



Summary & Practice Sheets

Grade 8



Thermal Energy
Elements and Chemical Bonds
Chemical Reactions and Equations
Electricity and Magnetism



OR



WORD BANK

Temperature: the average kinetic energy of the particles

Heat: the transfer of energy from hot to cold

Thermal Energy: the sum of kinetic and potential energy of the particles

Thermal energy can be transferred by

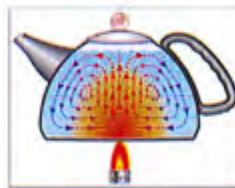
conduction

energy is
transferred by
direct contact



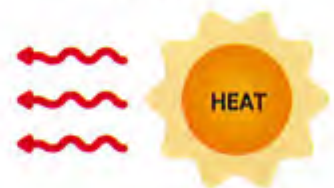
convection

energy is
transferred by the
motion of particles



radiation

energy is
transferred by
waves



thermal conductor
material that allows
heat energy to be
transferred



thermal insulator
material that does not
allow heat energy to be
transferred



Revision Sheets

Chapter 1 – Thermal Energy

Part A- True/False

Indicate whether the statement is true or false.

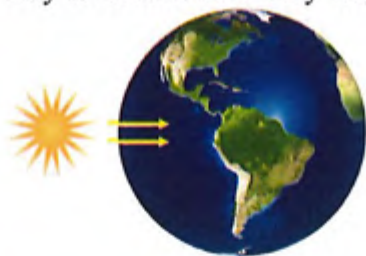
- 1. Potential energy is the energy of motion.
- _____ 2. Thermal energy is the temperature of the particles in a material.
- 3. Temperature is a measure of the average kinetic energy of all the particles in an object.
- _____ 4. Heat is the movement of kinetic energy from a warmer object to a cooler object.
- 5. The tool that is used for measuring temperature is called a anemeter.
- 6. The temperature at which all particle movement stops is 373 K.

Part B- Multiple Choice

Identify the choice that best completes the statement or answers the question.

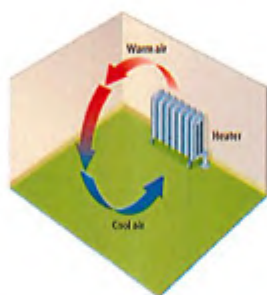
- 7. Which of the following objects has kinetic energy?
 - a. a bicycle parked at the top of a hill
 - b. leaves on the ground beneath a tree
 - c. a football rolling across a field
 - d. a sunny windowsill
- _____ 8. Which increases the kinetic energy of the particles in a bowl of soup?
 - a. dividing the soup in half
 - b. putting the soup in the refrigerator
 - c. heating the soup for one minute on the stove
 - d. decreasing the distance between the particles that make up the soup
- 9. What do convection and conduction have in common?
 - a. they can both transfer thermal energy from one material to another.
 - b. they can both occur in solids, liquids, and gases.
 - c. they both produce currents
 - d. they both involve the movement of particles

___ 10. Why is radiation the only way heat is transferred from the Sun to the Earth?



- a. because particles cannot move in the sun
- b. because particles cannot move on earth
- c. because it is the only kind of heat transfer that can occur in a vacuum
- d. because it is the only kind of heat transfer that can occur over a large distance

___ 11. Which is the transfer of thermal energy by the motion of heated particles in a gas or liquid from one part of a material to another?



- a. conduction
- b. radiation
- c. convection
- d. collision

___ 12. Which is an increase in the size of a substance when the temperature is increased?

- a. diffusion
- b. thermal expansion
- c. thermal contraction
- d. specific heat

___ 13. Which energy conversion typically occurs in a heating appliance?

- a. chemical energy to thermal energy
- b. electric energy to thermal energy
- c. thermal energy to chemical energy
- d. thermal energy to mechanical energy

___ 14. Which of the following statements about thermal energy transfer is true?

- a. When heat is transferred by conduction, particles collide but remain in the same location.
- b. Convection takes place most easily in solids.
- c. The Sun is the only source of radiation.
- d. Convection does not occur naturally.

Part C- Matching

Match each term with its correct description

- | | |
|-------------------|------------------------|
| a. thermal energy | g. thermostat |
| b. temperature | h. thermal contraction |
| c. heat | i. specific heat |
| d. radiation | |
| e. conduction | |
| f. convection | |

- ____ 15. The average kinetic energy of the particles that make up a material.
- ____ 16. The sum of the kinetic energy and the potential energy of the particles that make up a material.
- ____ 17. The movement of thermal energy from a warmer object to a cooler object.
- ____ 18. The amount of thermal energy required to increase the temperature of 1 kg of a material by 1° C.
- ____ 19. A decrease in a material's volume when the temperature decreases.
- ____ 20. The transfer of thermal energy by the movement of particles from one part of a material to another.
- ____ 21. The transfer of thermal energy between materials by the collisions of particles.
- ____ 22. The transfer of thermal energy from one material to another by electromagnetic waves.
- ____ 23. A device that regulates the temperature of a system.

Part D- Short Answer

Write the correct answer for each of the following questions.

24. Explain how thermal energy and temperature differ.
25. Identify one material that is a good thermal conductor and one material that is a good thermal insulator.
26. What is a thermostat? List three appliances that are equipped with thermostats.
27. How does a refrigerator keep food cold?
28. What are the energy transformations in a car engine?

Part E- Organizing

Complete the table by writing each phrase or statement under the correct heading. Each phrase or statement is used only once. Some examples have been done for you.

- All matter radiates thermal energy.
- involves the movement of thermal energy in a liquid
- occurs in fluids
- the transfer of thermal energy between materials because of collisions between the particles
- the transfer of thermal energy from one material to another by electromagnetic waves
- When particles with different kinetic energies collide, the particles with higher kinetic energy transfer energy to particles with lower kinetic energy

Radiation	Conduction	Convection
<i>Meaning:</i>	<i>Meaning:</i>	<i>Meaning:</i> The transfer of thermal energy by the movement of particles from one part of a material to another.
<ul style="list-style-type: none">• A car receives thermal energy from the sun through this.	<ul style="list-style-type: none">• Continues until the thermal energy of all particles in contact is equal.	

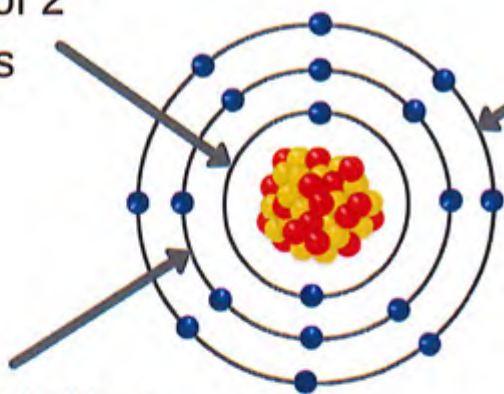
ATOMS: the unit of matter



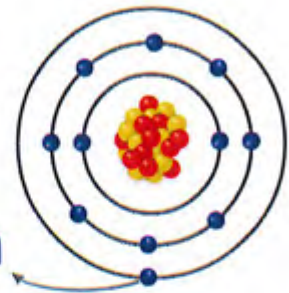
first shell holds a maximum of 2 electrons

third shell holds a maximum of 8 electrons

second shell holds a maximum of 8 electrons



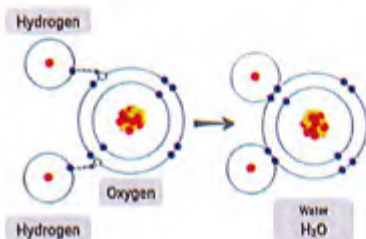
valence electron
is an outermost electron



COMPOUNDS

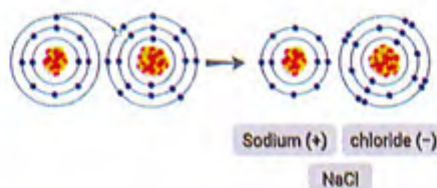
covalent

two or more nonmetals share valence electrons



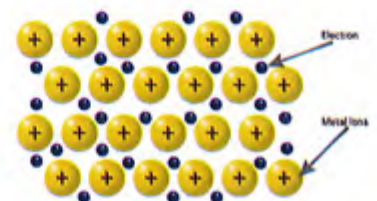
ionic

metal transfers valence electrons to a nonmetal



metallic

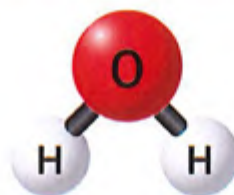
metals share pooled valence electrons



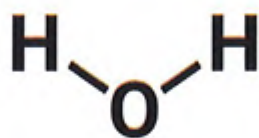
Representing Compounds



dot diagram



ball and stick model



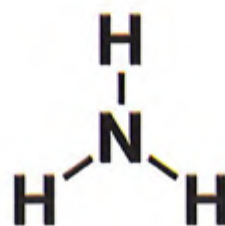
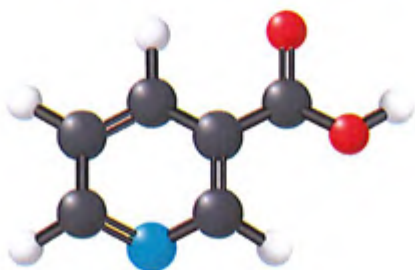
structural model



space filling model

PRACTICE-COMPOUNDS

Label the following compounds with the correct model.



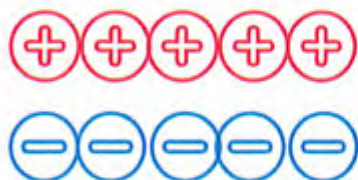
CHARGING TIME!



Electrons have a negative charge.

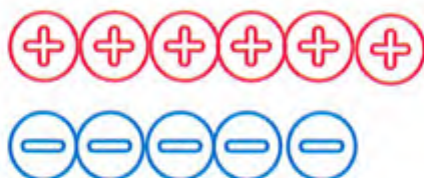


Protons have a positive charge.



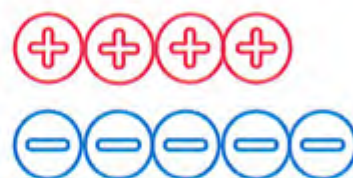
protons = electrons
NEUTRAL

$$5 + (-5) = 0$$



protons > electrons
POSITIVELY CHARGED

$$6 + (-5) = 1$$



protons < electrons
NEGATIVELY CHARGED

$$4 + (-5) = -1$$

PRACTICE-CALCULATING CHARGE

1. $4 - 10 =$

2. $(-8) + 15 =$

3. $9 + (-10) =$

4. $13 + (-10) =$

5. $0 + (-15) =$

6. $10 + (-10) =$

7. Magnesium has 12 protons and 12 electrons. What will its charge be when it loses 2 electrons?

Revision Sheets

Chapter 2 – Elements and Chemical Bonds

Part A- True/False

Indicate whether the statement is true or false.

- _____ 1. Chemical bonds that form between atoms involve electrons.
- _____ 2. The atomic number of an element equals the number of neutrons in an atom of that element.
- _____ 3. The exact position of electrons of an atom cannot be determined.
- _____ 4. A compound is a substance that is composed of two or more different kinds of molecules.
- _____ 5. A polar molecule has a slight positive end and a slight negative end because of the unequal sharing of electrons.
- _____ 6. An ionic bond forms when a nonmetal atom transfers one or more valence electrons to a metal atom.
- _____ 7. An atom with seven valence electrons would most likely lose an electron to become stable.
- _____ 8. The shiny appearance of metals is caused by valence electrons on the surface.

Part B- Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 9. Which is a property of covalent compounds?
 - a. poor conductor
 - b. good conductor
 - c. high melting point
 - d. always solid at room temperature
- _____ 10. How many valence electrons should an atom have to be stable?
 - a. 2
 - b. 6
 - c. 8
 - d. 7
- _____ 11. An ionic bond forms when
 - a. a metal and nonmetal atom share electrons.
 - b. a metal gains an electron and a nonmetal loses an electron.
 - c. a metal loses an electron and a nonmetal gains an electron.
 - d. a metal atom combines with a nonmetal atom to become one atom.

- ___ 12. In the chemical formula H_2O , how many atoms of oxygen are represented?
- one
 - four
 - two
 - zero
13. Which compound is an example of a polar molecule?
- H_2
 - H_2O
 - CO_2
 - CH_4
- ___ 14. A double covalent bond is formed when .
- two atoms share one pair of valence electrons
 - two atoms share bonds with four other atoms
 - two atoms share two pairs of valence electrons
 - two atoms share three pairs of valence electrons
15. Which part of an atom participates in chemical bonding?
- proton
 - neutron
 - electron
 - nucleus
- ___ 16. What does an electron dot diagram show?
- the number of valence electrons
 - the strength of electron energy fields
 - the spacing arrangement of electrons
 - the mass of the electrons
- ___ 17. What makes an atom more stable when it is forming an ionic bond?
- losing an electron
 - gaining an electron
 - gaining or losing an electron
 - the atom is not stable in an ionic bond
- ___ 18. Which type of bond joins nonmetal atoms to nonmetal atoms?
- ionic
 - metallic
 - covalent
 - synthetic
19. A metallic bond forms when valence electrons move freely around a metal atom that has become a
- ionic
 - metallic
 - covalent
 - catalyst
20. Which type of covalent bond is the strongest?
- triple covalent bond
 - double covalent bond
 - single covalent bond
 - they are all equally strong

Part C- Matching

Match each term with its correct description

- | | |
|---------------------|-------------------------|
| a. metallic bond | e. polar molecule |
| b. ionic bond | f. ion |
| c. chemical bond | g. electron dot diagram |
| d. valence electron | |

- ____ 21. a bond between positively and negatively charged atoms
- ____ 22. a force that holds atoms together
- ____ 23. a chemical bond formed when positively charged atoms share their electrons
- ____ 24. an atom that is no longer electrically neutral
- ____ 25. has a slight positive end and a slight negative end because of unequal sharing of electrons
- ____ 26. the part of an atom that participates in chemical bonding

Part D- Short Answer

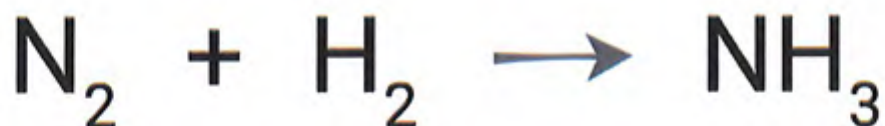
Write the correct answer for each of the following questions.

27. Describe how metallic bonds form.
28. Create an electron dot diagram for an atom of oxygen, atomic number 8, group 16.
29. Write a chemical formula to represent the compound methane, which is made up of a carbon atom with single bonds to four individual hydrogen atoms.
30. What is a characteristic of most nonpolar compounds?
31. The atoms of noble gases do NOT bond easily with other atoms because their valence electrons are

Balancing Chemical Reactions



NOT BALANCED CHEMICAL REACTION



Reactants

2 nitrogen (N) atoms
2 hydrogen (H) atoms

Product

1 nitrogen (N) atom
3 hydrogen (H) atoms

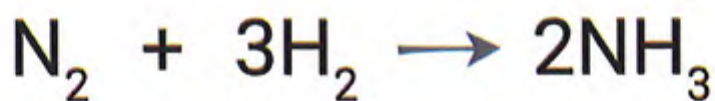
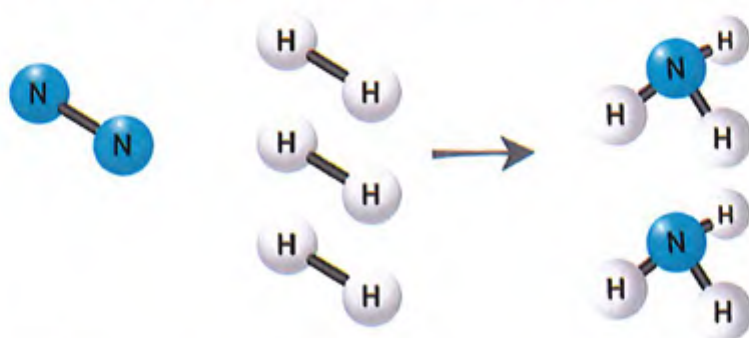
Step 1: Count the number of atoms on each side of the equation.
a. If the numbers are not equal, then the equation is not balanced.

Step 2: Add coefficients to the chemical formulas to balance the equation.

Step 3: Continue to add coefficients as needed until the equation is balanced.

Step 4: Write the balanced equation.

BALANCED CHEMICAL REACTION



Reactants

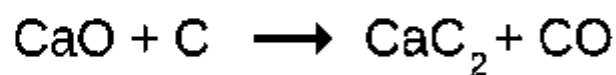
2 nitrogen (N) atoms
6 hydrogen (H) atoms

Product

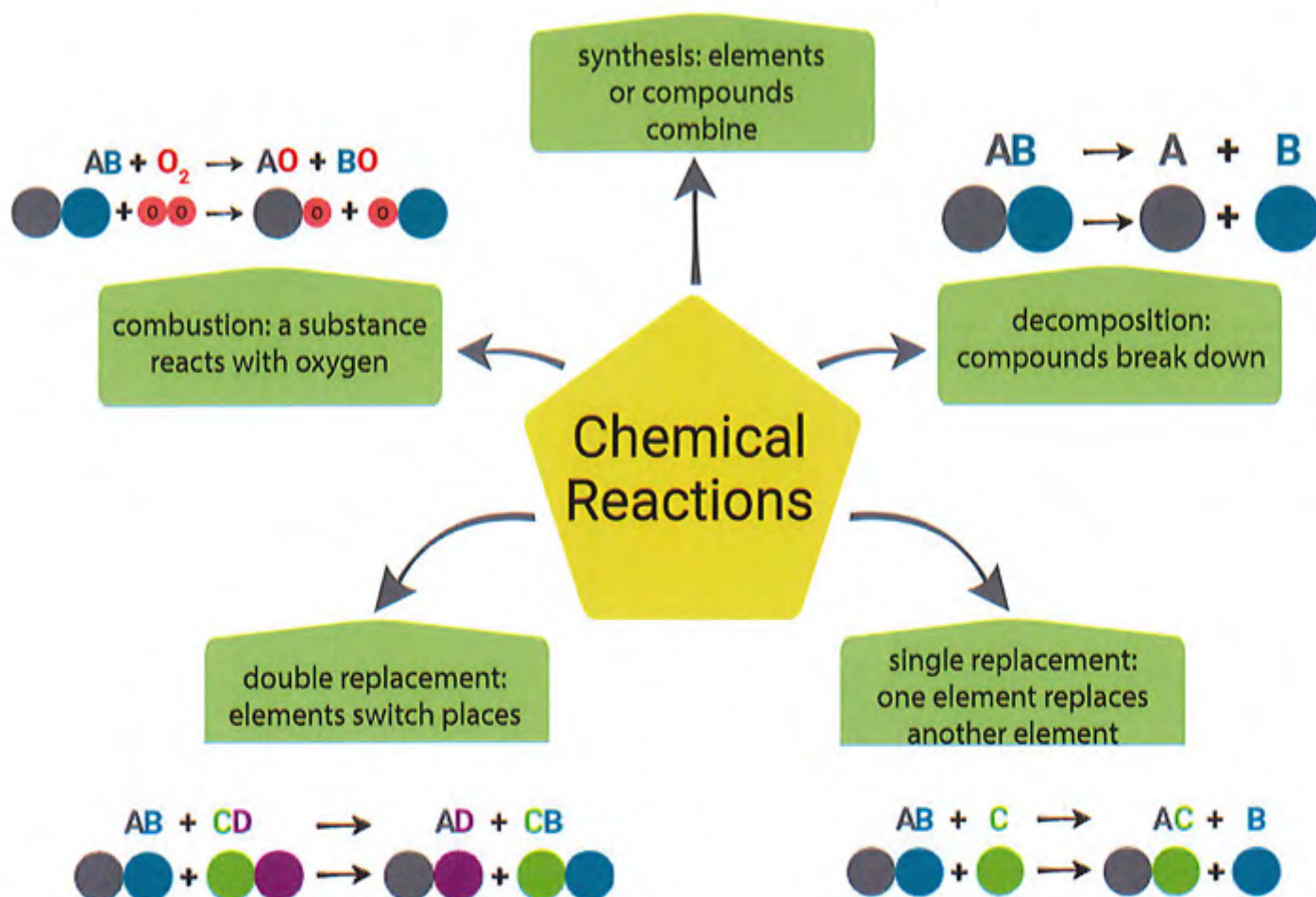
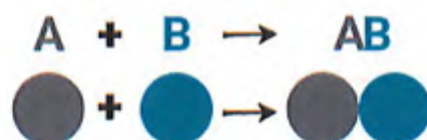
2 nitrogen (N) atoms
6 hydrogen (H) atoms

PRACTICE-BALANCING

Balance the following chemical reactions.



Types of Chemical Reactions



PRACTICE-TYPES OF CHEMICAL REACTIONS

Classify each type of chemical reaction.





Revision Sheets

Chapter 3 ~ Understanding Chemical Reactions

Part A- True/False

Indicate whether the statement is true or false.

- _____ 1. Inhibitors are used to speed up chemical reactions in the body.
- _____ 2. When a chemical equation contains the same number of atoms on both sides, the equation is balanced.
- _____ 3. Catalysts slow down chemical reactions.
- _____ 4. Exothermic reactions release energy.
- _____ 5. A double-displacement reaction has only one reactant
- _____ 6. Nitrogen is always present in combustion reactions.

Part B- Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 7. How can you know for sure that a chemical reaction has occurred?
 - a. Check the temperature of the starting and ending substances.
 - b. Compare the chemical properties of the starting and ending substances.
 - c. Look for a change in state.
 - d. Look for bubbling of the starting substances.
- _____ 8. The chemical equation below is unbalanced.
$$\text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$$
Which is the correct balanced chemical equation?
 - a. $\text{Zn} + \text{H}_2\text{Cl}_2 \rightarrow \text{ZnCl}_2 + \text{H}_2$
 - b. $\text{Zn} + \text{HCl} \rightarrow \text{ZnCl} + \text{H}$
 - c. $2\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
 - d. $\text{Zn} + 2\text{HCl} \rightarrow 2\text{ZnCl}_2 + \text{H}_2$
- _____ 9. Which is an example of a chemical change?
 - a. a ball of clay is split in two
 - b. a piece of wood is splintered
 - c. a coin rusts
 - d. salt and pepper are mixed
- _____ 10. Chopping a piece of wood and burning it demonstrates _____.
 - a. a chemical change followed by a physical change
 - b. a physical change followed by a chemical change
 - c. an endothermic reaction followed by an exothermic reaction
 - d. chemical energy converted into mechanical energy

- ____ 11. What kind of reaction is shown in the formula $2\text{AgCl} + \text{Pb} \rightarrow \text{PbCl}_2 + 2\text{Ag}$?
- synthesis reaction
 - replacement reaction
 - decomposition reaction
 - gaseous reaction
- ____ 12. Sodium and chlorine join together to form sodium chloride, a new compound. This is an example of a _____.
- synthesis reaction
 - compound reaction
 - replacement reaction
 - decomposition reaction
- ____ 13. How do the reactants and products compare in a chemical reaction?
- The reactants have more mass.
 - The products have more mass.
 - The products are much simpler substances.
 - The reactants and products have different physical and chemical properties.
- ____ 14. When iron combines with oxygen gas and forms rust, the total mass of the products _____.
- depends on the reaction conditions
 - is less than the mass of the reactants
 - is the same as the mass of the reactants
 - is greater than the mass of the reactants
- ____ 15. Potassium nitrate forms potassium oxide, nitrogen, and oxygen in certain fireworks

$$4\text{KNO}_3 \rightarrow 2\text{K}_2\text{O} + 2\text{N}_2 + 5\text{O}_2$$
This reaction is classified as a _____.
- combustion reaction
 - decomposition reaction
 - single-replacement reaction
 - synthesis reaction
- ____ 16. Which of the following must occur before new bonds can form during a chemical reaction?
- The atoms in the reactants are destroyed.
 - The bonds between atoms in the reactants are broken.
 - The atoms in the reactants are no longer moving.
 - The bonds between atoms in the reactants get stronger.
- ____ 17. Each substance written to the right of the arrow in a chemical equation is a _____.
- reactant
 - product
 - precipitate
 - catalyst
18. The following chemical reaction shows that there are _____ hydrogen in the reactants and _____ atoms of hydrogen in the products.

$$\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$$
- 2, 3
 - 6, 6
 - 3, 6
 - 6, 3

19. How many atoms of calcium are in a unit of calcium phosphate whose formula is $\text{Ca}_3(\text{PO}_4)_2$?

- a. one c. three
b. two d. four

Part C- Matching

Match each term with its correct description.

- | | |
|----------------------|---------------|
| e. chemical change | e. exothermic |
| f. chemical equation | f. product |
| g. chemical bond | g. reactant |
| h. endothermic | |

20. Forces that hold atoms together.

21. A way to represent a chemical reaction by using symbols for the amounts of reactants and products in the change.

22. A change in matter that produces a new substance with different properties from the original.

23. A chemical reaction that absorbs heat energy.

24. A chemical reaction that gives off heat energy.

25. The new substance produced in a chemical reaction

26. An original substance at the beginning of a reaction.

Part D: Short Answer

Write the correct answer for each of the following questions.

29. In exothermic reactions, is heat given off or required in order to have the reaction occur?

28. For the reaction described by the formula $\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$, identify the type of reaction.

29. Synthesis, replacement, and decomposition reactions are types of _____ reactions.

30. What is the difference between a chemical change and a physical change?

31. Explain what is meant by a balanced chemical equation.

ELECTRIC FORCES



Like charges REPEL



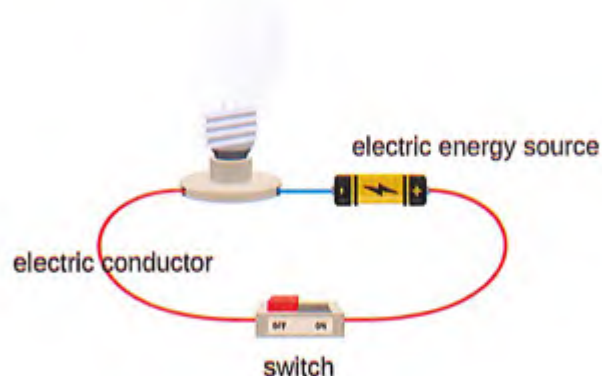
opposite charges ATTRACT



ELECTRIC CIRCUITS



electric device



CLOSE THE SWITCH



TRY IT YOURSELF!

- In a series circuit, the electric devices are connected side by side. This means you can trace the full circuit without lifting your pencil.
- In a parallel circuit, the electric devices are connected in parallel to each other. This means you will not be able to trace the whole circuit without lifting your pencil.



PRACTICE-CIRCUITS

1. Draw a series circuit with three lamps. Label your diagram.
2. Draw a parallel circuit with five lamps. Label your diagram.

WHAT WILL THE MAGNET PULL?

Magnets are objects that attract magnetic materials, like iron.



Magnets create invisible *magnetic fields*. They fill the area around a magnet where the *magnetic forces* work.



MAGNETIC POLES - ATTRACT OR REPEL?

Bar magnets have two poles:

- the north pole
- the south pole

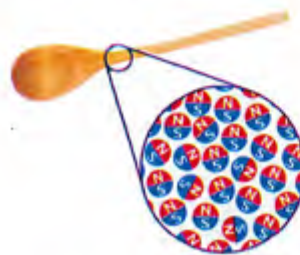
Opposite poles attract and like poles repel.



MAGNETIC VS NONMAGNETIC MATERIALS !



Magnetic materials have their atoms grouped in magnetic domains.



Nonmagnetic materials have their atoms not grouped in magnetic domains.

Revision Sheets

Chapter 4 – Electricity and Magnetism

Part A- True/False

Indicate whether the statement is true or false.

- ___ 1. Electrons move around the protons of an atom.
- ___ 2. When an atom's charge is balanced, the amount of negative charge equals the amount of neutral charge.
- ___ 3. The basic parts of an electric circuit include the source of energy, electric devices, and parallel circuits.
- ___ 4. Adding a fan and an electric light to a parallel circuit decreases the electric current flowing in the circuit.
- ___ 5. A device that has higher resistance transforms more electrical energy into other forms of energy.
- ___ 6. Increasing the length of a conductor decreases electric resistance.

Part B- Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 7. What kind of circuit has more than one path for current to flow?



- a. open
 - b. series
 - c. parallel
 - d. conducting
- ___ 8. What kind of circuit has only one path for current flow?
- a. open
 - b. series
 - c. parallel
 - d. conducting
- ___ 9. What flows in an electric circuit?
- a. protons
 - b. neutrons
 - c. electrons
 - d. ions

___ 10. Magnetic field lines are closest together in areas where ___.

- a. there is no magnetic force
- b. the magnetic force is the weakest
- c. the magnetic force is the strongest
- d. the magnetic force is equal

___ 11. What is the role of the electromagnet in an electric motor?

- a. supplies a current to the motor
- b. supplies motion to parts of the motor
- c. supplies current to the permanent magnet
- d. supplies current to the temporary magnet

___ 12. A magnet sticks to a refrigerator door. Therefore, the door must be ___.

- a. a magnet
- b. electrically charged
- c. made of a magnetic material
- d. probably not electrically grounded

___ 13. An electric generator ___.

- a. transforms chemical energy into motion
- b. produces an electric current in a wire coil
- c. uses two electromagnets to produce motion
- d. uses conducting magnets to produce a current

___ 14. Why is the lightbulb not on in this image?



- a. the battery is used up
- b. the bulb is burned out
- c. the circuit is open
- d. the circuit is closed

___ 15. Why are parallel circuits used in the wiring of houses and other buildings, rather than series circuits?

- a. because in a series circuit, all devices must be turned on in order for current to flow
- b. because too much wire would be needed for a series circuit for an entire building
- c. because in a series circuit, if you turn on one device, all of the devices turn on
- d. Because power plants generate electricity that can flow in parallel circuits.

16. Which phrase best describes an electric current?

- a. a force that repels
- b. a force that attracts
- c. a flow of uncharged particles
- d. An unmoving charge on an object

17. Each substance written to the right of the arrow in a chemical equation is a _____.

- a. reactant
- b. product
- c. precipitate
- d. catalyst

18. A string of light bulbs does not light. How can you determine whether the bulbs are in series or parallel circuit?

- a. Observe the material they are made of.
- b. Count the number of wires connecting the
- c. Change the bulbs one at a time to see if they all light.
- d. Measure the amount of thermal energy produced by the lights.

19. Rana pulls a sock from the clothes dryer. It is electrically charged. What must be true of the sock?

- a. It has lost all of its electrons.
- b. It can never again become electrically neutrally.
- c. It would not interact with other charged objects.
- d. It has unequal amounts of positive and negative charges.

Part C- Matching

Match each term with its correct description

- a. electromagnet
- b. magnet
- c. electric field
- d. voltage
- e. generator
- f. electric circuit
- g. electric current

20. The invisible region around any charged object where an electric force is applied.

21. The movement of electrically charged particles, such as electrons.

22. A closed, or complete, path in which an electric current flow.

23. The amount of energy used to move one coulomb of electrons through a circuit.

24. An object that attracts iron and other materials that have magnetic properties similar to iron.

25. A temporary magnet made with a current carrying- wire coil wrapped around a magnetic core.

26. A machine that transforms mechanical energy to electrical energy.

Part D- Short Answer

Write the correct answer for each of the following questions.

27. List the basic parts of a simple circuit.

28. Explain the difference between voltage and electric resistance.

29. Explain what causes a magnetic force.

30. What is the relationship between magnetic domains and magnetic materials?

31. Explain what happens when two charged objects have opposite charges.