Name:_____	**Score:**_____
Section:_____	**Date:**_____

UNIT 4

MODULE 1: BEHAVIOR OF GASSES

Objectives:

Upon completion of this lesson, the students should be able to:

1. become familiar with the basic characteristics of gases
2. understand the postulates of the Kinetic Molecular Theory as applied to gases
3. explain how the Kinetic Molecular Theory accounts for the properties of gases
4. apply the relations of volume, temperature, pressure, and mass to solve problems on gases

Introduction

What makes a gas different from liquid and a solid?

Gas is one of the three forms of matter. Every known substance is either a solid, liquid or a gas. These forms differ in the way they fill space and change shape. A gas, such as air has neither a fixed shape nor a fixed volume and has weight.

Properties of Gases

1. Most gases exist as molecules (in case of inert gases as individual atoms).
2. The molecules of gases are randomly distributed and are far apart.
    - Gases can be easily compressed, the molecules can be forced to be closed together resulting to lesser space between them.
    - The volume or space occupied by the molecules themselves is negligible as compared to the total volume of the container so that the volume of the container can be taken as the volume of the gas.
    - Gases have lower densities than solids and liquids.
    - The attractive forces between molecules (intermolecular) are negligible.
3. Most substances that are gaseous at normal conditions have low molecular mass.
4. Behavior of Gases

There are 5 main states of matter: solid, liquid, gas, plasma and the Bose-Einstein condensate. Out of these gases are a special state. Their properties are easy to study. We see that gases follow certain laws known as the gas laws. These laws tell us about the behavior of gases. By that, we mean the values and relations of temperature, pressure and volume etc. Let's see what these laws are.

Name:_____ Score:_____

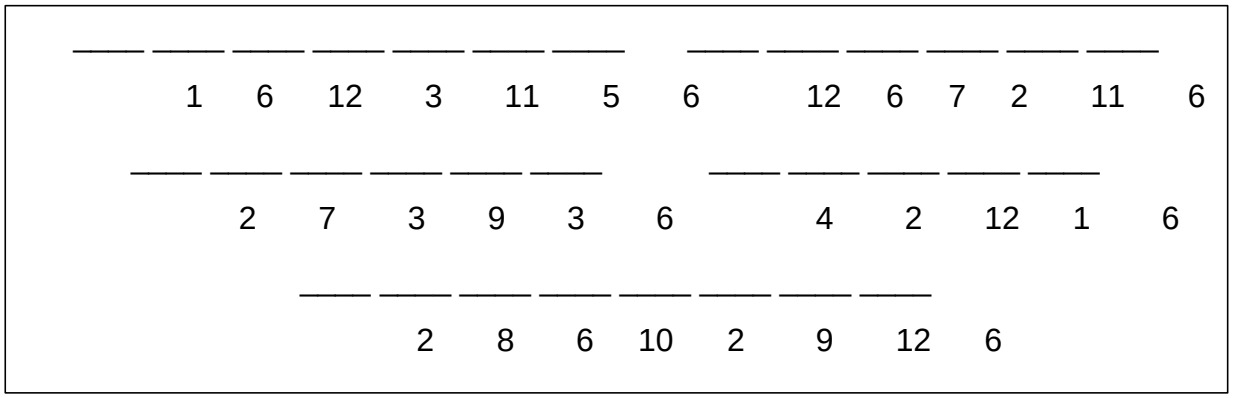
Section:_____ Date:_____

WORKSHEET #1

Who am I? (Avogrado's law)

Who is the first to suggest that the volume of a gas is directly proportional to the number of moles of gas present at a given temperature and pressure?

A	C	D	E	G	L
2	4	9	3	10	1
M	**N**	**O**	**R**	**V**	**Z**
7	11	6	12	8	5



Write other ideas about the person that is being asked:

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #1

Who am I? (answer key)

Who is the first to suggest that the volume of a gas is directly proportional to the number of moles of gas present at a given temperature and pressure?

A	C	D	E	G	L
2	4	9	3	10	1
M	**N**	**O**	**R**	**V**	**Z**
7	11	6	12	8	5

L	O	R	E	N	Z	O		R	O	M	A	N	O
1	6	12	3	11	5	6		12	6	7	2	11	6

A	M	E	D	E	O		C	A	R	L	O
2	7	3	9	3	6		4	2	12	1	6

A	V	O	G	A	D	R	O
2	8	6	10	2	9	12	6

ANSWERS MAY VARY

Name:_____ **Score:**_____

Section:_____ **Date:**_____

WORKSHEET #2

Complete me! (Avogrado's Law)

Directions: Complete all the blanks in each number by choosing the answer inside the box.

First half Lorenzo nineteenth Quaregna contributions Carlo
Avogadro Stoichiometry amount of gas definite quantifying volume
Compounds shedding light mass molecules mole atoms played
Pressure directly proportional kept same 1811 equal
all contain volume of gas Cerreto

During the _____of the _____century, _____ Romano Amedeo _____ _____, Count of _____and _____ made important _____ in _____ on reaction _____. He provided explanations as to why _____ reacted in _____ ratios on how the _____ affects its _____. Experimentally, the most convenient way _____the amount of gas through its mass. Avogadro _____ an important role in providing evidence of the existence of atoms. Eventually the number of _____ in a _____is named after him.

In _____, Avogadro wrote in a paper that, "_____volumes of _____ gases, _____ the _____ pressure and temperature, _____ the same number of molecules." Avogadro was the first to suggest that the _____ is _____ to the number of moles of gas at a given _____ and_____.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #2

Complete me! (answer key)

Directions: Complete all the blanks in each number by choosing the answer inside the box.

First half	Lorenzo	nineteenth	Quaregna	contributions	Carlo
Avogadro	Stoichiometry	amount of gas	definite	quantifying	volume
Compounds	shedding light	mass	molecules	mole	atoms
played	Pressure	directly proportional	kept	same	1811
equal	all	contain	volume of gas	Cerreto	

During the **first half** of the **nineteenth** century, **Lorenzo** Romano Amedeo **Carlo Avogadro**, Count of **Quaregna** and **Cerreto** made important **contributions** in **shedding light** on reaction **stoichiometry**. He provided explanations as to why **compounds** reacted in **definite** ratios on how the **amount of gas** affects its **volume.** Experimentally, the most convenient way **quantifying** the amount of gas through its mass. Avogadro **played** an important role in providing evidence of the existence of **atoms**. Eventually the number of **molecules** in a **mole** is named after him.

In **1811**, Avogadro wrote in a paper that, "**Equal** volumes of **all** gases, **kept** the **same** pressure and temperature, **contain** the same number of molecules." Avogadro was the first to suggest that the **volume of gas** is **directly proportional** to the number of moles of gas at a given **temperature** and **pressure**.

Name:_____	**Score:**_____
Section:_____	**Date:**_____

ACTIVITY #1

Gas Laws

Avogadro's Law

Objectives

- Determine how the amount of gas in a fixed volume at a fixed pressure and temperature depends upon the identity of the gas.
- Determine molar volume and the molar concentration of a gas at STP.

The experimental apparatus consists of a glass bulb which will be evacuated and then filled with a gas at standard temperature and pressure (STP). STP corresponds with 1 atm pressure (760 torr) and 0 oC. The bulb will be weighed when evacuated and when filled with a gas at STP. The difference in mass is the mass of the gas itself. The volume of the bulb is 500.0 mL.

This measurement will be performed for several different gases. For each gas, experimentally determine the mass of the gas at STP and calculate the following properties.

Density
The density, d, is the ratio of the mass to the volume (in mL): d = m/V

Concentration
The concentration, C, is the ratio of the moles of gas to the volume (in L): C = n/V

The number of moles, n, is the mass of the gas divided by the formula weight, FW, of the gas: n = m/FW

The formula weight, FW, is the mass of one mole of the gas.

Molar Volume
The molar volume, Vm, is the volume of one mole of gas and is the reciprocal of the concentration: Vm = 1/C = V/n

Experimental Details

In practice, this experiment would be performed in the following fashion. The bulb would be connected to a manifold, to which is attached a tank of the gas of interest, a vacuum pump, and a manometer. If gas is being added, the valve to the vacuum pump is be closed and the valve to the gas tank is gently opened to vent gas into the system. Gas is added until the desired pressure is displayed on the manometer. Gas is removed from the bulb by closing the valve to the gas tank and gently opening the valve to the vacuum pump. It is possible to completely evacuate the bulb using the vacuum pump. After the bulb contains the desired pressure of gas, the bulb is removed from the manifold and placed on a balance. The mass of the bulb containing gas minus the mass of the evacuated bulb is the mass of gas.

The open end of the manometer is connected to the manifold; thus the pressure recorded by the manometer is the pressure in the manifold and thus the bulb, which is open to the manifold.

In this simulated experiment, the pressure and mass are measured simultaneously (even though this is not really possible in practice).

The glass bulb has a volume of 500.0 mL. The temperature of the gas is held at 0 oC. You will need to add sufficient gas to produce a pressure of exactly 760 torr (1 atm). This temperature and pressure correspond to STP.

When a new gas is selected, the bulb is evacuated to remove the old gas. Each gas is given a color to illustrate its presence in the bulb. In reality, all of the gases used in this experiment are colorless except chlorine, which has green color.

Questions

After performing the measurements with each gas, answer the following questions.

1. How does the density of the gas at STP depend upon the identity of the gas?
2. How does the molar concentration at STP depend upon the identity of the gas?
3. How does the molar volume at STP depend upon the identity of the gas?

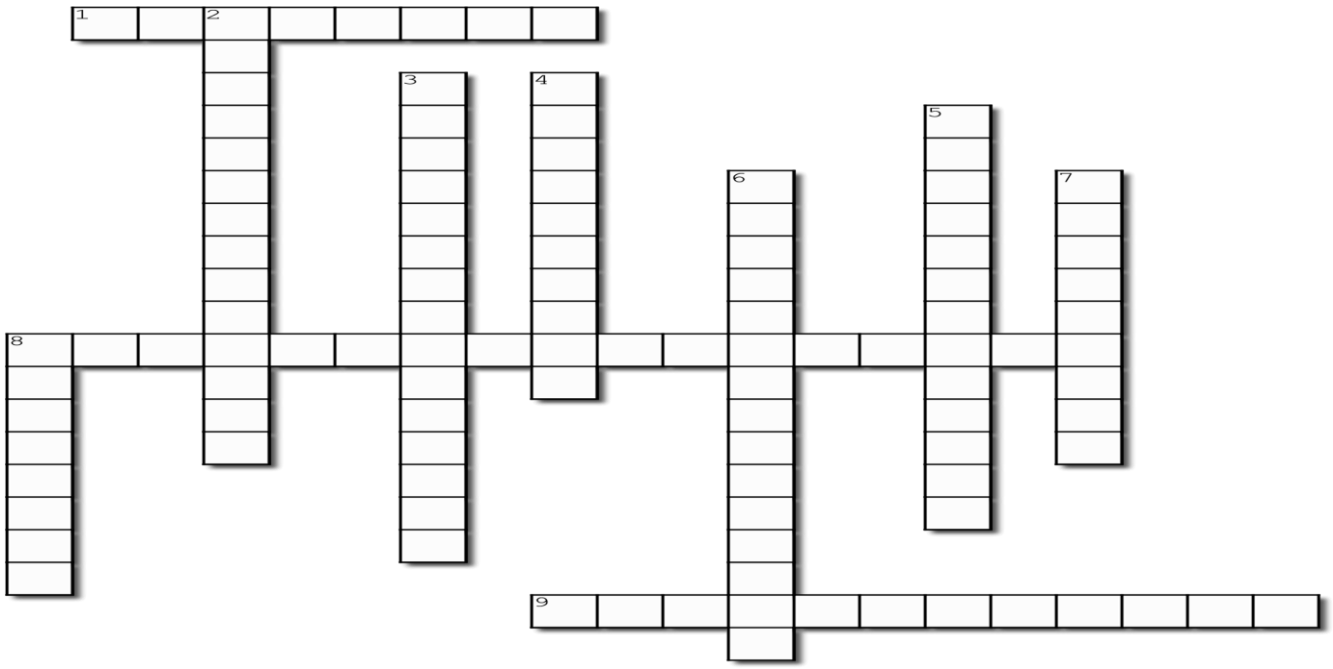
Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #3

COMPLETE ME PLEASE! (Boyle's Law)

Direction: Complete the crossword puzzle below.



Across

1. Mathematically, Boyle's law can be stated as where P is the pressure of the gas, V is the volume of the gas, and k is a

8.A process performed at constant temperature

9.the pressure (p) of a given quantity of gas varies inversely with its volume (v) at constant temperature

Down

2.Boyle observed that the product of the pressure and volume are observed to be

3.derived Boyle's law by applying Newton's laws of motion at the molecular level

4.is an experimental gas law that describes how the pressure of a gas tends to increase as the volume of the container decrease

5.Boyle's law, also called

6.This relationship between pressure and volume was first noted by**7.** Boyle's Law states that the pressure (P) of a gas is _____ proportional to the volume (V).

8. The product of pressure and volume is exactly a constant for an ____

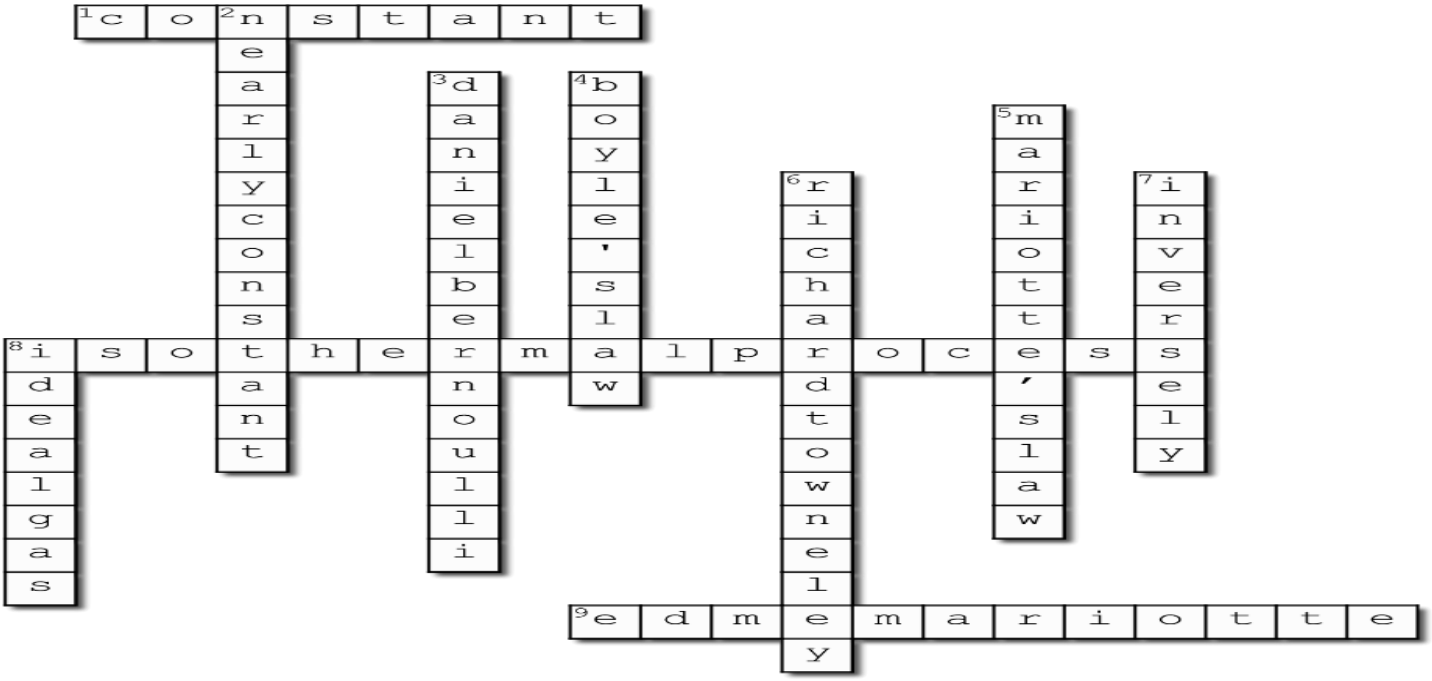
Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #3

COMPLETE ME PLEASE! (answer key)

Direction: Complete the crossword puzzle below.



Across

1. Mathematically, Boyle's law can be stated as where P is the pressure of the gas, V is the volume of the gas, and k is a

8.A process performed at constant temperature

9.the pressure (p) of a given quantity of gas varies inversely with its volume (v) at constant temperature

Down

2.Boyle observed that the product of the pressure and volume are observed to be

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8. The product of pressure and volume is exactly a constant for an ____

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #4

FIND MY TERMS! (Boyle's Law)

Direction: Find and encircle the terms connected to Boyle's Law.

I	A	P	C	S	D	R	E	S
A	D	R	D	S	Y	O	D	W
S	D	E	W	V	D	L	D	R
F	H	S	A	O	L	E	L	T
D	L	S	Q	L	E	D	E	O
W	H	U	C	U	G	D	G	P
E	P	R	E	M	A	A	I	O
I	U	E	R	E	S	Q	S	I
T	S	P	T	T	H	D	L	L
E	D	V	I	L	E	G	A	L
M	E	Z	O	A	G	G	T	K
P	R	X	R	W	B	E	I	H
E	O	W	A	A	D	T	O	Y
R	G	R	R	W	W	Y	N	T
A	A	J	I	P	C	H	R	R
T	T	L	E	A	B	E	T	H
U	I	N	Y	R	L	V	H	N
R	O	S	H	A	R	I	A	H
E	N	E	S	L	A	C	Y	P
W	R	D	R	E	Q	T	T	I
S	T	G	T	G	L	I	E	L
F	G	B	Y	A	N	O	M	W
C	B	L	U	L	A	N	A	S
M	A	N	D	A	M	U	S	X

IDEAL GAS	NOM	CERTIORARI
PRESSURE	VOLUME	SHARIAH
LEGISLATION	EVICTION	LEGAL
DEROGATION	TEMPERATURE	PARALEGAL
GAS	MANDAMUS	LAW

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #4

FIND MY TERMS (answer key)

Direction: Find and encircle the terms connected to Boyle's Law.

I	A	P	C	S	D	R	E	S
A	D	R	D	S	Y	O	D	W
S	D	E	W	V	D	L	D	R
F	H	S	A	O	L	E	L	T
D	L	S	Q	L	E	D	E	O
W	H	U	C	U	G	D	G	P
E	P	R	E	M	A	A	I	O
I	U	E	R	E	S	Q	S	I
T	S	P	T	T	H	D	L	L
E	D	V	I	L	E	G	A	L
M	E	Z	O	A	G	G	T	K
P	R	X	R	W	B	E	I	H
E	O	W	A	A	D	T	O	Y
R	G	R	R	W	W	Y	N	T
A	A	J	I	P	C	H	R	R
T	T	L	E	A	B	E	T	H
U	I	N	Y	R	L	V	H	N
R	O	S	H	A	R	I	A	H
E	N	E	S	L	A	C	Y	P
W	R	D	R	E	Q	T	T	I
S	T	G	T	G	L	I	E	L
F	G	B	Y	A	N	O	M	W
C	B	L	U	L	A	N	A	S
M	A	N	D	A	M	U	S	X

IDEAL GAS	NOM	CERTIORARI
PRESSURE	VOLUME	SHARIAH
LEGISLATION	EVICTION	LEGAL
DEROGATION	TEMPERATURE	PARALEGAL
GAS	MANDAMUS	LAW

Name:_____	**Score:**_____
Section:_____	**Date:**_____

ACTIVITY #2

GAS LAW

BOYLE'S LAW

Objectives:

- explain, in your own words, the relationship between the pressure (P) and the volume (V) of a gas at a constant temperature (T)
- explain at the particle level why this relationship exists.
- explain, with an equation, the relationship between the pressure (P) and the volume (V) of a gas at a constant temperature (T)
- construct a graph, using data you have generated, showing the relationship between the pressure (P) and the volume (V) of a gas at a constant temperature (T)

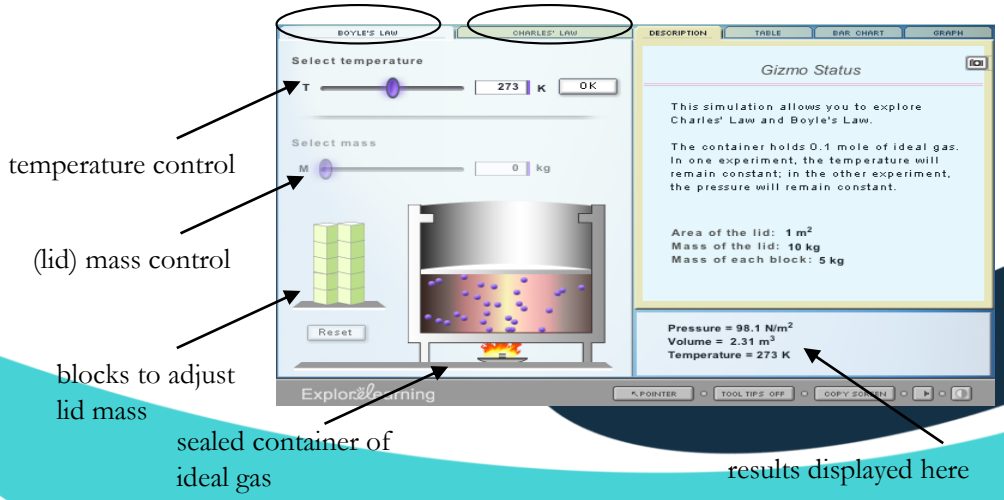
Materials:

- ballpen
- pencil
- ruler
- activity sheet

Procedure:

1. Together with your partner, follow the directions on the board to get to the simulation on the Explore Learning website.

2. Refer to the diagram of the simulation below to help you with the activity.



3. Investigate the properties of an ideal gas by performing experiments on a container of ideal gas in which the temperature is held constant.

4. Make sure the tab “Boyle’s Law” is selected. You are looking at a closed container containing 0.1 mol of an ideal gas. **The amount of gas in this container will never change.** This is important in this law. The temperature is set at 273 K (0 □C). Click “OK” to keep the system at this temperature.

5. Look in the lower right hand corner of the box. There you will see the current pressure, volume and temperature.

6. Changing the mass of the lid of the container will change the volume of the container. For example, if you make the lid heavier, the lid will go down and the volume of the container will get smaller. Changing the volume of the container will change the pressure of the gas in the container. (Think: if you have the same amount of “air” in the container but you make the container smaller, the pressure inside will go up. Picture yourself squeezing a balloon that has been tied off. This makes the balloon get smaller, but because the amount of air inside stays the same, the pressure inside the balloon goes up.) You can change the mass of the lid by adding or removing weights from on top of the lid in 1 of 3 ways: click and drag green cubes onto the lid, click and drag the blue oval under “Select Mass” or click in the box beside “kg” and enter a value. Take a few minutes to experiment with changing the mass of the lid. (Try to guess what will happen before you actually do it.)

a. What is happening with the lid as you increase the mass on it?

b. What is happening with the particles as you decrease the volume (V)? Keep in mind what these particles are doing in terms of their contact with the walls of the container.

c. What is happening with the pressure (P) as you decrease the volume (V)? Explain at the particle level why this occurs.

d. What is happening with the lid as you decrease the mass on it?

e. What is happening with the particles as you increase the volume (V)? Again, keep in mind what these particles are doing in terms of their contact with the walls of the container.

f. What is happening with the pressure (P) as you increase the volume (V)? Again, explain at the particle level why this occurs.

7. Click on the tab “Bar Graph.” As you continue to experiment with the weights on the lid, what happens to the bars representing…

a. …the temperature (T)?

b. …the volume (V)?

c. …the pressure (P)?

Note: don’t worry so much about the numbers, just watch the *relationships* between the bars – i.e. the increases and decreases with changes in mass.

8. Click on the tab “Table.” Click the “Reset” button in the bottom left hand corner and then click “OK” beside 273 K. You have once again locked the temperature in at 273 K, because Boyle’s Law depends on a constant temperature.

a. With the mass at 0 kg, click “Record.” Notice what information is recorded in the table.

b. Click and drag 1 green cube (5 kg) onto the lid. Click “Record.”

c. Click and drag 1 more green cube onto the lid. Click “Record.”

d. Continue with this same procedure until all boxes are on the lid.

e. Copy your data table here:

9. For each data point, **multiply** the values for pressure (P) and volume (V). What do you notice about your results?

10. Click on the tab “Graph.” Draw what you see here (don’t forget to label your axes and connect the data points when you are finished):

11. Using your data table and graph, answer the following questions:

a. What was the pressure (P) when the volume (V) was 1.54 m^3?

b. What was the pressure (P) when the volume (V) was 0.66 m^3?

c. What was the pressure (P) when the volume (V) was 0.46 m^3?

d. Based on your answers to a., b. and c. above, fill in the blanks.

Hint: use the words “increase” and “decrease.”

As volume _____, pressure _____.

Or, looking at it another way…

As volume _____, pressure _____.

e. Now, remember, we have done this all **at a fixed temperature, with a constant amount of an ideal gas**. So, put it this *law* together, in your own words.

f. This is called _____.

Hint: what is the name of this activity?

g. Finally, explain at the particle level why this relationship exists.

h. In question 6, you discovered that the product of the pressure (P) and volume (V) was the same each time you changed the volume (V). We can call this a *constant*. For Boyle's Law, the actual number for this constant does not really matter. But, it is important to remember that no matter what values for pressure (P) and volume (V) you have, the product will always be the same. Put another way,

$$\_\_\_\__1 \times \_\_\_\__1 = \_\_\_\__2 \times \_\_\_\__2$$

where "1" and "2" are referring to two different containers of gas (or two different situations).

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #5

SOLVE MY PROBLEMS (Charles's Law)

Direction: Solve the following problems.

1. The temperature inside my refrigerator is about 4° Celcius. If I place a balloon in my fridge that initially has a temperature of 22 degree C and a volume of 0.5 liters, what will be the volume of the balloon when it is fully cooled by my refrigerator?
2. A man heats a balloon in the oven. If the balloon initially has a volume of 0.4 liters and a temperature of 20 degree C, what will be the volume of the balloon be after he heats it to a temperature of 250 degree C?
3. On hot days, you may have noticed that potato chips bags seem to "inflate", even though they have not been opened. If I have a 250 mL bag at a temperature of 19 degree C, and I leave it in my car which has a temperature of 60 degree C, what will be the new volume of the bag?
4. A soda bottle is flexible enough that the volume of the bottle can change even without opening it. If you have an empty soda bottle (volume of 2L) at room temperature (25 degree C), what will the new volume beif you put it in your freezer (-4 degree C)?
5. Some students believe that teachers are full of hot air. If I inhale 2.2 liters of gas at a temperature of 18 degree C and it heats to a temperature of 38 degree C in my lungs, what is the new volume of the gas?
6. How hot will a 2.3 L balloon have to get to expand to a volume of 400L? Assume that the initial temperature of the balloon is 25 degree C.
7. I have made a thermometer which measures temperature by the compressing and expanding of gas in a piston. I have measured that at 100 degree C the volume of the piston is 20 L. What is the temperature outside if the piston has a volume of 15 L? What would be the appropriate clothing for the weather?

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #5

SOLVE MY PROBLEMS (Answer Key)

Direction: Solve the following problems.

1. The temperature inside my refrigerator is about 4° Celcius. If I place a balloon in my fridge that initially has a temperature of 22 degree C and a volume of 0.5 liters, what will be the volume of the balloon when it is fully cooled by my refrigerator? **0.47 L**
2. A man heats a balloon in the oven. If the balloon initially has a volume of 0.4 liters and a temperature of 20 degree C, what will be the volume of the balloon be after he heats it to a temperature of 250 degree C? **0.71 L**
3. On hot days, you may have noticed that potato chips bags seem to "inflate", even though they have not been opened. If I have a 250 mL bag at a temperature of 19 degree C, and I leave it in my car which has a temperature of 60 degree C, what will be the new volume of the bag? **285 mL**
4. A soda bottle is flexible enough that the volume of the bottle can change even without opening it. If you have an empty soda bottle (volume of 2L) at room temperature (25 degree C), what will the new volume beif you put it in your freezer (-4 degree C)? **1.81 L**
5. Some students believe that teachers are full of hot air. If I inhale 2.2 liters of gas at a temperature of 18 degree C and it heats to a temperature of 38 degree C in my lungs, what is the new volume of the gas? **2.35 L**
6. How hot will a 2.3 L balloon have to get to expand to a volume of 400L? Assume that the initial temperature of the balloon is 25 degree C. **51,800 K**
7. I have made a thermometer which measures temperature by the compressing and expanding of gas in a piston. I have measured that at 100 degree C the volume of the piston is 20 L. What is the temperature outside if the piston has a volume of 15 L? What would be the appropriate clothing for the weather? **THE TEMPERATURE IS 298.5 K, WHICH CORRESPONDS TO 0.5 DEGREE CELCIUS. A JACKET WOULD BE APPROPRIATE CLOTHING FOR THIS WEATHER.**

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #6

COMPLETE ME! (Charles's Law)

Direction: Complete the paragraph.

_____ (also known as the law of _____) is an _____ gas law that describes how gases tend to _____ when heated. When the _____ on a sample of a dry gas is held constant, the _____ temperature and the volume will be in _____ proportion.

This law describes how a ____ expands as the temperature _____; conversely, a _____ in temperature will lead to a decrease in volume. The law was named after scientist _____ _____, who formulated the original law in his unpublished work from the _____. _____ was the first to demonstrate that the _____ applied generally to _____ gases, and to the _____of _____ liquids if the temperature was well _____ the boiling point. Gay-Lussac concurred. With measurements only at the _____ thermometric fixed points of _____, Gay-Lussac was _____ to show that the _____ relating volume to temperature was a _____ _____. On mathematical grounds alone, _____ paper does not permit the _____of any law stating the linear relation.

Charles's law	volume	experimental
Expand	pressure	Kelvin
Celcuis	gas	increases
Decreases	Jacques Charles	1780s
Dalton	law	all
Vapours	volatile	above
Two	water	unable
Equation	linear function	Gay Lussacs's
assignment		

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #6

COMPLETE ME! (Answer Key)

Direction: Complete the paragraph.

Charles's law (also known as the law of **volumes**) is an **experimental** gas law that describes how gases tend to **expand** when heated. When the **pressure** on a sample of a dry gas is held constant, the **Kelvin** temperature and the volume will be in **direct** proportion.

This law describes how a **gas** expands as the temperature **increases**; conversely, a **decrease** in temperature will lead to a **decrease** in volume. The law was named after scientist **Jacques Charles**, who formulated the original law in his unpublished work from the **1780s**. **Dalton** was the first to demonstrate that the **law** applied generally to **all** gases, and to the **vapours** of **volatile** liquids if the temperature was well **above** the boiling point. Gay-Lussac concurred. With measurements only at the **two** thermometric fixed points of **water**, Gay-Lussac was **unable** to show that the **equation** relating volume to temperature was a **linear function**. On mathematical grounds alone, **Gay-Lussac's** paper does not permit the **assignment** of any law stating the linear relation.

Charles's law	volume	experimental
Expand	pressure	Kelvin
Celcuis	gas	increases
Decreases	Jacques Charles	1780s
Dalton	law	all
Vapours	volatile	above
Two	water	unable
Equation	linear function	Gay Lussacs's
assignment		

Name:_____	**Score:**_____
Section:_____	**Date:**_____

ACTIVITY #3

GAS LAW

CHARLES'S LAW

Objective:

- explain, in your own words, the relationship between the temperature (T) and the volume (V) of a gas at a constant pressure (P)
- explain at the particle level why this relationship exists
- explain, with an equation, the relationship between the temperature (T) and the volume (V) of a gas at a constant pressure (P)
- construct a graph, using data you have generated, showing the relationship between the temperature (T) and the volume (V) of a gas at a constant pressure (P)

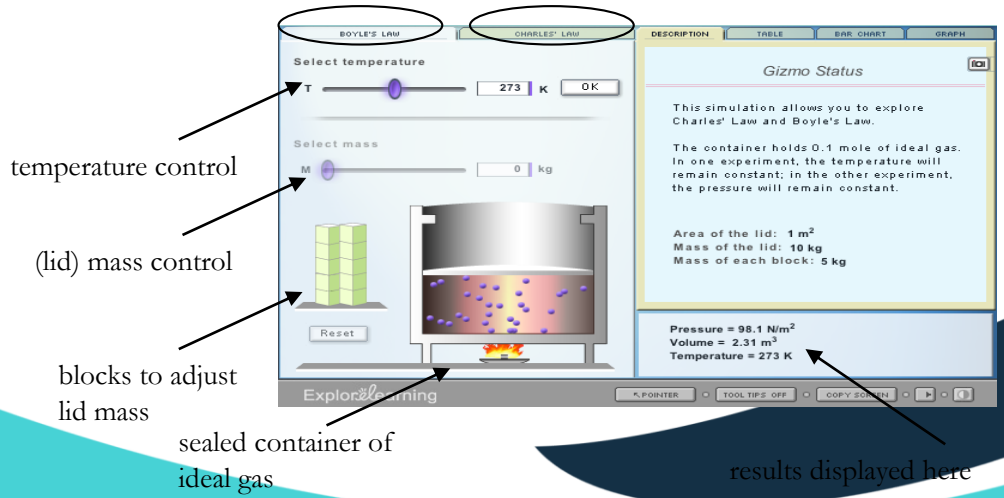
Materials:

- ballpen
- pencil
- ruler
- activity sheet

Procedure:

1. Together with your partner, follow the directions on the board to get to the simulation on the Explore Learning website.

2. Refer to the diagram of the simulation below to help you with the activity.



3. Investigate the properties of an ideal gas by performing experiments on a container of ideal gas in which the **pressure remains fixed.**

4. Make sure the tab “Charles’ Law” is selected. You are looking at a closed container containing 0.1 mol of an ideal gas. The amount of gas in this container will never change. Click “OK” beside the mass bar to keep the mass of the lid constant. Note: even though the mass is constant, the lid is free to move up and down, changing the volume of the container.

5.Change the temperature (T) of the gas in the container. You can do this by either dragging the blue oval under “Select Temperature” or by clicking in the box beside “K” and enter a value. Take a few minutes to experiment with changing the temperature of the system. (Try to guess what will happen before you actually do it.)

a. What is happening with the particles as you increase the temperature (T)?

b. What is happening with the lid as you increase the temperature (T)?

c. What is happening with the volume (V) as you increase the temperature (T)?

d. What is happening with the pressure (P) as you increase the temperature (T)?

e. What is happening with the particles as you decrease the temperature (T)?

f. What is happening with the lid as you decrease the temperature (T)?

g.What is happening with the volume (V) as you decrease the temperature (T)?

h. What is happening with the pressure (P) as you decrease the temperature (T)?

6. Click on the tab “Bar Graph.” As you continue to experiment with the temperature, what happens to the bars representing…

a. …the pressure (P)?

b. …the volume (V)?

c. …the temperature (T)?

Note: don't worry so much about the numbers, just watch the *relationships* between the bars – i.e. the increases and decreases with changes in temperature.

7. Click on the tab "Table." Click the "Reset" button in the bottom left hand corner and then click "OK" beside 0 kg. Remember, the lid is free to move, which will keep the pressure constant as the volume changes.

a. With the temperature (T) at 50 K, click "Record."

b. Do the same for 100 K, 160 K, 220 K, 275 K, 335 K, 390 K, 450 K and 500 K.

c. Copy your data table here:

8. For each data point, divide the value for volume (V) by the value for temperature (T). What do you notice about your results?

9. Click on the tab "Graph." Draw what you see here (don't forget to label your axes and connect the data points when you are finished):

10. Using your data table and graph, answer the following questions:

a. What was the volume (V) when the temperature (T) was 160 K?

b. What was the volume (V) when the temperature (T) was 275 K?

c. What was the volume (V) when the temperature (T) was 450 K?

d. Based on your answers to a., b. and c. above, fill in the blanks.

Hint: use the words "increase" and "decrease."

As temperature _____, volume _____.

Or, looking at it another way…

As temperature _____, volume _____.

e. Now, remember, we have done this all at a fixed pressure, with a constant amount of an ideal gas. So, put it all together, in your own words.

f. This is called _____ _____.

Hint: what is the name of this activity?

g. Explain at the particle level why these relationships exist.

h. In question 6, you discovered that each time you divided the value for the volume (V) by the value for the temperature (T), the quotient (answer) was the same for each temperature change. We can call this a *constant*. For Charles' Law, the actual number for this constant does not really matter. But, it is important to remember that no matter what values for volume (V) and temperature (T) you have, the quotient will always be the same. Put another way,

$$\_\_\_\_\__1 = \_\_\_\_\__2$$

$$_1 = \quad _2$$

Again, "1" and "2" are referring to two different containers of gas (or two different situations).

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #7

SOLVE MY PROBLEMS (Gay-Lussacs's Law)

Direction: Solve the following problems.

1. Determine the pressure change when a constant volume of gas at 1.00 atm is heated from 20.0 ˚C to 30.0 ˚C.

2.A container of gas is initially at 0.500 atm and 25 ˚C. What will the pressure be at 125 ˚C?

3. A gas container is initially at 47 mm Hg and 77 K (liquid nitrogen temperature.) What will the pressure be when the container warms up to room temperature of 25 ˚C?

4. A gas thermometer measures temperature by measuring the pressure of a gas inside the fixed volume container. A thermometer reads a pressure of 248 kPa at 0 ˚C. What is the temperature when the thermometer reads a pressure of 345 kPa?

5. A gas is collected at 22.0 ˚C and 745.0 mm Hg. When the temperature is changed to 0 ˚C, what is the resulting pressure?

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #7

SOLVE MY PROBLEMS (Answer Key)

Direction: Solve the following problems.

1. Determine the pressure change when a constant volume of gas at 1.00 atm is heated from 20.0 ˚C to 30.0 ˚C. 1.03 atm

2. A container of gas is initially at 0.500 atm and 25 ˚C. What will the pressure be at 125 ˚C? 0.668 atm

3. A gas container is initially at 47 mm Hg and 77 K (liquid nitrogen temperature.) What will the pressure be when the container warms up to room temperature of 25 ˚C? 182 mmHg

4. A gas thermometer measures temperature by measuring the pressure of a gas inside the fixed volume container. A thermometer reads a pressure of 248 kPa at 0 ˚C. What is the temperature when the thermometer reads a pressure of 345 kPa? 380. K

5. A gas is collected at 22.0 ˚C and 745.0 mm Hg. When the temperature is changed to 0 ˚C, what is the resulting pressure? 689 mmHg

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #8

FILL ME UP (Gay- Lussacs'sLaw)

Direction: Fill up the missing word. Choose the words in the box below.

When the temperature of a sample of _____in a rigid container is_____, the pressure of the gas _____ as well. The increase in _____results in the _____ of gas striking the walls of the container with more force, resulting in a _____ pressure. The French chemist _____ (1778 - 1850) discovered the relationship between the pressure of a gas and its _____ temperature**.** _____ states that the pressure of a given mass of gas varies _____ with the absolute temperature of the gas, when the volume is kept _____. Gay-Lussac's Law is very similar to_____, with the only difference being the type of_____. Whereas the container in a Charles's Law experiment _____, it is _____ in a Gay-Lussac's Law experiment.

Charles's Law	gas	constant
container	molecules	flexible
greater	directly	rigid
kinetic energy	Joseph Gay- Lussac	increased
absolute	Gay-Lussac's Law	increases

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #8

FILL ME UP (Answer Key)

Direction: Fill up the missing word. Choose the words in the box below.

When the temperature of a sample of GAS in a rigid container is increased, the pressure of the gas increases as well. The increase in kinetic energy results in the molecules of gas striking the walls of the container with more force, resulting in a greater pressure. The French chemist Joseph Gay-Lussac (1778 - 1850) discovered the relationship between the pressure of a gas and its absolute temperature**. Gay-Lussac's Law** states that the pressure of a given mass of gas varies directly with the absolute temperature of the gas, when the volume is kept constant. Gay-Lussac's Law is very similar to Charles's Law, with the only difference being the type of container. Whereas the container in a Charles's Law experiment flexible, it is rigid in a Gay-Lussac's Law experiment.

Charles's Law	gas	constant
container	molecules	flexible
greater	directly	rigid
kinetic energy	Joseph Gay- Lussac	increased
absolute	Gay-Lussac's Law	increases

Name:_____	**Score:**_____
Section:_____	**Date:**_____

ACTIVITY #4

GAS LAW

GAY-LUSSACS'S LAW

Objective:

- explain Gay-Lussacs's Law
- identify the factors or terms connected to Gay-Lussacs's Law
- relate Gay-Lussacs's Law in your daily life

Materials:

- 2 empty small plastic soft drink containers of the same size
- 2 eight inch balloons
- hot plate and pan or beaker of boiling water
- ring stand and clamp

Procedure:

1. Blow up two balloons to the same size, about 6 inches in diameter.

2. Place the opening of one balloon over the opening of each plastic bottle. Make sure the air doesn't leak out and that both balloons still have the same volume.

3. Leave one bottle on the table and place the other in the hot water bath.

4.Use the clamp to hold the bottle in position, so that it does not float.

5. Describe what happens to the balloons.

Guide Questions:

1. Which variable is plotted on the graph's vertical axis?

2. Which variable is plotted on the graph's horizontal axis?

3. Locate the pressure gauge. You may need to scroll down. What is the pressure in kilopascals?

4. The red plunger is used to exert pressure on the gas molecules in which colored area?

5. Complete the table below as you watch the animated gas lab.

Temperature	Volume
-	**2.5**
-	**3.5**
-	**4.5**

6. What do you predict the temperature will be when the volume becomes 5.5?

7. Sketch the completed temperature-volume graph.

8. Describe what is used to increase the temperature.

9. Sketch the completed volume-temperature graph.

10. Write the formula equation for Charles and Gay-Lussac's Law.

11. Write the equation for Charles and Gay-Lussac's Law in words.

12. In the animated gas lab, the units of temperature are _____.

13. What are the units of volume used in this lab?

14. Predict what the volume in this lab would be if the temperature were 525 K.

15. Predict what the volume in this lab would be if the temperature were 275 K.

16. State Charles and Gay-Lussac's Law in your own words.

17. How does your experience with the balloons compare to the animated gas lab?

Name:_____	**Score:**_____
Section:_____	**Date:**_____

UNIT 4

MODULE 2: CHEMICAL REACTIONS

Objectives:

Upon completion of this lesson, the students should be able to:

1. become familiar with the chemical change
2. understand how bonds are broken and new bonds are formed
3. explain how chemical reactions are translated into chemical equation
4. apply the chemical changes made the quality of our lives better

Introduction:

From the time we get up in the morning to the time that we sleep at night, chemical changes are taking place, within us and outside of us. Plants grow through photosynthesis, foods that we eat are digested by the body, metals corrode, raw materials are being converted to useful products, new medicines are being developed, more versatile and cost effective materials are being made.

Various chemical changes that occur around us have significant effects to our environment and consequently to our health. Chemical changes occurring in industries results to products that are useful to us. The wastes we throw continue to undergo chemical changes and this has an impact on our well-being as well. The irresponsible use of fertilizer, herbicides and pesticides have negatively affected plants and aquatic life. We continue to pollute the atmosphere with vehicle and industrial gas emissions.

Before, you were exposed to some chemical reactions, you've tested the reactivity of some metals and you've seen the color changes of an indicator when tested with acids and bases. You have also learned in chemical bonding, that atoms gain stability by losing or gaining electron/s.

In this module, you will further understand how a chemical change proceeds, how bonds are broken and new bonds are formed, and how are chemical reactions are translated into chemical equations, were rearrangements of atoms causes the formation of new substance/s. A lot of these chemical changes made the quality of our lives better.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #1

HOW DO THEY REACT?

Direction: Fill up the missing word. Choose the word in the box below.

_____ is a section of _____ that involves using relationship between _____ and/or _____in a _____ to determine desired _____ data.

_____ are frequently written as an _____, using chemical _____. It is like a _____ for a reaction so it displays all the _____ or _____ of a chemical reaction. The reactants are _____ on the _____ side of the equation and the products are shown on the _____, with the _____of either a _____ or _____ arrow is _____ when discussing _____constants.

Chemical reactions	stoichiometry	reactants
Chemistry	products	quantitative
Chemical reaction	equation	symbol
Recipe	menu	ingredients
Terms	displayed	left
Right	single	double
Important	solubility	insolubility

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #1

HOW DO THEY REACT? (Answer Key)

Direction: Fill up the missing word. Choose the word in the box below.

Stoichiometry is a section of **chemistry** that involves using relationship between **reactants** and/or products in a **chemical reaction** to determine desired **quantitative** data.

Chemical reactions are frequently written as an **equation**, using chemical **symbols**. It is like a **recipe** for a reaction so it displays all the **ingredients** or **terms** of a chemical reaction. The reactants are **displayed** on the **left** side of the equation and the products are shown on the **right**, with the **separation** of either a **single** or **double** arrow is **important** when discussing **solubility** constants.

Chemical reactions	stoichiometry	reactants
Chemistry	products	quantitative
Chemical reaction	equation	symbol
Recipe	menu	ingredients
Terms	displayed	left
Right	single	double
Important	solubility	insoulubility

Name:_____ **Score:**_____

Section:_____ **Date:**_____

WORKSHEET #2

TYPE ME!

Direction: Indicate which type of chemical reaction (synthesis, decomposition, single-displacement, double displacement or combustion) is being represented in 1 to 11.

1. $Na_3PO_4 + 3\ KOH \rightarrow 3\ NaOH + K_3PO_4$ Reaction Type
2. $MgCl_2 + Li_2CO_3 \rightarrow MgCO_3 + 2\ LiCl$ Reaction Type
3. $C_6H_{12} + 9\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$ Reaction Type
4. $Pb + FeSO_4 \rightarrow PbSO_4 + Fe$ Reaction Type
5. $CaCO_3 \rightarrow CaO + CO_2$ Reaction Type
6. $P_4 + 3\ O_2 \rightarrow 2\ P_2O_3$ Reaction Type
7. $2\ RbNO_3 + BeF_2 \rightarrow Be(NO_3)_2 + 2\ RbF$ Reaction Type
8. $2\ AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + 2\ Ag$ Reaction Type
9. $C_3H_6O + 4\ O_2 \rightarrow 3\ CO_2 + 3\ H_2O$ Reaction Type
10. $2\ C_5H_5 + Fe \rightarrow Fe(C_5H_5)_2$ Reaction Type
11. $SeCl_6 + O_2 \rightarrow SeO_2 + 3Cl_2$ Reaction Type
12. $2\ MgI_2 + Mn(SO_3)_2 \rightarrow 2\ MgSO_3 + MnI_4$ Reaction Type

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #2

TYPE ME! (Answer Key)

Direction: Indicate which type of chemical reaction (synthesis, decomposition, single-displacement, double displacement or combustion) is being represented in 1 to 11.

1. $Na_3PO_4 + 3\ KOH \rightarrow 3\ NaOH + K_3PO_4$ Reaction Type **DOUBLE DISPLACEMENT**
2. $MgCl_2 + Li_2CO_3 \rightarrow MgCO_3 + 2\ LiCl$ Reaction Type **DOUBLE DISPLACEMENT**
3. $C_6H_{12} + 9\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$ Reaction Type **COMBUSTION**
4. $Pb + FeSO_4 \rightarrow PbSO_4 + Fe$ Reaction Type **SINGLE DISPLACEMENT**
5. $CaCO_3 \rightarrow CaO + CO_2$ Reaction Type **DECOMPOSITION**
6. $P_4 + 3\ O_2 \rightarrow 2\ P_2O_3$ Reaction Type **SYNTHESIS**
7. $2\ RbNO_3 + BeF_2 \rightarrow Be(NO_3)_2 + 2\ RbF$ Reaction Type **DOUBLE DISPLACEMENT**
8. $2\ AgNO_3 + Cu \rightarrow Cu(NO_3)_2 + 2\ Ag$ Reaction Type **SINGLE DISPLACEMENT**
9. $C_3H_6O + 4\ O_2 \rightarrow 3\ CO_2 + 3\ H_2O$ Reaction Type **COMBUSTION**
10. $2\ C_5H_5 + Fe \rightarrow Fe(C_5H_5)_2$ Reaction Type **SYNTHESIS**
11. $SeCl_6 + O_2 \rightarrow SeO_2 + 3Cl_2$ Reaction Type **SINGLE DISPLACEMENT**
12. $2\ MgI_2 + Mn(SO_3)_2 \rightarrow 2\ MgSO_3 + MnI_4$ Reaction Type **DOUBLE DISPLACEMENT**

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #3

TRAPPED IN THE BOX

Direction: Find the missing words in the paragraph. Choose from the box.

physical	**products**	**chemical reaction**	**oxygen**	**isolated system**
chemical	**wax**	**matter**	**gases**	**solid**
mass	**atom**	**equal**	**water**	
reactants	**Law of Conservation of Mass**			**identical**
bonds	**balanced chemical equations**			**liquid**

The Law of Conservation of Mass is the principle that states that neither _____ transformation _____ nor reactions create or destroy _____ in an _____. According to this principle, the reactants and products in a _____ must have equal masses. Therefore, the sum of masses of_____ and _____ (reactants) in a chemical reaction must be _____ _____ to the amount of the masses of Carbon (IV) oxide and _____. The _____ _____ is essential in calculations involving the determination of unknown masses of _____ and _____ in any given chemical reaction. The

Law of Conservation of Mass provides the visualization that chemical

reactions involve the reorganization of _____ and _____ of the reactants to different arrangements in the products. Thus, the number of atoms in the process does not change. Besides, atoms of a given matter are _____; therefore, rearranging them would not alter the mass of the _____. The visualization is an essential assumption in the representation of chemical reactions using_____ . The Law of Conservation of Mass is essential in determining the masses of_____ in chemical reactions since they cannot be measured in most cases.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #3

TRAPPED IN THE BOX (Answer Key)

Direction: Find the missing words in the paragraph. Choose from the box.

physical products chemical reaction oxygen isolated system

chemical wax matter gases solid

mass atom equal water

reactants Law of Conservation of Mass identical
bonds balanced chemical equations liquid

The Law of Conservation of Mass is the principle that states that neither **PHYSICAL** transformation **CHEMICAL** nor reactions create or destroy **MASS** in an **ISOLATED SYSTEM**. According to this principle, the reactants and products in a **CHEMICAL REACTION** must have equal masses. Therefore, the sum of masses of **WAX** and **OXYGEN** (reactants) in a chemical reaction must be **EQUAL** to the amount of the masses of Carbon (IV) oxide and **WATER**. The **LAW OF CONSERVATION OF MASS** is essential in calculations involving the determination of unknown masses of **REACTANTS** and **PRODUCTS** in any given chemical reaction. The

Law of Conservation of Mass provides the visualization that chemical

reactions involve the reorganization of **ATOMS** and **BONDS** of the reactants to different arrangements in the products. Thus, the number of atoms in the process does not change. Besides, atoms of a given matter are **IDENTICAL**; therefore, rearranging them would not alter the mass of the **MATTER**. The visualization is an essential assumption in the representation of chemical reactions using **BALANCED CHEMICAL REACTIONS**. The Law of Conservation of Mass is essential in determining the masses of **GASES** in chemical reactions since they cannot be measured in most cases.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #4

COMPLETE ME!

Directions: Complete the paragraph by the given number below.

A ___L___ B___L___ HI___ _____
13 22 1 2 17 8

A W___N___ ___W I___ A
4 16 18 10

H___U___ ___, S___ATT___ ___I___G
18 8 3 6 3 9 10

T___E ___L___S___. ___H___
6 21 1 8 17 3

E___ER___ ___ FR___M T___ ___
10 21 22 18 6 3

B___LL WAS TR___N___F___RR___D
1 1 8 3 3

T___ T___E G___AS___
18 6 2 8

M___K___NG IT S___ATT___ ___
1 4 6 3 9

I___T___ ___IE___E___.
10 18 12 7 8

13	22	1	2	17	8	4	16	18	10	3
F	Y	A	L	T	S	I	D	O	N	E

H	R	G	P	C
6	9	21	12	7

WHAT CAN YOU SAY ABOUT WHAT YOU HAVE COMPLETED ABOVE:

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #4

COMPLETE ME! (Answer Key)

Directions: Complete the paragraph by the given number below.

A BALL HITS A WINDOW IN A HOUSE, SHATTERING THE GLASS.THE ENERGY FROM THE BALL WAS TRANSFERRED TO THE GLASS MAKING IT SHATTER INTO PIECES.

WHAT CAN YOU SAY ABOUT WHAT YOU HAVE COMPLETED ABOVE: ANSWERS MAY VARY

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #5

THINK OF IT!

Directions: Bases from the statements, determine what is being define. Write your answer in the given space.

_____1. This states that mass in an isolated system is neither created nor destroyed by chemical reactions or physical transformations.

_____2. The scientist credited with the discovery of the law of conservation of mass.

_____3. In a closed system, it is equal to mass of products.

_____4. It is used as the visualization is an essential assumption in the representation of chemical reactions.

_____ 5. The Law of Conservation of Mass is essential in determining the masses of this in chemical reactions since they cannot be measured in most cases.

		T			R

Mass must be differentiated from _____, since it may *not* be perfectly conserved in isolated systems,

			S

The _____ of the system must remain constant over time, as it's system's cannot change, so quantity can neither be added nor be removed.

	N					E

		V			S			R

His discovery of the law of conservation of mass led to many new findings in the 19th century.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #5

THINK OF IT! (Answer Key)

Directions: Bases from the statements, determine what is being define. Write your answer in the given space.

law of conservation of mass 1. This states that mass in an isolated system is neither created nor destroyed by chemical reactions or physical transformations.

Antoine Lavoisier 2. The scientist credited with the discovery of the law of conservation of mass.

mass of reactants 3. In a closed system, it is equal to mass of products.

balanced chemical equations 4. It is used as the visualization is an essential assumption in the representation of chemical reactions.

gases 5. The Law of Conservation of Mass is essential in determining the masses of this in chemical reactions since they cannot be measured in most cases.

		T			R

Mass must be differentiated from **MATTER** since it may *not* be perfectly conserved in isolated systems,

			S

The **MASS** of the system must remain constant over time, as it's system's cannot change, so quantity can neither be added nor be removed.

	N					E

		V			S			R

His discovery of the law of conservation of mass led to many new findings in the 19th century. **Antoine Lavoisier**

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #6

BALANCED IT!

Direction: Try to balanced it. Write the answers on the spaces.

1. ___ H_2 + _____ O_2 → ____H_2O

2. _____S e+ _____ O_2 → _____ SeO_2

3. _____ HgO → ____ _ Hg + _____ O_2

4. _____ Zn + _____ HCl → ____ _ $ZnCl_2$ + _____ H_2

5. _____ Na + _____H_2O → _____ _ NaOH + _____ H_2

6. _____ $C_{10}H_{16}$ + _____ Cl_2 → _____ C + _____ HCl

7. _____ Si_2H_2 + _____ O_2 → _____ SiO_2 + _____ H_2O

8. _____ $C_7H_6O_2$ + _____ O_2 → _____ CO_2 + _____ H_2O

9. _____ Fe_2O_2 + _____ H_2 → _____ Fe + _____ H_2O

10. _____ K + _____ Br_2 → _____ KBr

11. _____ SiO_2 + _____ HF → _____ SiF_4 + _____ H_2O

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #6

BALANCED IT! (Answer Key)

Direction: Try to balanced it. Write the answers on the spaces.

1. _2__ H_2 + __1__ O_2 → __2__H_2O

2. __1___Se+ __1___ O_2 → ___1___ SeO_2

3. ____2___ HgO → __2__ Hg + ___1___ O_2

4. ___1___ Zn + ___2___ HCl → __1__ $ZnCl_2$ + ___1___ H_2

5. __2_____ Na + ___2____H_2O → ___2___ NaOH + ___1____ H_2

6. ___1____ $C_{10}H_{16}$ + ___8____ Cl_2 → ___10____ C + ____16___ HCl

7. ____2___ Si_2H_2 + ___5___ O_2 → ___4__ SiO_2 + ___2____ H_2O

8. ___2_____ $C_7H_6O_2$ + ___17____ O_2 → ____14____ CO_2 + ___6____ H_2O

9. ____1____ Fe_2O_2 + ___1____ H_2 → ___2____ Fe + ___2____ H_2O

10. ___2_____ K + ____1____ Br_2 → ___2____ KBr

11. ____1___ SiO_2 + ___4_____ HF → ___1_____ SiF_4 + ___2___ H_2O

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #7

TRY IT!

Direction: Write true if the statement is true and if it is false, write the correct answer

1 . There are five types of chemical equations and their reactions.

2 . Decomposition Chemical Reaction is the most common type of chemical equation.

3 . In synthesis chemical reaction, a new product is formed by combining two to three combinations of reactants.

4 . This is a chemical equation where two atoms of hydrogen are combined to form a product, water. This is why this reaction is called as synthesis reaction.

5 . Decomposition chemical reaction is the reaction where only one compound decomposes and results in two or more than two products.

6 . The combination of any substance with carbon dioxide results in combustion.

7 . Acid Base Reaction is the simple chemical reaction where acid and base are combined together to provide water and salt.

8 . Combustion Reaction is the most common type of chemical equation.

9 . In Combination or Synthesis Chemical Reaction, the equation is only valid when the number of atoms and moles are equal on both sides.

10 . Decomposi tion Chemical Reaction is called as synthesis reaction.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #7

TRY IT! (Answer Key)

Direction: Write true if the statement is true and if it is false, write the correct answer

1 . There are five types of chemical equations and their reactions. **TRUE**

2 . Decomposition Chemical Reaction is the most common type of chemical equation. **FALSE, SYNTHESIS CHEMICAL REACTION**

3 . In synthesis chemical reaction, a new product is formed by combining two to three combinations of reactants. **TRUE**

4 . This is a chemical equation where two atoms of hydrogen are combined to form a product, water. This is why this reaction is called as synthesis reaction. **TRUE**

5 . Decomposition chemical reaction is the reaction where only one compound decomposes and results in two or more than two products. **TRUE**

6 . The combination of any substance with carbon dioxide results in combustion. **FALSE, OXYGEN**

7 . Acid Base Reaction is the simple chemical reaction where acid and base are combined together to provide water and salt. **FALSE, COMBINATION OR SYNTHESIS CHEMCIAL REACTION**

8 . Combustion Reaction is the most common type of chemical equation. **TRUE**

9 . In Combination or Synthesis Chemical Reaction, the equation is only valid when the number of atoms and moles are equal on both sides. **FALSE, COMBINATION OR SYNTHESIS CHEMCIAL REACTION**

10 . Decomposi tion Chemical Reaction is called as synthesis reaction. **TRUE**

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #8

REDOX

Direction: Determine what is oxidized and what is reduced in each reaction. Identify the oxidizing agent and the reducing agent also.

1. $2Sr + O_2 \longrightarrow 2SrO$
2. $2Li + S \longrightarrow Li_2S$
3. $2Cs + Br_2 \longrightarrow 2CsBr$
4. $3Mg + N_2 \longrightarrow Mg_3N_2$
5. $4Fe + 3O_2 \longrightarrow 2Fe_2O_3$
6. $Cl_2 + 2NaBr \longrightarrow 2NaCl + Br_2$
7. $Si + 2F_2 \longrightarrow SiF_4$
8. $2Ca + O_2 \longrightarrow 2CaO$
9. $Mg + 2HCl \longrightarrow MgCl_2 + H_2$
10. $2Na + 2H_2O \longrightarrow 2NaOH + H_2$

11. Give the oxidation number of each kind of atom or ion.

    a. sulfate b. Sn c. S^{2-} d. Fe^{3+} e. Sn^{4+} f. nitrate g. ammonium

12. Calculate the oxidation number of chromium in each of the following.

    a. Cr_2O_3 b. $Na_2Cr_2O_7$ c. $CrSO_4$ d. chromate e. dichromate

13. Use the changes in oxidation numbers to determine which elements are oxidized and which are reduced in these reactions. (Note: it is not necessary to use balanced equations)

a. $C + H_2SO_4 \rightarrow CO_2 + SO_2 + H_2O$

b. $HNO_3 + HI \rightarrow NO + I_2 + H_2O$

c. $KMnO_4 + HCl \rightarrow MnCl_2 + Cl_2 + H_2O + KCl$

d. $Sb + HNO_3 \rightarrow Sb_2O_3 + NO + H_2O$

14. For each reaction in problem 13, identify the oxidizing agent and reducing agent.

15. Write half-reactions for the oxidation and reduction process for each of the following.

a. $Fe^{2+} + MnO_4^- \rightarrow Fe^{3+} + Mn^{2+}$

b. $Sn^{2+} + IO_3^- \rightarrow Sn^{4+} + I^-$

c. $S^{2-} + NO_3^- \rightarrow S + NO$

d. $NH_3 + NO_2 \rightarrow N_2 + H_2O$

16. Complet and balance each reaction using the half-reaction method.

a. $Fe^{2+} + MnO_4^- \rightarrow Fe^{3+} + Mn^{2+}$

b. $Sn^{2+} + IO_3^- \rightarrow Sn^{4+} + I^-$

c. $S^{2-} + NO_3^- \rightarrow S + NO$

d. $NH_3 + NO_2 \rightarrow N_2 + H_2O$

e. $Mn^{2+} + BiO_3^- \rightarrow Bi^{2+} + MnO_4^-$

f. $I_2 + Na_2S_2O_3 \rightarrow Na_2S_2O_4 + NaI$

Name:_____ **Score:**_____

Section:_____ **Date:**_____

WORKSHEET #8

REDOX

Direction: Determine what is oxidized and what is reduced in each reaction. Identify the oxidizing agent and the reducing agent also.

1. $2Sr + O_2 \rightarrow 2SrO$ Sr^0 to Sr^{2+}; oxidized/reducing agent O^0 to O^{2-}; reduced/ox. ag.

2. $2Li + S \rightarrow Li_2S$ Li^0 to Li^{1+}; oxidized/red. ag. S^0 to S^{2-}; reduced/ox. ag.

3. $2Cs + Br_2 \rightarrow 2CsBr$ Cs^0 to Cs^{1+}; oxidized/red. ag. Br^0 to Br^{1-}; reduced/ox. ag.

4. $3Mg + N_2 \rightarrow Mg_3N_2$ Mg^0 to Mg^{2+}; oxidized/red. ag. N^0 to N^{3-}; reduced/ox. ag.

5. $4Fe + 3O_2 \rightarrow 2Fe_2O_3$ Fe^0 to Fe^{3+}; oxidized/red. ag. O^0 to O^{1-}; reduced/ox. ag.

6. $Cl_2 + 2NaBr \rightarrow 2NaCl + Br_2$ Cl^0 to Cl^{1-}; reduced/ox. ag. Br^{1-} to Br^0; oxidized/red. ag.

7. $Si + 2F_2 \rightarrow SiF_4$ Si^0 to Si^{4+}; oxidized/red. ag F^0 to F^{1-}; reduced/ox. ag.

9. $Mg + 2HCl \rightarrow MgCl_2 + H_2$ Mg^0 to Mg^{2+}; oxidized/red. ag. H^{1+} to H^0; reduced/o.a.

10. $2Na + 2H_2O \rightarrow 2NaOH + H_2$ Na^0 to Na^{1+}; oxidized/r.a. H^{1+} to H^0; reduced/o.a.

---

11. Give the oxidation number of each kind of atom or ion.

a. sulfate b. Sn c. S^{2-} d. Fe^{3+} e. Sn^{4+} f. nitrate g. ammonium

2- 0 2- 3+ 4+ 1- 1+

12. Calculate the oxidation number of chromium in each of the following.

a. Cr_2O_3 3+ b. $Na_2Cr_2O_7$ 6+ c. $CrSO_4$ 2+ d. chromate 7+ e. dichromate 6+

13. Use the changes in oxidation numbers to determine which elements are oxidized and which are reduced in these reactions. (Note: it is not necessary to use balanced equations)

a. $C + H_2SO_4 \rightarrow CO_2 + SO_2 + H_2O$ C^0 to C^{4+}; oxidized S^{6+} to S^{4+}; reduced

b. $HNO_3 + HI \rightarrow NO + I_2 + H_2O$ N^{5+} to N^{2+}; reduced I^{1-} to I^0; oxidized

c. $KMnO_4 + HCl \rightarrow MnCl_2 + Cl_2 + H_2O + KCl$ Mn^{7+} to Mn^{2+}; reduced Cl^{1-} to Cl^0; oxidized

d. $Sb + HNO_3 \rightarrow Sb_2O_3 + NO + H_2O$ Sb^0 to Sb^{3+}; oxidized N^{5+} to N^{2+}; red.

14. For each reaction in problem 13, identify the oxidizing agent and reducing agent.

a. oxidizing agent: sulfur reducing agent: carbon

b. oxidizing agent: nitrogen reducing agent: iodine

c. oxidizing agent: manganese reducing agent: chlorine

d. oxidizing agent: nitrogen reducing agent: antimony

15. Write half-reactions for the oxidation and reduction process for each of the following.

a. $Fe^{2+} + MnO_4^- \rightarrow Fe^{3+} + Mn^{2+}$

$Fe^{2+} \rightarrow Fe^{3+}$; oxidation $Mn^{7+} \rightarrow Mn^{2+}$; reduction

b. $Sn^{2+} + IO_3^- \rightarrow Sn^{4+} + I^-$

$Sn^{2+} \rightarrow Sn^{4+}$; oxidation I^{5+} I^{1-}; reduction

c. $S^{2-} + NO_3^- \rightarrow S + NO$

$S^{2-} \rightarrow S$; oxidation $N^{5+} \rightarrow N^{2+}$; reduction

d. $NH_3 + NO_2 \rightarrow N_2 + H_2O$

$N^{3-} \rightarrow N^0$; oxidation $N^{4+} \rightarrow N^0$; reduction

16. Complete and balance each reaction using the half-reaction method:

a. $Fe^{2+} + MnO_4^- \rightarrow Fe^{3+} + Mn^{2+}$

[$Fe^{2+} \rightarrow Fe^{3+} + 1e^-$] x 5

$MnO4^- + 8H^+ + 5e^- \rightarrow Mn2^+ + 4H2O$ 5Fe2+(aq) + MnO4-(aq) + 8H+(aq) →

5Fe3+(aq) + Mn2+(aq) + 4H2O(l)

b. $Sn^{2+} + IO_3^- \rightarrow Sn^{4+} + I^-$

Sn6H2++ Sn(aq) + 3Sn4+ 2+(aq) → IO3-(aq) 3Sn4+(aq) + I-(aq) + 3H2O(l)

IO_3^- I^-

c. $S^{2-} + NO_3^- \rightarrow S + NO$

$S8^{2-}H$ $S^{+}_{(aq)} + 3S^{2-}_{(aq)} + 2NO_3^-{}_{(aq)} \rightarrow 3S_{(s)} + 2NO_{(g)} + 4H_2O_{(l)}$

NO_3^- NO

d. $NH_3 + NO_2 \rightarrow N_2 + H_2O$

8NHNH33($N_{g)}$ + 6NO2 2(g) → 7N2(g) + 12H2O(l)

NO_2 N_2

e. $Mn^{2+} + BiO_3^- \rightarrow Bi^{2+} + MnO_4^-$

3MnMn2+2+(MnOaq) + 5BiO3-(4aq) + 6H+(aq) → 5Bi2+(aq) + 3MnO4-(aq) + 3H2O(l)

BiO_3^- Bi^{2+}

f. $I_2 + Na_2S_2O_3 \rightarrow Na_2S_2O_4 + NaI$

NaI2 NaI 2S2O3(aq) + H2O(l) + I2(s) → 2Na+(aq) Na2S2O4(aq) + 2H+(aq) + 2NaI(aq)

$Na_2S_20_3$ $Na_2S_2O_4$

Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #1

BALANCE ME

Objectives:

- To be able to balance an equation
- To know the importance of balancing equation and to determine the correct format in balancing it.

Materials:

- Pencil/Ballpen
- Worksheet provided

Procedure:

1. Look and analyze for the given equation.
2. Solve the equation and write the answer in the space given.

Balance the following chemical equations.

1. __AgI + __ Na2S ⟶ __ Ag2S + __NaI
2. __Na3PO4 + __ HCl ⟶ __ NaCl + __ H3PO4
3. __Ba3N2 + __ H2O ⟶ __Ba(OH)2 + __NH3
4. __TiCl4 + __ H2O ⟶ __ TiO2 + __HCl
5. __ CaCl2 + __Na3PO4 ⟶ __Ca3(PO4)2 + __NaCl
6. __ NaBr + __Cl2 ⟶ __NaCl + __Br2

7. __Mg(OH)2 + __HCl ⟶ __ MgCl2 + __ H2O

8. __ FeS + __ O2 ⟶ __ Fe2O3 + __SO2

9. __PCl5 + __H2O ⟶ __H3PO4 + __HCl

10. __C2H6O + __O2 ⟶ __CO2 + __H2O

Guide Questions:

1. After balancing an equation, do you understand it more? Do you find it easier?
2. In your own words, how can you define balancing equation?

2. How important balancing equation in our life? Is it really necessary or not? why would you say so?

Conclusion:

Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #2

WHAT'S IN A REACTION?

Objectives:

- Distinguish between reactants and products.
- Write a chemical equation

A. Reactants and Products

Reactants are substances that are used up to form new substances in a chemical reaction.

1. Iron reacts with copper sulphate ($CuSO_4$) and forms iron (II) sulfate ($FeSO_4$) and copper.

2. Magnesium combines with oxygen gas (O_2) to produce magnesium oxide.

3. Hydrogen peroxide (H_2O_2) in the presence of manganese dioxide (MnO_2) produces water and oxygen gas.

4. Acetic acid (CH_3COOH) an sodium bicarbonate ($NaHCO_3$) produce sodium acetate with the release of carbon dioxide (CO_2) gas and water.

5. Copper sulfate ($CuSO_4$) reacts with sodium hydroxide (NaOH) to produce insoluble copper (II) hydroxide $Cu(OH)_2$ and sodium sulfate (Na_2SO_4) solution.

Fill in the table below with the reactants and products from the chemical reactions above. Below each number, write the symbol or the formula of the reactant and product.

Reaction	Reactants	Products
1		
2		
3		
4		
5		

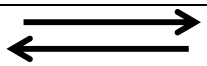
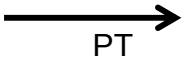
Symbols	Meaning
	To show combination of reactants or products
	To produce; to form; to yield
(s), (l), (g), (aq)	(s)-solid (l)-liquid (g)-gas (aq)-aqueous (substance is dissolved in water)
	Reversible reaction
Heat 	Indicates that heat is supplied to the reaction
 PT	A formula written above or below the yield sign indicates It's use as a catalyst or solvent

Table 6. Reactants and Products

B. Symbols used in Chemical Equation

There are other symbols used in writing a chemical equations.

Table 7. Symbols and their Meanings

Using the symbols and formulas in Table 6 and the symbols in Table 7, write the chemical equation using these symbols to complete chemical equation.

Table 8. Chemical Equation

Reaction	Chemical Equation
1	
2	
3	
4	
5	

Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #3

WE SIMPLY CLICK TOGETHER!

Objectives:

- Classify reactions according to their types, based on how atoms are grouped or regrouped.
- Classify chemical reactions.

Materials:

- Activity guide
- Students tabulated data from activity 1 “What’s in a reaction?”

Procedure:

Bring out your filled up (answered) table from activity 1

Guide Questions:

1. In the second chemical reaction, how many reactants are used? How many product/s is/are formed?

2. In the third chemical reaction, how many reactants are used? How many product/s is/are formed?

3. . In the first chemical reaction, what changes did copper and iron undergo during the reaction? What can you conclude about iron?

4. . In the 4^{th} chemical reactions, how many reactants are involved? What kind of substance are they?

5. In the 5^{th} chemical reaction, both the reactants and products are compounds made up of positive and negative ions, what did you notice with the pairing of the positive and negative ions in the reactant and product side?

Name:_____	**Score:**_____
Section:_____	**Date:**_____

ACTIVITY #4

BALANCING ACT

Objectives:

- Recognize that the number of atoms of each element is conserved in a chemical reaction as atoms in the reactants only rearrange themselves to form the products.
- Apply the concept of law of Conservation of mass in balancing chemical equations.

Materials:

Table 11. Balanced Chemical Equations

Reaction	Chemical Equation	Types of Chemical Reaction
1		
2		
3		
4		
5		

Procedure:

1.analyze the informations that cn be gathered in the chemical equation :

$2\ H_2 + O_2 \longrightarrow 2\ H_2O$

2 molecules of H_2 + 1 molecule of O_2 $\longrightarrow$ 2 molecules of H_vO

2 moles of H_2 + 1 mole of O_2 $\longrightarrow$ 2 moles of H_2O

4 atoms of H + 2 atoms of O $\longrightarrow$ 4 atoms of H and 2 atoms of O

Note that the coefficient placed before the formulas indicate the number of molecules or moles**.**

Determining the correct coefficients balances the number of atoms in the reactant in the

Reaction	Chemical Equation	Types of Chemical Reaction
1		
2		
3		
4		
5		

product side, allowing it to follow the Law of Conservation of mass.

2. Bring out your idea on table 9 types of chemical reactions, balance the chemical equations guided by the steps in balancing equations below this table.

Table 11. Balanced Chemical Equations

Conclusion:

Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #5

COMBUSTION REACTION

Objectives:

- identify the reaction needed to complete the formula
- define combustion reaction
- identify importance of combustion reaction

Materials:

- ballpen
- activity sheet

COMPLETE MY MISSING PARTS

1. methane (CH_4) + oxygen □

2. ethane (C_2H_6) + oxygen □

3. propane (C_3H_8) + oxygen □

4. butane (C_4H_{10}) + oxygen □

5. pentane (C_5H_{12}) + oxygen □

6. hexane (C_6H_{14}) + oxygen □

7. ethene (C_2H_4) + oxygen □

8. ethyne (C_2H_2) + oxygen □

9. benzene (C_6H_6) + oxygen □

ANSWER KEY

1. methane (CH_4) + oxygen □ carbon dioxide + water

   $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

2. ethane (C_2H_6) + oxygen □ carbon dioxide + water

   $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

3. propane (C_3H_8) + oxygen □ carbon dioxide + water

   $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

4. butane (C_4H_{10}) + oxygen □ carbon dioxide + water

   $2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$

5. pentane (C_5H_{12}) + oxygen □ carbon dioxide + water

   $C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$

6. hexane (C_6H_{14}) + oxygen □ carbon dioxide + water

   $2C_6H_{14} + 19O_2 \rightarrow 12CO_2 + 14H_2O$

7. ethene (C_2H_4) + oxygen □ carbon dioxide + water

   $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$

8. ethyne (C_2H_2) + oxygen □ carbon dioxide + water

   $2C_2H_2 + 5O_2 \rightarrow 4CO_2 + 2H_2O$

9. benzene (C_6H_6) + oxygen □ carbon dioxide + water

   $2C_6H_6 + 15O_2 \rightarrow 12CO_2 + 6H_2O$

Name:_____	**Score:**_____
Section:_____	**Date:**_____

MODULE 4

UNIT 3: BIOMOLECULE

Objectives:

Upon completion of this lesson, the students should be able to:

1. Recognize the major categories of biomolecules such as carbohydrates, lipids, proteins, and nucleic acids;
2. Differentiate the biomolecules from each other in terms of their structeure and function.

Introduction:

Think about the food you eat everyday. Different types of foods give you different nutrients for energy, growth and repair. These were also introduced to you when you were at elementary days. Also, in Grade 9, you have learned that the bonding characteristics of carbon result in the formation of larger variety of compounds.

In this module, you will learn more about compounds which is essential to life. These compounds belong to four main classes of biomolecules: carbohydrates, lipids, proteins, and nucleic acids. Protein and nucleic acids and some derivatives of carbohydrates and lipids also contain nitrogen. You will also have the opportunity to create a masterpiece because of this. Be ready to be transformed be more intelligent.

Name:_____ **Score:**_____

Section:_____ **Date:**_____

WORKSHEET #1

LOOK FOR ME (FATS)

Direction: Fill up the missing word.

_____ are substances that help the body use some _____ and keep the skin _____ ; they are also the main way the body _____ energy. In food, there are many types of fats -- saturated, unsaturated, polyunsaturated, _____ , and _____.

Fat is an important foodstuff for many forms of life, and fats serve both structural and _____. They are a necessary part of the diet of most heterotrophs (including humans) and are the most energy dense, thus the most efficient form of energy storage.

Some fatty acids that are set free by the digestion of fats are called _____ because they cannot be synthesized in the body from simpler constituents. There are two essential fatty acids (EFAs) in human nutrition: _____ (an omega-3 fatty acid) and linoleic acid (an omega-6 fatty acid). Other lipids needed by the body can be synthesized from these and other fats. Fats and other lipids are broken down in the body by enzymes called lipases produced in the _____.

Fats and oils are categorized according to the number and bonding of the carbon atoms in the _____. Fats that are saturated fats have no double bonds between the carbons in the chain. _____ have one or more double bonded carbons in the chain. The nomenclature is based on the non-acid (non-carbonyl) end of the chain. This end is called the_____end or the n-end. Thus alpha-linolenic acid is called an omega-3 fatty acid because the 3rd carbon from that end is the first double bonded carbon in the chain counting from that end.

Some oils and fats have multiple double bonds and are therefore called _____. Unsaturated fats can be further divided into _____, which are the most common in nature, and trans fats, which are rare in nature. Unsaturated fats can be altered by reaction with hydrogen effected by a _____. This action, called _____, tends to break all the double bonds and makes a fully saturated fat. _____ can stack themselves in a closely packed arrangement, so they can solidify easily and are typically solid at room temperature.

Fats, healthy, unsaturated fats, polyunsaturated fats, trans fats, essential, alpha-linolenic acid, monounsaturated, stores, metabolic functions, omega , vitamins, cis fats, catalyst, saturated fats, pancreas, aliphatic chain, hydrogenation

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #1

LOOK FOR ME (FATS) (Answer Key)

Direction: Fill up the missing word.

Fats are substances that help the body use some **vitamins** and keep the skin **healthy;** they are also the main way the body **stores** energy. In food, there are many types of fats -- saturated, unsaturated, polyunsaturated, **monounsaturated, and trans fats.**

Fat is an important foodstuff for many forms of life, and fats serve both structural and **metabolic functions**. They are a necessary part of the diet of most heterotrophs (including humans) and are the most energy dense, thus the most efficient form of energy storage.

Some fatty acids that are set free by the digestion of fats are called **essential** because they cannot be synthesized in the body from simpler constituents. There are two essential fatty acids (EFAs) in human nutrition: **alpha-linolenic acid** (an omega-3 fatty acid) and linoleic acid (an omega-6 fatty acid). Other lipids needed by the body can be synthesized from these and other fats. Fats and other lipids are broken down in the body by enzymes called lipases produced in the **pancreas.**

Fats and oils are categorized according to the number and bonding of the carbon atoms in the **aliphatic chain**. Fats that are saturated fats have no double bonds between the carbons in the chain. **Unsaturated fats** have one or more double bonded carbons in the chain. The nomenclature is based on the non-acid (non-carbonyl) end of the chain. This end is called the **omega** end or the n-end. Thus alpha-linolenic acid is called an omega-3 fatty acid because the 3rd carbon from that end is the first double bonded carbon in the chain counting from that end.

Some oils and fats have multiple double bonds and are therefore called **polyunsaturated fats**. Unsaturated fats can be further divided into **cis fats**, which are the most common in nature, and trans fats, which are rare in nature. Unsaturated fats can be altered by reaction with hydrogen effected by a catalyst. This action, called **hydrogenation**, tends to break all the double bonds and makes a fully saturated fat. **Saturated fats** can stack themselves in a closely packed arrangement, so they can solidify easily and are typically solid at room temperature.

Fats, healthy, unsaturated fats, polyunsaturated fats, trans fats, essential, alpha-linolenic acid, monounsaturated, stores, metabolic functions, omega , vitamins, cis fats, catalyst, saturated fats, pancreas, aliphatic chain, hydrogenation

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET#2

WORD HUNT

Direction: Find the missing terms.

U	C	H	O	L	E	S	T	E	R	O	L	M	R	F
Z	N	R	T	X	F	T	H	Y	A	D	I	A	A	G
H	C	S	E	R	Y	W	R	E	L	R	P	C	D	F
B	D	O	A	A	E	G	G	T	H	N	O	R	I	H
E	E	Q	C	T	W	E	E	L	U	I	T	O	P	E
O	F	X	V	R	U	T	E	N	O	L	E	N	O	L
K	S	A	N	M	L	R	G	Y	U	H	M	U	S	A
Y	R	W	T	W	A	S	A	T	U	R	A	T	E	D
U	T	A	F	S	N	A	R	T	B	A	T	R	C	I
G	T	E	D	C	R	T	H	A	E	H	H	I	E	A
D	E	A	O	L	E	C	A	C	I	D	J	E	L	C
R	H	K	L	E	Q	X	Z	V	B	L	I	N	L	I
F	A	T	T	Y	A	C	I	D	S	S	U	T	P	D
T	R	I	G	L	Y	C	E	R	I	D	E	S	R	C

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET#2

WORD HUNT (Answer Key)

Direction: Find the missing terms.

U	C	H	O	L	E	S	T	E	R	O	L	M	R	F
Z	N	R	T	X	F	T	H	Y	A	D	I	A	A	G
H	C	S	E	R	Y	W	R	E	L	R	P	C	D	F
B	D	O	A	A	E	G	G	T	H	N	O	R	I	H
E	E	Q	C	T	W	E	E	L	U	I	T	O	P	E
O	F	X	V	R	U	T	E	N	O	L	E	N	O	L
K	S	A	N	M	L	R	G	Y	U	H	M	U	S	A
Y	R	W	T	W	A	S	A	T	U	R	A	T	E	D
U	T	A	F	S	N	A	R	T	B	A	T	R	C	I
G	T	E	D	C	R	T	H	A	E	H	H	I	E	A
D	E	A	O	L	E	C	A	C	I	D	J	E	L	C
R	H	K	L	E	Q	X	Z	V	B	L	I	N	L	I
F	A	T	T	Y	A	C	I	D	S	S	U	T	P	D
T	R	I	G	L	Y	C	E	R	I	D	E	S	R	C

Name:_____ **Score:**_____

Section:_____ **Date:**_____

WORKSHEET #3

LOOK FOR ME (PROTEIN)

Direction: Fill up the missing word. Choose your answer in the box.

Unsaturated	macronutrients	olecacid
lipotein	triglycerides	fats
LDL	saturated	eladicacid
HDL	transfat	cholesterol
fattyacids	oxygen	adiposecell

There are three macronutrients: _____, fats and carbohydrates. Macronutrients provide calories, or energy. The body requires large amounts of macronutrients to sustain life, hence the term "_____," according to the University of Illinois McKinley Health Center. Each gram of protein contains ____ calories. Protein makes up about 15 percent of a person's body weight.

Chemically, protein is composed of _____, which are organic compounds made of carbon, hydrogen, nitrogen, oxygen or sulfur. Amino acids are the _____ of proteins, and proteins are the building blocks of muscle mass, according to the National Institutes of Health (NIH).

"When protein is broken down in the body it helps to fuel _____, which helps _____," said Jessica Crandall, a registered dietitian nutritionist, certified diabetes educator and national spokesperson for the Academy of Nutrition and Dietetics. "It also helps the immune system stay strong. It helps you stay full. A lot of research has shown that protein has _____."

Besides animal sources, there are several alternative _____ of protein, including soy, hemp and whey. _____l said that all are good options and it comes down to personal preference. For example, whey protein is better for building and regenerating muscle mass, so people looking to bulk up or who exercise a lot may prefer it.

All food made from _____, poultry, seafood, beans and peas, eggs, processed soy products, nuts and seeds are considered part of the _____, according to the USDA. Most people eat enough food in this group, but they should select leaner and more varied selections.

Macronutrient,	Protein,	4,	Found,	Macro,	Legumes,
Sources,	Building Blocks,		Metabolism,	Satiety Effects,	
Protein Group,	Amino acids,		Muscle mass,		Crandall, Meat

Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #1

FOOD LABEL COLLAGE

Objectives:

- To determine the 2 kinds of fats.

- To sort all the unhealthy and healthy fats.

- To know the importance of knowing the food labels.

Materials:

• Several copies of food labels containing “healthy” and “unhealthy” fats. You can use the sample food labels from this unit, but feel free to add more and have children bring in their own labels from foods at home. Print and arrange on tables around the room

• See: www.nutritiondata.com or www.peapod.com for more printable label images.

• 2 Large Poster Boards

• Grocery bulletins and food magazines. Use a range of food types and bulletins/magazines from different types of grocery stores (for example Latino or Asian markets).

• Scissors, Markers and Glue

Procedures:

1. Cut out labels of foods and snacks you like or would like to try. Then you have identify and sort the labels into 2 piles: foods with “healthy fats” and foods with “unhealthy fats.” Tell and look at the number of grams of trans fats as well as the ingredient list for partially hydrogenated oils.
2. Collect the labels into two separate containers. Divide the group into two teams and have one team work to create a “healthy fats” collage and the other an “unhealthy fats” collage by gluing the labels on the poster board and using markers and grocery bulletins to depict the various foods.

Guide Questions:

1. What foods do you encounter from your sources?
2. In your foods collection, what foods belong to healhty fats?
3. In your foods collection, what foods belong to unhealhty fats?
4. Is it easy for you to sort the labels into 2 piles? Why or Why not?

Name:_____ **Score:**_____

Section:_____ **Date:**_____

WORKSHEET #3

LOOK FOR ME (PROTEIN) (Answer Key)

Direction: Fill up the missing word. Choose your answer in the box.

Unsaturated	macronutrients	olecacid
lipotein	triglycerides	fats
LDL	saturated	eladicacid
HDL	transfat	cholesterol
fattyacids	oxygen	adiposecell

Protein is a **macronutrient** that is essential to building muscle mass. It is commonly **found** in animal products, though is also present in other sources, such as nuts and **legumes**.

There are three macronutrients: **protein**, fats and carbohydrates. Macronutrients provide calories, or energy. The body requires large amounts of macronutrients to sustain life, hence the term "**macro**," according to the University of Illinois McKinley Health Center. Each gram of protein contains **4** calories. Protein makes up about 15 percent of a person's body weight.

Chemically, protein is composed of **amino acids**, which are organic compounds made of carbon, hydrogen, nitrogen, oxygen or sulfur. Amino acids are the **building blocks** of proteins, and proteins are the building blocks of muscle mass, according to the National Institutes of Health (NIH).

"When protein is broken down in the body it helps to fuel **muscle mass**, which helps **metabolism**," said Jessica Crandall, a registered dietitian nutritionist, certified diabetes educator and national spokesperson for the Academy of Nutrition and Dietetics. "It also helps the immune system stay strong. It helps you stay full. A lot of research has shown that protein has **satiety effects**."

Besides animal sources, there are several alternative **sources** of protein, including soy, hemp and whey. **Crandall** said that all are good options and it comes down to personal preference. For example, whey protein is better for building and regenerating muscle mass, so people looking to bulk up or who exercise a lot may prefer it.

All food made from **meat**, poultry, seafood, beans and peas, eggs, processed soy products, nuts and seeds are considered part of the **protein group**, according to the USDA. Most people eat enough food in this group, but they should select leaner and more varied selections.

Macronutrient,	Protein,	4,	Found,	Macro,	Legumes,
Sources,	Building Blocks,		Metabolism,	Satiety Effects,	
Protein Group,	Amino acids,		Muscle mass,		Crandall, Meat

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #4

SAY IT WITH DNA – DNA

Direction: FIND THE MYSTERY word.

tRNA	sym	AA
AAA	F	Phe
AAC	L	Leu
AAG	F	Phe
AAU	L	Leu
ACA	C	Cys
ACC	W	Trp
ACG	C	Cys
ACU	-	spc
AGA	S	Ser
AGC	S	Ser
AGG	S	Ser
AGU	S	Ser
AUA	Y	Tyr
AUC	-	spc
AUG	Y	Tyr
AUU	-	spc

tRNA	sym	AA
CAA	V	Val
CAC	V	Val
CAG	V	Val
CAU	V	Val
CCA	G	Gly
CCC	G	Gly
CCG	G	Gly
CCU	G	Gly
CGA	A	Ala
CGC	A	Ala
CGG	A	Ala
CGU	A	Ala
CUA	D	Asp
CUC	E	Glu
CUG	D	Asp
CUU	E	Glu

tRNA	sym	AA
GAA	L	Leu
GAC	L	Leu
GAG	L	Leu
GAU	L	Leu
GCA	R	Arg
GCC	R	Arg
GCG	R	Arg
GCU	R	Arg
GGA	P	Pro
GGC	P	Pro
GGG	P	Pro
GGU	P	Pro
GUA	H	His
GUC	Q	Glu
GUG	H	His
GUU	Q	Glu

tRNA	sym	AA
UAA	I	Iso
UAC	M	Met
UAG	I	Iso
UAU	I	Iso
UCA	S	Ser
UCC	R	Arg
UCG	S	Ser
UCU	R	Arg
UGA	T	Thr
UGC	T	Thr
UGG	T	Thr
UGU	T	Thr
UUA	N	Asn
UUC	K	Lys
UUG	N	Asn
UUU	K	Lys

1.CGTCCACTT

2.CTCCTTAAC

3.ACACGATCT

4.CTCCGAGCA

5.CTTGAATAC

6.AAGTATGCA

7.GTACGTATG

8.AACTAGGGT

9.GGACGATTG

10.AGTCGTGGA

11.CGATCTTAC

12.ACACGATGT

13.ACGCGTGG

14.CTTCCACCT

15.CTCATGCTT

16.GTACGTTGC

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #4

SAY IT WITH DNA – DNA (Answer Key)

Direction: FIND THE MYSTERY word.

tRNA	sym	AA
AAA	F	Phe
AAC	L	Leu
AAG	F	Phe
AAU	L	Leu
ACA	C	Cys
ACC	W	Trp
ACG	C	Cys
ACU	-	spc
AGA	S	Ser
AGC	S	Ser
AGG	S	Ser
AGU	S	Ser
AUA	Y	Tyr
AUC	-	spc
AUG	Y	Tyr
AUU	-	spc

tRNA	sym	AA
CAA	V	Val
CAC	V	Val
CAG	V	Val
CAU	V	Val
CCA	G	Gly
CCC	G	Gly
CCG	G	Gly
CCU	G	Gly
CGA	A	Ala
CGC	A	Ala
CGG	A	Ala
CGU	A	Ala
CUA	D	Asp
CUC	E	Glu
CUG	D	Asp
CUU	E	Glu

tRNA	sym	AA
GAA	L	Leu
GAC	L	Leu
GAG	L	Leu
GAU	L	Leu
GCA	R	Arg
GCC	R	Arg
GCG	R	Arg
GCU	R	Arg
GGA	P	Pro
GGC	P	Pro
GGG	P	Pro
GGU	P	Pro
GUA	H	His
GUC	Q	Glu
GUG	H	His
GUU	Q	Glu

tRNA	sym	AA
UAA	I	Iso
UAC	M	Met
UAG	I	Iso
UAU	I	Iso
UCA	S	Ser
UCC	R	Arg
UCG	S	Ser
UCU	R	Arg
UGA	T	Thr
UGC	T	Thr
UGG	T	Thr
UGU	T	Thr
UUA	N	Asn
UUC	K	Lys
UUG	N	Asn
UUU	K	Lys

1.CGTCCACTT AGE

2.CTCCTTAAC EEL

3.ACACGATCT CAR

4.CTCCGAGCA EAR

5.CTTGAATAC ELM

6.AAGTATGCA FIR

7.GTACGTATG HAY

8.AACTAGGGT LIP

9.GGACGATTG PAN

10.AGTCGTGGA SAP

11.CGATCTTAC ARM

12.ACACGATGT CAT

13.ACGCGTGG CAP

14.CTTCCACCT EGG

15.CTCATGCTT EYE

16.GTACGTTGC HAT

Name:_____ Score:_____

Section:_____ Date:_____

ACTIVITY #2

PAPER PROTEIN

Objectives:

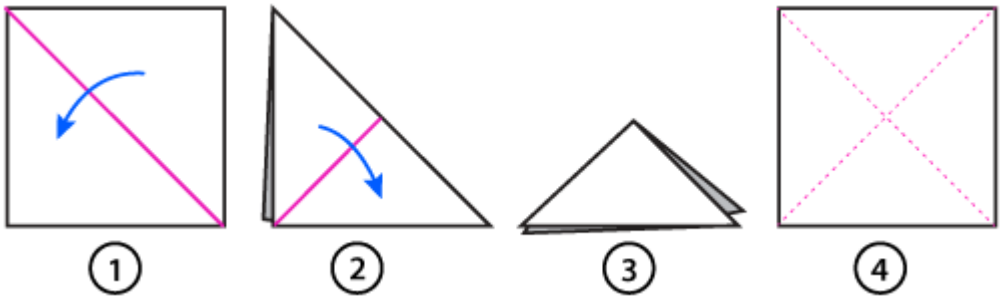
- To determine how amino acid look like
- To determine how it works and function
- To know the importance of amino acid in our body

Materials:

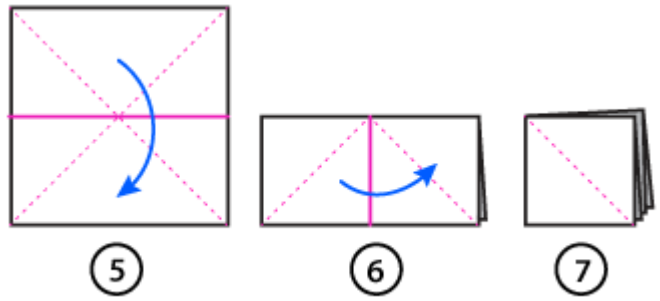
- Colored Paper
- Scissor
- Glue
- You will need 8 square pieces of paper of the same size.

Procedures:

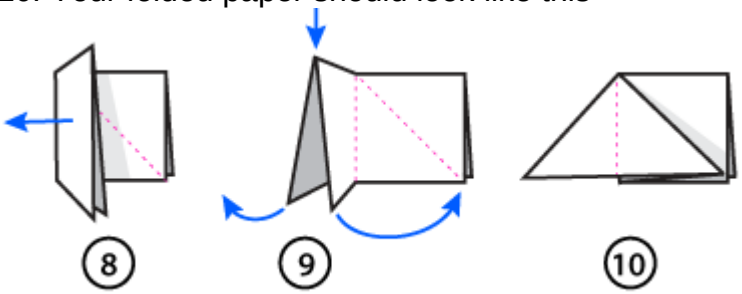
1. Fold a single piece of paper in half diagonally
2. Fold the paper in half diagonally again
3. Your folded paper should look like this
4. Unfold the paper



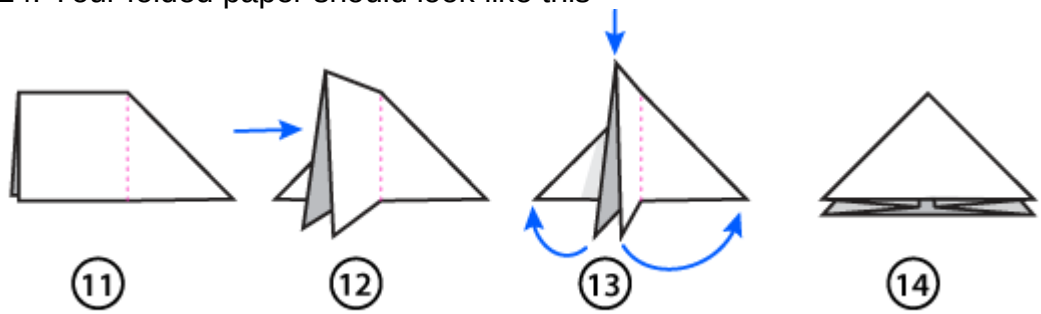
5. Fold the paper in half
6. Fold the paper in half again
7. Your folded paper should look like this



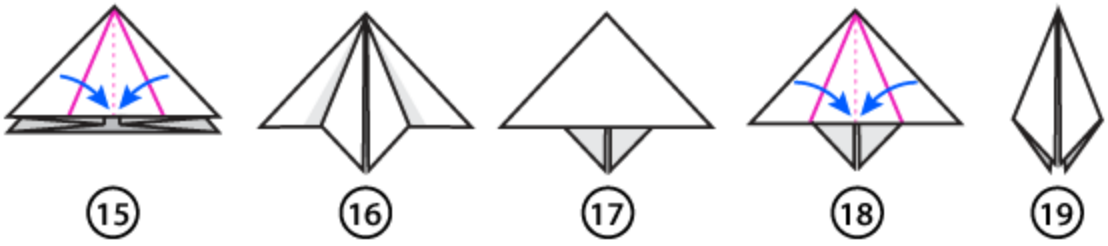
8. Unfold the top layer of the square halfway
9. Open the top layer of the square and flatten it into a triangle, using the existing creases.
10. Your folded paper should look like this



11. Flip it over
12. Unfold the top layer halfway
13. Open the top layer and flatten it into a triangle, using the existing creases.
14. Your folded paper should look like this



15. Fold the edges of the top layer only into the centerline
16. Your folded paper should look like this
17. Flip it over
18. Fold the edges of the top layer only into the centerline
19. You've now completed one amino acid. Repeat these steps with another piece of paper until you've created a total of eight amino acids.



And, that's it! Once you have amino acids, you are ready to move onto Part 2 to make the protein channel.

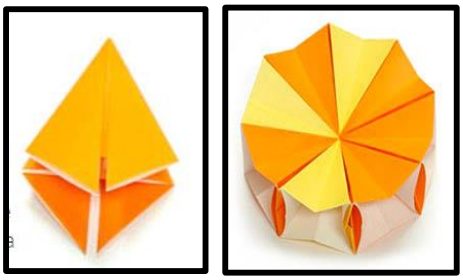
Guide Questions:

1. As you'll discover while building your origami channel, the shape of a protein is very important. Why?

2. Where do the protein channel you made sits?

3. What happened when the amino channel is open?

4. What do you think is the job of amio acid in our body?



Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #5

FIND MY OTHERS

Direction: Find the 16 words that are hidden in box. After that, make a conclusion about the words you've find.

C	A	R	B	O	H	Y	D	R	A	T	E
E	E	Q	R	T	Y	U	I	O	P	L	K
L	N	B	X	C	Z	A	F	S	D	G	H
L	B	E	N	Q	W	E	R	T	Y	U	I
U	F	G	R	D	K	J	P	L	P	O	G
L	S	A	U	G	Z	X	C	V	O	B	L
O	E	Y	C	H	Y	L	B	M	L	N	Y
S	Q	W	T	E	R	T	Y	U	Y	I	C
E	W	Y	O	W	W	E	E	P	S	O	O
V	S	H	S	S	D	M	D	E	A	P	S
B	X	G	E	L	F	A	F	C	C	K	I
G	R	H	Q	C	G	I	C	T	C	F	D
S	D	B	A	F	H	L	V	I	H	S	I
U	E	M	S	P	J	L	B	N	A	X	C
G	G	P	X	O	K	A	F	W	R	V	B
A	B	L	C	L	L	R	G	D	I	F	O
R	N	A	D	Y	E	D	H	F	D	S	N
Q	H	N	Z	M	K	F	I	V	E	B	D
A	K	T	O	E	M	V	T	H	Q	M	Q
S	E	S	N	R	B	B	Y	U	W	N	A
F	I	K	O	P	T	G	U	I	S	S	Z
C	F	G	E	T	S	T	A	R	C	H	X
P	O	I	U	Y	T	R	E	W	Q	B	S
L	L	A	C	T	O	S	E	R	T	E	Y

HIDDEN MESSAGE:

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #5

FIND MY OTHERS

Direction: Find the 16 words that are hidden in box. After that, make a conclusion about the words you've find.

C	A	R	B	O	H	Y	D	R	A	T	E
E	E	Q	R	T	Y	U	I	O	P	L	K
L	N	B	X	C	Z	A	F	S	D	G	H
L	B	E	N	Q	W	E	R	T	Y	U	I
U	F	G	R	D	K	J	P	L	P	O	G
L	S	A	U	G	Z	X	C	V	O	B	L
O	E	Y	C	H	Y	L	B	M	L	N	Y
S	Q	W	T	E	R	T	Y	U	Y	I	C
E	W	Y	O	W	W	E	E	P	S	O	O
V	S	H	S	S	D	M	D	E	A	P	S
B	X	G	E	L	F	A	F	C	C	K	I
G	R	H	Q	C	G	I	C	T	C	F	D
S	D	B	A	F	H	L	V	I	H	S	I
U	E	M	S	P	J	L	B	N	A	X	C
G	G	P	X	O	K	A	F	W	R	V	B
A	B	L	C	L	L	R	G	D	I	F	O
R	N	A	D	Y	E	D	H	F	D	S	N
Q	H	N	Z	M	K	F	I	V	E	B	D
A	K	T	O	E	M	V	T	H	Q	M	Q
S	E	S	N	R	B	B	Y	U	W	N	A
F	I	K	O	P	T	G	U	I	S	S	Z
C	F	G	E	T	S	T	A	R	C	H	X
P	O	I	U	Y	T	R	E	W	Q	B	S
L	L	A	C	T	O	S	E	R	T	E	Y

HIDDEN MESSAGE:

ANSWERS MAY VARY.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #6

FILL MY SPACES!

Direction: Fill in the blank spaces with the appropriate terms to complete the sentence.

1.__ __ __ __ __ __ __ are identical in chemical composition but differ structurally.

2. __ __ __ __ __ __ __ __ __ is a polymer of glucose and serves as a source of dietary fiber for humans.

3. __ __ __ __ __ __ __ __ __ __ __ __ __ are an inexpensive and widely available source of energy for our bodies.

4. __ __ __ __ __ __ __ is a disaccharide found in cow's milk.

5. __ __ __ __ __ __ __ is a disaccharide composed of glucose and fructose.

6. __ __ __ __ __ __ is a starch that has gelling properties and is used in making jams and preserves.

7. Glucose is a __ __ __ __ __ __ __ __ __ __ __ __ __ __.

8. The reaction is a nonenzymatic browning reaction that occurs when foods are roasted

or baked, it is _ _ _ _ _ _ _

9. Bonds chemically join two or more monosaccharide molecule it is _ _ _ _ _ _ _ _ _ _ _.

10. Carbohydrates are the primary products of plant it is _ _ _ _ _ _ _ _ _ _ _ _ _ _ _.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #6

FILL MY SPACES! (Answer Key)

Direction: Fill in the blank spaces with the appropriate terms to complete the sentence.

1. **ISOMERS** are identical in chemical composition but differ structurally.

2. **CELLULOSE** is a polymer of glucose and serves as a source of dietary fiber for humans.

3. **CARBOHYDRATES** are an inexpensive and widely available source of energy for our bodies.

4. **LACTOSE** is a disaccharide found in cow's milk.

5. **SUCROSE** is a disaccharide composed of glucose and fructose.

6. **PECTIN** is a starch that has gelling properties and is used in making jams and preserves.

7. Glucose is a **MONOSACCHARIDE**.

8. The reaction is a nonenzymatic browning reaction that occurs when foods are roasted

or baked, it is **MAILLARD**

9. Bonds chemically join two or more monosaccharide molecule it is **GLYCOSIDIC**

10. Carbohydrates are the primary products of plant it is **PHOTOSYNTHESIS.**

Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #3

CARBOHYDRATED INGREDIENTS

Objective:

- observe how pectin can be used to form a gel and the effects of too little and too much sugar on gelling.

-determine the terms connected

-relate to everyday life

Materials:

Sure-Jell Heatproof gloves

Concentrated fruit juice (apple, grape), if frozen, thawed Balance or scale

Granulated sugar Graduated cylinder

Water Heatproof pad

600-milliliter beakers Stirring rod/spoon/wooden Popsicle

Bunsen burner with stand or hot plate stick

Procedures:

Part 1

1. Measure out 53 grams (1/4 cup) of sugar.

2. Put 18 milliliters (0.75 fluid ounce) of fruit juice concentrate, 60 milliliters (1/4 cup) of water, and 7 grams (3 teaspoons) of Sure-Jell into a 600-milliliter beaker.

3. Place the beaker on a hot plate or Bunsen burner and stir constantly over a high heat until bubbles form all around the edge.

4. Add the sugar. Bring the mixture to a boil and boil hard, while stirring, for one minute. Be sure to adjust the heat source so that the liquid does not boil up the sides of the beaker. Caution! This can boil over very quickly if it's not carefully watched.

5. Using gloves, remove the beaker from the heat source. Place the beaker on a heatproof pad to cool. Allow the jelly to cool. Use a spoon to skim off the foam on the top.

6. Record your results.

Part 2

1. Measure out 26 grams (1/8 cup) of sugar.

2. Repeat steps 2, 3, 4, and 5 in Part 1.

3. Record your results.

Part 3

1. Measure out 106 grams (1/2 cup) of sugar.

2. Repeat steps 2, 3, 4, and 5 in Part 1.

3. Record your results.

Guide Questions:

1. How did the consistency of the jelly change when you changed the ratio of sugar to pectin?

2. Why did the consistency change when you changed the ratio of sugar to pectin?

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #7

HUNT MY DNA WORDS

Direction: Find the words in the box that is connected to DNA.

d	e	o	x	y	r	i	b	o	s	e	a	r	b	f
n	g	r	r	g	h	t	l	s	k	e	f	g	f	f
g	d	b	n	c	t	h	l	c	u	x	w	e	n	q
u	j	n	r	y	y	y	b	l	j	g	x	f	u	e
e	w	f	l	t	p	m	z	e	z	x	a	b	c	n
o	e	v	l	o	k	i	j	t	b	f	g	r	l	i
w	h	l	k	s	o	n	t	a	d	a	t	e	e	n
a	e	n	o	i	r	e	a	h	g	n	a	k	o	e
n	c	e	o	n	l	i	r	p	f	r	i	e	t	d
y	u	i	k	e	h	a	n	s	a	y	h	a	i	a
r	o	c	d	k	e	y	b	o	j	a	i	r	d	g
t	n	a	l	c	m	a	i	h	m	o	r	k	e	p
p	r	a	n	e	n	a	r	p	r	u	n	g	s	t
n	o	h	r	d	i	c	u	c	g	a	e	m	y	r
g	u	a	n	i	n	e	n	o	e	s	e	s	a	b

deoxyribose acid cytosine bases phosphate nuclei thymine rungs sugar adenine guanine nucleotide

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #7

HUNT MY DNA WORDS (Answer Key)

Direction: Find the words in the box that is connected to DNA.

d	e	o	x	y	r	i	b	o	s	e	a	r	b	f
n	g	r	r	g	h	t	l	s	k	e	f	g	f	f
g	d	b	n	c	t	h	l	c	u	x	w	e	n	q
u	j	n	r	y	y	y	b	l	j	g	x	f	u	e
e	w	f	l	t	p	m	z	e	z	x	a	b	c	n
o	e	v	l	o	k	i	j	t	b	f	g	r	l	i
w	h	l	k	s	o	n	t	a	d	a	t	e	e	n
a	e	n	o	i	r	e	a	h	g	n	a	k	o	e
n	c	e	o	n	l	i	r	p	f	r	i	e	t	d
y	u	i	k	e	h	a	n	s	a	y	h	a	i	a
r	o	c	d	k	e	y	b	o	j	a	i	r	d	g
t	n	a	l	c	m	a	i	h	m	o	r	k	e	p
p	r	a	n	e	n	a	r	p	r	u	n	g	s	t
n	o	h	r	d	i	c	u	c	g	a	e	m	y	r
g	u	a	n	i	n	e	n	o	e	s	e	s	a	b

deoxyribose acid cytosine bases phosphate nuclei thymine rungs sugar adenine guanine nucleotide

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #8

KNOW YOUR DNA

Direction: Identify the terms that is being define.

deoxyribose acid cytosine bases phosphate nuclei thymine rungs sugar adenine guanine nucleotide

1.) It is a sugar derived from ribose by replacing a hydroxyl group with hydrogen.

2.) It is the very dense and central region of a cell.

3.) These are nitrogen-containing compounds that form nucleosides.

4.) It is the general form of a DNA.

5.) It is the horizontal part that supports a DNA.

6.) These are chemical derivative of the phosphoric acid.

7.) It is a type of disaccharide made from the combination of the monosaccharides glucose and fructose.

8.) These are organic molecules that serve as the monomer units for forming the the nucleic acid polymers DNA and RNA.

9.) It is a purine nucleobase with an amine group attached to the carbon at position-6.

10.) It is a pyrimidine derivative, with a heterocyclic aromatic ring and 2 substituents attached.

11.) It is also known as 5-methyluracil, a pyrimidine nucleobase.

12.) In DNA, it is paired with cytosine.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #8

KNOW YOUR DNA

Direction: Identify the terms that is being define.

deoxyribose acid cytosine bases phosphate nuclei thymine rungs sugar adenine guanine nucleotide

1.) It is a sugar derived from ribose by replacing a hydroxyl group with hydrogen.

2.) It is the very dense and central region of a cell.

3.) These are nitrogen-containing compounds that form nucleosides.

4.) It is the general form of a DNA.

5.) It is the horizontal part that supports a DNA.

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12.) In DNA, it is paired with cytosine.

Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #5

WHAT IS REAL?

Objectives:

- Define DNA
- Classify the terms related to DNA
- Relate DNA in your daily lives

Materials:

- Ballpen
- Activity sheet (ONE QUESTION, ONE ANSWER)

Procedure:

1. Bring out the activity sheet (ONE QUESTION,ONE ANSWER) and answer it by your group.

ONE QUESTION, ONE ANSWER

1. What do the letters DNA stand for?

2. DNA is a polymer, which means that is made up of many repeating single units (monomers). What are the monomers called?

3. The “backbone” of the DNA molecule is made up of two alternating components, what are these?

4. There are four different variations of these monomers (four different bases), what are the names of those bases?

5. These bases are of two different types of molecules: purines and pyrimidines. Purines have _____ ring(s) in their structure, and pyrimidines have _____ ring(s) in their structure.

6. The two bases that are purines are _____ and _____. These bases are comprised of _____ rings.

7. The two bases that are pyrimidines _____ and _____. These bases are comprised of _____ rings.

8. Based on this information, scientist could predict that the base _____ pairs with _____ and the base

_____ pairs with _____ in the formation of the DNA molecules. This is called complementary base pairs. Thus one strand of DNA is complementary to the other strand (opposite/matching).

9. The bases are paired by _____ bonds along the axis of the molecule.

10. Draw the basic structure of a nucleotide with its three parts.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #9

HUNT MY RNA

Direction: Find the words in the box that is connected to RNA.

r	i	b	o	n	u	c	l	e	i	c	a	c	i	d
r	p	f	g	h	j	k	l	a	s	f	g	t	y	j
a	i	s	s	f	e	h	j	j	i	l	p	o	o	g
k	i	b	m	i	n	o	n	a	w	a	d	e	r	e
s	e	r	o	w	q	f	g	h	j	k	l	q	w	n
q	w	e	r	s	s	e	w	y	u	i	o	p	h	e
z	x	c	v	b	o	b	n	m	z	a	s	q	w	t
q	w	e	p	o	i	m	e	r	d	b	j	n	k	i
d	f	y	b	h	j	a	e	a	q	w	t	f	l	c
a	s	d	c	g	h	e	t	s	k	k	s	i	l	c
h	e	r	e	d	i	t	y	i	s	d	c	a	v	o
q	w	e	r	t	y	p	o	i	t	a	w	t	g	d
l	k	j	h	g	f	d	d	a	r	s	a	s	d	e
q	w	e	e	r	t	y	y	u	f	f	c	g	b	b
z	a	e	n	e	g	p	e	w	e	c	b	h	f	l

RIBOSOMES HEREDITY URACIL

GENES GENETIC CODE RIBONUCLEIC ACID

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #9

HUNT MY RNA (Answer Key)

Direction: Find the words in the box that is connected to RNA.

r	i	b	o	n	u	c	l	e	i	c	a	c	i	d
r	p	f	g	h	j	k	l	a	s	f	g	t	y	j
a	i	s	s	f	e	h	j	j	i	l	p	o	o	g
k	i	b	m	i	n	o	n	a	w	a	d	e	r	e
s	e	r	o	w	q	f	g	h	j	k	l	q	w	n
q	w	e	r	s	s	e	w	y	u	i	o	p	h	e
z	x	c	v	b	o	b	n	m	z	a	s	q	w	t
q	w	e	p	o	i	m	e	r	d	b	j	n	k	i
d	f	y	b	h	j	a	e	a	q	w	t	f	l	c
a	s	d	c	g	h	e	t	s	k	k	s	i	l	c
h	e	r	e	d	i	t	y	i	s	d	c	a	v	o
q	w	e	r	t	y	p	o	i	t	a	w	t	g	d
l	k	j	h	g	f	d	d	a	r	s	a	s	d	e
q	w	e	e	r	t	y	y	u	f	f	c	g	b	b
z	s	e	n	e	g	p	e	w	e	c	b	h	f	l

RIBOSOMES HEREDITY URACIL

GENES GENETIC CODE RIBONUCLEIC ACID

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #10

KNOW YOUR RNA

Direction: Identify the terms that is being define.

RIBOSOMES HEREDITY URACIL

GENES GENETIC CODE RIBONUCLEIC ACID

1.) It is the set of rules by which information encoded in genetic material is translated into proteins by living cells.

2.) It is one of the 4 nucleobases in the nucleic acid of RNA that are represented by the letters A, G, C and U.

3.) It is a polymeric molecule essential in various biological roles in different processes if genes.

4.) The passing of traits from parent to offspring.

5.) A sequence of nucleotides in DNA or RNA that codes for a molecule that has a function.

6.) It is a minute particle consisted of RNA and associated proteins found in large numbers in the cytoplasm of living cells.

Name:_____ Score:_____

Section:_____ Date:_____

WORKSHEET #10

KNOW YOUR RNA

Direction: Identify the terms that is being define.

RIBOSOMES HEREDITY URACIL

GENES GENETIC CODE RIBONUCLEIC ACID

1.) It is the set of rules by which information encoded in genetic material is translated into proteins by living cells.

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Name:_____ **Score:**_____

Section:_____ **Date:**_____

ACTIVITY #6

FILL MY BLANKS

Objectives:

- define RNA
- classify the terms related to RNA
- relate RNA in your daily lives

Materials:

- Ballpen
- Activity sheet (FILL MY BLANKS)

Procedure:

1. Bring out your activity sheet and answer it.

FILL MY BLANKS

1. The sugar in a nucleotide of RNA is _____

2. The pyrimidine bases are _____ and _____.

3. The purine bases are _____ and _____.

4. In complimentary base pairing, _____ bonds with _____ and _____ bonds with _____.

5. RNA is a _____-stranded polymer.

6. There are _____ types of RNA each with its only function. Comparison of Nucleic Acids

7. The five-carbon sugar in RNA is _____ whereas in DNA it is _____.

8. In RNA the base _____ is substituted for _____.

9. DNA molecules are double stranded and RNA molecules are _____ stranded.

10. In terms of length, DNA molecules are much _____ than RNA molecules.