF: L2

OBJ: CaPS.10.1.2 Explain how balanced and unbalanced forces affect an object's velocity.

STA: S 8.2.a BLM: analysis

48. ANS:

The acceleration of the 1-kg object is twice the acceleration of the 2-kg object.

PTS: 1 DIF: L2

OBJ: CaPS.10.3.2 State Newton's second law of motion. STA: S 8.2.e

BLM: analysis

49. ANS:

The length represents the size, or magnitude, of the force.

PTS: 1 DIF: L2

OBJ: CaPS.10.1.2 Explain how balanced and unbalanced forces affect an object's velocity.

STA: S 8.2.a BLM: analysis

50. ANS:

to the left

PTS: 1 DIF: L2

OBJ: CaPS.10.1.2 Explain how balanced and unbalanced forces affect an object's velocity.

STA: S 8.2.a BLM: analysis

51. ANS:

The object will accelerate upward and to the left.

PTS: 1 DIF: L2

OBJ: CaPS.10.3.2 State Newton's second law of motion. STA: S 8.2.e

BLM: analysis

52. ANS:

The air pressure on the surface of the water outside the glass tube in each container is the same.

PTS: 1 DIF: L2 OBJ: CaPS.11.1.2 Explain how fluids exert pressure.

STA: S 8.9.f BLM: analysis

53. ANS:

The air pressure is greater in container A. It must be, because the height of the water's surface inside the tube is lower.

PTS: 1 DIF: L2 OBJ: CaPS.11.1.2 Explain how fluids exert pressure.

STA: S 8.9.f BLM: analysis

54. ANS:

In container D. It must be, because the surface of the water in the glass tube is lowest in container D.

PTS: 1 DIF: L2 OBJ: CaPS.11.1.2 Explain how fluids exert pressure.

STA: S 8.9.f      BLM: analysis

55. ANS:

The fluid pressures are the same; the water is the same depth in both containers.

PTS: 1      DIF: L2      OBJ: CaPS.11.1.2 Explain how fluids exert pressure.  
STA: S 8.9.f      BLM: analysis

56. ANS:

If the stopper is removed, air pressure will return to normal in the glass tube, which means it will increase. The weight of the air pressure will push the water in the tube down, causing the surrounding water to rise until the levels are the same.

PTS: 1      DIF: L3      OBJ: CaPS.11.1.2 Explain how fluids exert pressure.  
STA: S 8.9.f      BLM: synthesis

57. ANS:

The water is at the same height in the glass tubes in containers B and C. Therefore, the pressure on the surface of the water is the same inside the tubes in both containers. The force on the surface of the water inside the tube in container C is greater than that inside the tube in container B because the pressure is acting over a greater area.

PTS: 1      DIF: L2      OBJ: CaPS.11.1.2 Explain how fluids exert pressure.  
STA: S 8.9.f      BLM: analysis

58. ANS:

The block displaced some of the liquid.

PTS: 1      DIF: L2  
OBJ: CaPS.11.2.2 Describe the effect of the buoyant force.      STA: S 8.8.c  
BLM: comprehension

59. ANS:

The buoyant force is acting upward on the block of wood.

PTS: 1      DIF: L2  
OBJ: CaPS.11.2.2 Describe the effect of the buoyant force.      STA: S 8.8.c  
BLM: analysis

60. ANS:

The weight of the displaced liquid equals the buoyant force on the block.

PTS: 1      DIF: L2  
OBJ: CaPS.11.2.2 Describe the effect of the buoyant force.      STA: S 8.8.c  
BLM: analysis

61. ANS:

The buoyant force is less than the weight of the block. The buoyant force acts in an upward direction and the weight of the block acts in a downward direction. Because the weight is greater than the buoyant force, the block sinks.

PTS: 1      DIF: L2  
OBJ: CaPS.11.2.2 Describe the effect of the buoyant force.      STA: S 8.8.c



BLM: analysis

62. ANS:

Archimedes' principle states that the buoyant force on an object equals the weight of the fluid displaced by the object. The block in container A is only partially submerged; the block in container B is completely submerged. Therefore, the block in container B displaces more fluid than the block in container A. Because the fluids in both containers are identical, the weight of the fluid displaced in container B has to be greater than that in container A. Therefore, the buoyant force in container A is less than the buoyant force in container B.

PTS: 1 DIF: L2

OBJ: CaPS.11.2.2 Describe the effect of the buoyant force. STA: S 8.8.c

BLM: analysis

63. ANS:

The density of the block in container B must be greater than the density of the block in container A.

PTS: 1 DIF: L2

OBJ: CaPS.11.2.1 Explain how the density of an object determines whether it sinks or floats.

STA: S 8.8.c BLM: analysis

64. ANS:

This is the sun's core. This is the region that converts hydrogen into helium by the process of nuclear fusion.

PTS: 1 DIF: L2

OBJ: CaPS.14.2.2 Name the layers of the sun's interior and the sun's atmosphere.

STA: S 8.4.b BLM: analysis

65. ANS:

This is the corona. It is generally visible to the eye only during a solar eclipse.

PTS: 1 DIF: L2

OBJ: CaPS.14.2.2 Name the layers of the sun's interior and the sun's atmosphere.

STA: S 8.4.b BLM: analysis

66. ANS:

This is the chromosphere. During a solar eclipse this layer appears as a red glow.

PTS: 1 DIF: L2

OBJ: CaPS.14.2.2 Name the layers of the sun's interior and the sun's atmosphere.

STA: S 8.4.b BLM: analysis

67. ANS:

1. Mercury
2. Venus
3. Earth
4. Mars

PTS: 1 DIF: L2

OBJ: CaPS.14.3.1 Describe the characteristics that the inner planets have in common.

STA: S 8.4.e      BLM: analysis

68. ANS:

The body labeled 10 (Pluto) is now classified as a dwarf planet.

PTS: 1      DIF: L1

OBJ: CaPS.14.4.2 Identify characteristics that distinguish each outer planet.

STA: S 8.4.e      BLM: knowledge

69. ANS:

The object is Uranus. It has a tilt of approximately 90 degrees from vertical, so it rotates on its side.

PTS: 1      DIF: L2

OBJ: CaPS.14.4.2 Identify characteristics that distinguish each outer planet.

STA: S 8.4.e      BLM: analysis

70. ANS:

Temperature; the horizontal axis ( $x$ -axis)

PTS: 1      DIF: L2

OBJ: CaPS.1.2.1 Describe how scientists investigate the natural world. | CaPS.1.4.1 Describe what math skills scientists use in collecting data and making measurements.

STA: S 8.9.c      BLM: analysis

71. ANS:

time; the vertical axis ( $y$ -axis)

PTS: 1      DIF: L2

OBJ: CaPS.1.2.1 Describe how scientists investigate the natural world. | CaPS.1.4.1 Describe what math skills scientists use in collecting data and making measurements.

STA: S 8.9.c      BLM: analysis

72. ANS:

The size of the ice cube, the amount of water, the type of water, and the type of container were controlled parameters. Scientists use controlled parameters to be sure that the changes to the manipulated variable are causing the changes to the responding variable.

PTS: 1      DIF: L2

OBJ: CaPS.1.2.1 Describe how scientists investigate the natural world.

STA: S 8.9.c      BLM: analysis

73. ANS:

The temperature of water will affect the amount of time it takes an ice cube to melt. The warmer the water, the faster the ice cube will melt.

PTS: 1      DIF: L3

OBJ: CaPS.1.2.1 Describe how scientists investigate the natural world.

STA: S 8.9.c      BLM: synthesis

74. ANS:

An important part of the process of scientific inquiry is communication. Scientists use graphs to help communicate the results of their experiments and identify trends.

PTS: 1 DIF: L2  
OBJ: CaPS.1.2.1 Describe how scientists investigate the natural world.  
STA: S 8.9.a BLM: application

75. ANS:  
Volume is shown on the horizontal axis (x-axis).

PTS: 1 DIF: L2  
OBJ: CaPS.1.5.1 Explain what types of data line graphs can display.  
STA: S 8.9.d BLM: analysis

76. ANS:  
Time is shown on the vertical axis (y-axis).

PTS: 1 DIF: L2  
OBJ: CaPS.1.5.1 Explain what types of data line graphs can display.  
STA: S 8.9.d BLM: analysis

77. ANS:  
It is a line of best fit.

PTS: 1 DIF: L2  
OBJ: CaPS.1.5.1 Explain what types of data line graphs can display.  
STA: S 8.9.d BLM: analysis

78. ANS:  
A line of best fit emphasizes the overall trend of the data.

PTS: 1 DIF: L2  
OBJ: CaPS.1.5.2 Describe how you determine a line of best fit or the slope of a graph.  
STA: S 8.9.d BLM: comprehension

79. ANS:  
Each point is a data point.

PTS: 1 DIF: L2  
OBJ: CaPS.1.5.2 Describe how you determine a line of best fit or the slope of a graph.  
STA: S 8.9.e BLM: comprehension

80. ANS:  
Reaction B is more likely to involve the melting of ice. The melting of ice is an endothermic change, a change in which energy is taken in. Based on its decreasing temperature, reaction B appears to be taking in energy in the form of heat. On the other hand, the increasing temperature of reaction A indicates that it is releasing heat rather than absorbing it.

PTS: 1 DIF: L2  
OBJ: CaPS.2.3.1 Identify forms of energy that are related to changes in matter.  
STA: S 8.5.c BLM: application

81. ANS:  
In reaction A, the temperature increased, while in reaction B, the temperature decreased.

PTS: 1 DIF: L2  
OBJ: CaPS.2.3.1 Identify forms of energy that are related to changes in matter.  
STA: S 8.5.c BLM: analysis

82. ANS:

Reaction A is more likely to involve a form of combustion. Combustion is a chemical change that releases energy in the form of heat and light, and based on its increasing temperature, reaction A appears to be releasing heat. On the other hand, the decreasing temperature of reaction B indicates that it is absorbing heat rather than releasing it.

PTS: 1 DIF: L3  
OBJ: CaPS.2.3.1 Identify forms of energy that are related to changes in matter.  
STA: S 8.5.c BLM: synthesis

83. ANS:

Reaction B is endothermic. An endothermic reaction is a reaction in which energy is taken in. Reaction B shows a decreasing temperature, meaning that it is taking in energy, not releasing it.

PTS: 1 DIF: L3  
OBJ: CaPS.2.3.1 Identify forms of energy that are related to changes in matter.  
STA: S 8.5.c BLM: synthesis

84. ANS:

Yes. The law of conservation of matter states that matter is neither created nor destroyed during a chemical or physical change. The equation demonstrates this by showing the same number of atoms on both sides. Each side of the equation has 6 carbon atoms, 12 hydrogen atoms, and 12 oxygen atoms. Thus, no atoms were destroyed or created in the reaction. The atoms that were present at the start of the reaction remained at the end of the reaction.

PTS: 1 DIF: L3 OBJ: CaPS.2.2.2 Describe what a chemical change is.  
STA: S 8.5.b BLM: analysis

85. ANS:

Photosynthesis is an endothermic reaction because it takes in energy (in the form of light).

PTS: 1 DIF: L2  
OBJ: CaPS.2.3.2 Describe how chemical energy is related to chemical change.  
STA: S 8.5 BLM: application

86. ANS:

The ratio of hydrogen to oxygen atoms is 2 : 1.

PTS: 1 DIF: L2  
OBJ: CaPS.2.1.2 Define elements and explain how they relate to compounds.  
STA: S 8.3 BLM: comprehension

87. ANS:

Nitrate

PTS: 1 DIF: L3 OBJ: CaPS.5.2.1 Explain how ions form bonds.  
STA: S 8.3.f BLM: analysis

88. ANS:

Nitrate ( $\text{NO}_3^-$ ) and carbonate ( $\text{CO}_3^{2-}$ ) are polyatomic ions, because they are made of more than one atom.

PTS: 1

DIF: L3

OBJ: CaPS.5.2.1 Explain how ions form bonds.

STA: S 8.3.f

BLM: analysis

89. ANS:

Water forms from the reaction between hydrogen and oxygen.

PTS: 1

DIF: L2

OBJ: CaPS.6.2.1 Identify what information a chemical equation contains.

STA: S 8.5.a

BLM: analysis

90. ANS:

Synthesis. Two elements (hydrogen and oxygen) combine to form a compound (water).

PTS: 1

DIF: L2

OBJ: CaPS.6.2.4 Name three types of chemical reactions.

STA: S 8.5.a

BLM: application

91. ANS:

Lemons have a pH of about 2 and apples have a pH of about 3. A lemon is more acidic.

PTS: 1

DIF: L2

OBJ: CaPS.7.3.1 Name the properties of acids and bases.

STA: S 8.5.e

BLM: analysis

92. ANS:

Soap is a base, and bases taste bitter.

PTS: 1

DIF: L2

OBJ: CaPS.7.3.1 Name the properties of acids and bases.

STA: S 8.5.e

BLM: analysis

93. ANS:

A high pH means that drain cleaner is very basic. The solution can burn and damage skin.

PTS: 1

DIF: L2

OBJ: CaPS.7.4.2 Explain what pH tells you about a solution.

STA: S 8.5.e

BLM: comprehension

94. ANS:

Blue. Baking soda has a pH of about 8.5, which means it is a base. Bases turn red litmus paper blue.

PTS: 1

DIF: L2

OBJ: CaPS.7.4.2 Explain what pH tells you about a solution.

STA: S 8.5.e

BLM: analysis

95. ANS:

A, E, and F

PTS: 1 DIF: L2 OBJ: CaPS.8.3.1 Explain how polymers form.  
STA: S 8.3.c BLM: analysis  
96. ANS:  
three; B, C, and D

PTS: 1 DIF: L2 OBJ: CaPS.8.3.1 Explain how polymers form.  
STA: S 8.3.c BLM: analysis