

## Physical Science Semester 2 Final Exam Review

### CHAPTER 8 – Matter and Temperature

**Matching:** Select the correct term to complete each sentence. There are extra terms in the list.

Homogeneous	heterogeneous	pure substance	Fahrenheit
Mixture	evaporation	absolute zero	melting point
Solid	liquid	gas	boiling point
Celsius	more	less	

- A certain brand of cough syrup contains caramel, citric acid, FD&C red #40, flavoring, glucose, glycerine, high fructose corn syrup, purified water, saccharin sodium and sodium benzoate. It is considered to be a mixture.
- Matter that cannot be separated into other types of matter by physical means would be called a(n) pure substance.
- A mixture in which different samples are not necessarily made up of exactly the same proportions of matter is a heterogeneous mixture.
- A mixture that contains more than one type of matter and is the same throughout is a homogeneous mixture.
- The temperature scale on which the freezing point of water is 32 degrees and boiling point of water is 212 degrees is the Fahrenheit scale.
- The temperature at which molecules have their lowest possible energy is named absolute zero.
- The phases of matter which flow are both liquid and gas.
- The temperature at which a solid changes to a liquid is called the melting pt.
- The cooling process that changes a liquid to a gas is called boiling pt.
- Most materials are more dense in their solid phase than in their liquid phase.

- Convert 27 degrees Celsius to Kelvin.

$$T_K = T_C + 273$$

$$T_K = 27 + 273$$

$$\boxed{300K}$$

- Convert 45 degrees Fahrenheit to degrees Celsius.

$$T_F = 32 + \frac{9}{5} T_C$$

$$\boxed{T_C = 7.2^\circ C}$$

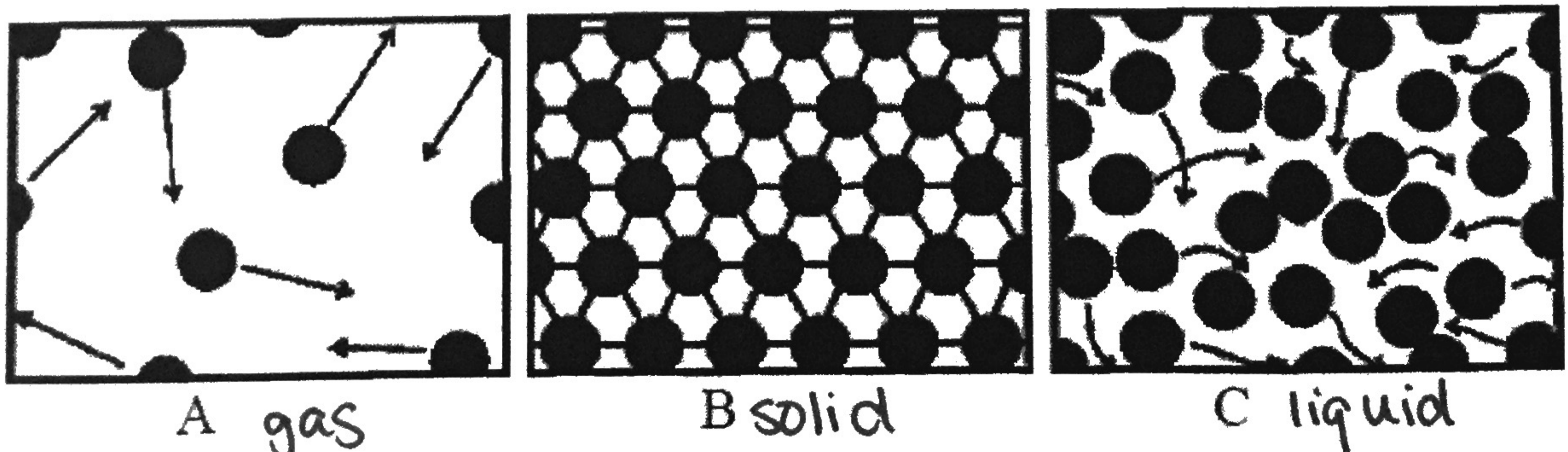


Figure 8-1:

- Identify each phase in Figure 8-1.

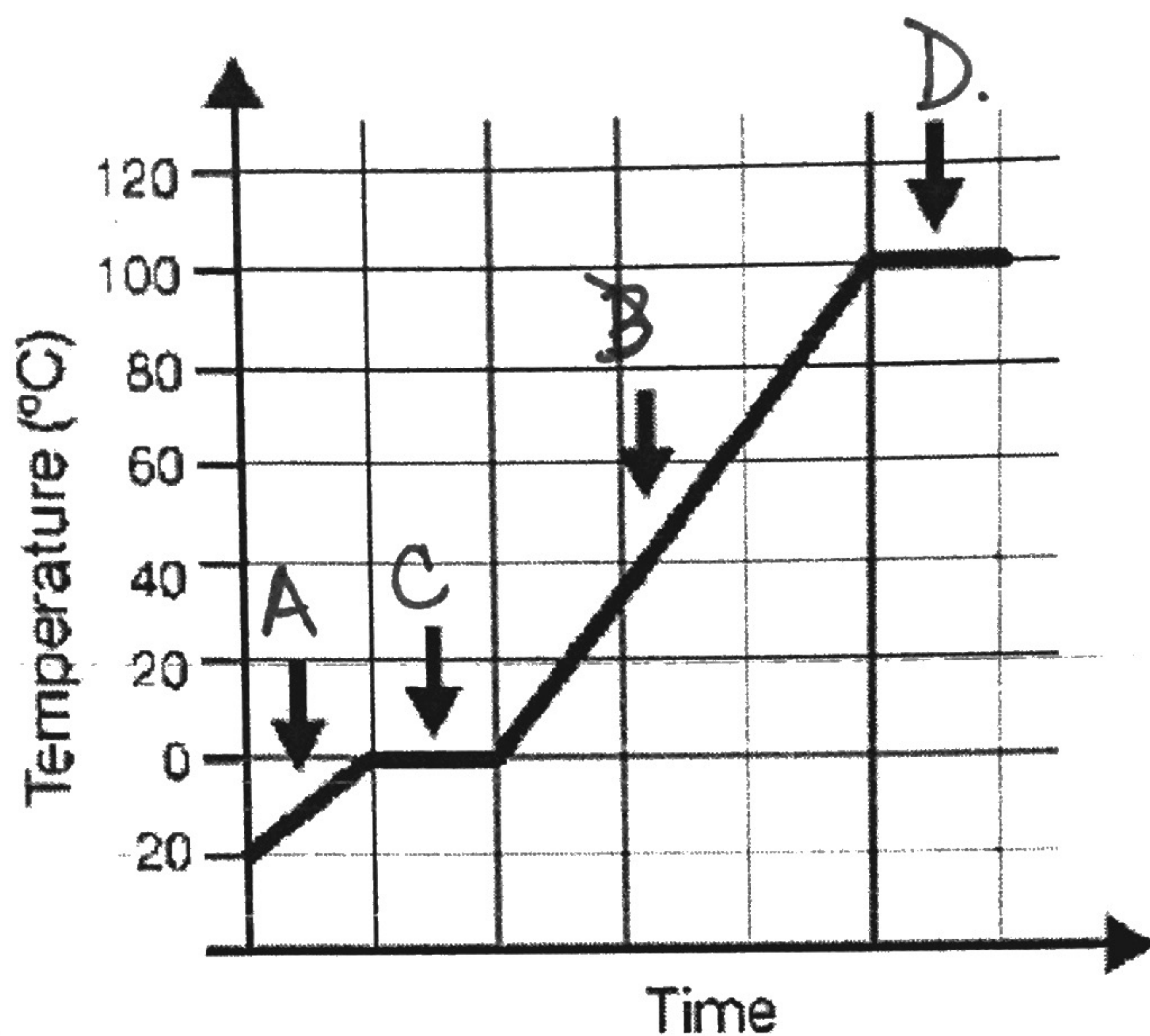
- List the phases shown in Figure 8-1 in order of their temperatures from highest to lowest.

gas, liquid, solid

- List the strength of the intermolecular forces between molecules shown in Figure 8-1 in order of strongest to weakest.

solid, liquid, gas

16. The graph below was drawn using data recorded as water at  $-20^{\circ}\text{C}$  was heated to  $100^{\circ}\text{C}$ . On the graph, use letters A, B, C, and D to label the arrows pointing to those phases or combination of phases represented from the list.



- A. Only ice is present
- B. Only liquid water is present
- C. Ice and water are present
- D. Steam and water are present

**CHAPTER 10 – Properties of Matter**

17. In general, how do the densities of solids, liquids, and gases compare?

Most dense: solid  $\rightarrow$  liquid  $\rightarrow$  gas

- a. Explain why most substances follow this order.

atoms more closely packed in a particular volume. intermolecular forces.

- b. Give an example of a substance that does NOT follow this order.

molecules in ice are less close together than as liquid  $\text{H}_2\text{O}$ . ICE less dense, floats.

18. A density column was created using the liquids in the table below. Assuming the materials do not mix, in what order do the liquids appear from bottom to top? Give a brief explanation for why this arrangement occurs.

Liquid	Chemical Formula	Density ( $\text{g}/\text{cm}^3$ ) at $T = 20^{\circ}\text{C}$
④ Ethyl alcohol	$\text{C}_2\text{H}_5\text{OH}$	0.791
② Carbon tetrachloride	$\text{CCl}_4$	1.60
⑤ Gasoline		0.66-0.69
① Mercury	Hg	13.6
③ Water	$\text{H}_2\text{O}$	0.998

19. What is the density of a block of aluminum with a mass of 312 grams and a volume of  $116 \text{ cm}^3$ ?

$$D = \frac{m}{V} \quad D = \frac{312\text{g}}{116\text{cm}^3} = 2.7 \text{ g}/\text{cm}^3$$

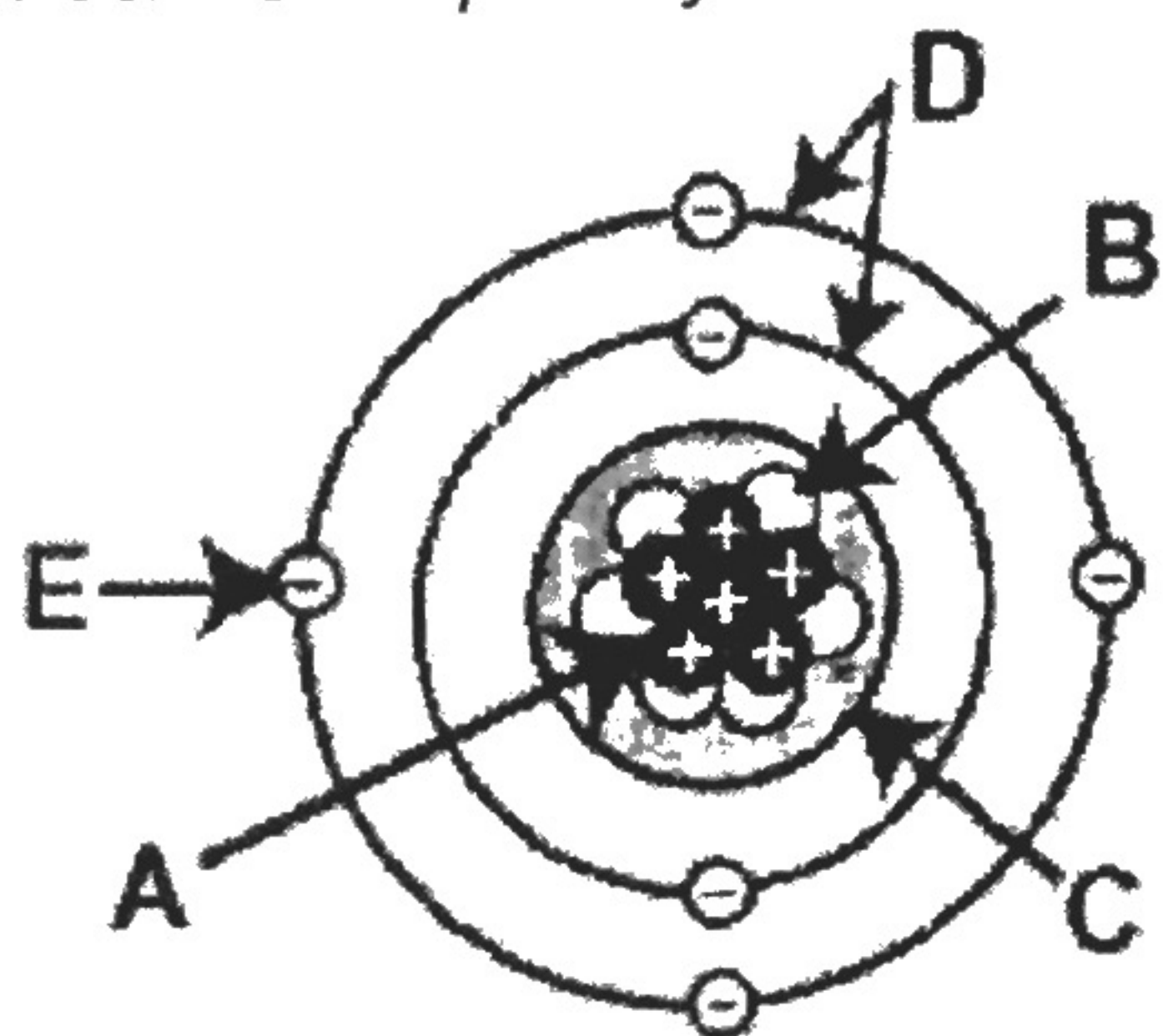
20. What is the mass of an iron horseshoe with a volume of  $97.0 \text{ cm}^3$ ? The density of iron is  $7.90 \text{ g}/\text{cm}^3$ .

$$D = \frac{m}{V} \quad 7.9 \frac{\text{g}}{\text{cm}^3} = \frac{m}{97.0 \text{ cm}^3} =$$

**CHAPTER 12 – Atoms and the Periodic Table**

21. Draw the five models of the atom: Dalton, Thompson, Rutherford, Bohr, Quantum. Label any subatomic particles thought to have existed.

Match each part of the atom with its identity from the list below.



- 22. D energy level
- 23. B neutron
- 24. A proton
- 25. E electrons
- 26. C nucleus

27. Label the information provided on the periodic table for oxygen:

8	←	Atomic #
<b>O</b>	←	Atomic symbol
Oxygen	←	Element name
15.999	←	Atomic Weight

28. Atomic number = number of protons or number of electrons (neutral atom)

29. Atomic mass = number of protons + number of neutrons

30. Complete the chart below:

	Element	Atomic Number	Atomic Weight (a decimal)	Protons	Neutrons	Electrons	Mass #
a	Na	11		11	12	11	23
b	O	8	15.999	8	8	8	16
c	H	1		1	0	1	1
d	Ar	18		18	22	18	40
e	F	9		9	10	9	19

31. The atomic mass of magnesium is listed as 24.31 amu when magnesium has 3 stable isotopes:  $Mg^{24}$ ,  $Mg^{25}$ , and  $Mg^{26}$ .

a. Define "isotope":

(protons)  
Elements that are the same, but different number of neutrons

b. Which isotope of magnesium is most commonly found on Earth? How do you know?

Mg-24 because the amu is closest to 24.

32. List 3 halogens: F, Cl, Br, I

33. List 3 alkali metals: Li, Na, K

34. List 3 noble gases: He, Ne, Ar

35. How are elements in the same group related to one another? valence #

36. How are elements in the same period related to one another?

chemical / physical prop.

### CHAPTER 13 – Compounds


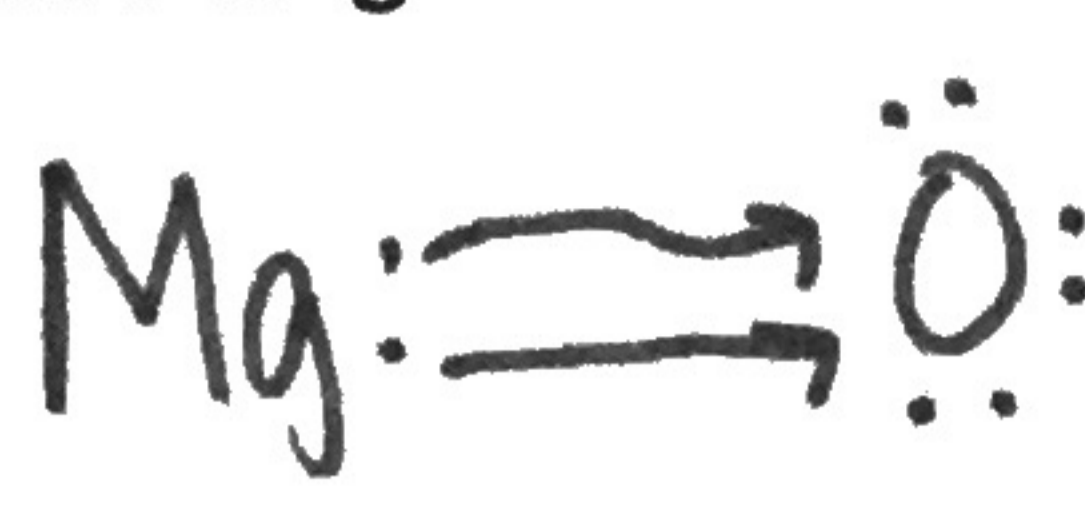
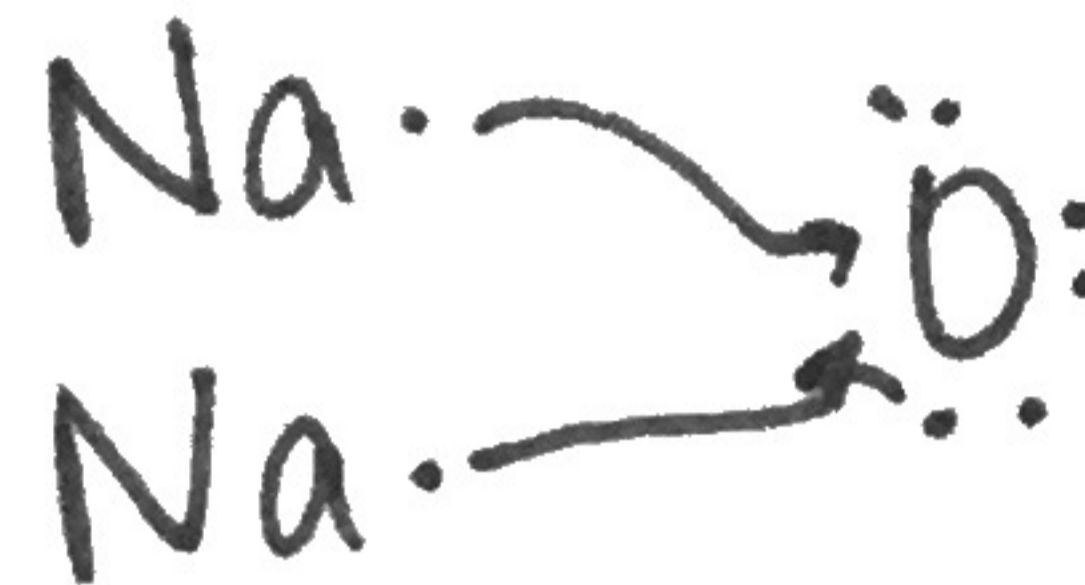
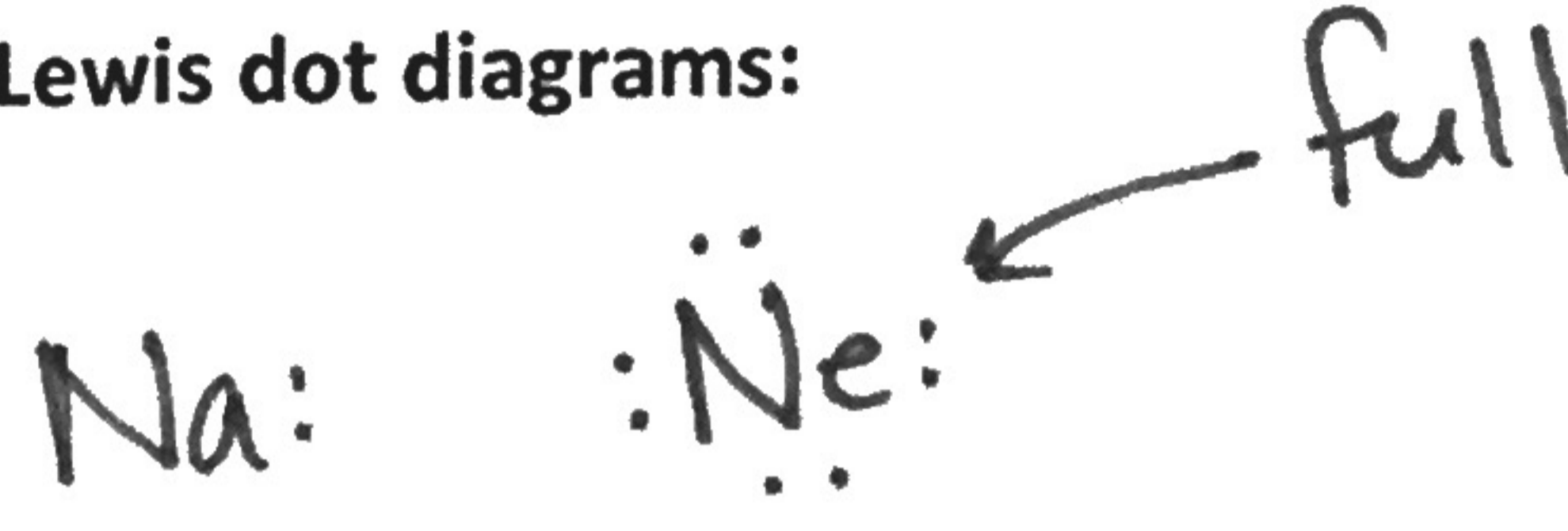
37. Which electrons in atoms interact to form chemical bonds? valence  $e^-$

38. How many electrons can each level hold? First = 2 Second = 8 Third = 8

39. Complete the chart below:

	Element	Total Number of Electrons	Number of Valence Electrons	Lewis Dot Diagram	Will it lose or gain electrons?	Charge when electrons lost/gained
a	Fluorine	9	7	$\cdot\ddot{F}\cdot$	gain	$F^{1-}$
b	Sodium	11	1	$Na\cdot$	lose	$Na^{1+}$
c	Oxygen	8	6	$\cdot\ddot{O}\cdot$	gain	$O^{2-}$
d	Magnesium	12	2	$Mg\cdot$	lose	$Mg^{2+}$
e	Chlorine	17	7	$\cdot\ddot{Cl}\cdot$	gain	$Cl^{1-}$
f	Neon	10	8	$:\ddot{Ne}:$	N/A	N/A

40. Draw Lewis dot diagrams to show the ionic bonding that occurs between the following pairs of elements:

<p>magnesium + chlorine</p> <p>Lewis dot diagrams:</p>  <p>Chemical formula: <u>MgCl<sub>2</sub></u></p>	<p>magnesium + oxygen</p> <p>Lewis dot diagrams:</p>  <p>Chemical formula: <u>MgO</u></p>
<p>sodium + oxygen</p> <p>Lewis dot diagrams:</p>  <p>Chemical formula: <u>Na<sub>2</sub>O</u></p>	<p>sodium + neon</p> <p>Lewis dot diagrams:</p>  <p>Chemical formula: <u>N/A</u></p>

#### CHAPTER 14 – Changes in Matter

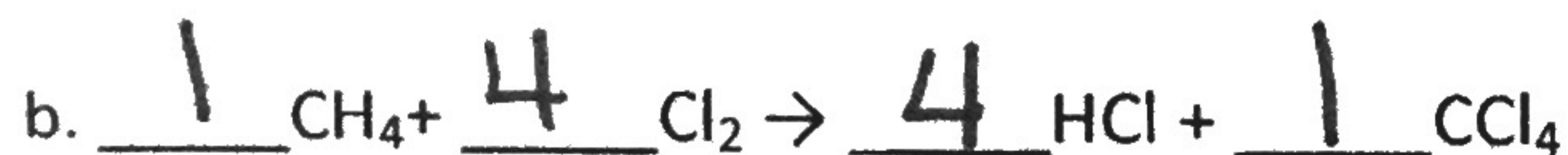
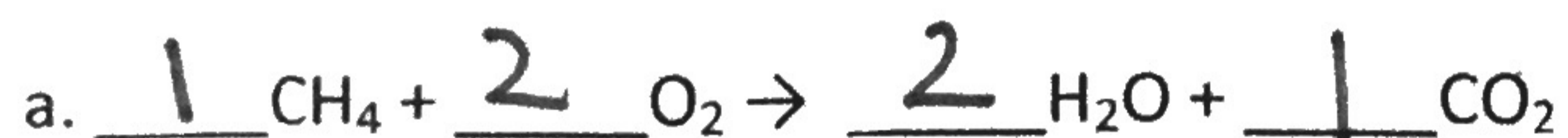
Modified True/False: Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

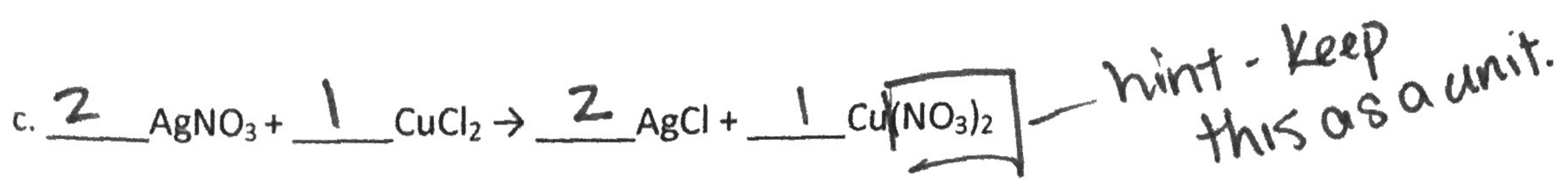
41. T An equation for a chemical reaction that correctly preserves the number and type of atoms on both sides of the reaction is considered *balanced*.
42. F A number in an equation which designates the number of molecules of a substance taking part in a chemical reaction is called a *subscript*. coefficient
43. F A substance formed in a chemical reaction is called a *reactant*. product
44. F A solid product that comes out of solution in a chemical reaction is called a *pollutant*. precipitate
45. T The term applied to a nucleus that does NOT spontaneously break up is *stable*.

46. List the 4 indicators of a chemical reaction:

- color change
- heat produced
- bubbles (gas)
- solid form

47. Balance the following equations. Use a separate sheet of paper if needed:





48. Identify the types of reactions below:

- a.  $\text{C}_{10}\text{H}_8 + 12 \text{O}_2 \rightarrow 10 \text{CO}_2 + 4 \text{H}_2\text{O}$  combustion
- b.  $2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2$  decomposition
- c.  $\text{Pb(NO}_3)_2 + 2 \text{KI} \rightarrow \text{PbI}_2 + 2 \text{KNO}_3$  dbl. displacement
- d.  $8 \text{Fe} + \text{S}_8 \rightarrow 8 \text{FeS}$  synthesis
- e.  $\text{Cl}_2 + 2 \text{KI} \rightarrow 2 \text{KCl} + \text{I}_2$  single displacement

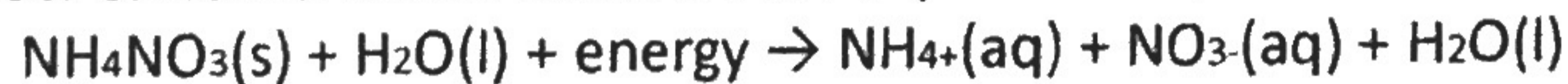
49. a. What is an endothermic reaction?

more energy into reactants to make products  
 $\text{AB} + \text{energy} \rightarrow \text{A} + \text{B}$

b. What is an exothermic reaction?

more energy out of products  
 $\text{A} + \text{B} \rightarrow \text{AB} + \text{energy}$

c. Is the reaction below endothermic or exothermic? Explain how you know.



~~exo~~ endo energy "in" the system

50. What is the difference between nuclear fission and nuclear fusion?



**CHAPTER 17 – Magnetism**

Modified True/False: Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

51. F The difference between true north and the direction a compass needle points is called magnetic inspiration. declination
52. F The type of magnet created when a coil of wire carries an electric current is called a permanent magnet. electromagnet
53. F The device that switches the direction of the electric current in the electromagnet of an electric motor is called the rotor. commutator
54. F An electric generator changes electrical energy to mechanical energy. mech. elect.

**Matching:** Select the correct term to complete each sentence. There are extra terms in the list.

- |             |               |                  |                                 |
|-------------|---------------|------------------|---------------------------------|
| alternating | direct        | permanent magnet | electric                        |
| generator   | electromagnet | magnetic         | electromagnetic induction motor |
| north       | positive      | renewable        | south                           |
| negative    | nonrenewable  | positive         | magnetic field                  |

55. The influence created by a magnet that exerts forces on other magnets and magnetic material is called a(n) magnetic field

56. A device that keeps its magnetic properties even when it is not close to other magnets is known as a(n) permanent mag.

57. A material that is attracted to a magnet, but never repelled, is described as magnetic.

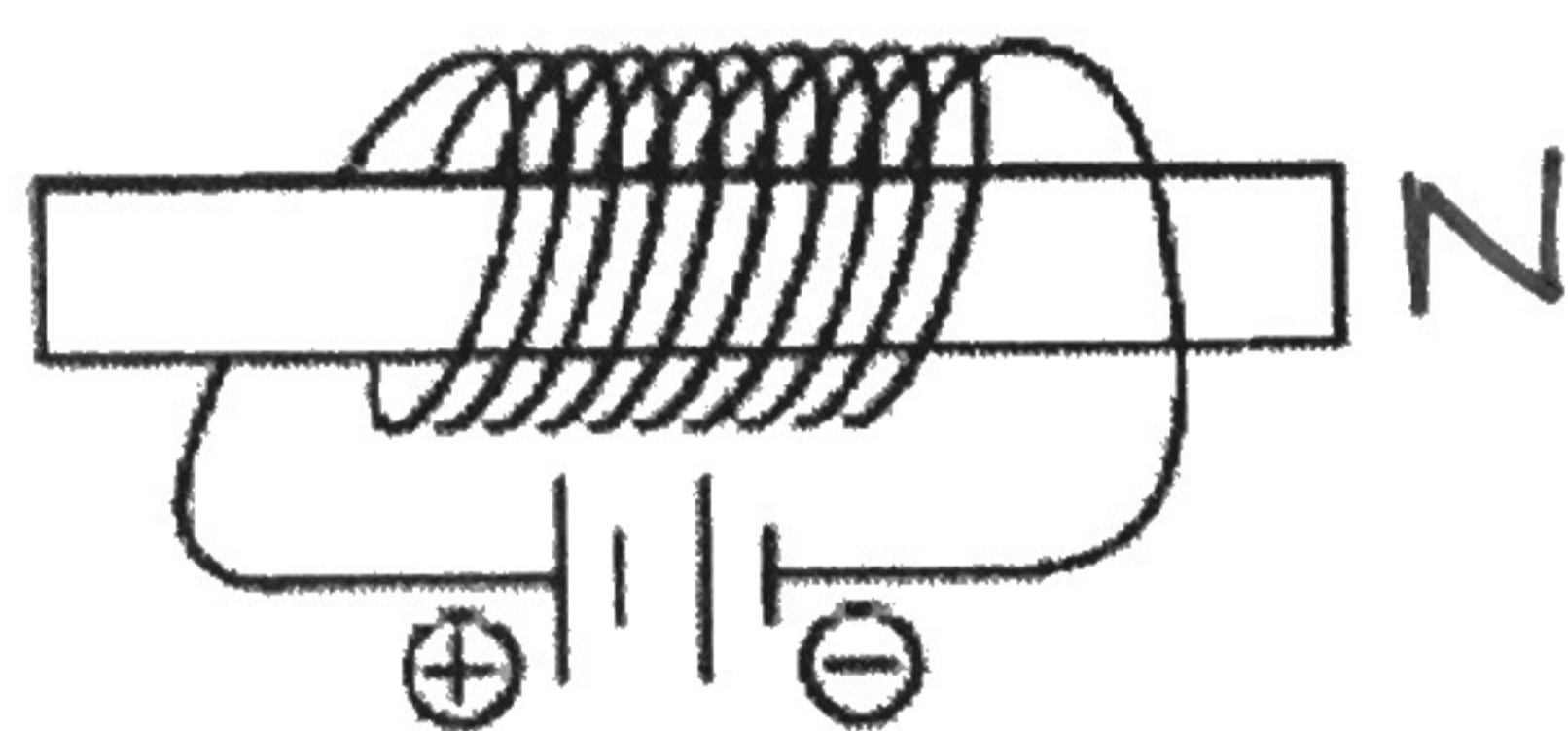
58. The opposite ends of a magnet are identified as N and S poles.

59. A device that changes mechanical energy to electrical energy is a(n) generator.

60. The process of using a moving magnet to create an electric current is called electric motor.

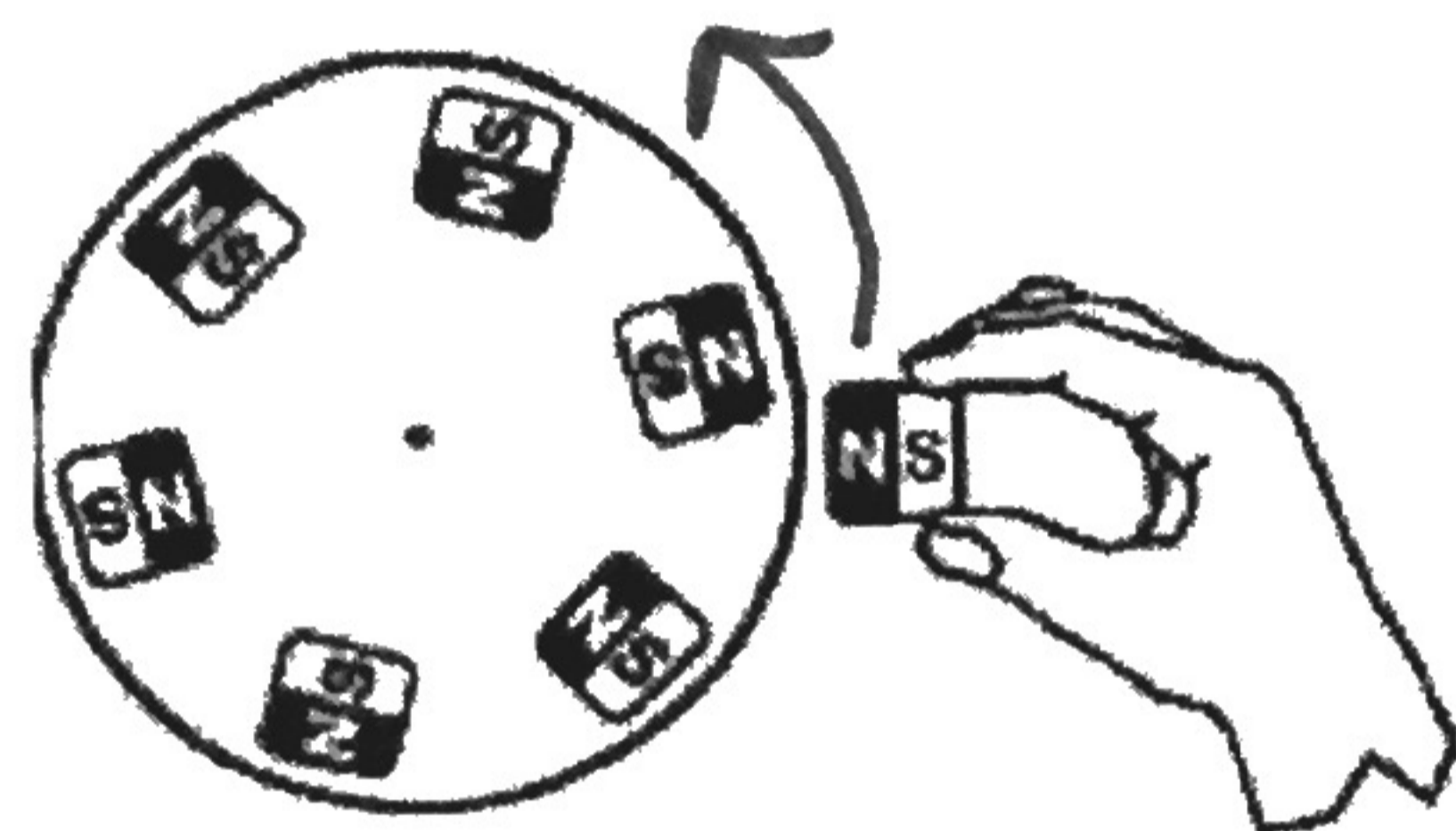
61. A natural resource that is not replaced as it is used is called a(n) renewable resource.

62. Which end of the electromagnet pictured below would be labeled north pole or "N"? Explain your answer.



Right Hand Rule

63. In which direction will the rotating disk below spin? Explain your answer.



64. What causes the Northern Lights?

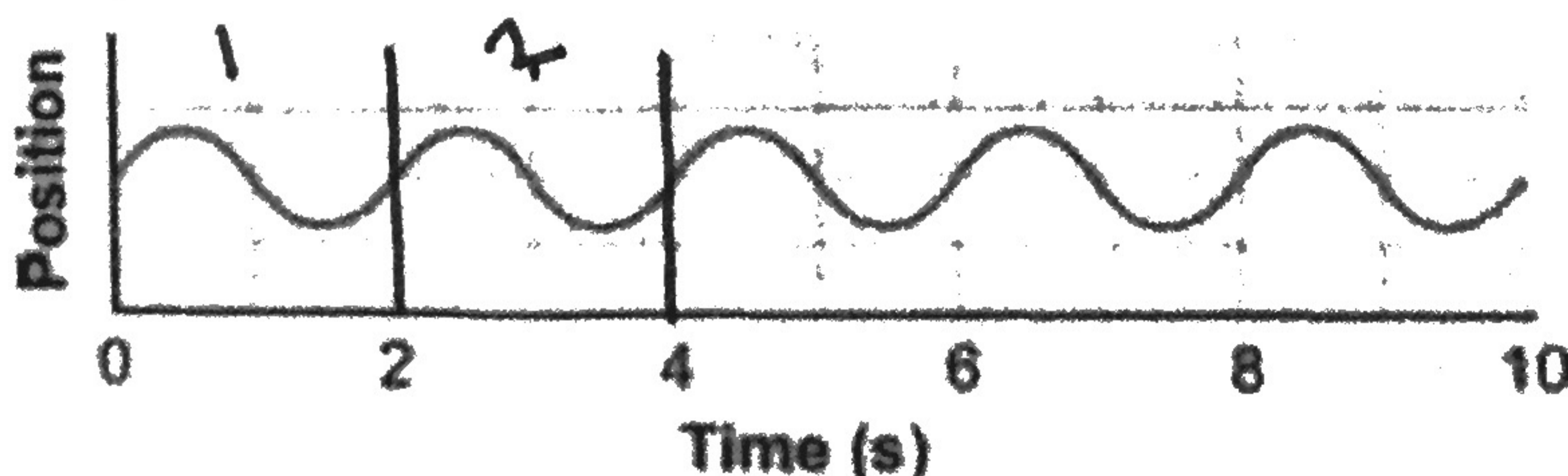
**CHAPTER 24 – Waves and Sound**

65. Define frequency: cycles completed in 1 sec.

66. Define period: time for 1 cycle

67. The maximum distance an oscillator moves from its equilibrium position is called its amplitude

68. What is the period of the oscillation shown below?

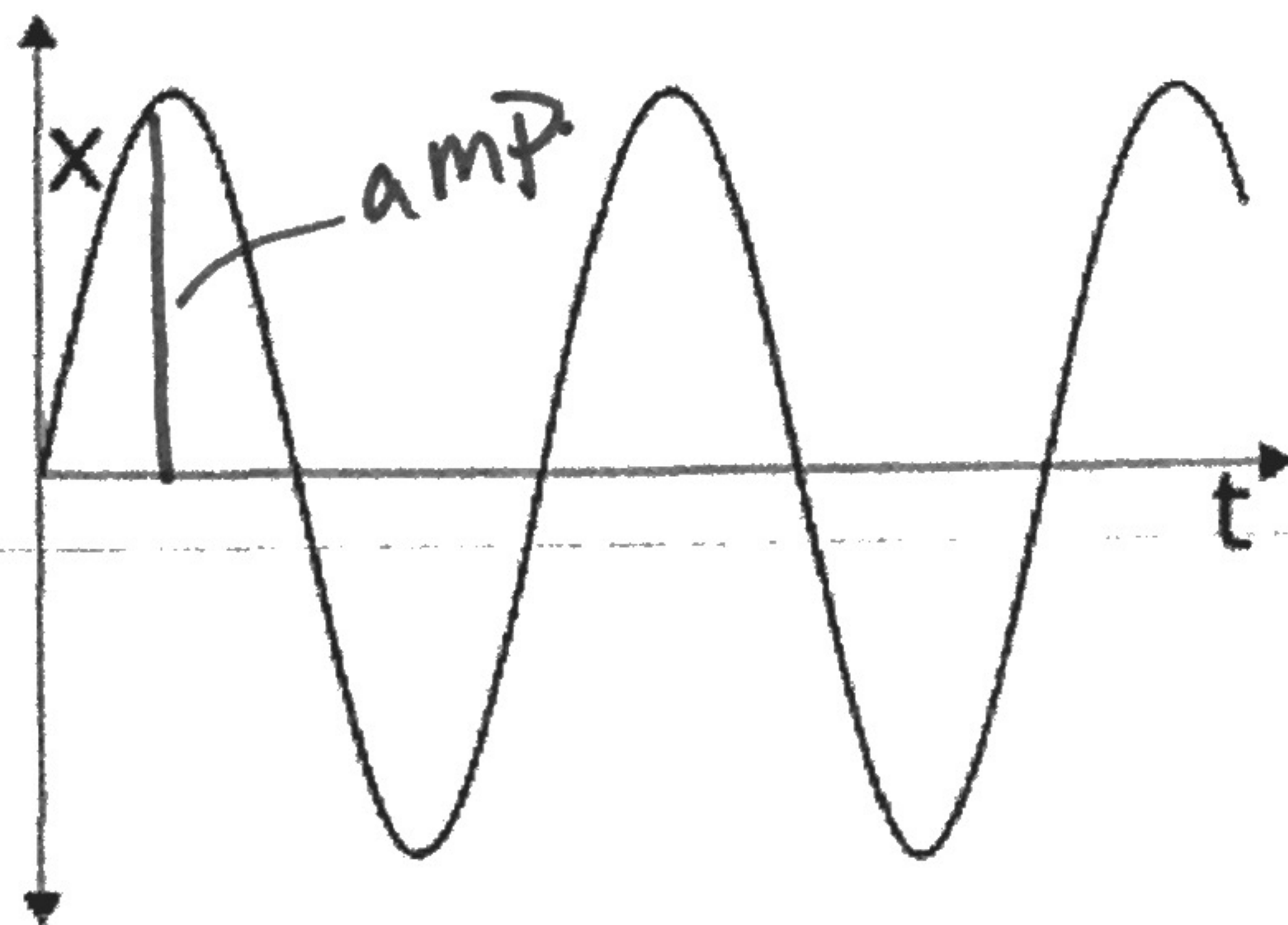


2 sec.

69. State whether the following are linear or harmonic motions.

- a. skiing downhill **linear**
- b. riding on a merry-go-round **harmonic**
- c. hiking uphill **linear**
- d. jumping on a trampoline **harmonic**

70. Draw an arrow on the diagram below that shows the amplitude of the wave.



71. A swing has a period of 7 seconds. What is its frequency?

$$T = \frac{1}{f} \quad / \quad f = \frac{1}{T} = .142 \text{ Hz}$$

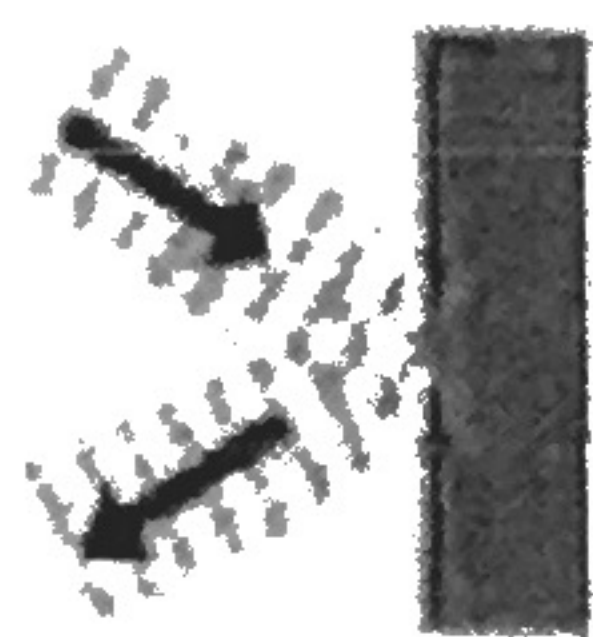
72. An oscillator makes 8 vibrations in 1 second. What is its period and frequency?

$$\text{frequency} = 8 \text{ Hz} \quad T = \frac{1}{8}$$

73. A wave has a frequency of 5 hertz and a wavelength of 6 meters. Calculate the speed of the wave.

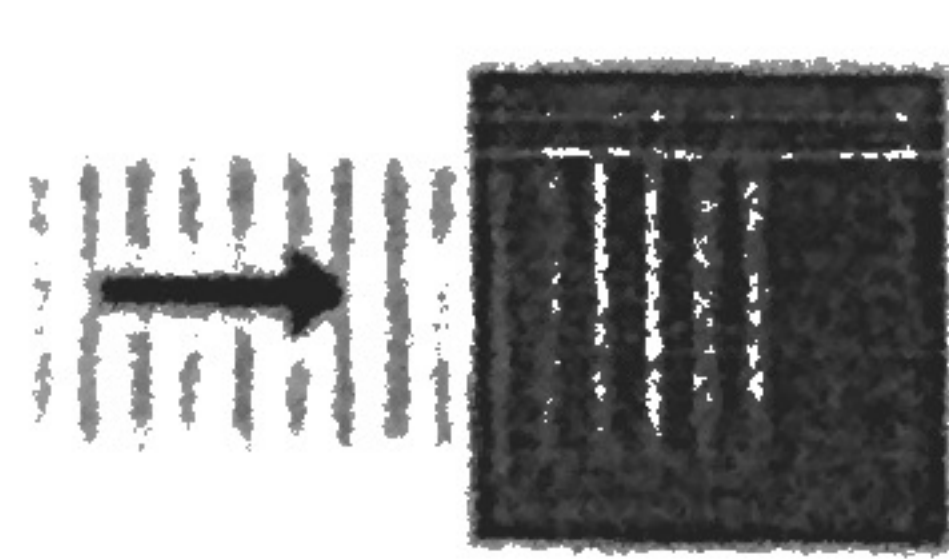
$$v = f\lambda \quad v = 5 \times 6 = \boxed{30 \text{ m/s}}$$

74. Below are diagrams representing interactions between waves and boundaries. Identify each interaction by name.



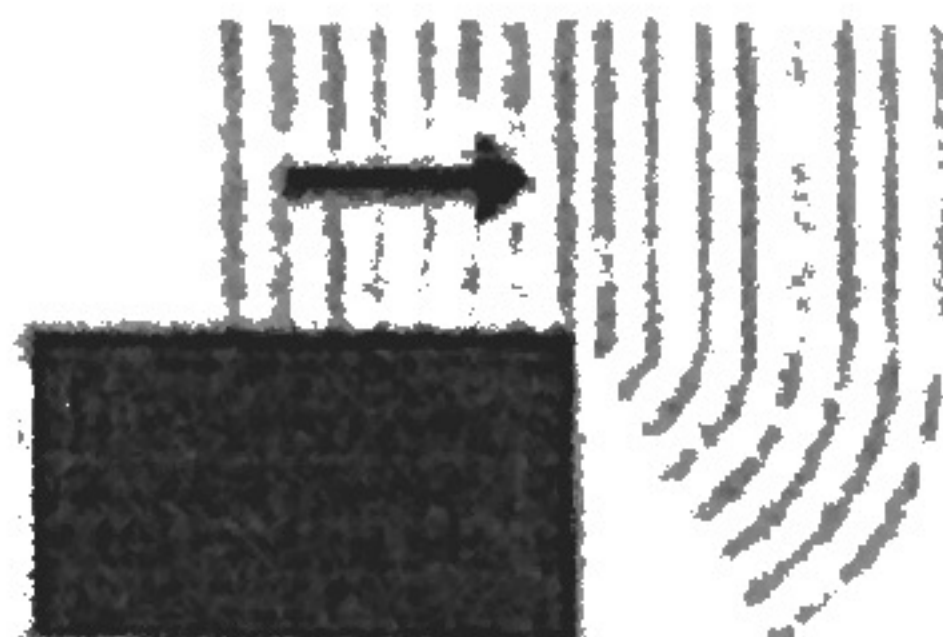
**A**

Reflection



**B**

Absorption



**C**

Diffraction



**D**

Refraction

75. Read the descriptions below and indicate which of the four types of wave interactions (*absorption*, *reflection*, *refraction*, or *diffraction*) has occurred for each.

a. The distortion of your partially submerged arm makes it look "broken" when viewed from the air.

**Refraction**

b. You hear the music even though you are seated behind an obstruction at a concert.

**diffraction**

c. You see yourself when you look at a polished car hood.

**Reflection**

d. Heavy curtains are used to help keep a room quiet.

**Absorption.**