PEAC
PRIVATE EDUCATION ASSISTANCE COMMITTEE
Trustee of the Fund for Assistance to Private Education

DepED
DEPARTMENT OF EDUCATION

2018

LEARNING MODULE

Science G8| Q3

Matter

PEAC
PRIVATE EDUCATION ASSISTANCE COMMITTEE
Trustee of the Fund for Assistance to Private Education

PEAC National Secretariat
Units 2505-2507, 25th Floor Philippine AXA Life Centre
1286 Sen. Gil Puyat Avenue corner Tindalo St., Makati City
Tel No.: (02) 8-570-7322
Fax No.: (02) 8-511-7695

NOTICE TO THE SCHOOLS

This learning module (LM) was developed by the Private Education Assistance Committee under the GASTPE Program of the Department of Education. The learning modules were written by the PEAC Junior High School (JHS) Trainers and were used as exemplars either as a sample for presentation or for workshop purposes in the JHS In-Service Training (INSET) program for teachers in private schools.

The LM is designed for online learning and can also be used for blended learning and remote learning modalities. The year indicated on the cover of this LM refers to the year when the LM was used as an exemplar in the JHS INSET and the year it was written or revised. For instance, 2017 means the LM was written in SY 2016-2017 and was used in the 2017 Summer JHS INSET. The quarter indicated on the cover refers to the quarter of the current curriculum guide at the time the LM was written. The most recently revised LMs were in 2018 and 2019.

The LM is also designed such that it encourages independent and self-regulated learning among the students and develops their 21st century skills. It is written in such a way that the teacher is communicating directly to the learner. Participants in the JHS INSET are trained how to unpack the standards and competencies from the K-12 curriculum guides to identify desired results and design standards-based assessment and instruction. Hence, the teachers are trained how to write their own standards-based learning plan.

The parts or stages of this LM include Explore, Firm Up, Deepen and Transfer. It is possible that some links or online resources in some parts of this LM may no longer be available, thus, teachers are urged to provide alternative learning resources or reading materials they deem fit for their students which are aligned with the standards and competencies. Teachers are encouraged to write their own standards-based learning plan or learning module with respect to attainment of their school's vision and mission.

The learning modules developed by PEAC are aligned with the K to 12 Basic Education Curriculum of the Department of Education. Public school teachers may also download and use the learning modules.

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SCIENCE GRADE 8

Module No 3: Matter

Introduction and Focus Questions

Have you ever wondered what things are made of? Have you asked yourself, “Do I really need vitamins, minerals and nutrients?" Have you thought of checking the nutritive value of the food products that you are buying?

The building block of matter is the atom. Its properties and behavior make matter useful. Its study makes science dynamic and productive. The existence of the atom marks the importance of every material in our environment.

In this module, you will find out the building blocks of matter, how they are arranged, formed and designed to be used in our daily life.

Remember to search for the answers to the following question(s):

1. What is matter made of?
2. How does the behavior of particles in matter help us understand the nature of matter?
3. How does the arrangement of the elements relate to their properties?

☑ LESSONS AND COVERAGE:

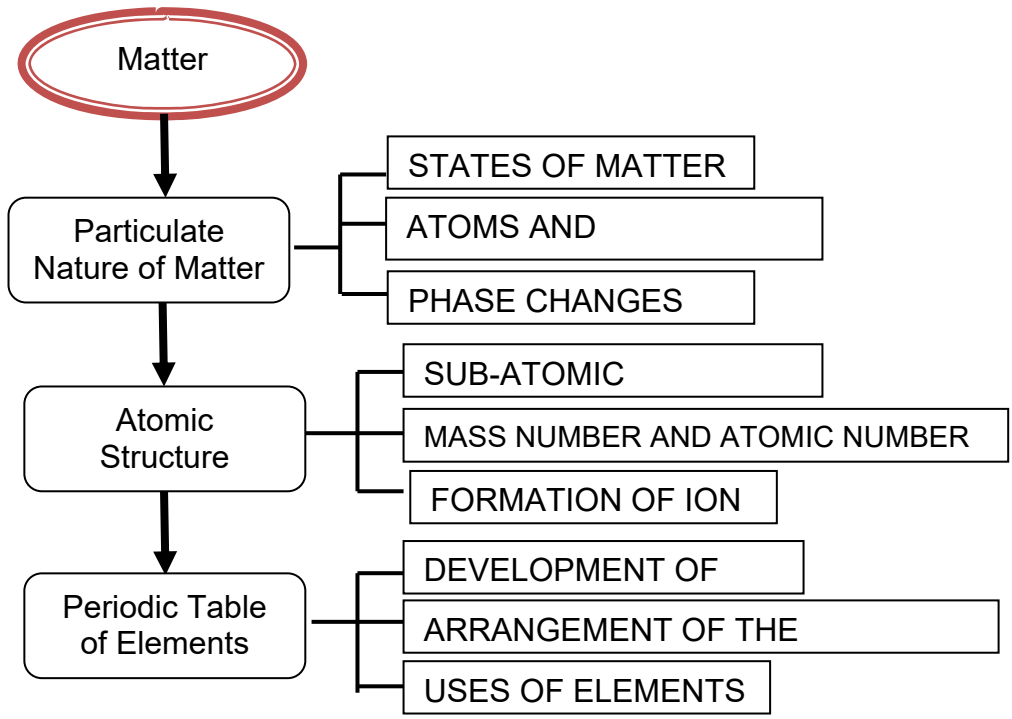
In these lessons, you will learn the following:

Lesson No.	Title	You’ll learn to …	Estimated Time
Lesson 1	Particulate Nature of Matter A. States of Matter B. Particles of Matter C. Phase Changes	• Makes a chart, poster or multimedia presentation of elements, ions and compounds that are important to living organisms. • Presents creatively how water behaves in its different states based on the arrangement of its particles (atoms and molecules).	12 days
Lesson 2	Atomic Structure A. Subatomic Particles	• Interprets food labels in terms of the amount of ions present in	

	B. Mass Number and Atomic Number C. Electron Configuration D. Formation of Ions E. Formula of Common Ions	relation to the required daily mineral intake.	
Lesson 3	Periodic Table of Elements A. Development of the Periodic Table of Elements B. Arrangement of the Elements in the Periodic Table C. Chemical Behavior of The Elements D. ACTIVITY NO. of Elements E. Uses and Importance of Elements	• Participates actively on the constructing of Periodic Table of Elements model relating to one's health, industry and the environment	

☑ MODULE MAP:

Here is a simple map of the above lessons you will cover:



☑ **EXPECTED SKILLS:**

To do well in this module, you need to remember and do the following: (List key study skills and other actions that will help students succeed in doing the module)

1. *Read the instructions carefully.*
2. *Take down notes and copy some important link so that you could go back whenever you need information given in that site.*
3. *Go beyond the procedure given in the net. Explore more.*
4. *Do the Web test for several times and don't forget to click on the correct answer for your reference.*

Lesson 1: Particulate Nature of Matter

In this lesson, you shall:

1. Infer the particulate nature of matter from demonstration
2. Explain the properties of solids, liquids, and gases using the particulate nature of matter
3. Recognize the different particles of matter as atoms and molecules
4. Use the particulate nature of matter to explain:
   - Melting
   - Freezing
   - Evaporation
   - Condensation
5. Explain the physical changes in terms of arrangement and motion of atoms and molecules
6. Use models to present elements, compounds, and mixtures
7. Write the names and symbols of the first 20

PRE-ASSESSMENT:

Let's find out how much you already know about this module. Click on the letter that you think best answers the question. Please answer all items. After taking this short test, you will see your score. Take note of the items that you were not able to correctly answer and look for the right answer as you go through this module.

1. Which of the following statements is NOT in agreement with the particulate nature of matter?
   1. A. The particles of all matter are always in motion.
   2. B. All matter is composed of small particles.
   3. C. Among solids, liquids and gases, particles are hardest in solids.

4. D. Among solids, liquids and gases, particles are spaced farthest apart in gases.

2. Which one of the following statements best supports the idea that matter is made up of particles?

A. Metal expands when heated.
B. If a bottle of perfume is opened, the smell spreads quickly.
C. Water always fills the space available to it.
D. Gases are usually lighter than liquids.

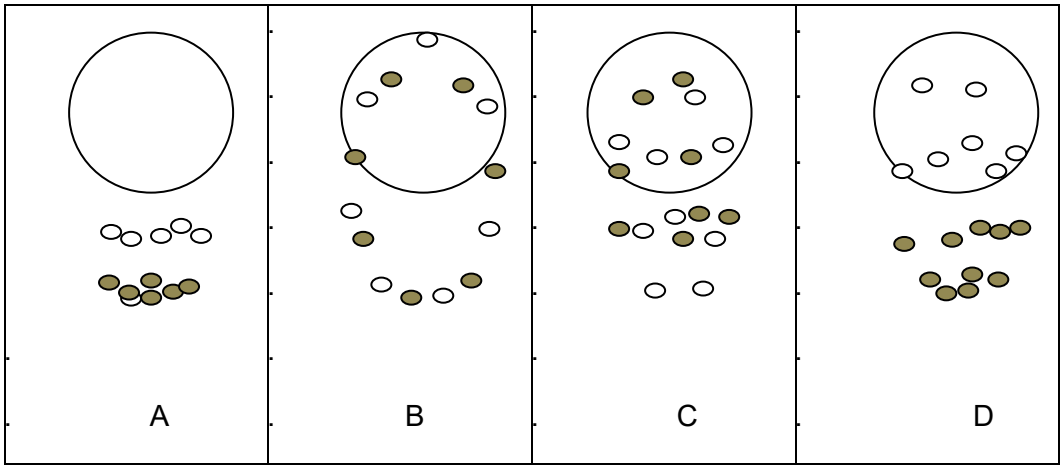
3. A compound cannot be separated into other substances by physical methods, and the elements in it are always combined in fixed proportions of atoms that are held together by chemicals bond. Which of the following substances does not belong to the group?

A. calcium B. ammonia
C. iodized salt D. glucose

4. Which of the following is NOT a property of a compound?

A. It can be broken down into simpler substances.
B. It consists of multiple phase.
C. It has a definite temperature
D. It has a uniform appearance

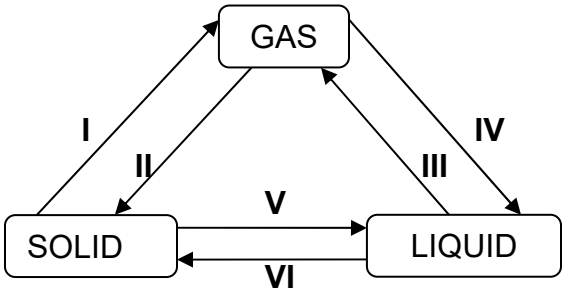
5. Which diagram best shows the arrangement of particles in a balloon filled with a mixture of oxygen and helium gases?



6. If a balloon is blown up in a warm room and then placed in a refrigerator overnight, what will probably happen to the balloon?

A. It will completely deflate C. It will remain the same size
B. It will become slightly larger D. It will become slightly smaller

7. The diagram below shows the changes between the three phases of matter. Which changes represent melting and freezing?



A. I and III B. II and V C. IV and V D. V and VI

8. You observe that there are puddles of water on the bathroom floor. After few minutes, it dries up due to warm temperature. What happened to the water?

A. It just dried up into nothing.
B. It seeped into the gaps between the tiles.
C. It turned into water vapor and blends with the air.
D. It split up into hydrogen and oxygen atoms which then blend with the air.

9. When a taxi vehicle collided with a ten-wheeler truck, immediately the taxi exploded causing a widespread fire due to the LPG tank. Which of the following would explain why the LPG caused the explosion of the vehicle?

X – The density of the LPG is denser than air.
Y – LPG vapors flow and accumulate at the ground level.
Z – The LPG contained detergent

A. X only B. Y only C. X and Y D. Y and Z

10. Which of the following provides evidence that air is a mixture?
A. Living organisms breathe in oxygen.
B. Nitrogen and oxygen are both gases.
C. Substances burn in the presence of air.
D. Air can be physically separated into several components.

11. Ice floats on water. Which of the statements most correctly describes this observation?
A. Ice is denser than liquid water.
B. Ice is less dense than liquid water.
C. Ice is not soluble in liquid water.
D. Ice is colder than liquid water.

12. Miko gets a dry glass and pours cold water with some ice into it. He left the glass for a while to get some bread, and when he got back to it, he saw that

the outside of the glass is now wet with water droplets. Where did these water droplets come from?

A. Miko just spilled some water on the outside of the glass while pouring.
B. Water evaporated from inside the glass, and then condensed outside the glass.
C. The water vapor outside the glass condensed on the cold walls of the glass.
D. Miko held the glass with sweaty hands. The water droplets are actually Miko's sweat.

13. Water behaves like most other molecules in all ways, except that
A. It interact strongly with other water molecules
B. It can exist as a solid, liquid, or gas.
C. Its temperature correlates with how rapidly its molecules are moving.
D. Water in an open container is absorbed by the container, disappears, changes into air, or dries up and goes into the air.

14. A pot of water is placed on a hot stove. Small bubbles begin to appear at the bottom of the pot. The bubbles rise to the surface of the water and seem to pop or disappear. Which of the following is NOT true when water is heated?
A. Steam is hot air.
B. The molecules move faster.
C. More liquid molecules are vaporized
D. The kinetic energy of molecules increased

15. In a certain rural community, you observe that the number of malnourished children has been increasing in the community. The rural community conducts a seminar workshop, through the support of a certain NGO and the DOH, for parents of malnourished children. This seminar will do dissemination of information on foods that improve health awareness of the people. Which of the following presentations would best capture the attention of the participants?
A. Posters about nutritional foods.
B. PowerPoint presentation that features elements, ions, and compounds.
C. News report about nutritional foods.
D. Pictures that feature the particulate nature of matter.

16. Which of the following statements is NOT correct about atoms and molecules in matter?
A. Matter can disappear.
B. Attracted to one another
C. Constantly moving
D. Move faster as temperature increases

17. Water is essential in the body. It behaves like most other molecules in all ways. Which characteristics best describes the physical change of water?
A. Composition changes
C. It will produce a new substance

B. Composition stays the same D. Mass is lost

18. As a nutritionist and the one responsible for multimedia presentation in the department, you are tasked to study the daily food intake of children, to help the parents realize that nutritional value should be considered in choosing the kind of food for their children. Which of the following is NOT recommended by nutritionist to maintain a healthful diet?
    A. Eating a varied diet
    B. Eating foods low in fats and calories
    C. Eliminate sugar from your diet
    D. Eliminating sodium from your diet

19. A barangay nutritionist was asked to make a feeding program for the barangay officials. The program would be used to facilitate possible answers on the issue of malnourished children. Which of the following nutrients known as building block of life?
    A. vegetables B. proteins C. carbohydrates D. fats

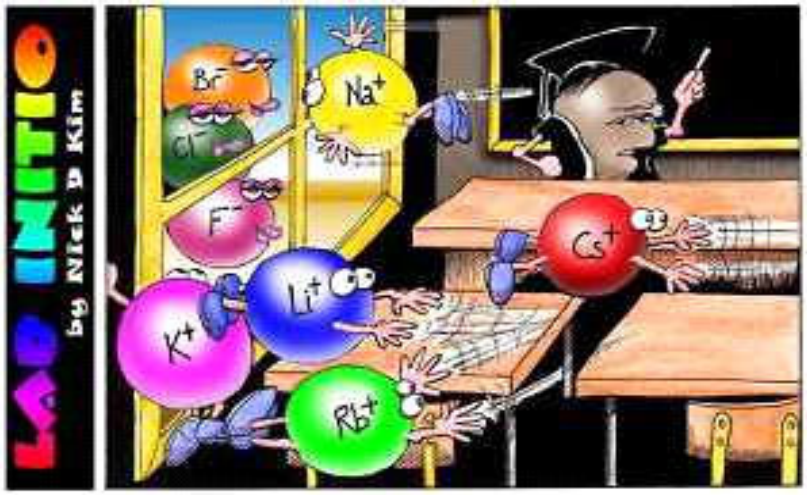
20. Which of the following behaviors is part of a healthy eating plan?
    A. Chris always eats leftover for breakfast.
    B. Most of the food that Laurence eats falls into the milk, yogurt, and cheese group.
    C. Liam skips breakfast when he is late for school.
    D. Ethan counts fruit pie and sugared drinks that contain some fruit as his daily fruit servings.

EXPLORE

Let's start the module by exploring the particulate nature of matter on how particles behave and how the behavior of these invisibly small particles can explain observable phenomenon. How are particles of solid, liquid and gas arranged? How do interactions of matter affect your life? Why is the understanding of the behavior of the particulate nature of matter significant to living organisms?

ACTIVITY 1. Par ticulate Nature of Matter

Matter in the world around us is composed of atoms and molecules. Atoms come in many different elements, but all atoms are composed of three fundamental building blocks. The building blocks of atoms are electrons, protons and neutrons. Any atom of any element can be built with a combination of electrons, protons and neutrons. These three fundamental building blocks make up all the atoms of all the molecules of the world around us.

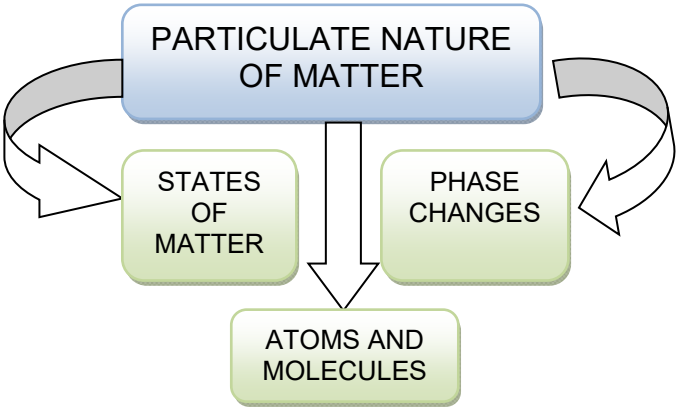


http://www.google.com.ph/search?q=cartoons+on+behavior+of+matter+in+chemistry&num=10&hl=en&biw=1024&bih=499&site=imghp&tbm=isch&ei=AhCkUJD2O6GhmQWiwoHABg&start=0&sa=N

PROCESS QUESTIONS:

1. Based on the caricature, what questions come to your mind about particulate nature of matter?
2. How do particles behave in different states (atoms and molecules)?
3. What is your understanding about the arrangement and movement of the particles of matter?
4. Why is the understanding of the behavior of the particulate nature of matter significant to living organisms?

Here is a simple map of the lessons you will cover:



Reading 1

Open this webpage and read an overview on the particulate nature of matter.
http://voices.yahoo.com/chemistry-101-particulate-nature-matter-_1805053.html

PROCESS QUESTIONS:

1. How do you differentiate the arrangement and movement of the particles of matter?
2. How does water behave in its different states?
3. Why is there a need to understand the behavior of particulate nature of matter?

ACTIVITY 2. KWHL Chart

Before you begin with this lesson, fill in the first, second, and third columns of the KWHL Chart below. It will help you check your understanding of the lesson. Write the answers in your notebook.

Particulate Nature of Matter			
What you KNOW	**What you WANT to know**	**HOW will you find out**	**What I have LEARNED**

As you proceed to the rest of the activities, always have these questions in your mind. How do particles behave in different states? How elements,

compounds and mixture arranged are based on their properties? How can your understanding of the particulate nature of matter become beneficial? Why are transitions between states of matter important to living organisms?

End of EXPLORE:

You just tried finding out about the particulate nature of matter and you reviewed the basic properties of matter and recognized how particles of solid, liquid and gas behave and the arrangement of the particles in a different states.

Your understanding of the particulate nature of matter will be increased as you study the lessons and perform the activities in the FIRM UP phase.

FIRM-UP

Your goal in this section is to learn and understand key concepts about particulate nature of matter such as States of Matter, Particles of Matter and the Phase Changes. The competencies you are to learn are listed in the checklist below. Monitor your accomplishment in these competencies.

CHECKLIST OF COMPETENCIES	
	Makes a chart, poster or multimedia presentation of elements, ions and compounds that are important to living organisms.
	Presents creatively how water behaves in its different states based on the arrangement of its particles (atoms and molecules).

ACTIVITY 3. What's the Matter?

The main concept in the particulate nature of matter is that atoms and molecules possess energy of motion that we can perceive as temperature. Atoms and molecules are constantly in motion and we measure the energy of these movements as the temperature of that substance. This means that if there is an increase in temperature, the atoms and molecules will gain more energy and move even faster.

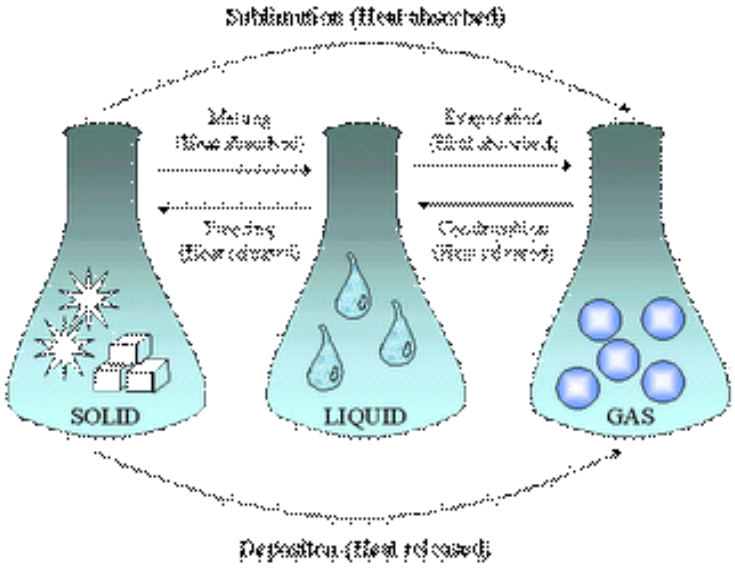
Open the webpage this http://www.teachersdomain.org/asset/lsps07_int_naturematter/ this site will show how the behavior and interaction of atoms and molecules account for the states of matter. Important terms such as elements, molecules, compounds, and mixtures are also reviewed.

PROCESS QUESTIONS:

1. What does the distance between atoms and molecules say about the forms and properties of matter?
2. How can your understanding of the changes in properties of matter become beneficial?
3. Why is understanding of the behavior of particulate nature of matter important?
4. Can the behavior of the particulates be manipulated? In what way?
5. How can this manipulation be useful?

ACTIVITY 4. Phase Transitions

Phase transition is a change of a substance from one phase to another. All particulates of matter that we encounter everyday are found in one of the three phases: solid, liquid, or gas. It is vital to gain better knowledge on phase transitions and the reasons why these everyday events occur. The diagram below shows the transformation through heat absorption from the solid state with particles that are compact, to the liquid state with particles that are loose, and to the gaseous state with particles that are far apart from one another.



http://www.google.com.ph/imgres?q=comic+strip+on+states+of+matter+in+science&num=10&hl=en&sa=X&sout=0&tbm=isch&tbnid=aXFVZpxO42FCOM:&imgrefurl=http://icecreamdiary.blogspot.com/2007_09_01_archive.html&docid=9B05nxfN3HUHOM&imgurl=http://1.bp.blogspot.com/_sjt5jFYO-BM/RumLxL2pNxI/AAAAAAAAAaM/QasA7IsqujM/s320/3WATER.gif&w=320&h=243&ei=V7miUMGdD4-ZiAeoxIC4CQ&zoom=1&iact=hc&vpx=727&vpy=168&dur=1242&hovh=194&hovw=256&tx=170&ty=134&sig=114667533063339657963&page=3&tbnh=122&tbnw=161&start=24&ndsp=18&ved=1t:429,r:16,s:20,i:178&biw=1024&bih=499

Your goal in this section is to learn and understand key concepts by working on the following questions:

PROCESS QUESTIONS:
Write your ideas on the following questions in your notebook.

1. What are the phases of matter?
2. What is meant by a solid, liquid and gas in terms of their particle composition and motion, and their shape and volume?
3. What do you mean by sublimation, melting, freezing condensation, evaporation, and condensation
4. What are the causes of these changes and why there are different forms?
5. Why is there a need to understand the behavior of particulate nature of matter?

ACTIVITY 5. Does Matter Really Matter?

Matter is all around us. It surrounds us, and interacts with us all of the time. Anything that takes up space is matter. Everything you can hold, taste, or smell is made of matter. Matter makes up everything you can see, including clothes, water, food, plants, and animals. It even makes up some things you cannot see, such as air or the smell of perfume. Matter is everywhere! The three most common states of matter that you will encounter on a daily basis is solid, liquid and gas. Matter exists, or, in other words, is made up of tiny particles. Thus, how are these particles of matter arranged? How important the interactions of matter to the life of living organism?

Click these web pages on states of matter: solids, liquids and gases:
http://www.iit.edu/~smile/ch9611.html and
http://www.doe.state.la.us/Lde/uploads/4249.pdf

Open the Webpage and video below to know more about particles of matter http://www.harcourtschool.com/ACTIVITY NO./states_of_matter/ and after learning how the tiny particles behave, open this video: http://www.youtube.com/watch?v=2E4uK6zoJmo this video will enhance your learning on how simple phase change.

PROCESS QUESTIONS:

1. What are the motion and arrangement of tiny particles in various states of matter? What causes these changes?
2. What is the significance of these tiny particles that will change your life?
3. Why is understanding the behavior of particulate nature of matter important?

Open this webpage and click the sub topics below for understanding the changes of matter.
http://mysciencelessons.blogspot.com/2009/08/statesphases-of-matter-venn-diagram.html

Click the following for the Phases/ States of Matter:
Handout: States and Phase changes of Matter
BrainPOP: States of Matter Movie
BrianPOP: Matter Changing States Movie

Give other examples of the different changes of states of matter.

ACTIVITY 6. Big Circles

The Venn diagram is a graphic organizer used to compare and contrast specific concepts and allow you to visually organize similarities and differences between the physical characteristics of the concepts.

CLICK http://www.gliffy.com/gliffy/#templateId=blank&signup=1. You will use web based diagram by means of this site you can create a Venn diagram about states of matter and submit to your teacher.

PROCESS QUESTIONS:
1. Based on your Venn diagram, how are matters classified?
2. What are the characteristics of each phase of matter?
3. What types of changes can matter undergo and how can these types be distinguished from one another?
4. How beneficial are these states of matter to humans? Industries? Environment?

ACTIVITY 7. Packed, Unpacked, and Separated

Solids, liquids and gases are all made up of microscopic particles but the behaviors of these particles differ in the three phases.

The Website below will illustrate the microscopic differences of the states of matter. Open this interactive webpage. This site focuses on the states of matter and the physical properties of matter.
http://michellespecialeducation.blogspot.com/2012/01/states-of-matter-interactive-games-and.html

PROCESS QUESTIONS:

1. Why do gases behave so differently than solids and liquids?
2. How is the particulate nature of matter maintained?
3. When are the particles of matter in a system disrupted?
4. Why are transitions between states of matter important to living organism?
5. What do organisms gain from the changes in the different states of matter?
6. How do humans use matter and the elements every day?

ACTIVITY 8. Check for Understanding.

Exercise 1- Check your comprehension through the following questions:

Check-up Quiz:
I - Multiple Choice:

1. Which of the following describes the particles in a liquid?
   a) Fixed volume, changeable shape
   b) Changeable shape and volume
   c) Fixed shape and volume
   d) Fixed shape, changeable volume

2. Which of the following statements below is correct
   a) In gases the particles are compact.
   b) In liquids the particles are partly close to each other.
   c) In solids the particles are partly close to each other.
   d) In solids the particles are far apart.

3. Which states of matter do not have definite shapes?
   a) Gases only c) liquids and gases

b) b) liquids only d) solid and liquid

4. What happens when a liquid becomes a gas?
   a) The particles give of energy.
   b) The particles beak away from each other.
   c) The particles move closer together
   d) The particles slow down.

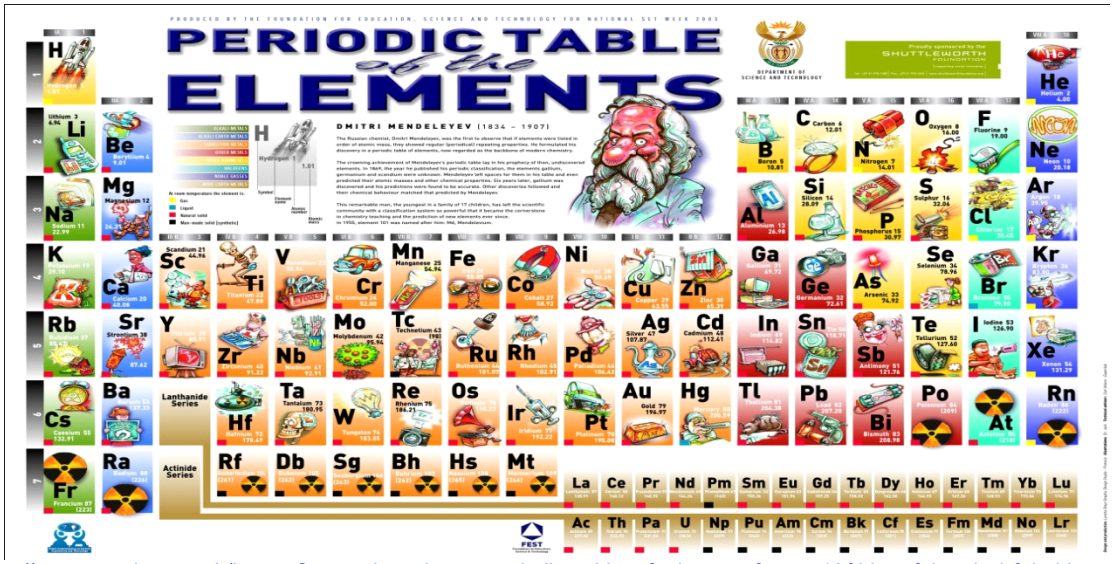
5. What state of matter can fit into any container of any size and any shape?
   a) gas and solid b) solid c) liquid and solid d) gas

Exercise 2 - Complete the Table: Write your answers in your notebook

PHASES	PROPERTIES				
	Mass	Shape	Volume	Compressibility	Changes in phase (Temperature)
Solids					
Liquids					
Gases					

ACTIVITY 9. Transformation of Materials

There are many properties of matter which is built-in to the matter itself. One of these properties is called the state of the matter. The transformation of one material to another is called a phase change.



http://www.google.com.ph/imgres?q=comic+strip+on+periodic+table+of+elements&num=10&hl=en&tbm=isch&tbnid=eupQTa9XqjsuyM:&imgrefurl=http://www.cnsef.org/Page/162&docid=GqDAifSvMGYf4M&imgurl=http://www.myscience8.com/images/PeriodicTable.jpg&w=2562&h=1800&ei=yeSiUK2xGcjUiges-4DQCw&zoom=1&iact=rc&dur=3&sig=114667533063339657963&page=1&tbnh=134&tbnw=191&start=0&ndsp=9&ved=1t:429,r:0,s:0,i:66&tx=273&ty=234&biw=1024&bih=499

PROCESS QUESTIONS:

1. What is the basis of the arrangement of the elements in the periodic table? Identify the name and symbol of the first 20 elements
2. What are the uses and functions of these first 20 elements to humans and environment?
3. Why is there a need to understand the behavior of particulate nature of matter?

ACTIVITY 10. Importance of Elements and Compounds

Elements, compounds, and the chemical reactions between them are the basic building blocks of everything: The planet, everything on it, including humanity, as well as every action and reaction in daily lives and industry depends on them. The importance of elements and compounds is such that nothing would exist or function without them.

Open and read this web page: http://www.biology-online.org/7/6_food.htm. This site features foods that contain compounds and elements that are useful to our body and our daily functions.

PROCESS QUESTIONS:

1. What are the compositions of protein, carbohydrates, fats, vitamins, and minerals?
2. Why are these compounds significant to living organisms? Do the changes of compounds affect the survival of living organisms and the quality of the environment?
3. How is the composition of protein, carbohydrates, fats, vitamins, and minerals related to the states of matter?
4. Why is the behavior of the particulate nature of matter important to living organisms and the environment?

Aside from the common states of matter, there are other important states of matter: the plasma (*This is different from the kind of plasma in the blood.*) and Bose-Einstein condensate. These two states of matter exist at temperature extremes.

Plasma is a gas that has been energized to the point that some of the electrons break free from atoms and molecules. High temperature is required for the existence of the plasma which can be useful in industry just like torches that are used to cut metals. Also, hot gas passing through a big spark will create plasma like sun, stars, etc. The sun is made up of hydrogen and helium gas molecules which are valuable to human and the environment. Plasma is present at all times. Common uses of plasma include fluorescent lamps and neon signs. Plasma is useful in medical applications for sterilizing medical equipment. Plasma can be used also in industry to cut and melt and chemically alter materials. For more examples click http://chemistry.about.com/od/photogalleries/ig/Lightning-and-Plasma-Photos/index.01.htm. This site is a photo gallery of lighting and plasma pictures.

Bose-Einstein condensate has a unique feature as compared to other forms of matter. It has an extreme low temperature which is close to absolute zero or -273^{o}C. Under such condition the atoms stay at one entity or all atoms are identical. Thus, BEC is yet to be tried for future technologies. http://planetfacts.org/bose-einstein-condensate/ Two specific examples of BEC that have been created were the: rubidium that are super cooled and behaved as one atom for 10 seconds, It is also known as superconductor and supercooled liquid helium which loses all viscosity at below 2.2 Kelvin.

ACTIVITY 11. Exploring States of Matter

Absolute zero is the lowest possible temperature at which point the atoms of a substance transmit no thermal energy. All atomic and molecular motion stops it is the coldest temperature in nature.
Click this webpage: This is an activity that introduces students to two new states of matter: the plasma and Bose Einstein Condensate.
http://www.sciencelearn.org.nz/Science-Stories/Strange-Liquids/Exploring-states-of-matter

Guide Questions:

1. In what ways are the concept maps similar?
2. In what ways are the concept maps different?
3. How can your understanding the behavior of Bose-Einstein Condensate become beneficial to you?

End of FIRM UP:

In this section, the discussion was about the particulate nature of matter. You have read about how particles of solid, liquid and gas are arranged. Are there more than three states of matter? How do interactions of matter affect your life? How can your understanding of the changes in the characteristics of matter become beneficial?
Go back to the previous section and compare your initial ideas with the discussion. How much of your initial ideas are found in the discussion? Which ideas are different and need revision? Please explain how particles behaved in different states? And how can your understanding of the particulate nature of matter become beneficial?

Now that you know the important ideas about this topic, let's go deeper by moving on to the next section.

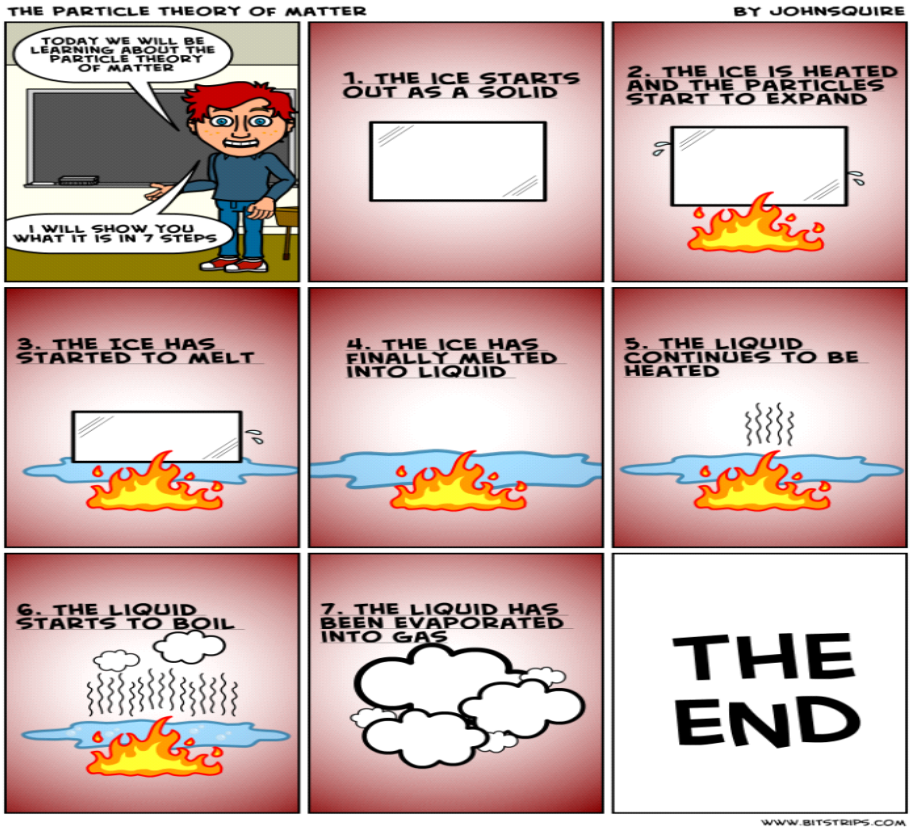
DEEPEN

Now that you have learned about the concepts of particulate nature of matter, it's time for you to look more deeply, analyze, and assess some factors affecting the phases of matter. You are also going to learn more about how water behaves in its different states based on the arrangement of its particles (atoms and molecules).

Your goal in this section is to take a closer look at these aspects of the topic.

ACTIVITY 12. Phase Changes

Distance between the molecules or atoms of the matter shows its state or phase. Temperature and pressure are the only factors that affect the phases of matter. Under constant pressure, when you heat matter, its speed of motion increases and as a result the distance between the atoms or molecules becomes larger. If you give heat to a solid substance, its temperature increases up to a specific point and after this point temperature of it is constant and it starts to change its phase from solid to liquid.



http://www.google.com.ph/imgres?q=comic+strip+on+particles+of+matter&um=1&hl=en&sa=N&tbm=isch&tbnid=T8zPP6binBO7AM:&imgrefurl=http://bitstrips.com/r/3D2GL&docid=_fCNtiPYUHcC6M&imgurl=http://cstrips.bitstrips.com/3D2GL_D8KS.png&w=716&h=1056&ei=efihUNaDFqqdiAf6zIGADQ&zoom=1&iact=rc&dur=343&sig=114667533063339657963&page=1&tbnh=154&tbnw=104&start=0&ndsp=10&ved=1t:429,r:0,s:0,i:66&tx=48&ty=81&biw=1024&bih=499

PROCESS QUESTIONS:

1. Based on the caricature, how does temperature affect the arrangement of the particles of matter? How does water behave in its different states based on the arrangement of its particles?
2. How will you relate the model to present elements, compounds, and mixtures?

3. How does the model help you predict the behavior or determine the use of certain elements, compounds and mixtures?
4. Why is understanding the behavior of particulate nature of matter important? How do interactions of matter affect your life?

ACTIVITY 13. Fallacy

Fill in the table: Provide answers in the first three columns on the physical change of matter: Write your answers in your notebook.

Statements about Changes of Matter	Agree or Disagree	Initial Explanation	Revised Explanation	Concluding Explanation
1. When water boils and bubbles, the bubbles are air, oxygen or hydrogen, or heat.				
2. Steam is hot air.				
3. When steam is no longer visible it becomes air.				
4. Water in an open container is absorbed by the container, disappears, changes into air, or dries up and goes into the air.				
5. Ice molecules are colder than water molecules.				
6. Condensation is when air				

turns into a liquid.				
7. Condensation on the outside of a container is water that seeped (or sweated) through the walls of the container.				
8. Expansion of matter is due to the expansion of the particles rather than increased space between the particles.				

http://beyondpenguins.ehe.osu.edu/issue/water-ice-and-snow/common-misconceptions-about-states-and-changes-of-matter-and-the-water-cycle

As you go on to the succeeding activities you will find out the answer of the above statements.

Open this website for animated video: http://www.makemegenius.com/video_play.php?id=86&type=0. This animated video will enhance your learning about phases/changes of matter.

ACTIVITY 14. Changes that Matter

Change is everywhere around us and it even affects our life. In this lesson, change is seen in the loss and gain of heat. Some believe that certain atoms and molecules are basically hard or cold, regardless of temperature. In this activity, you will check if this belief is correct or incorrect. You will be guided by the following questions:

How does temperature relate to the states of matter? What happens to the particles of a substance when it changes state? Why is understanding the behavior of particulate nature of matter important?

You will also give your own hypothesis after finding out important ideas with regard to this belief.

You will perform an interactive activity to enhance your understanding of phase changes of a substance and relate how temperature variations accompany these changes of state. Click http://www.harcourtschool.com/activity/states_of_matter/ to view the motion of different states of matter or click http://www.miamisci.org/af/sln/phases/watergas.html to manipulate the thermometer and observe the changes of an element or molecules at different temperature. Then write your findings in the table.

States of Matter	PROPERTIES		GENERALIZATION (Construct relationship based on the data)
	Movement of Molecules - Molecules move most freely. - Molecules move freely. - Molecules just vibrate.	**Arrangement of particles** - Particles are closely packed - Particles are slightly apart - Particles are far apart	
Gas			
Liquid			
Solid			

PROCESS QUESTIONS:

1. What happened to the particles of an element or molecule as you change the temperature?
2. How does the arrangement of particles determine the phases of matter?
3. How can your understanding of the changes in properties of matter become beneficial to human, and the environment?
4. Why is understanding the behavior of particulate nature of matter important?

Recall what you have learned in the previous section of this lesson on the arrangement and movement of the particles of matter. You observed how the particles behave. However, we cannot really see the movement of particles.

ACTIVITY 15. Changes of State

Water is a common substance that can be seen to undergo the processes of phases of matter. You can observe the change state by changing its

temperature. Several students find it hard to appreciate the reversibility of the state changes, thinking of each process as a separate event. In this activity, you will be guided to check your ideas about the change of matter.

Open the video below to know more about the States of Matter. http://www.youtube.com/watch?v=j2KZmRIKea8&feature=related It is a short clip and demonstration about the states of matter.

PROCESS QUESTIONS:

1. Based on the video, what is the relationship between the states of matter and the temperature?
2. Can the arrangement of particles of a substance be changed? Explain.
3. Describe the interaction of the molecules in each states of matter.
4. How does your idea about difficulty on reversibility of the state changes compare with the ideas in the lesson?
5. How can your understanding of the behavior of the particulate nature of matter become beneficial to living organisms?

Click this interactive site http://www.bbc.co.uk/schools/scienceclips/ages/9_10/changing_state.shtml you can operate the substance and observe the changes occur.

PROCESS QUESTIONS:

1. Was heat absorbed during the phase changes of ice? Explain.
2. What happened to the temperature when the ice melted?
3. What happened to the liquid particles inside the beaker when heat was applied? What happened to the volume of the gas in the next beaker?
4. How can temperature change the state of matter of an object?
5. How can your understanding of the behavior of the particulate nature of matter become beneficial to living organisms?

.
Review the interactive site; pausing it every now and then so you can take down notes.

ACTIVITY 16. Material Changes

Matter can undergo a physical change from one state to another: solid, liquid or gas. In this activity, you will study the three phases of water by melting ice and then boiling water. You should record the temperature of the liquid over a period of time and plot this data using graphing paper in order to visualize the two changes of state. At each point, the temperature should stabilize briefly as the

heat energy is absorbed and a portion of the graph will be horizontal. From this plot, you should be able to determine the freezing, melting and boiling points of water

Open this webpage to perform and understand the energy flow that results in changes of state.
http://galileo.phys.virginia.edu/outreach/8thgradesol/ChangeStateFrm.html

PROCESS QUESTIONS:

1. Why there are different forms of matter and what causes these changes?
2. How does the temperature affect the phases/changes of matter?
3. How will you assess the changes of matter affect your life and become beneficial to you and to the environment?

You have just learned the behavior, arrangement and movement of the particulate nature of matter.

Let's re-examine the concepts of the physical change of water for the concluding explanation column. Write your answers in your notebook. This will go through as your check up quiz.

Statements about Changes of Matter	Agree or Disagree	Initial Explanation	Revised Explanation	Concluding Explanation
1. When water boils and bubbles, the bubbles are air, oxygen or hydrogen, or heat.				
2. Steam is hot air.				
3. When steam is no longer visible it becomes air.				
4. Water in an open container is absorbed by the container, disappears, changes into air, or dries up and goes into the air.				

5. Ice molecules are colder than water molecules.				
6. Condensation is when air turns into a liquid.				
7. Condensation on the outside of a container is water that seeped (or sweated) through the walls of the container.				
8. Expansion of matter is due to the expansion of the particles rather than increased space between the particles.				

http://beyondpenguins.ehe.osu.edu/issue/water-ice-and-snow/common-misconceptions-about-states-and-changes-of-matter-and-the-water-cycle

ACTIVITY 17. Matter Sorter

Matter is composed of small particles that are in constant motion. Normally it exists as solid, liquid, gas, and plasma known as phases of matter. In this ACTIVITY NO. you will assess your learning about the nature of matter. You should sort the falling objects and decide which correct category it belongs.

Click this site:
http://www.spaceweathercenter.org/amazing_plasmas/01/mattersorter.html
which is an interactive site to enhance learning about identifying the states of matter.

Use the directional buttons to guide the dropping objects into the buckets matching their states of matter. Record the results in the data table: Put check (✓) if the object matches with its state of matter. When you are finished, click on submit.

Dropping Objects	States of Matter				GENERALIZATION
	Solid	Liquid	Gas	Plasma	
Carbon monoxide					

Concrete					
Flame					
Feather					
Helium					
Lightning					
Milk					
Neon Sign					
Oxygen					
Rock					
Sun					
Water					

PROCESS QUESTIONS:

1. Based on the table, how will you relate your initial thoughts on states of matter to your generalization?
2. How will you know the correct matching between the falling object and its state of matter?
3. Were your initial ideas of states of matter changed in the lesson? Explain.
4. Why is it important to understand the behavior of the particulate nature of matter?

.

Let's go back to the KWHL Chart. Now fill in the last column. Write the answers in you notebook

Particulate Nature of Matter			
What you KNOW	**What you WANT to know**	**HOW will you find out**	**What I have LEARNED**

End of DEEPEN:

In this section, the discussion was about the physical change of particulate nature of matter, how particles of solid, liquid and gas are arranged, and how interactions of matter affect your life. What new realizations do you have about the topic? What new connections have you made for yourself?

In your notebook, write a brief reflection on your experience about the implication of the particulate nature of matter in the environment. Why there are different forms and what causes these changes? How the behavior of the particles of matter affect the survival of living organisms and its quality of the environment? Do you think understanding the changes in the particulate nature of matter is beneficial in human and in an environment? Why or why not?

Now that you have a deeper understanding of the topic, you are ready to do the tasks in the next section.

TRANSFER

Your goal in this section is apply your learning to real life situations. You will make a multimedia presentation that includes the comparative food analysis with recommendation that is important to sustain quality life

ACTIVITY 18. Drag and Drop

This is a challenging task for you to synthesize the concepts you have learned from the previous sections.

Open this webpage you will do an online Interactive diagram check. Click “Label the Diagram of states of matter”. http://www.neok12.com/diagram/States-of-Matter-01.htm. In this site your understanding and learning will be assess about the changes of the particles of matter.

PROCESS QUESTIONS:

1. What helped you make the correct match?
2. What have you learned and realized about your answers? Were they all correct? Explain.
3. What is the possible impact of the particulate nature of matter to human activities?
4. How can your understanding of the changes in particles of matter become beneficial for humans and to the environment?

ACTIVITY 19. Multimedia

A multimedia program like PowerPoint presentation is an educational or instructional tool to deliver message to audience in the changing world where interconnections and applications of the particles of matter are significant. Thus multimedia fosters meaningful learning.

Open and read this webpage, http://go.hrw.com/eolang/myomed/creating.htm this site is essential for you to create your own presentation for the topic on particulate nature of matter. Just follow the steps to make your multimedia program successful.

PROCESS QUESTIONS:

1. How can you use multimedia to explain your topic?
2. What are the basic design principles to make your presentation more effective?
3. How does a multimedia presentation enhance and help explain your topic?

ACTIVITY 20. Create Your Own, You Can Do It!

You will create a multimedia presentation to explain the topic. The presentations have to be entertaining as well as interesting and informative to the audience.

Directions: Complete the tasks below to design and develop a Multimedia Presentation. Click www.glogster.com/ . This site allows you to design and share digital information with others.

1. Select a topic from the list below or determine another one you prefer (obtain teacher's permission) for a multimedia presentation production.

   Topics:
   a. State of Matter
   b. Elements, Ions, and Compounds
   c. Phase changes
   d) physical changes
   e) mixtures

   Teacher initials _____

2. Prepare a report identifying or including the following information about your selected topic.

   a. Plan the multimedia presentation
      i. Determine the theme
      ii. Identify the goals, objectives, and purpose of the presentation
      iii. Identify the target audience
      iv. Storyboard the presentation including all navigation links
      v. Technology Requirements:
         1. Minimum of 12 slides
         2. A sound/music clip
         3. 5-6 minute oral report
         4. Two animations
         5. Four pictures or graphics
         6. Navigation links
         7. Transitions, build effects, word art, color fonts, and backgrounds

   b. Prepare multimedia presentation
      1. Schedule to computerize multimedia presentation
      2. Reference page format
      3. Copyright infringements review process
      4. Schedule to test multimedia presentation
   c. Practice presenting multimedia presentation
   d. Present multimedia presentation

3. Prepare an oral presentation of multimedia presentation and present to group or class. Allow audience to see your report also.
4. Get someone from the audience to record feedback below about your report and presentation.
5. Record how you are going to include the feedback in developing your multimedia presentation.
6. Revise multimedia presentation report as necessary.
7. Obtain teacher's signature on report for approval to computerize multimedia presentation.
8. Computerize the multimedia presentation.
9. Review presentation for copyright infringements, spelling, and grammar.

10. Test the multimedia presentation.
11. Present the multimedia presentation.

https://docs.google.com/viewer?a=v&q=cache:5lGBM-8HvUoJ:vscott.cmswiki.wikispaces.net/file/view/3.01%2BMultimedia%2BPresentation%2BACTIVITY NO..doc+ACTIVITY NO.+on+multimedia+presentation&hl=en&gl=ph&pid=bl&srcid=ADGEESheT2CGieHAyM1oBejWw_KgHmO9tNhyRxBrJFTwZmMJrsU8oIdjPwSZK6QUMZ8_8XwN6qqB_Nvl4zxKY8vK2ydAAhS6HPtaPbTMMkpFFagbN3wwM3Ddjnezcnqtvkb5MtamotB5&sig=AHIEtbR7dQWFfzclfUVnHG5339aob6nNaw

ACTIVITY 21. Performance Task

TASK

In a certain rural community you observe that the problem of malnutrition has been worsening in the community. The rural community conducts a seminar workshop, through the support of a certain NGO and the DOH, for parents of malnourished children. This seminar will do dissemination of information on foods that improve one's health.

As a nutritionist and the one responsible for multimedia presentation in the department, you are tasked to study the daily food intake of children, to help the parents realize that nutritional value should be considered in choosing the kind of food for their children. You were asked to create a multimedia presentation. The presentation will feature elements, ions, and compounds that are important to humans and should include the comparative food analysis with recommendation, which you will present to the parents during the community meeting. This multimedia input will be evaluated according to its content accuracy, organization, and creativity.

Rubrics for the Performance Task:

CRITERIA	Outstanding 4	Satisfactory 3	Developing 2	Beginning 1	RATING
Content Accuracy	Pieces of information are comple-tely accurate and related to the topic at hand; all facts are precise and explicit.	Pieces of information are mostly accurate and related to the topic at hand..	Pieces of information are somewhat accurate and related to the topic at hand; there are a few inconsistencies or errors in information.	Pieces of information are very inaccurate and/or incomplete; the facts are misleading to the audience.	
Organization	The presen-tation is extremely well organi-zed; it follows a logical format that is easy to follow. It flows smoothly from one idea to another; the organization enhances effectiveness of the presentation.	The presen-tation is done in a thoughtful manner; there are signs of organization and most transitions are easy to follow.	The presen-tation is somewhat organized; ideas are not presented coherently and transitions are not always smooth, which at times distract the audience.	The presen-tation is choppy and confusing; format is difficult to follow; transitions of ideas are abrupt and seriously distract the audience.	
Creativity	The input is extremely creative and presented with	The input is creative and uniquely presented.	The input adds a few original touches to enhance the presentation	The input uses little creative energy during the presentatio	

	origina-lity. It uses a unique app-roach that truly enhan-ces the pre-sentation.		but does not incorporate it throughout.	n. It is bland, predictable, and inade-quate.	
				OVERALL RATING	

Adapted from http://ctap295.ctaponline.org/~jboston/student/grading_rubric.htm

Before you go to the post-assessment, write a reflection in your synthesis journal about your experiences in the entire lessons. You may choose to answer one, or all of these guide questions:

1. What have you learned about the entire lesson? Is it challenging to see the world you live in?
2. What would our life be if particulate nature of matters was not discovered by the scientists?
3. What other tasks would you like to work on in the future that could be beneficial to humans and the environment?

End of TRANSFER:

In this section, your task was to create a multimedia presentation on particulate nature of matter that includes elements, ions, and compounds that are important to living organisms.
How did you find the performance task? How did the task help you see the real world use of the topic?
You have completed this lesson. Before you go to the next lesson, you have to answer the following post-assessment.

POST-ASSESSMENT:

It's now time to evaluate your learning. Click on the letter of the answer that you think best answers the question. Your score will only appear after you answer all items. If you do well, you may move on the next module. If your score is not at the expected level, you have to go back and take the module again.

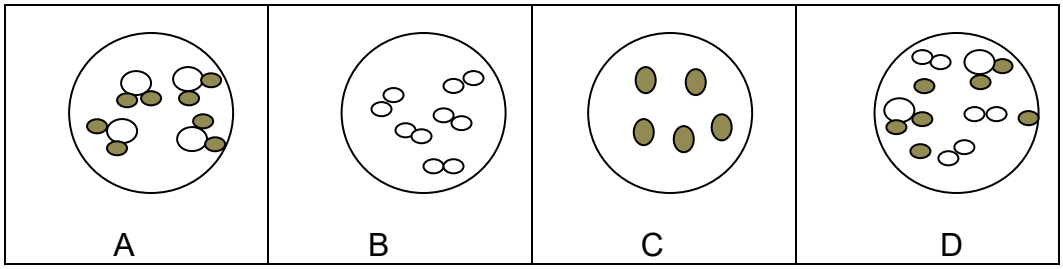
1. Which of the following characteristics is not a property particulate of matter?
   A. It has constant motion.
   B. It has a volume.
   C. It has physical form.
   D. It has only abstract qualities.

2. Which of the following is NOT an element?
   A. Americium B. carbon C. radon D. water

3. Which of the following best describes what happens when hydrogen and oxygen to form water?
   A. Atoms are changing place with other atoms.
   B. Atoms are combining to form molecules.
   C. Hydrogen and oxygen are undergoing change of states.
   D. Hydrogen and oxygen are stable condition.

4. Salt is soluble in water. What will most likely happen to the salt molecules once it is dissolved in water?
   A. The molecules will spread throughout the liquid.
   B. The molecules will sink to the bottom.
   C. The molecules will no longer exist.
   D. The molecules will float on top.

5. Different circles represent atoms of different elements. Which diagram shows a mixture of different elements?



6. Evaporation is the process by which a liquid changes into gas. Which of the following choices is correct?
   A. tiny drops of water
   B. molecules of water vapor
   C. separate atoms of water
   D. atoms of the hydrogen and oxygen

7. Which of the following statements is correct description concerning the temperature in liquid when place in the freezer?
   A. The temperature removed from the liquid remains in the freezer.
   B. The temperature from the freezer is absorbed by the liquid.
   C. The temperature from the liquid is used up into the atmosphere outside the freezer.
   D. The temperature removed from the freezer remains in the liquid.

8. What happens to water molecules when liquid water evaporates?
   A. The molecules become lighter.
   B. The molecules become smaller.
   C. The molecules break up into different atoms.
   D. The molecules move away from each other.

9. Which gas is produced when wood and charcoal burn completely in air?
   A. carbon dioxide
   B. oxygen
   C. nitrogen dioxide
   D. carbon monoxide

10. When a solid substance is heated, it melts at a definite temperature. Further heating produces a black solid and a gas. What do these observations tell about the substance?
   A. It is an element
   B. It is a compound
   C. It is a mixture
   D. It is a solution

11. Refer to the illustration

Which of the following is arranged according to decreasing movement of particles?
   A. Solid, liquid, gas
   B. Liquid, solid, gas
   C. Gas, solid, gas
   D. Gas, liquid, solid

12. A balanced diet includes three types of food: energy foods, body-building foods, and maintenance foods. Which of the following food groups contains energy foods?

   A. carbohydrates only
   B. carbohydrates and minerals
   C. carbohydrates, vitamins and minerals
   D. carbohydrates, fats and proteins

13. You can pump additional air into a tire that is already with air. Which of the following is a misconception about gases?
   A. The molecules in gases will float.
   B. The molecules in gases have very high pressure.
   C. The molecules in gases can spread evenly over an available space.
   D. The molecules in gases move slowly throughout a given medium.

14. When you apply a few drops of alcohol on your hands, the spot feels cool while the alcohol is evaporating. Which statement below accounts for this observation?
   A. The heat of the skin was absorbed by alcohol.
   B. The alcohol has lower temperature so it feels cool on the skin.
   C. The heat from the sun was used to separate the alcohol molecules.

D. The amount of heat possessed by the body is lower than the amount of heat possessed by alcohol.

15. Diffusion of gases is needed to maintain the concentration of gases in the blood. Which of the following statements would explain why proper ventilation is beneficial to humans?

X – Ventilation is a process of filtering the air that enters the lungs.
Y – Ventilation is a process of transporting waste products from cell to the lungs
Z – Ventilation is a process of taking oxygen from the air and supplying it to the blood.

A. X only B. Y only C. Z only D. Y and Z

16. You observe that the odor of frying tuna fish can be detected a few meters away but that of fresh tuna fish cannot be detected from the same distance. What must be the reason for this?

A. The air carries the odor to the observer.
B. The heat causes molecules of tuna fish to move faster.
C. The molecules of fresh tuna do not move.
D. The oil used for frying carries the odor away.

17. Synthetics are particles that, specifically, can damage the environment. Which of the following is able to cause climate change?

A. Attempting to manage and simplify nature.
B. Burning of fuel
C. Rapid population growth rate
D. Sustainable resource use.

18. A non-government organization that advocates environmental protection will conduct a seminar in a certain barangay. As an IT expert, your task is to create an educational/ instructional tool to understand the behavior and interconnections of particles of matter in the changing world. How will you present your educational tool to the barangay officials?

A. design B. storyboard C. development D. layout

19. In a statistical data result from a certain barangay, cough cases have increased due to emission of smoke from the factories. Smoke particles are examined under a microscope, and were observed to be moving randomly. What causes the smoke particles to move at random?

A. Air currents blowing on the smoke particles.
B. Air molecules bumping into smoke particles.
C. Smoke particles are moving in one direction.

D. Smoke particles have different weight and fall at different speed

20. As the SK chairman, you were asked to produce a documentary report for the barangay officials. The report would be used to mediate possible solutions on the issue on pollution. Your report includes identifying the types of pollutants in the air. Which of the following choices is not part of your plan for you report?

A. Designing B. Forecasting C. Planning D. Testing

GLOSSARY OF TERMS USED IN THIS LESSON:

Atom – Smallest particle of an element

Condensation – Change of state from gas to a liquid usually due to cooling or compression.

Compounds – A combination of two or more elements which are chemically bonded

Deposition – Change of state from gas to a solid without first becoming a liquid.

Elements – Pure substances composed of only one type of atom.

Evaporation – Change of state from liquid to a gas.

Freezing – Change of state from liquid to a solid due to low temperature.

Gas – Neither a definite shape nor a definite volume, fills the whole volume of any container.

Liquid – No definite shape but has definite volume.

Matter - Generally considered to be a substance that has mass and also volume.

Melting – Change of state from solid to liquid, usually due to application of heat/temperature or pressure.

Mixture - is a combination of two or more substances that are not chemically united and do not exist in fixed proportions to each other.

Particulate Nature of Matter - Matter is made up of discrete particles called atoms or their combinations called molecules/compounds. Furthermore, said atoms have further discrete subdivisions, protons, neutrons, electrons. Indeed matter may also be made of discrete charged atoms, called ions. So the particulate nature of matter does not simply mean dust particles in the air but rather suggests that all matter is made up of discrete particles.

Solid – Definite shape, volume, generally, rigid and resistant to deformation.

Sublimation – Change of state from solid to gas without first becoming a liquid.

REFERENCES AND WEBSITE LINKS USED IN THIS LESSON:

http://www.google.com.ph/search?q=cartoons+on+behavior+of+matter+in+chemistry&num=10&hl=en&biw=1024&bih=499&site=imghp&tbm=isch&ei=AhCkUJD2O6GhmQWiwoHABg&start=0&sa=N This webpage shows diagrams and caricatures for the arrangement and movement of elements, compounds, mixture and ions.

http://voices.yahoo.com/chemistry-101-particulate-nature-matter-1805053.html This site gives an overview of the particulate nature of matter

http://www.teachersdomain.org/asset/lsps07_int_naturematter/ This website provides an interactive simulation of particulate nature of matter. It deals on the behavior and interaction of atoms and molecules. Important terms such as elements, molecules, compounds, and mixtures are also reviewed.

http://www.google.com.ph/imgres?q=comic+strip+on+states+of+matter+in+science&num=10&hl=en&sa=X&sout=0&tbm=isch&tbnid=aXFVZpxO42FCOM:&imgrefurl=http://icecreamdiary.blogspot.com/2007_09_01_archive.html&docid=9B05nxfN3HUHOM&imgurl=http://1.bp.blogspot.com/_sjt5jFYO-BM/RumLxL2pNxI/AAAAAAAAAaM/QasA7IsqujM/s320/3WATER.gif&w=320&h=243&ei=V7miUMGdD4-ZiAeoxIC4CQ&zoom=1&iact=hc&vpx=727&vpy=168&dur=1242&hovh=194&hovw=256&tx=170&ty=134&sig=114667533063339657963&page=3&tbnh=122&tbnw=161&start=24&ndsp=18&ved=1t:429,r:16,s:20,i:178&biw=1024&bih=499 This webpage shows a illustration of the changes of phases of matter that will enhance the learning your particles of matter.

http://www.iit.edu/~smile/ch9611.html This website will help you to recognize the properties of each state of matter and the similarities/differences between the three states of matter.

http://www.doe.state.la.us/Lde/uploads/4249.pdf This website is a hands-on activity to enhance your the learning to infer and develop skills to investigate the particles of matter.

http://www.harcourtschool.com/activity/states_of_matter/ This website discusses concept on the behavior of the tiny particles.

http://www.youtube.com/watch?v=2E4uK6zoJmo this video will enhance your learning on simple phase changes

http://mysciencelessons.blogspot.com/2009/08/statesphases-of-matter-venn-diagram.html This site will develop your understanding about the changes of matter.

Mysciencelessons.wordpress.com. This has a graphic organizer to check your understanding about particles of matter.

http://michellespecialeducation.blogspot.com/2012/01/states-of-matter-interactive-games-and.html. This interactive webpage focuses on the states of matter and the physical properties of matter.

http://www.biology-online.org/7/6_food.htm. This site feature foods containing compounds and elements that are useful to our body and our daily functions.

https://docs.google.com/viewer?a=v&q=cache:H5KPziio7roJ:www.windsorct.org/sagelepak/documents/PhaseChangeLab-MeltIceandHeatWater.doc+laboratory+activity+on+phase+change&hl=en&gl=ph&pid=bl&srcid=ADGEESg5yMgOxcjRDmM-IY6Z-QUOELGnNgD2FBXIxZZVBpXMkGtYWtOmptG3PD5xydJWtSsM02vZTA7dOoj5fw5CX0S0_MuQMblfogeaY4mnrc-sH-I6J6Xi6VI73htWH-kPWIzGBzGY&sig=AHIEtbSZaQlFxfdZ7uYM55wDnpry8wPH5g This webpage has a laboratory activity to enhance your understanding of phase changes of a substance and relate how energy changes and temperature variations accompany these changes of state.

http://www.google.com.ph/imgres?q=comic+strip+on+periodic+table+of+elements&num=10&hl=en&tbm=isch&tbnid=eupQTa9XqjsuyM:&imgrefurl=http://www.cnsef.org/Page/162&docid=GqDAifSvMGYf4M&imgurl=http://www.myscience8.com/images/PeriodicTable.jpg&w=2562&h=1800&ei=yeSiUK2xGcjUiges-4DQCw&zoom=1&iact=rc&dur=3&sig=114667533063339657963&page=1&tbnh=134&tbnw=191&start=0&ndsp=9&ved=1t:429,r:0,s:0,i:66&tx=273&ty=234&biw=1024&bih=499 This shows a diagram for the elements of the periodic table.

http://www.google.com.ph/imgres?q=comic+strip+on+particles+of+matter&um=1&hl=en&sa=N&tbm=isch&tbnid=T8zPP6binBO7AM:&imgrefurl=http://bitstrips.com/r/3D2GL&docid=_fCNtiPYUHcC6M&imgurl=http://cstrips.bitstrips.com/3D2GL_D8KS.png&w=716&h=1056&ei=efihUNaDFqqdiAf6zIGADQ&zoom=1&iact=rc&dur=343&sig=114667533063339657963&page=1&tbnh=154&tbnw=104&start=0&ndsp=10&ved=1t:429,r:0,s:0,i:66&tx=48&ty=81&biw=1024&bih=499 This presents a diagram for Physical change of matter (water)

http://www.makemegenius.com/video_play.php?id=86&type=0 this is an animated video will enhance your learning about phases/changes of matter.

http://www.youtube.com/watch?v=j2KZmRIKea8&feature=related It is a short clip and demonstration about the states of matter.

http://www.brainpop.com/science/matterandchemistry/statesofmatter/ This website is an interactive science site to enhance the learning about matter.

http://galileo.phys.virginia.edu/outreach/8thgradesol/ChangeStateFrm.htm This webpage will help you understand the energy flow that results in changes of states.

http://beyondpenguins.ehe.osu.edu/issue/water-ice-and-snow/common-misconceptions-about-states-and-changes-of-matter-and-the-water-cycle This site can help understand the common misconceptions about states and changes of matter and the water cycle.

http://www.neok12.com/diagram/States-of-Matter-01.htm and click “Label the Diagram of states of matter”. In this site your understanding and learning will be assessed about the changes of the particles of matter.

, http://go.hrw.com/eolang/myomed/creating.htm This site is essential for students to create their own presentation for the lesson in particulate nature of matter. Just follow the steps to make your multimedia successful.

https://docs.google.com/viewer?a=v&q=cache:5lGBM-8HvUoJ:vscott.cmswiki.wikispaces.net/file/view/3.01%2BMultimedia%2BPresentation%2Bactivity.doc+activity.+on+multimedia+presentation&hl=en&gl=ph&pid=bl&srcid=ADGEESheT2CGieHAyM1oBejWw_KgHmO9tNhyRxBrJFTwZmMJrsU8oIdjPwSZK6QUMZ8_8XwN6qqB_Nvl4zxKY8vK2ydAAhS6HPtaPbTMMkpFFagbN3wwM3Ddjnezcnqtvkb5MtamotB5&sig=AHIEtbR7dQWFfzclfUVnHG5339aob6nNaw This site is a guide for you to create your own multimedia presentation.

Lesson 2: Atomic Structure

In this lesson, you should be able to:

1. name and describe the atomic particles
2. determine the number of protons, neutrons and electrons in an atom.
3. recognize that an element is identified by the number of protons in the nucleus
4. describe how electrons are arranged in a atom
5. explain how ions are formed
6. write the formula of common ions

PRE-ASSESSMENT:

Let's find out how much you already know about this module. Click on the letter that you think best answers the question. Please answer all items. After taking this short test, you will see your score. Take note of the items that you were not able to correctly answer and look for the right answer as you go through this module.

1. Which of the following statements is incorrect?
   a. Electron is a light and negatively charged particle.
   b. Number of electrons is equal to the number of protons.
   c. Electrons are located outside the nucleus.
   d. Electrons are negatively charged and it is where the mass of the atom is concentrated.

2. An element with the symbol $_{23}X^{55}$ has the following number of subatomic particles…
   a. 23 protons, 32 neutrons and 23 electrons
   b. 45 neutrons, 23 electrons and 23 protons
   c. 23 protons, 23electrons and 32 neutrons
   d. 23 protons, 23 electrons and 55 neutrons

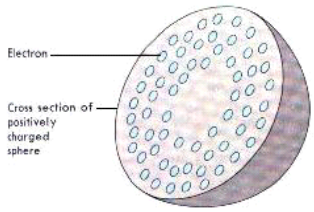
3. Ions are formed when
   a. an atom loses an electron
   b. an atom loses a proton
   c. an atom loses a neutron
   d. an atom gains a proton

4. Your uncle complained about feeling weak and dizzy and having experienced palpitation. The doctor's diagnosis is that he has hyperthyroidism, which may lead to goiter. Which of the following ions is related to this disorder?
   a. Calcium ion
   b. Potassium ion

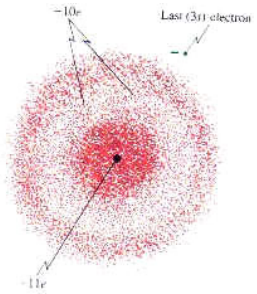
c. Iodine ion
d. Sodium ion

5. Which of the following atomic models is the result of Rutherford's experiment on gold foil?

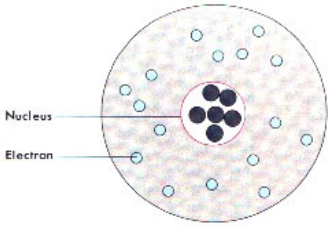
a.



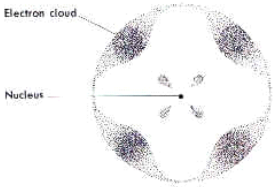
c.



b.



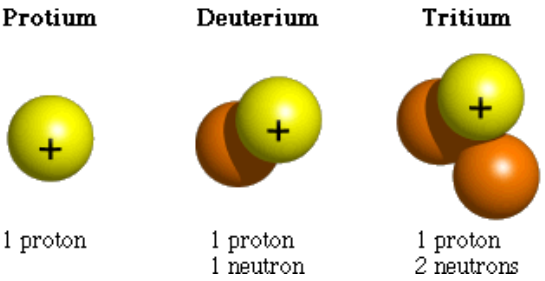
d.



http://hi.fi.tripod.com/timeline/

6. Isotopes of hydrogen are illustrated below. Which of the following statements is NOT true about isotopes?
   a. They have the same number of protons.
   b. They differ in masses because of their difference in the number of neutrons.
   c. They have different number of neutrons so they differ in charge.
   d. They are atoms of the same element.

The Nuclei of the Three Isotopes of Hydrogen

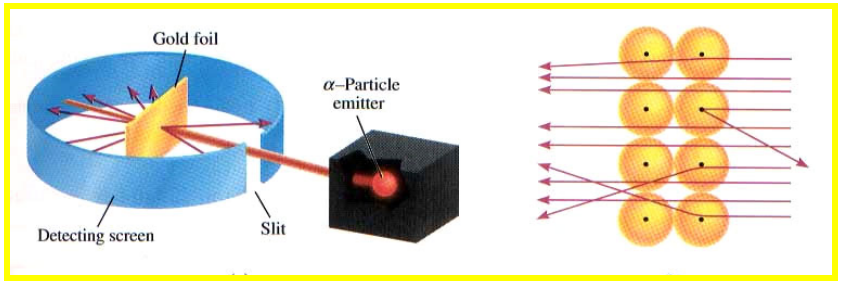


http://education.jlab.org/glossary/isotope.html

7. From the gold foil experiment of Rutherford, the following statements were concluded:
   a. The atom is mostly empty space.

b. The positive charge and the mass of an atom is concentrated at its center called “nucleus”.
c. The nucleus is composed of protons and neutrons
d. The electrons are distributed around the nucleus, and occupy most of the volume of the atom.

From the picture, it shows that some alpha particles (+2 charge) were deflected. Which of the conclusions given above is formed based on this observation?



8. Rene is employed in a factory of fire crackers as part of the Research and Development staff. If he will be making a new line of fire crackers, which do you think should be the experiment that he should try?
   a. Gold foil experiment
   b. Cathode ray
   c. Flame test
   d. Oil drop

9. Anemia is caused by shortage of red blood cells, which are involved in the transport of oxygen from the lungs to the tissues. Which ion plays a key role in the action of hemoglobin in the red blood cells?
   a. Calcium
   b. Iodine
   c. Phosphorus
   d. Iron

10. If you are a proton inside an atom, which of the following would affect you most?
    a. Removal of an neutron
    b. Movement of electron around the nucleus
    c. Behavior of neutron
    d. Transfer of electron to another atom

11. Of the ions below, only _____ has a noble gas electron configuration.
    A. S^{3+} C. O^{2+}
    B. I^{+} D. Cl^{-}

12. In which set do all symbols have the same number of electrons (isoelectronic)?

A. He^0, Ne^0, Ar^0 **C.** S^{-2}, Cl^-, Ar^0
B. Li^+, Ne^0, Na^+ **D.** Cl^-, Ar^0, Na^+

13. When Rutherford bombarded gold foil with positively charged alpha particles, most of the particles went through but some were deflected back. Rutherford concluded that atoms

A. are solid spheres. **C.** contain neutral particles.
B. have negative charges. **D.** have positive nuclei

14. What neutral atom has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$?

A. $_{19}K$ **C.** $_{56}Ba$
B. $_{20}Ca$ **D.** $_{17}Cl$

15. Which electron configuration represents the $_{29}Cu^{+2}$ ion?

A. [Ar] $3d^8$ **C.** [Ar] $3d^7\ 4s^2$
B. [Ar] $3d^9$ **D.** [Ar] $3d^{10}\ 4s^1$

For numbers **16-17**, Use the diagram below:

A. B. C. D.

16. Which of the following models best describes the picture of the atom as it existed around 1900, after the work of Thomson?

17. Which best represents the model of the atom Dalton's Atomic Theory?

18. The "plum pudding" model of the atom was devised by:

A. Dalton C. Democritus
B. Rutherford D. none of the above

19. Bohr's model of the atom was able to accurately explain:

A. Why spectral lines appear when atoms are heated.
B. The energies of the spectral lines for each element.
C. Why electrons travel in circular orbits around the nucleus.
D. none of the above answers is correct.

20. What subatomic particle has a mass of one atomic mass unit?

A. proton C. neutron
B. electron D. proton and neutron

EXPLORE

What makes up things? How can you describe the size of an atom? Do you think humans are made up of atoms? How small is an electron? If electron is a human being, what are its characteristics? Can two substances look alike yet be actually different? Conversely, can several substances look different, but are actually the same? Is it possible for several substances to be made of the same thing?

Do all foods have the enough nutrients and minerals that would make our body healthy? Interesting questions but are you ready to discover the atomic world?

Let's begin by doing this activity.

ACTIVITY 1. CheMYXtry Music Video

Welcome to ChemYXtry!!!

The week's top chart in music is featuring the top 2 music video for the discovery of the atom:

A. http://www.youtube.com/watch?v=QbWKF9uDF7w

B. http://www.youtube.com/watch?v=WK7wuTwAiBU

Processing Questions:

1. What is an atomos?
2. Compare and contrast the content of the two video-clips.
3. What are the atomic sub-particles?
4. How did chemists make their proposed model of the sub atomic particles?
5. What makes substance differ from each other?

ACTIVITY 2. _PICK YOUR CHOICE

"What I Want to Eat'

If you are to arrange the pictures in order of your choice, how will it be? Put a number in the box picture to indicate your order with number one as your first choice.

How did you arrange the foods? What are your bases? Are these foods just delicious or nutritious? If they were nutritious, what do you think are the components of these foods? What do you think are these foods made of?

To be able to answer the focus questions, let' try to find out what building blocks, the particles and the materials made up our foods. But before we get there, let us first review our prior knowledge. Let's do the next activity.

ACTIVITY 3. GENERALIZATION TABLE

This topic will be focusing on the nature of substances. . Now, think of the following question: How do substances differ from each other? You will accomplish the 1st column of the Generalization Guide to express your prior thoughts about this topic.

GENERALIZATION TABLE

MY THOUGHTS	*MY FINDINGS AND CORRECTIONS*	*SUPPORTING EVIDENCES*	*QUALIFYING CONDITIONS*	*MY GENERALIZATION*

End of EXPLORE:

You just tried finding out what substances are made up of.
Let's now find out what the answer is by doing the next part.
What you will learn in the next section will also enable you to do the final project which involves comparative analysis of foods.

Everything around us is matter. But what makes matter? Should we be thankful to Democritus for bringing the concept of atom? How did scientists come up with their sub atomic particles' experiment? Let us start by doing the next activity.

FIRM-UP

Your goal in this section is to learn and understand key concepts about atom, which is the basic particle of matter. Substances have a special link with atoms. You will take a closer look at atoms. Where do we find atoms? Are they arranged in one way? If not, how many possible ways? Does an atom itself consist of something else? Let's find out in the next activity.

How are the concepts of atom developed? What's inside the atom?
What atoms are present in substances that we are using?

ACTIVITY 4. ATOM ADVENTURE

Do you believe that there are smaller particles that make up everything? Like "LEGO" tiles that are used as building blocks of toy planes, trucks and robots, every material is said to be made up of particles called "atoms". Let's find out by doing this activity.

A. What is an Atom?

Click on these websites

1. http://www.youtube.com/watch?v=wRYfbGPG3LA
   This is a video in a form of cartoons entitled **"Everything is made up of atom"** will give you insight about atom.
   Process Questions:
   a. What are atoms?
   b. What materials are made up of atoms?
   c. Do you agree that we have not seen one atom but we have seen billions of it? Explain what this statement means.

Now that you have learned that everything is made up of atoms, let us go deeper and investigate on what is inside the atom. Is it rigid or hollow? Are there other things inside it? If yes, how come this very small particle could still have something inside? Let us view this video to find the answers to this questions.

2. http://www.youtube.com/watch?v=yQP4UJhNn0I
   John Bergmann **" Just How Small is An Atom"** , Video on what is inside the atom.
   Process Questions:
   a. How small is an atom?
   b. What are the particles inside the atom?
   c. How do you compare the size of the nucleus to the size of the atom?
   d. How dense is the nucleus?
   e. What are inside the nucleus?
   f. How are particles arranged inside the atom?
   g. Why is the atom mostly empty space?
   h. From the video, materials like the house, blueberry and foot ball field are used to describe the size of atom and nucleus. Can you give your own comparison to show that you have imagined the difference in sizes of these two particles?

Somehow, you have now the idea on how small is an atom and how it looks like inside it. You have learned that there are other smaller particles that composed the atom. But how important are these particles? What are their properties and functions? How understanding their properties will help us understand the behavior of an atom? Let us try the next activity to answer these questions.

ACTIVITY 5. "What's Inside it?"

Subatomic Particles

Open this webpage. These give you an overview of the descriptions of the subatomic particles

1. http://www.miamisci.org/af/sln/phantom/spectroscope.html
   Atomic structure with moving electrons

2. http://www.windows2universe.org/physical_science/physics/atom_particle/atom.html Atomic structure with animated subatomic particles
   Click on the name of the particles inside the atom to have full description of each.

Process Questions:

1. Can you describe the positions of the particles inside the atom?
2. What can you say about the space between the nucleus and the surrounding electrons?
3. What other properties of subatomic particles can you give?
4. Can you compare their charges? their masses? or their sizes? Tabulate the comparison of their properties.

Subatomic Particle	Symbol	Mass (Kg)	Charge	Discoverer

3. http://www.particleadventure.org/eternal-questions.html
   More subatomic particles

Process questions:

a. Are there other particles which are smaller than electrons, protons and neutrons?

b. What are their functions? Are they still important?
c. What are protons made of?
d. What are neutrons made of?
e. What are anti particles?

After going through these web pages you have now enough knowledge about atom. Try the next activity to evaluate what you have learned from previous activity.

EXERCISE NO. 1: CHECK UP QUIZ:

Answer the following questions to test your understanding.

1. Which of the following is responsible for the positive charge of the nucleus?
a. electron b. neutron c. quark d. proton

2. The particle with the least mass is
a. neutron b nucleus c. electron d. proton

3. Which of the following statements is true about the atom and the nucleus?
a. Nucleus is found anywhere inside the atom.
b. The nucleus is very small compared to the size of the atom.
c. The nucleus is positive thus atom is also positive.
d. Inside the nucleus are protons and electrons.

4. Who discovered electrons?
a. Goldstein b. Dalton c. Chadwick d. Thomson

5. The electrons are
a. moving around the nucleus
b. neutral in charge
c. found always with proton
d. not involved in the reaction of atoms

6. Neutron is made up of
a. 2 down quarks and 1 up quark
b. 1 down quarks and 2 up quark
c. 3 down quarks and 3 up quark
d. 2 down quarks and 3 up quark

7. The anti particle of electron is
a. Proton b. gluon c. baryons d. positron

8. Which of the following statements is NOT correct?
a. Neutron and proton have almost equal masses.
b. The charge of the nucleus is neutral because of the presence of neutron.
c. The electron is the lightest among the three subatomic particles.
d. The electrons have the same number as of protons.

9. Which is true about the motion of electrons? Electrons are moving
a. around the nucleus through pathways called orbits.
b. in random and zigzag motion.
c. in circular motion towards the nucleus.
d. in parallel motion in reference with the nucleus.
10. Who discovered the nucleus of atom?
11.
a. Dalton b. Thomson c. Goldstein d. Rutherford

Key Answers:
Answer the following questions to test your understanding.
1. Which of the following is responsible for the positive charge of the nucleus?
a. electron b. neutron c. quark d. proton***

2. The particle with the least mass is
a. neutron b nucleus c. electron*** d. proton

3. Which of the following statements is true about the atom and the nucleus?
a. Nucleus is found anywhere inside the atom.
b. The nucleus is very small compared to the size of the atom.***
c. The nucleus is positive thus atom is also positive.
d. Inside the nucleus are protons and electrons.

4. Who discovered electrons?
a. Goldstein b. Dalton c. Chadwick d. Thomson***

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2 down quarks and 1 up quark***

1 down quarks and 2 up quark
3 down quarks and 3 up quark
2 down quarks and 3 up quark

The anti particle of electron is
Proton b. gluon c. baryons d. positron***

Which of the following statements is NOT correct?
Neutron and proton have almost equal masses.
The charge of the nucleus is neutral because of the presence of neutron.
The electron is the lightest among the three subatomic particles.
The electrons have the same number as of protons.***

Which is true about the motion of electrons? Electrons are moving
around the nucleus through pathways called orbits.
in random and zigzag motion.***
in circular motion towards the nucleus.
in parallel motion in reference with the nucleus.
Who discovered the nucleus of atom?
Dalton b. Thomson c. Goldstein d. Rutherford***

Questions :

1. How do you describe an atom?
2. What smaller particles are inside the atom?
3. How are subatomic particles arranged inside the atom?
4. How do you describe each particle inside the atom?
5. Are atoms made up of much smaller particles?
6. How do substances differ from each other?

EXERCISE NO. 2: GRAPHIC ORGANIZER

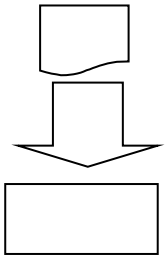
Concept map
Fill up the shapes with word(s) or phrases depending on the following legend:

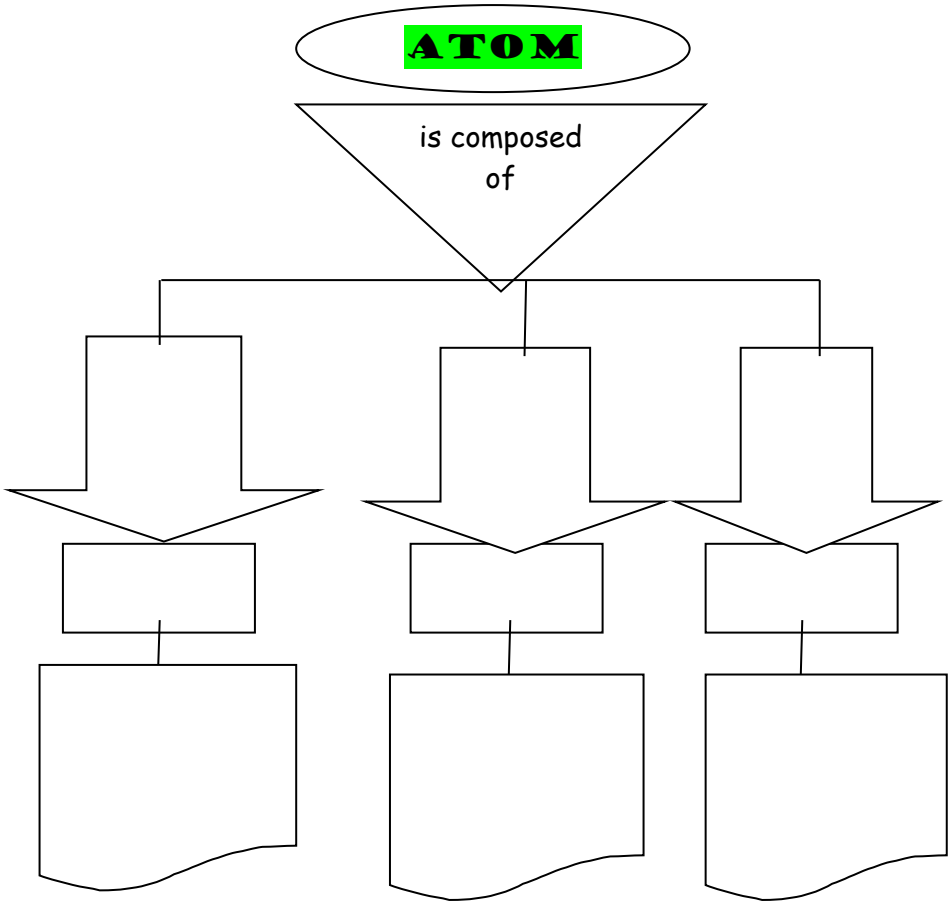
Legend:

Description of subatomic particle

Charge of subatomic particle

Name of subatomic particle





We have now explored the atom but have you ever wondered how scientists come up with the idea of atom? You will learn this in the next activity.

ACTIVITY 6. ATOMIC TIMELINE

Click on these web pages. By opening these web pages you will trace the development of the idea of atom from the very beginning up to the present. Let us start traveling in time.

1. http://www.docstoc.com/docs/125152019/Atom-Theories-development-of-the-atom PowerPoint presentation about atom

2. http://www.docstoc.com/docs/81585722/atom-development-project PowerPoint presentation on the development of atom

Process Questions:

1. What are the first ideas of scientists about atom?
2. Do they have the same ideas? How did they come up with new ideas that we are using at present?
3. What experiments were performed by the scientist?

Based on the Powerpoint presentations that you have viewed, accomplish the table below by writing the ideas of the scientist on the left side and draw their atomic models on the right side . Submit this file as a conversion of web pages information as a summary in table or graphic organizer to your tutor.

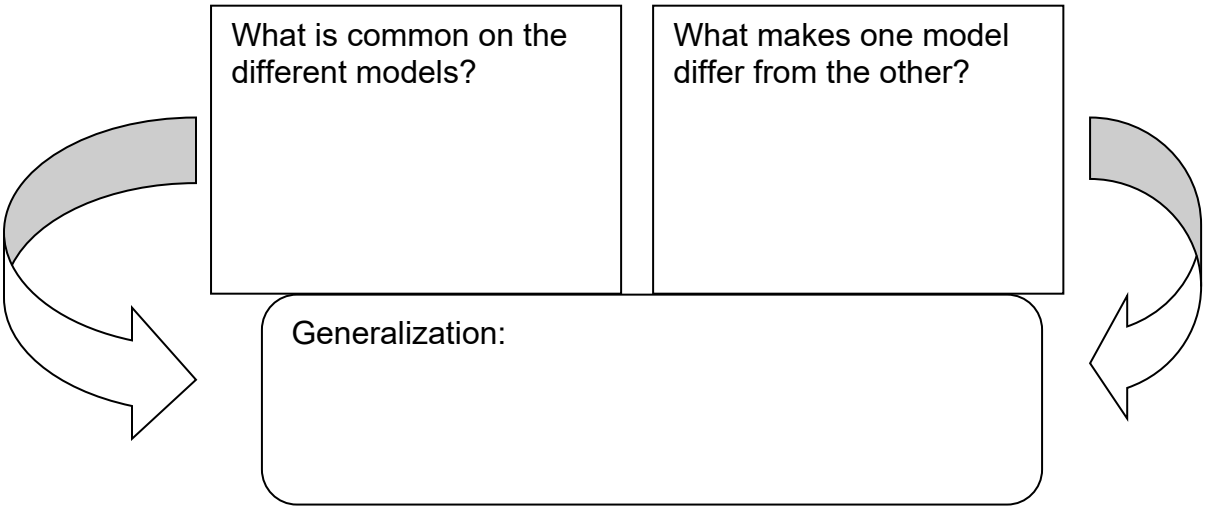
ɛmocritus Idea	ɒdel
ɹlton's Ideas	ɒdel
ɹomson's	ɒdel

utherford's	odel
ohr's	odel
chrodinger's	odel

Process Questions:

1. Whose work is credited with being the beginning of modern atomic theory?
2. What are the sub-atomic particles?
3. Basing from the different models, what's the common denominator?
4. How are these concepts helpful in identifying substances?

Base from the activity, describe how the atoms and its subatomic particles were developed through time and. Make one general statement about it.



You have explored the nature, the properties, the models and history of an atom. This time let us see if you can recall some of the concepts that you have encountered in the previous activities.

EXERCISE NO.3: Concept Check

ATOMIC FILLING UP

What have you learned so far? Can you see the connections on how sub-atomic particles were discovered? Let's see if you can connect one statement from another. Do the concept check below.

Fill in the box by typing the correct word which will complete the statement. You can click for hint if you are not sure of your answer but note that a hint given means a minus point!

http://www.kchemistry.com/Quizzes/AtomHistry.htm

Key answer:

Greek philosophers thought that matter was made of four elements which are earth, air, fire, and water. But Democ proposed that if a material is continuously cut, there will come a time when it will be indivisible. He called it atom. But his idea was forgotten for sometimes until JOhn D developed a theory that used Democritus' idea as basis. He developed four ideas about the atom:

1. All matter is made of atoms which are extremely small and indivisil particles.

2. All atoms of a given elements are alike. Atoms of different elements are differen. Atoms of different elements have different masses.

3. In a chemical reactions, atoms are rearran.

4. When atoms combine, they do it in a same number ratios. Compounds have set of formulas that have small number ratio.

After this theory, J.J. Tho proposed that an atom has scattered negative and positive charges. His atomic model was called Raisin E. This idea was again changed when Rutherf performed GOld fo experiment which proved that an atom has a positively charged nucleus.

Did you do well in the learning check up? If not, you can repeat it until you get a good score.

At this point you can go back to your GENERALIZATION TABLE and fill up the 2nd (My Findings and Corrections) and the 3rd Column(Supporting Evidences) to keep track on your progress in this lesson.

ACTIVITY 7. Atomic World of Food

Atoms make up all substances, including food. In this activity, you will get to see the connection of food in Chemistry. Chemistry studies how atoms react with each other and the changes that occur when that happens. When you heat food, freeze it, mix it and store it, you are making changes to the atoms in food, and that all boils down to chemistry. Food chemists are experts who study the atoms in food and how they react to change.

Now, you are aspiring to be a food chemist. Then, you are asked by your company to study details regarding nutrients found in foods.

To really become an expert you are asked to study nutritional fact present in food. Read/watch the following websites as your guide:
A. Figuring Out Food Labels
http://kidshealth.org/kid/stay_healthy/food/labels.html

B. Nutrition Labels: How to Read them
http://www.huffingtonpost.com/2012/09/17/nutrition-labels-how-to-read_n_1889011.html

C. Interview a nutritionist

http://www.youtube.com/watch?v=qikCr_f26iw

Process Questions:

1. What are nutritional facts?
2. What are the main components of food?
3. Are these components helpful in identifying foods? Explain further.
4. How are substances differ from one another?

Now that you are already equipped with the knowledge of concepts about atom, let's go and explore more. If atom composed everything, then elements are made up of atoms. Do atoms of specific element differ from atoms of another element? Are subatomic particles the same in every atom? What is the importance of the number of protons, electrons and neutrons in an atom? Can this particles help us determine substances? How do substances differ from each other?

Let's proceed to the next activity to answer these questions.

ACTIVITY 8. Mass Number and Atomic Number

What is an atom's atomic number?

The **number of protons** in the nucleus of an atom **determines an element's atomic numbe**r. In other words, each element has a unique number that identifies how many protons are in one atom of that element. For example, all hydrogen atoms, and only hydrogen atoms, contain one proton and have an atomic number of 1. All carbon atoms, and only carbon atoms, contain six protons and have an atomic number of 8. Oxygen atoms contain 8 protons and have an atomic number of 8. **The atomic number of an element never changes, meaning that the number of protons in the nucleus of every atom in an element is always the same.**

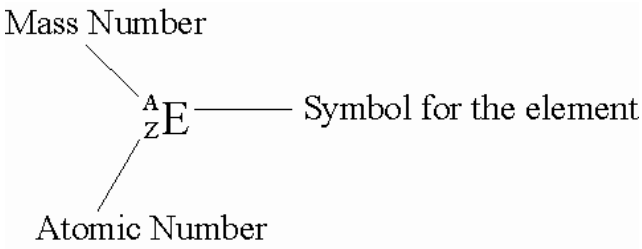
http://www.ndt-ed.org/EducationResources/HighSchool/Radiography/atomicmassnumber.htm

What is the Atomic Number?

The number of protons in the nucleus
is called the atomic number.
For sodium (Na) the atomic number is 11.
The atomic number tells you what the element is
(see the periodic table).
The atomic number of an element never changes.

What is the Mass Number?

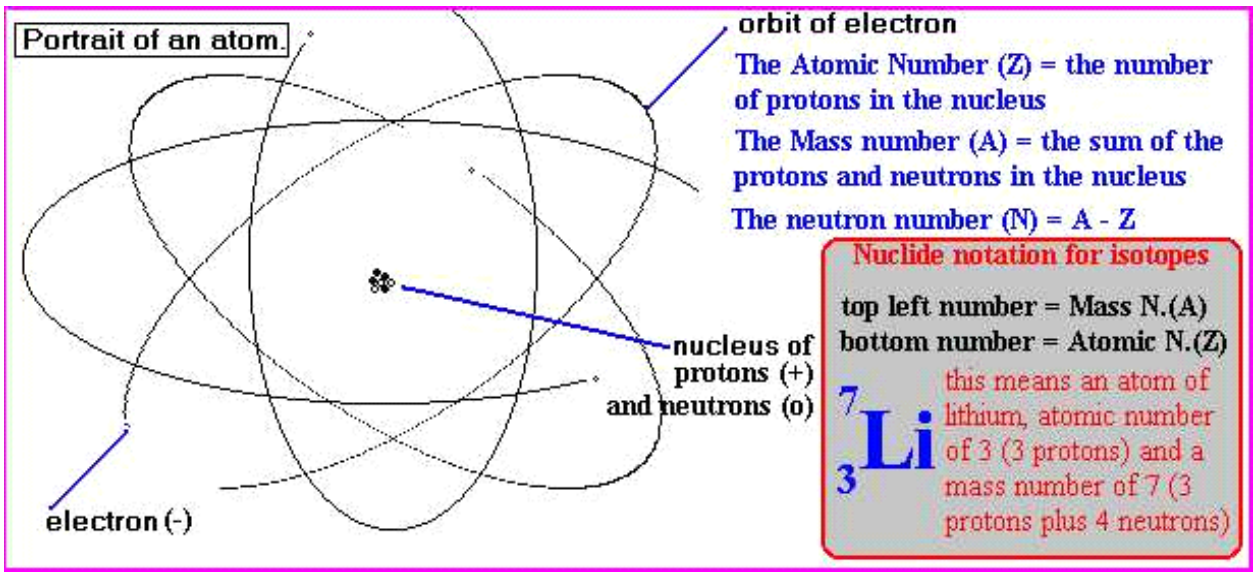
The number of protons plus the number of neutrons
is called the mass number.
Sodium has 11 protons and 12 neutrons.
The mass number is 11 + 12 = 23.
The mass number is the total number of particles
in the nucleus. The mass number and the atomic number
are written above and below
the chemical symbol for the element, as shown.



EXAMPLE:

$$^{23}_{11}Na$$

http://www.gcsescience.com/a2-atomic-mass-number.htm



http://www.docbrown.info/page04/4_71atom.htm#1.

Process Questions:

Just to check, we could say that:

1. In the representation $^{A}X_{z}$, A stands for _____ and Z stands for _____.
2. Atomic Number gives the number of _____
3. Mass number is equal to the number of _____ and _____ inside the nucleus of an atom.
4. Since atom is neutral , this means that the number of _____ is equal to the number of _____
5. To determine the number of neutron inside the atom, subtract the _____ from the _____.

Key:

1. In the representation $^{A}X_{z}$, A stands for __(Mass number)_____ and Z stands for (Atomic Number)_____.
2. Atomic Number gives the number of _____(Protons)_____
3. Mass number is equal to the number of (Protons) and _(Neutrons)_____ inside the nucleus of an atom.
4. Since atom is neutral , this means that the number of ____(electron)____ is equal to the number of ___(Protons)_____
5. To determine the number of neutron inside the atom, subtract the (atomic number)_ from the (mass number)_____.

Let us take this next activity to check your understanding.

EXERCISE NO. 4: Work sheet on Atomic Number and Mass Number

Fill up the table below :

SYMBOL	Atomic Number	Mass Number	Proton	Electron	Neutron
64 Cu 29					
___ K ___			**19**		**20**
___ Au ___	**79**	**197**			
65 Zn __					**35**
__ Al __				**13**	**14**

Note: Red numbers are the answers.

Using the previous activity, what insights can you bring in answering this question, "How do substances differ from each other?" Try to give supporting evidences on this and qualifying conditions.

GENERALIZATION TABLE

MY THOUGHTS	***MY FINDINGS AND CORRECTIONS***	***SUPPORTING EVIDENCES***	***QUALIFYING CONDITIONS***	***MY GENERALIZATION***

End of FIRM UP:

In this section, the discussion was about the basic concepts of atom.
What atoms are made up of? How can sub-atomic particles be of help in identifying substances?

Go back to the previous section (Generalization Table) and compare your initial ideas with the discussion. How much of your initial ideas are found in the discussion? Which ideas are different and need revision?

Now that you know the important ideas about this topic, let's go deeper by moving on to the next section.

DEEPEN

Your goal in this section is to take a closer look at some aspects of the atom.

From previous activity, you have learned that atoms are composed of charged particles like protons and electrons but their numbers are equal. That makes an atom neutral. Can atoms be charged? How do we know if they are charged? The next activity will help us answer these questions.

ACTIVITY 9. ELECTRICAL NATURE OF ATOM

Look at these pictures.

http://ph.images.search.yahoo.com/search/images;_ylt=A0S0uD88x6xQDCYACZm1Rwx.?p=rising+of+hair+because+of+electricity&fr=yfp-t-711&ei=utf-8&n=30&x=wrt&y=Search

What do you think is the reason for this phenomenon? Do you think this is supernatural? Let us perform this simple experiment and see how concepts of atom can explain this.

Materials needed:
Pair of scissors
Plastic cover
Comb
Piece of cloth

Procedure:

1. Cut plastic cover into strips at 2 inches by 10 inches size.
2. Rub a strip with the piece of cloth in one direction only for many times.
3. Bring it near your hair. Observe.
4. Do no. 3 for several trials . Incease the frequency of rubbing and compare.What do you observe.
5. Comb your hair. If you have somebody with long hair try combing her hair instead. Do it for several times.
6. Put the comb near your hair and observe.
7. Now , rub a plastic strip like what you have done in no. 2
8. Let somebody comb her hair while you are doing no 7.
9. Now, put the plastic strip and the comb together. Observe.

Data and observation:

	Observation	Charges
Plastic strip rub with cloth		
Comb use in combing hair		
Plastic strip and comb		

How did you find this activity? What do you think happens to the atoms of the plastic? the atoms of the comb?

Read this article to explain your observations obtained from this experiment.

ACTIVITY 10. ATOM AS ELECTRICALLY CHARGED PARTICLE

(LECTURE)

Everything we see is made up of tiny little particles called atoms. The atoms are made of even smaller particles. These are called protons, electrons and neutrons. They are very different from each other in many ways. One way they are different is their "charge." Protons have a positive (+) charge. Electrons have a negative (-) charge. Neutrons have no charge.

Usually, atoms have the same number of electrons and protons. Then the atom has no charge, it is "neutral." But if you rub things together, electrons can move from one atom to another. Some atoms get extra electrons. They have a negative charge. Other atoms lose electrons. They have a positive charge. When charges are separated like this, it is called static electricity.

If two things have different charges, they attract, or pull towards each other. If two things have the same charge, they repel, or push away from each other.

So, why does your hair stand up after you take your hat off? When you pull your hat off, it rubs against your hair. Electrons move from your hair to the hat. Now each of the hairs has the same positive charge. Things with the same charge repel each other. So the hairs try to move away from each other. The farthest they can get is to stand up and away from all the other hairs.

If you walk across a carpet, electrons move from the rug to you. Now you have extra electrons. Touch a door knob and ZAP! The electrons move from you to the knob. You get a shock.

http://www.ehow.com/list_7159393_list-positive-negative-ions.html

You have experienced how materials get charged. Now let us see how neutral atoms become charged particles. But before that, try to deepen first your understanding of the behavior of subatomic particles like electrons.
Though electron is smaller than neutrons and protons, it plays a great part in the activity of an atom.

From the idea of Niels Bohr, electrons are moving around the nucleus following orbits just like the planets in the solar system. But later other scientists claimed that the position of the electrons cannot be determined at a particular place and time.

Processed Questions:

1. An atom is basically a neutral particle. How can it be charged?
2. How atoms be positively charged or negatively charged?
3. What kind of force of attraction exist between particles of the same charge? particles of opposite charge?
4. How can a material be charged?
5. How do we call charged particles? Specifically positively charged? Negatively charged?

From your readings, you've learned that atoms can be charged. But how can that be? What subatomic particles are involved?
How structure of atoms can be affected by making them positively or negatively charged? Let us do the next activity to answer these questions.

ACTIVITY 11. WEB PAGE READING

Read these web pages and see how electrons behave. How electrons form shapes when they move around the nucleus.

1. http://www.chem4kids.com/files/atom_orbital.html
   Basic of electron configuration

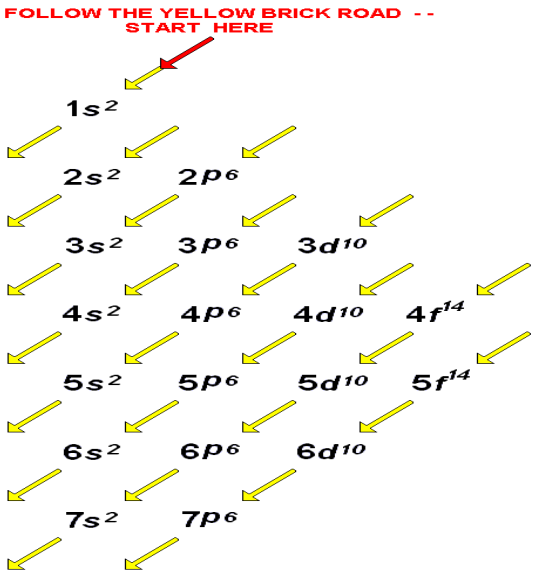
2. http://encyclopedia.kids.net.au/page/at/Atomic_orbital
   basic electron configuration for kids
3. http://www.slideshare.net/Komperda/electron-configurations#btnNext
   Power point presentation on atomic configuration

4. http://www.slideshare.net/gengarl/how-to-write-electron-configurations-13456823#btnNext
   PowerPoint presentation on how to write electron configuration.

What is a shell? How are they named? Where can you find electrons? What shapes are formed by electrons? How do you write electron configuration? How does electron configuration help you figure out how electrons are distributed inside the atom? Can you draw an atom by interpreting its electron configuration? Let's see if you could answer this exercise.

Writing Electron Configuration

Look for the following elements in the periodic table. Get their atomic number which is equal to the number of their electrons. And write their electron configuration. Periodic table and Electron distribution pattern are provided for you.



http://www.chemtutor.com/struct.htm

After going through this lecture on writing electron configuration, take this sample practice test in preparation for the CHECK UP POINT. Click of this web page and try to give your answer for each item.

http://www.mpcfaculty.net/mark_bishop/complete_electron_configuration_tutorial.htm Practice exercise in writing electron configuration.

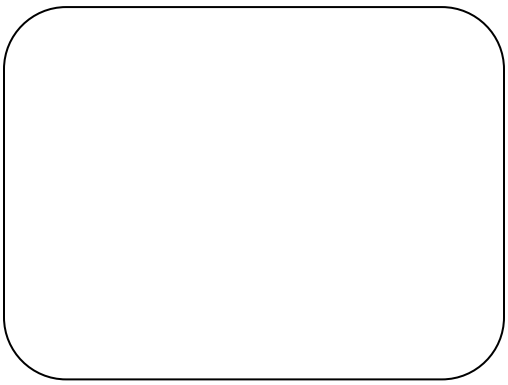
Did you do well in this exercise? If you give incorrect answer, check the correct one and review. You can always retake the exercise until you obtain the perfect score.

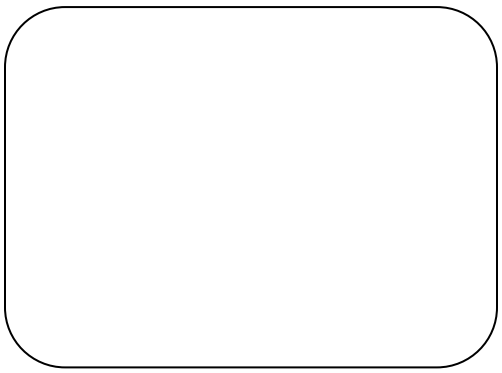
EXERCISE NO. 5: WRITING ELECTRON CONFIGURATION

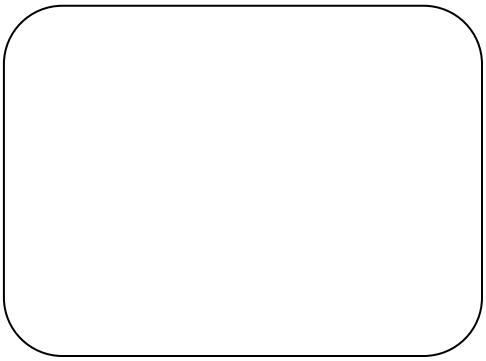
If you are now ready, take this exercise below:
Get your periodic table. Locate the given elements. Take their atomic number and write their electron configuration and MEL Distribution:

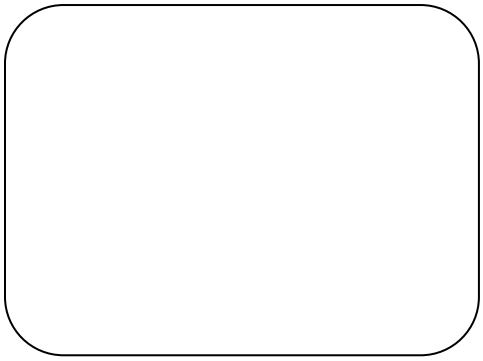
ELEMENT	ATOMIC NUMBER	ELECTRON CONFIGURATION	MEL Distribution
K			
Ge			
Rb			
In			
Xe			

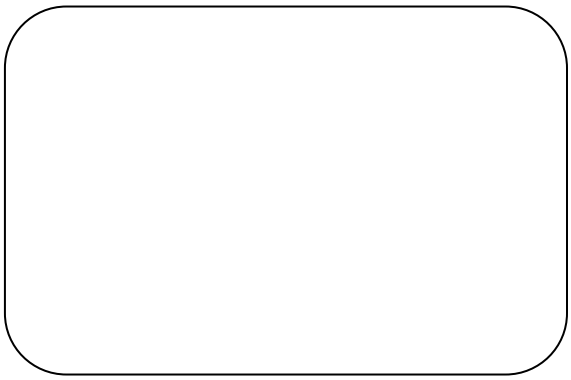
Now, based on their electron configuration and MEL Distribution , illustrate the atoms of the elements given above.











Send your answer here to your teacher as part of your **E-portfolio**. Now that you know already know how to write electron configuration, let's see how it affects the atom itself in actual experiment.

ACTIVITY 12. The Flame Test Worksheet

Materials:
0.5 molar of the following solutions:
Barium chloride
Lithium chloride
Sodium chloride
Copper chloride
Calcium chloride
Cesium chloride
HCl
Dropper
Wire loop
Burner

Procedure

1. Put on lab gown and safety goggles.
2. Add 15 drops of each 0.5M solution to a different clean test tube.
3. To clean the wire, dip it into the test tube of 1M of HCl and heat the wire in the hottest part of the flame until no color shows.
4. When the wire loop is clean, dip the wire in the test tube containing a 0.5M solution and hold it in the hottest part of the flame. Record your observation of the color of the flame on the data table.
5. Repeat the process of cleaning the wire loop. Now get ready to test another solution.
6. Test all of the solutions and make sure that you record the color of the flame for each element on the Data Table.
7. Before leaving the laboratory, wash your hands thoroughly with soap and water.

http://imagine.gsfc.nasa.gov/docs/teachers/lessons/xray_spectra/student-worksheet-flame.html

Data and observation:

ELEMENT	COLOR
Calcium (0.5M CaCl)	
Sodium (0.5M NaCl)	
Barium (0.5M BaCl)	
Lithium (0.5M LiCl)	

Copper (0.5M CuCl)	
Cesium (0.5MCsCl)	
Potassium (0.5M KCl)	

Guide questions:

1. What is the use of the HCl in the experiment?
2. What do you think has taken place during the Flame Test whereby various colors of light have been emitted?
3. What particles are found in the chemicals that may be responsible for the production of colored light?
4. Why do different chemicals emit different colors of light?
5. Why do you think the chemicals have to be heated in the flame first before the colored light is emitted?
6. Colorful light emissions are applicable to everyday life. Where else have you observed colorful light emissions. Are these light emission applications related? Explain.
7. What is the characteristic flame color for Sodium, Lithium, Barium, Cesium, Calcium and copper?

ACTIVITY 13. CHEMISTRY OF FIREWORKS: Video-Clip

In this activity, you will get to know that chemistry is everywhere as atoms are.

To check if you have obtained correct results in your flame test, watch these videos of actual Flame test.

The video clip below is about the metal flame test:

1. http://www.youtube.com/watch?v=Vmlj6B3mRaE&feature=related

The second video is about characteristics color of alkali metal thru flame test:

2. http://www.youtube.com/watch?v=QNojS6ZZ4og&feature=endscreen&NR=1

The third video is about coming up with your own flame test:
3. http://www.youtube.com/watch?v=Dw5bmM-sw3A&feature=related

If electrons can jump from one shell to another, is it also possible that theycan jump and transfer to another atom? What is formed when this happens? Are there things which are made up of ions? Why are ions important? Do we have ions in our body? What ions are needed by our body? These are the questions that we have to consider while doing the next activity

ACTIVITY 14. FORMATION OF IONS

Now that you have made inferences on how electrons in an atom behave, let us check on these videos and see how ions are formed.

1. http://www.youtube.com/watch?v=upg-FUHp6ys
   Formation of ions
2. http://www.youtube.com/watch?v=xTx_DWboEVs
   Formation of ions in chemical bonding
3. http://www.youtube.com/watch?v=QqjcCvzWwww
   Formation of positive and negative ions

Process Question:

1. How are ions formed?
2. How are positive ions formed? How are negative ions formed?
3. What subatomic particles are involved in the process?
4. What makes ion differ from an ordinary atom?
5. How do use ions in identifying substances?

ACTIVITY 15. IONS IN THE BODY

From the previous activity, you have learned that ions are formed when electrons are gained or donated by an atom. An atom that donates an electron becomes positively charged while the one that gains an electron becomes negatively charged.

Let us discover the ions that we have in our body.

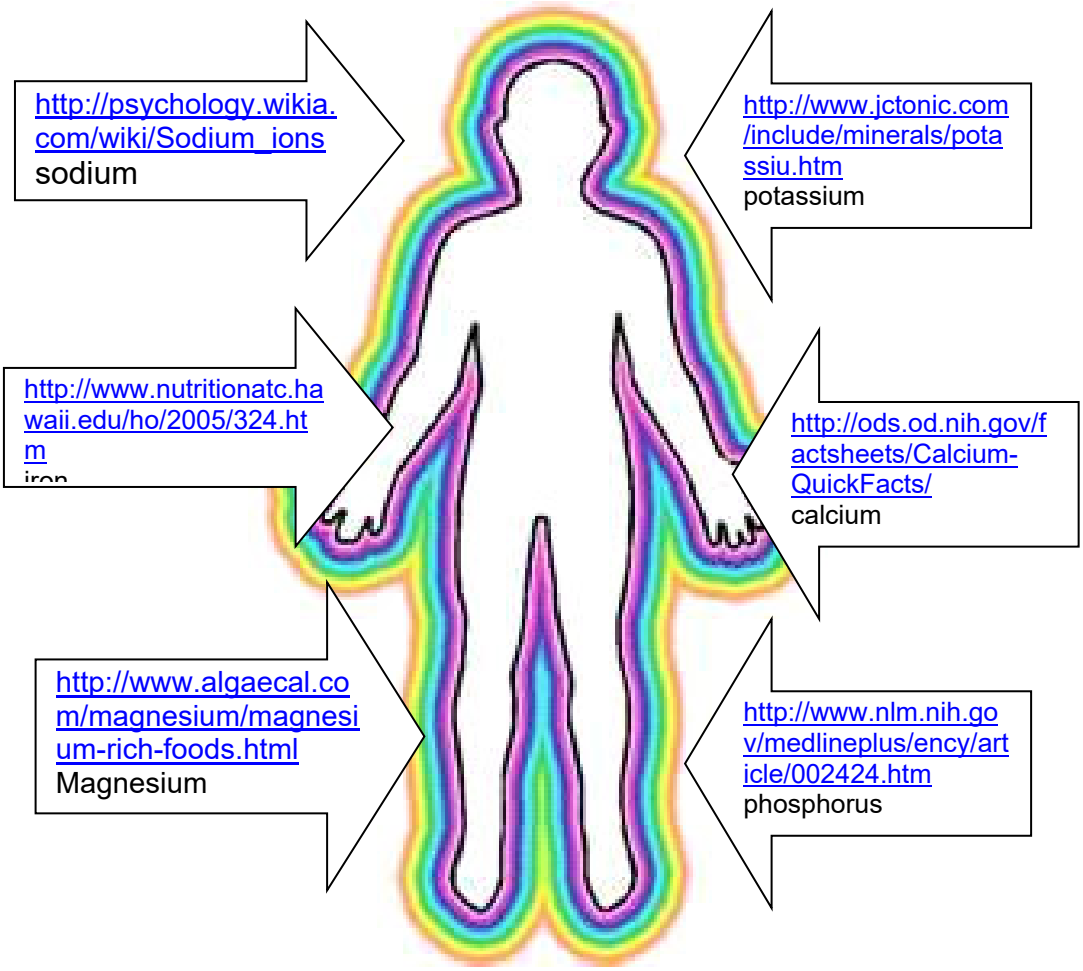
1. Click on the web pages in the arrow pointing towards the human body.
2. Make your own matrix where you can have all the information about ions in our body.
3. Construct and organize your own table. It should contain the following:
   a. Function
   b. Deficiency
   c. Effect of too much
   d. Recommended daily intake
   e. Sources
4. You can add more ions that are present in the body.

What other ions are found in our body? Do you think you are taking the recommended amount of each ion? Are you eating the foods that these ions are present? other?

How can you tell if foods you eat are appropriate to your health or not? Are the components of food composed of different substances? How do substances differ from each other?

Now, it's time for you to complete the Generalization Table.

Generalization Table and answer columns 4. Are your thoughts the same as what you have learned in this lesson?



ACTIVITY 16. What Atoms Are In Sour Foods?

Materials Needed:
Five amber dropper bottles filled with:
orange juice (pulp free)
milk
lemon juice
vinegar
water
dropper bottle with green dye (pH indicator diluted to 20% in water
plastic cups
marker

Click on this webpage to see the full instruction of the activity.
http://www.nyscience.org/biochem/content/educators/sour_foods-educators.pdf

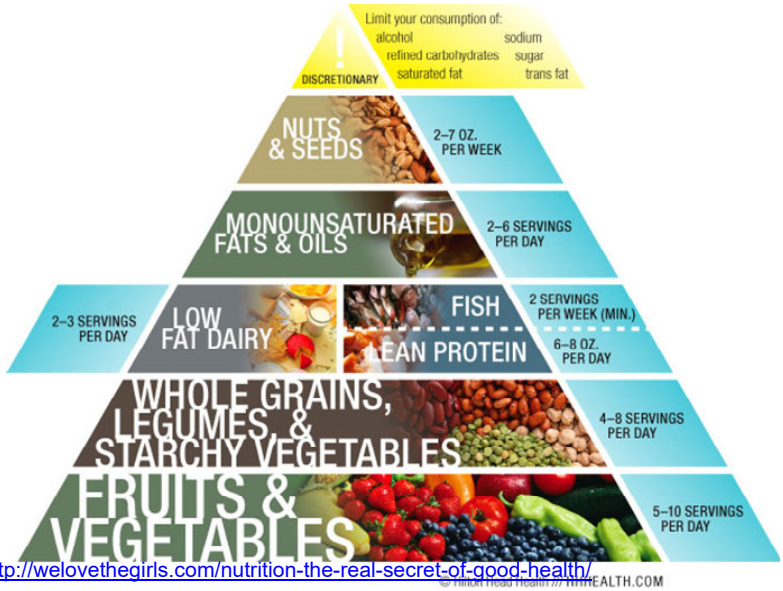
From this experiment ,what makes these foods taste sour? What atom is present in sour foods? What food has the greatest number of atom or the one higher in concentration of this atom? Does the sourness of these foods matches with what you predicted using this experiment?

The Science Behind the Investigation:
Dye is added to unknown liquids. The dye (pH indicator) turns different colors depending on the concentration of loose hydrogen atoms (hydrogen ions). Each food turns a different colour, and the foods that are the most sour have the highest concentration of loose hydrogen atoms. The foods that are the least sour have the lowest concentration of loose hydrogen atoms. By looking at the color of the dye, students can predict which foods are the most sour and which are the least sour.

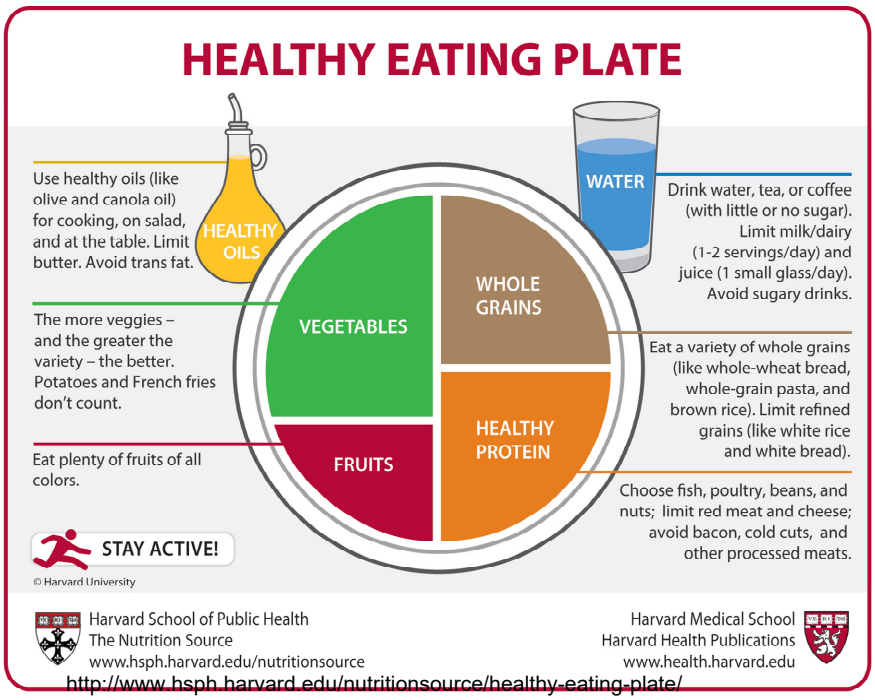
Now that you have proven that atoms are present in foods let us learn more about atoms. Let us strengthen your knowledge about atoms by doing the next activity.

ACTIVITY 17. Nutritionally speaking!

Study the images below:



http://welovethegirls.com/nutrition-the-real-secret-of-good-health/



Now use also the images, to study the nutritional value you can get from food.

You are to look for two identical foods. Check on the nutritional value you can get from the two.

You will create a table of comparison of nutrients of a given food products like biscuits. You will compare the amount calories ,ions, ,fats, proteins and vitamins per serving of the food product and compare it with the required daily intake.

You will make conclusion on which brand conforms to the required daily intake.

Process questions:

1. What ions are present in your food?
2. How do you relate ions to healthy foods?
3. Do you agree with the statement: more ions, healthier foods? Explain your answer.
4. How does the food differ from one another?
5. How do substances differ from each other?

ACTIVITY 18. FOOD GAME

Now click on this web page
http://school.fueluptoplay60.com/tools/nutrition-education/games/arianna/quintricious.php

1. Click on this website
2. Play the game by identifying the set of foods given as fruits , vegetables milk products and grains

ACTIVITY 19. COOKIES MAKING

Click on this web page and view this video of making cookies. Take note of the ingredients, measurements materials and procedure used.

http://www.youtube.com/watch?v=J8eUcEvLQ2g cookies making video

Adopt the same procedure to make your own cookies. But this time, you will be adding fruits or vegetables that contain nutrients, ions and minerals which are essential to the body.
The taste and appearance of the your finished product should not be sacrificed even with the addition of the fruits and vegetables.
Your output for this activity will be a cookies making video and a table showing summary of the nutrients that could be obtained from your product. The table should show **nutrients, source ingredients, estimated amount and required daily intake**.

Process questions:

1. Do you think your product contains ions that are good for your health?
2. Based on your table, did your product meet the daily requirement of the nutrients that are good to our health?
3. Do you think adding vegetables or fruits enhanced the products essential nutrients?
4. What recommendations can you give to improve the quality of your product?

End of DEEPEN:

In this section, the discussion was about the presence of atoms and ions in things around us, especially foods.

What new realizations do you have about the topic? What new connections have you made for yourself?

Now that you have a deeper understanding of the topic, you are ready to do the tasks in the next section.

TRANSFER

Your goal in this section is apply your learning to real life situations. You will be given a practical task which will demonstrate your understanding.

ACTIVITY 20. ANALYSIS OF FOOD PRODUCT

Procedure:

1. Select a line of food product like biscuits, chips, cup cakes, canned goods, cold cuts, hot dogs, etc.
2. Collect ten different brands of your selected product.
3. Determine the ingredients by looking at the labels. Look at their nutritional facts in their labels.
4. Design a table where you could compare the amount of different ions, minerals, vitamins, carbohydrates, proteins and calories.

What minerals, ions and other substances are present in the food product that you have selected? Which brand has substances which you think are healthy and substances which are not healthy? Which brand has the highest percentage of vitamins, mineral, carbohydrates and proteins? Can you identify the one which could give you the recommended daily amount of nutrients?

ACTIVITY 21. PERFORMANCE TASK

In your village, where most of the parents especially mothers are working and are busy, children are noticed to be malnourished, not because they cannot afford to buy foods but it isfound that their food intake are no longer nutritious.

As the new nutritionist you are tasked by the DOH officer to investigate the foods that most children are taking everyday to help the parents realize that nutritional value should be considered in choosing the kind of food for their children. You are to submit a list of recommended foods to parents during the home owners monthly meeting in your village. This paper will be evaluated by the DOH officer in terms of impact to the community, comprehensive, depth of investigation and organization.

Criteria	**4** **EXCELLENT**	**3** **SATISFACTORY**	**2** **DEVELOPING**	**1** **BEGINNING**
Impact to the Community	The results are highly useful and highly commendable.	The results are useful and commendable.	The results are useful but need further study.	The results are not useful and commendable.
Comprehensive	The paper is extensively supported with insightful justifications, evidence, facts and ideas.	The paper is adequately supported with valid justifications, evidences, facts and ideas.	Some important facts and evidences were lacking or erroneous.	The paper was superficial and not comprehensive.
Depth of Investigation	The experimental design is done in great detail to arrive at substantial and solid conclusion.	The experimental design is just enough to arrive at a substantial conclusion.	The experimental design is limited to arrive at a substantial conclusion	The experimental design lacks substance and is not align with the purpose of the study.
Organization	The experimental results and discussion flows smoothly and logically. Clear and compelling evidences gathered from	The experimental results and discussions flow smoothly. Clear and substantial evidences	The experimental results and discussions flow smoothly but the conclusion	The experimental results and discussion is not organized. The conclusion is not supported with evidences.

	the experiment support the conclusion.	support conclusion.	lacks supporting evidences.	

Generalization Table and answer column 5. Are your thoughts the same as what you have learned in this lesson?

End of TRANSFER:

In this section, your task was to apply your knowledge about atom in real life situation.

How did you find the performance task? How did the task help you see the real world use of the topic?

ACTIVITY 22. ATOM REFLECTION

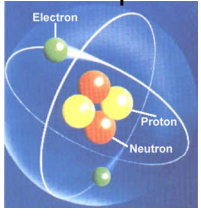
1. Click on this web page.
   http://www.youtube.com/watch?v=o2S5JCZYVk8
   "everything is made up of ATOMS", a reflection video
2. View the video and write a short journal relating this video to what you have learned in this lesson.

You have completed this lesson. Before you go to the next lesson, you have to answer the following post-assessment.

POST-ASSESSMENT

It's now time to evaluate your learning. Click on the letter of the answer that you think best answers the question. Your score will only appear after you answer all items. If you do well, you may move on to the next module. If your score is not at the expected level, you have to go back and take the module again

1. Protons are located in the nucleus of the atom. A proton has
A. No charge.
B. A negative charge.
C. A positive and a negative charge.
D. A positive charge



2. Neutrons are in the nucleus of the atom. A neutron has
A. A positive charge.
B. No charge.
C. A negative charge.
D. Twice as much positive charge as a proton.

3. An electron is in a region outside the nucleus. An electron
A. Is larger than a proton and has no charge.
B. Has less mass than a proton and has a negative charge.
C. Is smaller than a proton and has no charge.
D. Has a positive charge.

4. A hydrogen atom is made up of one proton and one electron. The proton and electron stay near each other because
A. Positive and negative charges repel.
B. Positive and positive charges repel.
C. Positive and negative charges attract.
D. Two negatives make a positive.

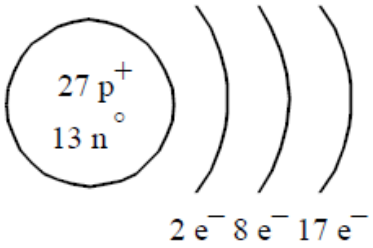
5. The atomic number of an atom is
A. The mass of the atom.
B. The number of protons added to the number of neutrons.
C. The number of protons.
D. Negatively charged.

6. The atoms of the same element can have different isotopes. An isotope of an atom
A. Is an atom with a different number of protons
B. Is an atom with a different number of neutrons
C. Is an atom with a different number of electrons
D. Has a different atomic number

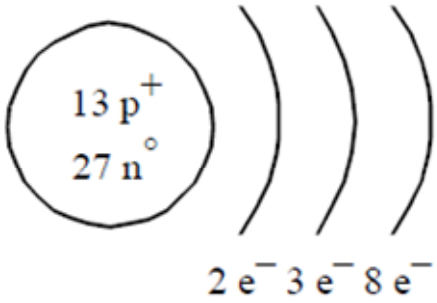
7. The atomic mass of an element is
A. The average mass of all the isotopes of the element
B. A measure of the density of that element
C. The mass of the most common isotope of that element
D. The number of protons and electrons in the atoms of the element.

8. Which of the following best represents the aluminum (Al) atom according to the Rutherford-Bohr model?

A.



B.



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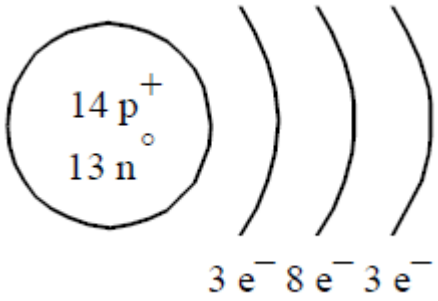
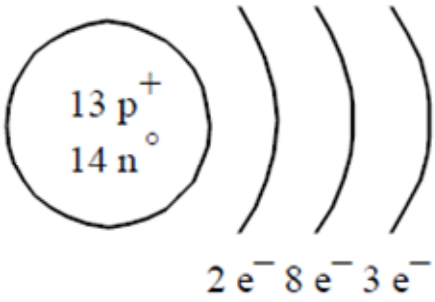
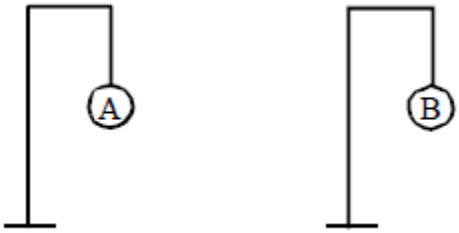


D.



9. A student was given the following materials:
- a wool cloth
- a vinyl ruler
- two Styrofoam balls (A and B) suspended from ring stands



Using these materials, she performed a laboratory experiment consisting of five steps.
The table below lists the five steps and the results of the first three steps.

Step	Result
1. Rub the ruler with the wool cloth.	1. The wool cloth and the ruler acquire opposite charges.
2. Touch ball A with the ruler.	2. Ball A and the ruler have the same charge.
3. Touch ball B with the wool cloth.	3. Ball B and the wool cloth have the same charge.
4. Bring the ruler close to ball A, but without touching it.	4. ?
5. Bring the ruler close to ball B, but without touching it.	5. ?

What were the results of steps 4 and 5?
A. Result of Step 4: the ruler and ball A repelled each other.
Result of Step 5: the ruler and ball B attracted each other.
B. Result of Step 4: the ruler and ball A repelled each other.
Result of Step 5: the ruler and ball B repelled each other.
C. Result of Step 4: the ruler and ball A attracted each other.
Result of Step 5: the ruler and ball B repelled each other.
D. Result of Step 4: the ruler and ball A attracted each other.
Result of Step 5: the ruler and ball B attracted each other.

10. While operating cathode ray tube you make the following observations :
1. The cathode rays travel in straight lines from the negative cathode towards the positive anode.
2. The temperature of the cathode ray tube does not change during the experiment.
3. When a negative charge is brought near the tube the cathode rays are deflected away from the charge.
4. The tube emits a green light.

5. When a positive charge is brought near the tube the cathode rays are deflected towards the charge.

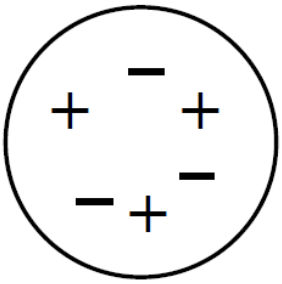
Which observations permit you to conclude that the cathode rays are negatively charged?

A. 1, 2 and 3
B. 2, 3 and 4
C. 1, 3 and 5
D. 3, 4 and 5

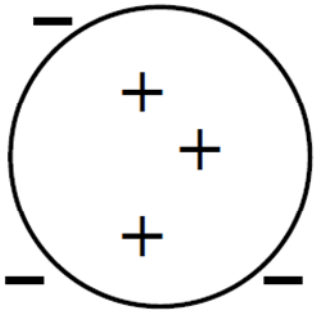
11. Dalton devised the first modern atomic model.
Which one of the following characteristics is NOT part of Dalton's atomic model?
A. Atoms of different elements are different.
B. All atoms of the same element are identical.
C. Atoms combine to form compounds.
D. Atoms consist of positive particles and negative particles.

12. In 1911, at McGill University, Ernest Rutherford conducted a famous experiment that led him to conclude the structure of the atom was very different than previously believed. Which of the following models of the Lithium (Li) atom is most like the model proposed
by Rutherford?

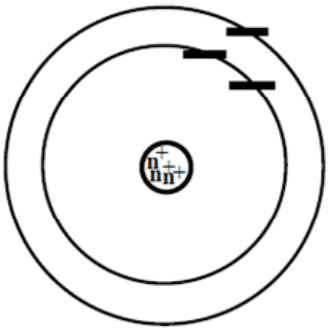
A.



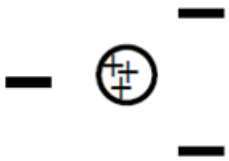
C.



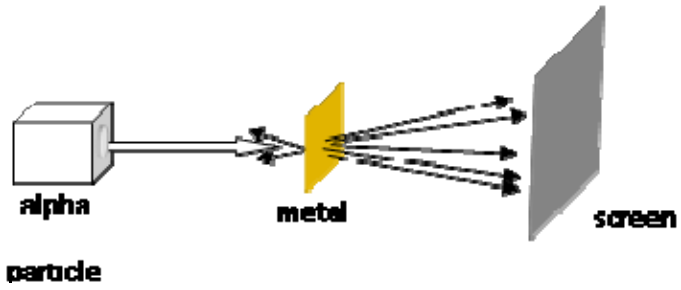
B.



D.



13. Which model of atomic structure was developed to explain the results of the experiment shown?



A. Bohr model
B. quantum mechanical atom
C. billiard ball atom
D. nuclear atom

For nos: 14-15, Consider the following list of electron configurations:

(*1*) $1s^2\ 2s^2\ 3s^2$ (*4*) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$
(*2*) $1s^2\ 2s^2\ 2p^6$ (*5*) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^6$
(*3*) $1s^2\ 2s^2\ 2p^6\ 3s^1$

14. Which one of the above lists represents the electronic configuration for the ground state of the atom with $Z = 20$?

A. 1 C. 3
B. 2 D. 4

15. Which electronic configuration is characteristic of noble gases?

A. 1 C. 3
B. 2 D. 4

16. Which one of the above configurations represents a neutral atom that readily forms a singly charged positive ion?

A. 1 C. 3
B. 2 D. 5

17. Which one of the above configurations represents an excited state of a neutral atom?

A. 1 C. 3
B. 2 D. 4

18. Which one of the above configurations represents a transition element?

A. *1* C. *3*
B. *2* D. 5

19. Three atoms, I, II and III, each have an atomic number of 12. Atom I has 12 neutrons, atom II has 13 neutrons and atom III has 14 neutrons. If you are asked to analyze the three atoms, which of the following sentences is correct?
A. Atoms I, II and III are allotropes of each other.
B. Atoms I, II and III are isotopes of the same element.
C. Atom I is a neutral atom while atoms II and III are cations of atom I.
D. Atom I is a neutral atom while atoms II and III are anions of atom I.

20. Bohr's theory of the atom proposed that:
A. electrons orbit the nucleus like planets move around the sun
B. no more than two electrons are allowed in any energy level
C. electrons move around the nucleus in fixed orbits, each of which has a different energy level
D. energy shells have subshells which contain regions of space called orbitals.

GLOSSARY OF TERMS USED IN THIS LESSON:

Atom
The smallest component of an element having the chemicalproperties of the ele ment, consisting of a nucleus containingcombinations of neutrons and protons an d one or moreelectrons bound to the nucleus by electrical attraction; thenumber o f protons determines the identity of the element.
http://dictionary.reference.com/browse/atom

Protons are positively charged and so would be deflected on a curving path towards the negative plate.

Electrons are negatively charged and so would be deflected on a curving path towards the positive plate.

Neutrons don't have a charge, and so would continue on in a straight line.

Atomic Number of an element is referred to as Z and is the total number of protons (P+) that the element has. Since each element has the same number of electrons as protons the Atomic Number is also equal to the number of electrons each element has. http://www.homework-help-secrets.com/atomic-structure.html

Atomic Mass of an element is the total mass (weight) of all the protons, neutrons and electrons that make up the atom of an element. The protons and neutrons are much bigger and heavier than the electrons. The protons and neutrons have an individual Atomic Mass of about 1.

http://www.homework-help-secrets.com/atomic-structure.html

ATOMIC STRUCTURE:
structure of an atom, theoretically consisting of a positivelycharged nucleus surro unded and neutralized by negatively chargedelectrons revolving in orbits at varyi ng distances from the nucleus,the constitution of the nucleus and the arrangeme nt of the electronsdiffering with various chemical elements.
http://dictionary.reference.com/browse/atomic+structure

ELECTRON CONFIGURATION: is a shorthand description of how electrons are arranged around the **nucleus** of an atom. Electron configurations are important because they help us predict chemical behavior.

ION: charged particle

REFERENCES AND WEBSITE LINKS USED IN THIS LESSON:

WEBSITES:

http://www.youtube.com/watch?v=wRYfbGPG3LA
This is a video in a form of cartoons entitled “Everything is made up of atom”.
http://www.youtube.com/watch?v=yQP4UJhNn0I
John Bergmann “ Just How Small is An Atom” very good for kids
http://www.miamisci.org/af/sln/phantom/spectroscope.html
Atomic structure
http://www.windows2universe.org/physical_science/physics/atom_particle/atom.html *Moving model of atoms with subatomic particles*
http://www.particleadventure.org/eternal-questions.html
More subatomic particles
http://www.docstoc.com/docs/125152019/Atom-Theories-development-of-the-atom power point presentation about atom

http://www.docstoc.com/docs/81585722/atom-development-project
power point presentation on the development of atom

http://www.kchemistry.com/Quizzes/AtomHistry.htm quiz on atomic structure and history
http://www.ndt-ed.org/EducationResources/HighSchool/Radiography/atomicmassnumber.htm lecture on atomic number and mass number
http://www.gcsescience.com/a2-atomic-mass-number.htm lecture on atomic number and mass number
http://www.ehow.com/list_7159393_list-positive-negative-ions.html electrical nature of atom
http://www.chem4kids.com/files/atom_orbital.html
Basic of electron configuration
http://encyclopedia.kids.net.au/page/at/Atomic_orbital
basic electron configuration for kids
http://www.slideshare.net/Komperda/electron-configurations#btnNext
Power point presentation on atomic configuration
http://www.slideshare.net/gengarl/how-to-write-electron-configurations-13456823#btnNext
Power point presentation on how to write electron configuration.
http://imagine.gsfc.nasa.gov/docs/teachers/lessons/xray_spectra/student-worksheet-flame.html flame test experiment procedure
http://www.youtube.com/watch?v=Vmlj6B3mRaE&feature=related flame test video
http://www.youtube.com/watch?v=QNojS6ZZ4og&feature=endscreen&NR=1
flame test video

http://www.youtube.com/watch?v=Dw5bmM-sw3A&feature=related flame test video
http://www.youtube.com/watch?v=upg-FUHp6ys
Formation of ions
http://www.youtube.com/watch?v=xTx_DWboEVs
Formation of ions in chemical bonding
http://www.youtube.com/watch?v=QqjcCvzWwww
Formation of positive and negative ions
http://psychology.wikia.com/wiki/Sodium_ions
sodium
http://www.jctonic.com/include/minerals/potassiu.htm
potassium
http://www.nutritionatc.hawaii.edu/ho/2005/324.htm
iron
http://ods.od.nih.gov/factsheets/Calcium-QuickFacts/
http://www.algaecal.com/magnesium/magnesium-rich-foods.html
Magnesium
http://www.nlm.nih.gov/medlineplus/ency/article/002424.htm
phosphorus
http://www.nyscience.org/biochem/content/educators/sour_foods-educators.pdf test for atom in sour taste experiment
http://school.fueluptoplay60.com/tools/nutrition-education/games/arianna/quintricious.php

http://www.youtube.com/watch?v=o2S5JCZYVk8
"everything is made up of ATOM", a reflection video

http://jimchatt.com/test4.ps.436.pdf Chemistry Test bank.

Images:
http://hi.fi.tripod.com/timeline/ atomic models
http://www.docbrown.info/page04/4_71atom.htm#1.atomic no. and mass no.
http://ph.images.search.yahoo.com/search/images;_ylt=A0S0uD88x6xQDCYACZm1Rwx.?p=rising+of+hair+because+of+electricity&fr=yfp-t-711&ei=utf-8&n=30&x=wrt&y=Search hair rising pictures
http://www.chemtutor.com/struct.htm Electron configuration pattern
http://www.shutterstock.com/pic-70726018/stock-photo-collage-bar-food.html
food collage

LESSON 3: PERIODIC TABLE OF ELEMENTS

PRE-ASSESSMENT:

Let's find out how much you already know about this module. Click on the letter that you think best answers the question. Please answer all items. After taking this short test, you will see your score. Take note of the items that you were not able to correctly answer and look for the right answer as you go through this module.

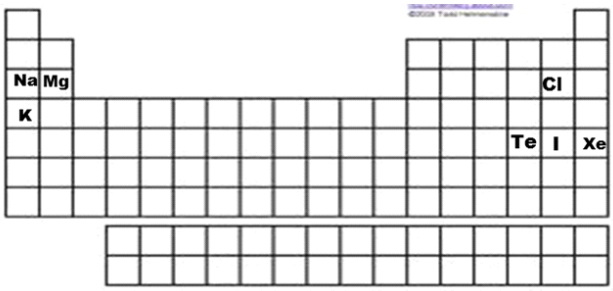
1. The nineteenth century chemists arranged elements in the periodic table according to increasing
A. atomic number. C. atomic mass.
B. number of electrons. D. number of neutrons.

2. Your group planned to initiate the "Living Mannequin" of different scientists and their contribution to the development of the Periodic Table. If you are asked to position the chemists according to their contribution in the development of the periodic table, how would you arrange the chemists?

A. Dobereiner, Newlands, Mendeleev and Moseley
B. Newlands, Dobereiner, Mendeleev and Moseley
C. Dobereiner, Newlands, Moseley and Mendeleev
D. Newlands, Dobereiner, Mendeleev and Moseley

3. A student hypothesizes that bromine (Br) has different chemical properties from krypton (Kr). The periodic table supports this hypothesis by indicating that —
A. bromine is a metal while krypton is a nonmetal.
B. one mole of bromine is heavier than one mole of krypton.
C. bromine and krypton are members of the same family.
D. bromine and krypton have different numbers of valence electrons.

4.



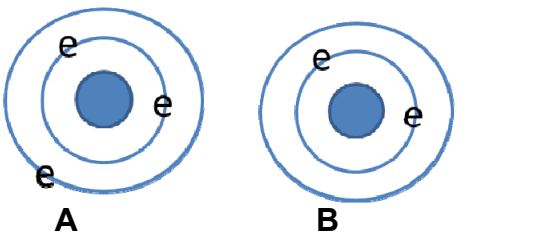
Sodium reacts instantly with chlorine. Using the diagram above, which element will have the same chemical behavior as of Sodium?

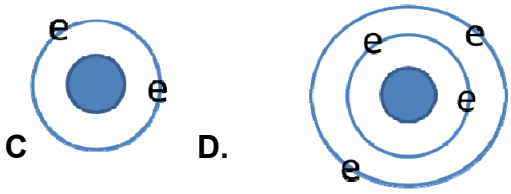
A. manganese (Mn)
B. potassium (K)
C. Iodine (I)
D. xenon (Xe).

5. Which of the following elements below has atoms with the largest atomic radius?
A. Q
B. T
C. R
D. Y

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Q												T				W	Y
	S												U		V		
																X	
R																	Z

Use the following diagrams to answer questions #6-8





6. Which of the atoms has the highest Ionization energy?
7. Which of the atoms has the smallest radius?

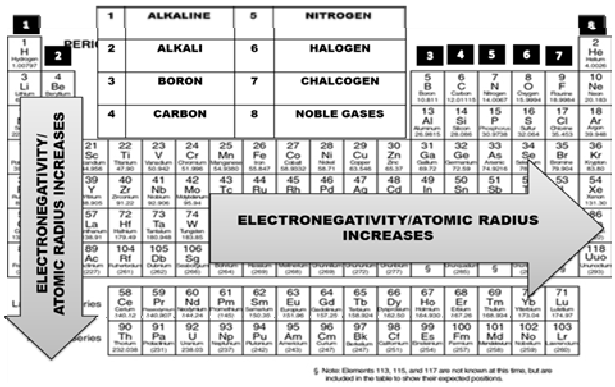
8. Which of the atoms has the easiest electron to be removed?

9. Which of the atoms is the largest?

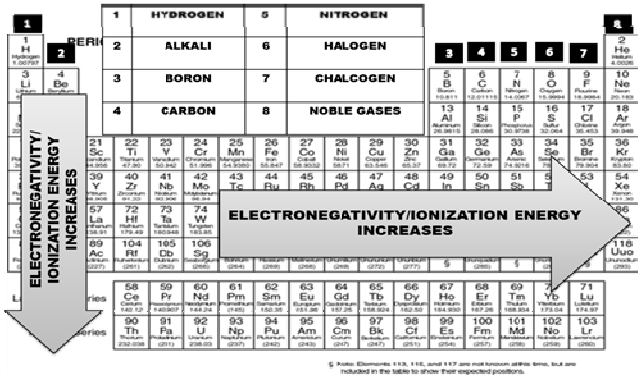
10. Mobile Tablet User Interface Group is seeking an interactive designer with interface and prototyping experience who possesses a passion for great design and shows an exceptional eye for detail. The designer will conceive, design and develop Chemistry Application in the Mobile Tablet product line.

As an aspiring Application designer, you wish to create a periodic table application. One of the standards is to give informative and concepts of the periodic trends. Which of the following periodic table will you showcase?

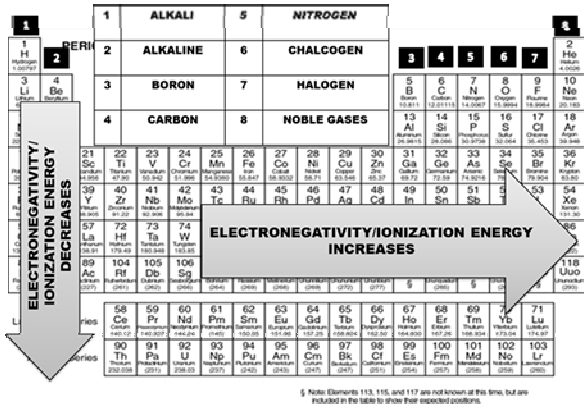
A.



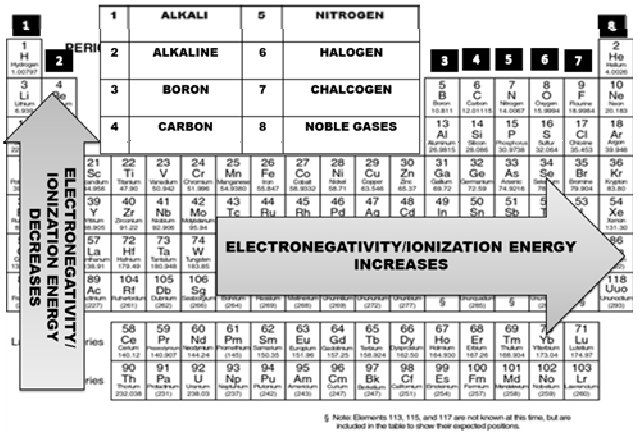
B.



C.



D.



11. An element in the upper right corner of the periodic table is _____.
A. either a metal or metalloid
B. definitely a metal
C. definitely a non-metal
D. either a metalloid or a non-metal

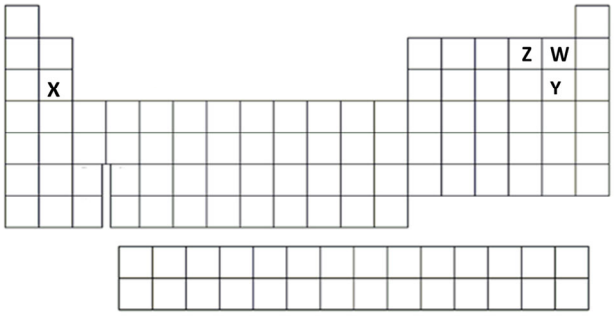
12. There is chemistry in cooking. Processing and improper storage practices can expose food items to heat or oxygen, which causes deterioration. In ancient times, salt was used to cure meats and fish to preserve them longer. Salt is a compound made of sodium and chlorine. What types of elements are present in salt?
A. Metal and Nonmetal
B. Metalloids and Nonmetal
C. Nonmetal and Metal
D. Both are nonmetals.

13. Atomic radius generally increases as we move _____.
A. down a group and from left to right across a period
B. down a group and from right to left across a period
C. down a group; the period position has no effect

D. up a group and from left to right across a period

B. As you go down a Group in the Periodic Table from top to bottom, the number of energy levels or electron shells increases so the atomic radius of the elements increases.

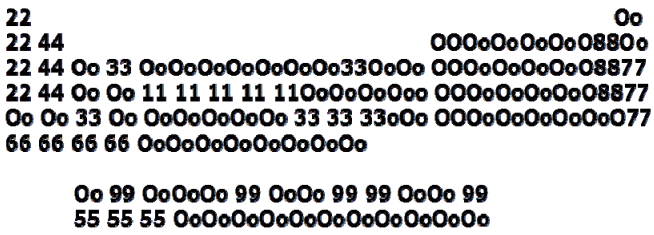
14. Based from the location of the elements in the periodic table, which of the following is most likely to gain electrons in a chemical reaction?



A. X
B. Z
C. W
D. Y

Please refer to the following:

Below is a hypothetical periodic table. It is divided into group/family of elements (vertical column) and period (horizontal row).



15. What could be said of the elements marked with 11 in the periodic table above?

A. They are in the same group.
B. They are in the same period.
C. They are alkali metals.
D. They are noble gases.

16. Which property best describe the elements represented by number 88?

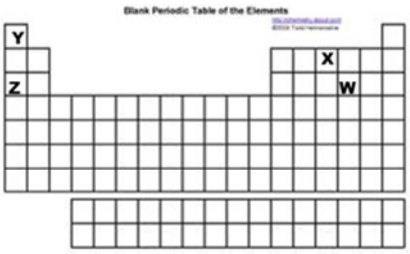
A. They have a stable octet.
B. They are salt formers.
C. They react instantly with nonmetals.
D. They donate electrons.

17. This table shows some information about the atoms of the elements W, X, Y and Z.

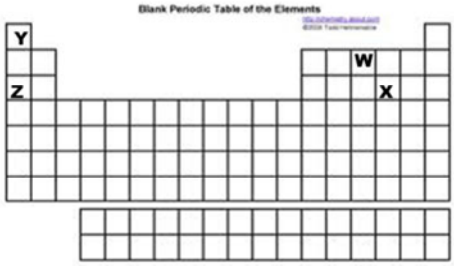
Element	Atomic number	Number of protons	Number of neutrons	Mass number	Electronic configuration
W	16	16	16	32	2, 8, 6
X	7	7	7	14	2, 5
Y	1	1	1	2	1
Z	11	11	12	23	2,8, 1

You are asked to plot the element in the blank periodic table. Which will you report?

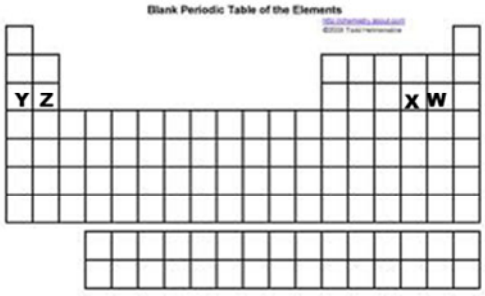
A.



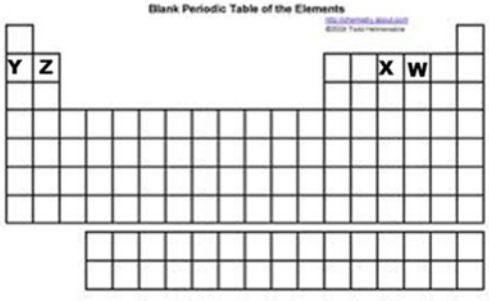
B.



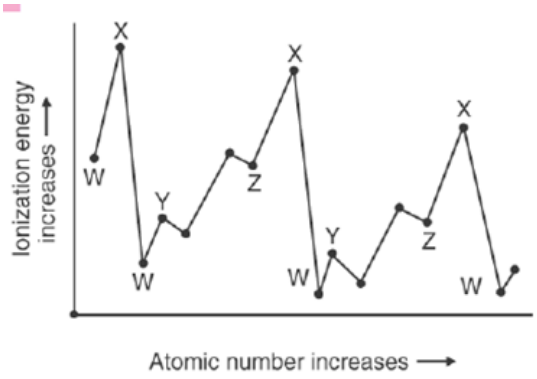
C.



D.



18.



The chart above shows the relationship between the first ionization energy and the increase in atomic number. The letter on the chart for the alkali family of elements is _____.

A. W
B. X
C. Y
D. Z

19. Imagine you have to carry on the work of Dmitri Mendeleev and identify the some elements below. You have to convince the rest of the scientific community where to place these elements within the periodic table by using periodic trends.

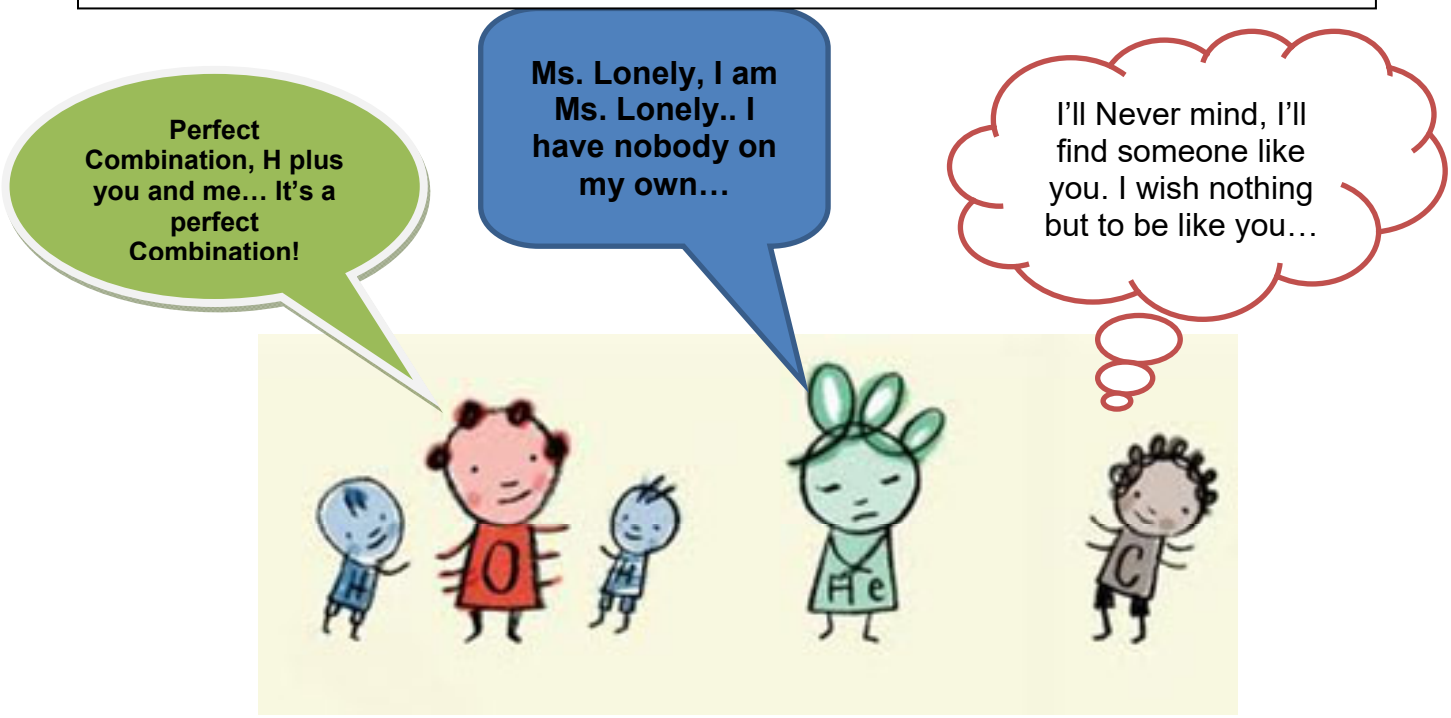
Which among the group of elements are in correct order for increasing first ionization energy levels?

A. Be, C, Cl, Kr
B. H, C, Mg, K
C. Ca, P, Ne, B
D. Br, Zn, Cr, Ar

20. Based from the previous choices, which group of elements will present to the scientific community that shows increasing electronegativity?

EXPLORE

To begin with this lesson, try to think why the following songs are being used…



Now try to think about the answers to the following process questions:

What makes Hydrogen and Oxygen a Perfect Combination?

What makes Ms. Helium so lonely?

Why does Carbon wish to be like Helium?

Where are the elements located in the Periodic Table?

Does the position of the element in the Periodic Table have something to do with its properties? Explain.

In this lesson you will try to answer the question: "How elements are arranged?"

You have your own ideas and concepts about the Periodic Table of Elements. Let us find out which of your ideas are acceptable by doing the next activity.

Map of Conceptual Change:

A-R Guide

Read each statement below and make a check mark to indicate your response. Do you agree or disagree?
(Please create small boxes which students can tick or check to indicate Agree or Disagree)

Before Reading	Statements*	After Reading
1. Agree/ Disagree	The elements belonging to a given group bear a strong similarity in their physical behaviors.	1. Agree/ Disagree
2. Agree/ Disagree	Those electrons in the outmost or valence shell are especially important because they are the ones that can engage in the sharing and exchange that is responsible for chemical reactions;	2. Agree/ Disagree

3. Agree/ Disagree	The chemical elements are arranged in order of increasing atomic mass.	3. Agree/ Disagree
4. Agree/ Disagree	It was Meyer who succeeded in producing the best arrangement of atoms in a table published in 1869.	4. Agree/ Disagree
5. Agree/ Disagree	All elements in a specific group have equivalent outermost, or valence shell	5. Agree/ Disagree
6. Agree/ Disagree	Lead, tin and mercury have industrial uses.	6. Agree/ Disagree
7. Agree/ Disagree	The properties of the elements exhibit trends.	7. Agree/ Disagree
8. Agree/ Disagree	Sodium atom is smaller than Magnesium atom.	8. Agree/ Disagree
9. Agree/ Disagree	In order to remove an electron from an atom, work must be done to overcome the electrostatic attraction between the electron and the nucleus; this work is called the *electronegativity*	9. Agree/ Disagree
10. Agree/ Disagree	The electron configuration of elements influences physical and chemical properties of the elements	10. Agree/ Disagree

End of EXPLORE:

At the end of this lesson, we will find out if your responses are right. We will also find out if you can make an interactive Powerpoint of periodic table with its effect to one's health, industry and environment.

We will start by doing the next activity.

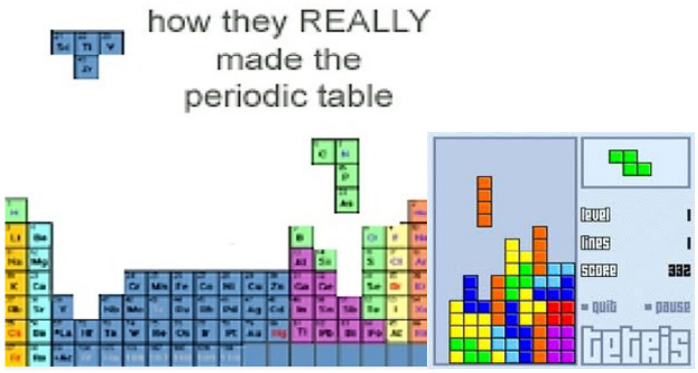
FIRM-UP

Many scientists attempted to organize the elements. They made their own studies, researches and even styles to come up with an organized list of the elements. In this lesson you will learn how periodic table was developed. You will be amazed that the placements of the elements in the periodic table are very much related. Can you identify the relationship of the arrangement of the elements in terms of its properties? So, I guess it's time for you to do the activities that will lead you to answer:

How are the elements arranged in the periodic table?

ACTIVITY 1. History in Chemistry

So, do you think this is how they did it?



http://www.google.com.ph/imgres?q=how+they+made+the+periodic+table&um=1&hl=fil&sa=N&biw=1366&bih=664&tbm=isch&tbnid=u-

In this activity, you will learn and understand the key concepts of the development of the Periodic Table:

Click the following sites to understand the development of the periodic table:

Periodic Table of Elements - Chemistry: A Volatile History - BBC Four
http://www.youtube.com/watch?v=nsbXp64YPRQ
Chemistry. A Volatile History. Episode 2 Part 3/5
http://www.youtube.com/watch?v=iVZF889fc_U
Chemistry. A Volatile History. Episode 2 Part 4/5
http://www.youtube.com/watch?v=jxd-fcubJRE&feature=relmfu

Chemistry. A Volatile History Episode 2 Part 5/5
http://www.youtube.com/watch?v=FGlzJcCSnK4

Then based from the video clips, answer the following Guide Questions:

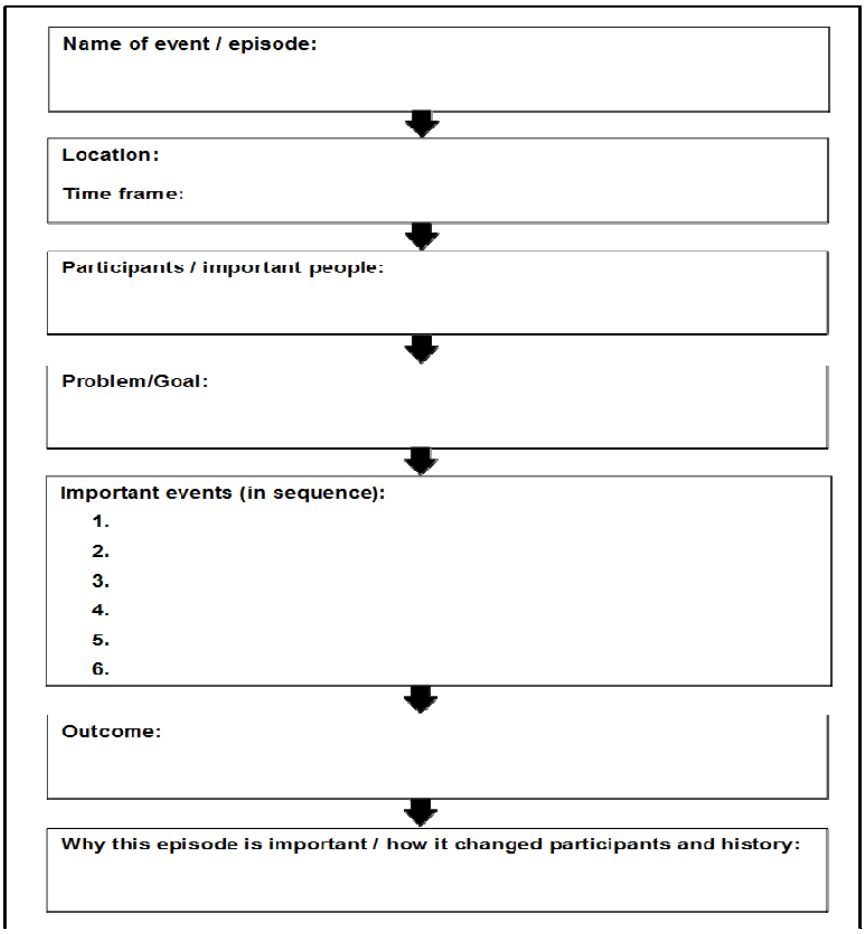
A. How did Mendeleev's card game lead to the discovery of the Periodic Table?

B. What made Mendeleev a great genius?

C. Why is the Periodic Table so remarkable?

Reading 1 Read the website http://www.wou.edu/las/physci/ch412/perhist.htm. Then, using the information from the site, completely fill up the HISTORY FRAME below (Worksheet #1):

History Frame



And now, you have learned how the periodic table was developed, try to answer the following Process Questions:

1. What do you think triggers the scientists to come up with a periodic table?

2. If you are to choose among the scientists, who do you think deserves the following title:
   a. Father of Periodic Table?
      Reason:

   b. Father of Unrecognized Periodic Table?
      Reason:

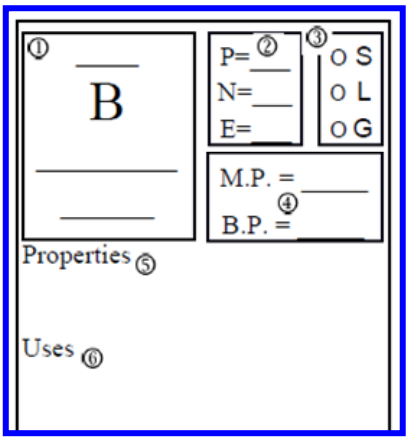
3. If you were one of the scientists, how would arrange the elements in the periodic table? Explain.

ACTIVITY 2. Basics of Periodic Table

Graphics by: http://dribbble.com/shots/373871-Boy-Pick-Up?hex=EDBA36&list=color&percent=30&variance=50

The Periodic table is based on how it is arranged. Is it possible to put together Uranium and Iodine?

Now do the following steps, to further learn the basics of periodic table.



Step 1: Complete the square for each element by filling in the atomic number, name, & atomic mass. Refer to the format on the right side.
Step 2: Determine the number of protons, neutrons, and electrons in an atom of each element.
Step 3: Identify if the element is a solid, liquid, or gas at room temperature.
Step 4: Give the melting (M.P.) and boiling points (B.P.) in degrees Celsius.
Step 5: List at least three physical or chemical properties for each element.
Step 6: List at least three uses for each element.

Step 7: Use the following colors to shade in the square for each element. You should ONLY color the small square in the upper left-hand corner and not the entire card.

Green = Li & Na Pink = O & S Blue = Be & Mg Purple = F & Cl
Orange = B & Al Red = C & Si Tan = N & P Yellow = He, Ne, & Ar

Step 8: Cut the cards apart and arrange according to atomic number in the pattern shown. Once you have the cards arranged in the correct order, glue them to a large sheet of construction paper.

1							2
3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18

Done? Answer the questions on the worksheet using the information on your Periodic Table!

Worksheet #2

Use your periodic table to answer each question.

1. How many elements in your table were:
(a) solids? _____ (b) liquids? _____ (c) gases? _____
2. Which elements had complete outer shells? Give the name and symbol for each.

_____ _____ _____ _____ _____ _____

3. What do you notice about the location of the elements in Question #2?
4. Which elements had only one valence electron? Give the name and symbol for each.

_____ _____ _____ _____ _____ _____

5. What do you notice about the location of the elements in Question #4?
6. What do you notice about the number of valence electrons as you move from left to right across a period (or row) in the periodic table? (Example: Na Ar)
7. What do you notice about the number of valence electrons as you move down a group or column in the periodic table? (Example: H Li Na)
8. What do you notice about the number of energy levels or shells as you move down a group or column in the periodic table? (Example: H Li Na)
9. What do you notice about the melting points as you move from left to right across a period (or row) in the periodic table? (Example: Li Ne)
10. What do you notice about the boiling points as you move from left to right across a period (or row) in the periodic table? (Example: Li Ne)
11. Each column or group in the periodic table is called a family. Elements are organized into families according to their physical and chemical properties. Identify the elements that belong to each family based on the number of valence electrons. Give the name and symbol for each element.

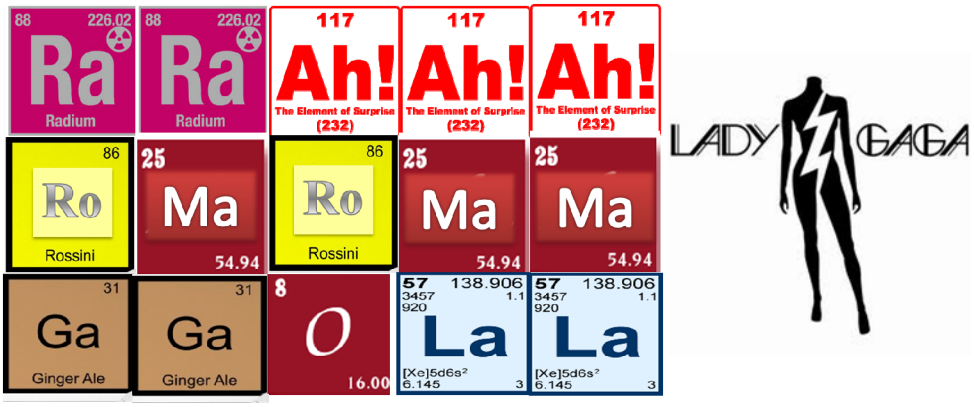
HINT: You will only use the elements you colored in Step 8!
Alkali Metals - 1 valence electron _____ _____ _____ _____
Alkaline Earth Metals - 2 valence electrons _____ _____ _____ ___
Boron Family - 3 valence electrons _____ _____ _____ _____
Carbon Family - 4 valence electrons _____ _____ _____ ____
Nitrogen Family - 5 valence electrons _____ _____ _____ ___
Oxygen Family - 6 valence electrons _____ _____ _____ ____
Halides - 7 valence electrons _____ _____ _____ _____
Noble Gases - Complete outermost shell
_____ _____ _____ _____ _____ _____

12. What do you notice about the location of the elements in each family?
13. How would you classify hydrogen? Give at least one reason.
14. Do any of the elements have similar properties? If yes, list the names of the elements and the properties they have in common.
15. Do any of the elements have similar uses? If yes, list the names of the elements and the uses they have in common.

Challenge: Predict the number of valence electrons for each element based on its location in the Periodic Table of Elements. You will need to use the periodic table in your textbook.
Barium = _____ Lead = _____ Xenon = _____ Potassium = _____

ACTIVITY 3. Game Time

Let's see if you have learned something from the previous activity. Recall the elements in the Periodic Table, Sing ALOUD the following elements:



Using the picture above, is there a newly discovered element?

Which among the elements exist in the Periodic Table?

Are the elements in the same group?

Now, try playing the Element Hangman http://education.jlab.org/elementhangman/prob431.html

Reflective Questions:

1. What helped you identify the elements?
2. What are the difficulties you've encountered in answering the game?
3. Are the information provided useful in constructing a periodic table? In what way?

ACTIVITY 4. Constructing a Periodic Table

After learning the properties of the Periodic Table, let's see if you can create a skeleton periodic table.

And Try to answer the Question below:
How are the elements in the periodic table arranged?

The logical organization of the periodic table can be easily understood if you try to remember patterns of the properties of these elements. One way to understand is to create models.

After learning the properties of the elements from the previous activities, let's now place them in our own model periodic table.

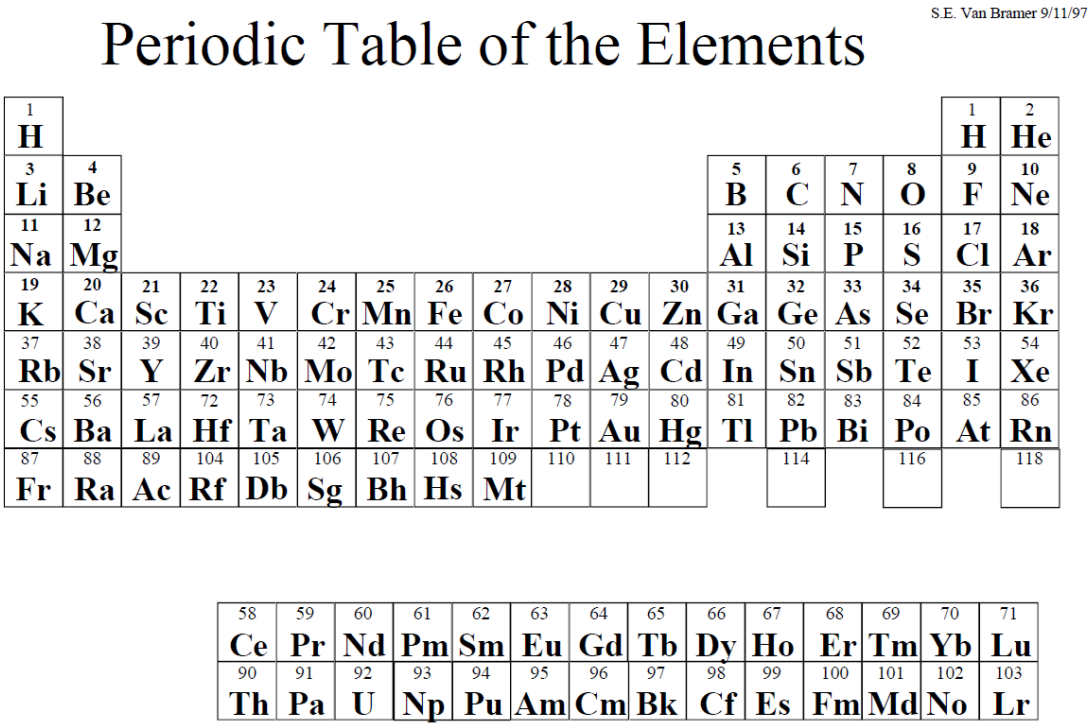
When you were a kid, it's fun to color pictures in the coloring book and to construct your own toy out of your ingenuity. In this activity, you will color and construct a periodic table. Refer to the procedure below:

Procedure

1. Label the groups with 1-18 at the top of each column.
2. Label the periods with 1-7 at the left of each row.
3. Using a dark color, draw a zig-zag diagonal staircase that divides the metals from the nonmetals (to the left of B; between B & Al; between Al & Si; between Si & Ge; between Ge & As; between As & Sb; between Sb & Te; between Te & Po; between Po & At).
4. Label the Representative Elements with roman numerals IA – VIIIA at the top of each column.
5. Label each of the specially named groups above the roman numerals.
6. Label the transition metals.
7. Label the inner transition or "rare earth" metals.
8. Label the Lanthanide Series to the left of the proper row.
9. Label the Actinide Series to the left of the proper row.
10. Make a legend or key in the bottom left-hand corner of your periodic table sheet.

11. Use cross-hatching (i.e., ▨) to mark all the transition metals.
12. Use different cross-hatching (i.e., ▦) to mark all the inner transition or "rare earth" metals.
13. Darkly outline the *s*, *p*, *d* and *f* blocks.
14. Place a * in the boxes of elements 57 and 89

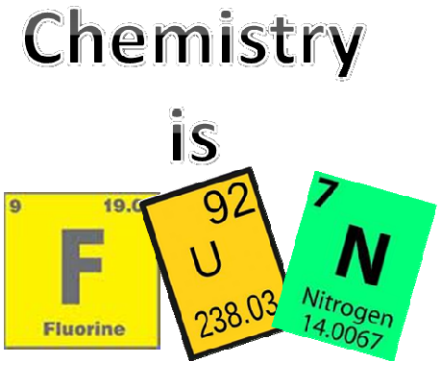
Download a periodic table of elements picture in the internet, as shown in the sample below:



Processing Questions:

1. What color did you select for the metals?
2. What is the name of the element in group III, period 4?
3. What is the name of the 4th halogen?
4. How many elements are in the lanthanide series?
5. What is the name of group IIA? Why does it have this name?
6. What is the group number for the halogens?
7. How many transition metals are there in period 2? How many in period 3?
8. How many nonmetals are there?
9. Is barium a metal, metalloid or nonmetal? How do you know?
10. What families are included in the "s" block?
11. Why were you asked to put asterisks (*) next to lanthanum and actinium?
12. Copper, silver and gold are all excellent conductors of electricity. From this information, what can you conclude about elements that share the same column of the periodic table?

ACTIVITY 5. Fun with Colors



You learned about the properties of the elements in the periodic table. In this section, you will see the connections between the properties and classifications of the elements in the periodic table.

To begin with, **download a copy of the blank periodic table** to color. You may search in Google Images a blank periodic table. Using map pencils, color each group on the table as follows:

Worksheet #3

1. Color the square for Hydrogen pink.
2. Lightly color all metals yellow.
3. Place black dots in the squares of all alkali metals.
4. Draw a horizontal line across each box in the group of alkaline earth metals.
5. Draw a diagonal line across each box of all transition metals.
6. Color the metalloids purple.
7. Color the nonmetals orange.
8. Draw small brown circles in each box of the halogens.
9. Draw checkerboard lines through all the boxes of the noble gases.
10. Color all the lanthanides red.
11. Color all the actinides green.

ACTIVITY 6. The Day the Earth Lost An Element

The elements are arranged in the Periodic Table because of many reasons but with a purpose.

In this part of the activity, you will get to appreciate the existence of the elements in the periodic table.

Try to answer the question:

How are elements arranged in the Periodic Table?

You have learned how the periodic table was developed in the previous activities. In this activity, you will know that elements are important.

You will imagine that one day, out of nowhere, one of the elements in the periodic table suddenly starts to disappear from the face of the earth. Depending on the elements, the results could be dreadful.

Choose an element. Write a fictionalized “firsthand” account of the day your element disappeared. (Example: “The day earth lost its iron – buildings crumble, bridges collapse, blood gradually becomes anemic and so on…)

To guide in finishing this activity, use the following websites:

For the properties of the elements:
http://www.chemicool.com/

The Role of Elements in Life Processes:
http://www.mii.org/periodic/lifeelement.html

Uses of the chemical elements:
http://www.webelements.com/uses.html

Submit your output by **reading it in voki.com**

Now, try to answer the following questions:

1. When do they appear in nature?

2. What element has the similarities with your element?

3. Are they in the same group? How do you account for that answer?

4. How are they used by scientist, engineers, doctors and so on?

5. How would life be different with them?

6. Would life even be able to survive?

ACTIVITY 7. 3D Periodic Table (Level 2)

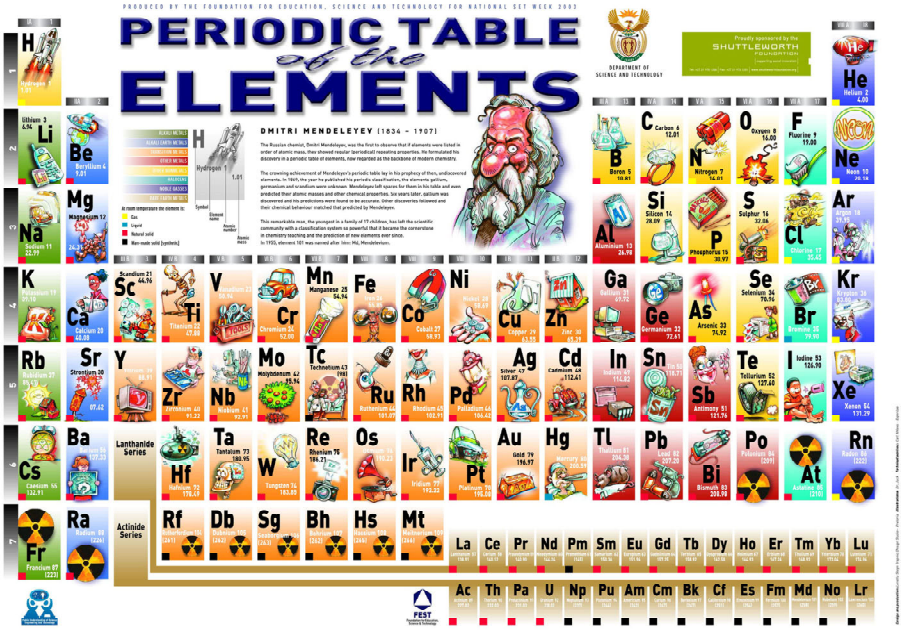
Based from the previous activity, every element has a story. Sometimes how an element is discovered is interesting, like the alkali metals and the noble gases. Other interesting questions are:

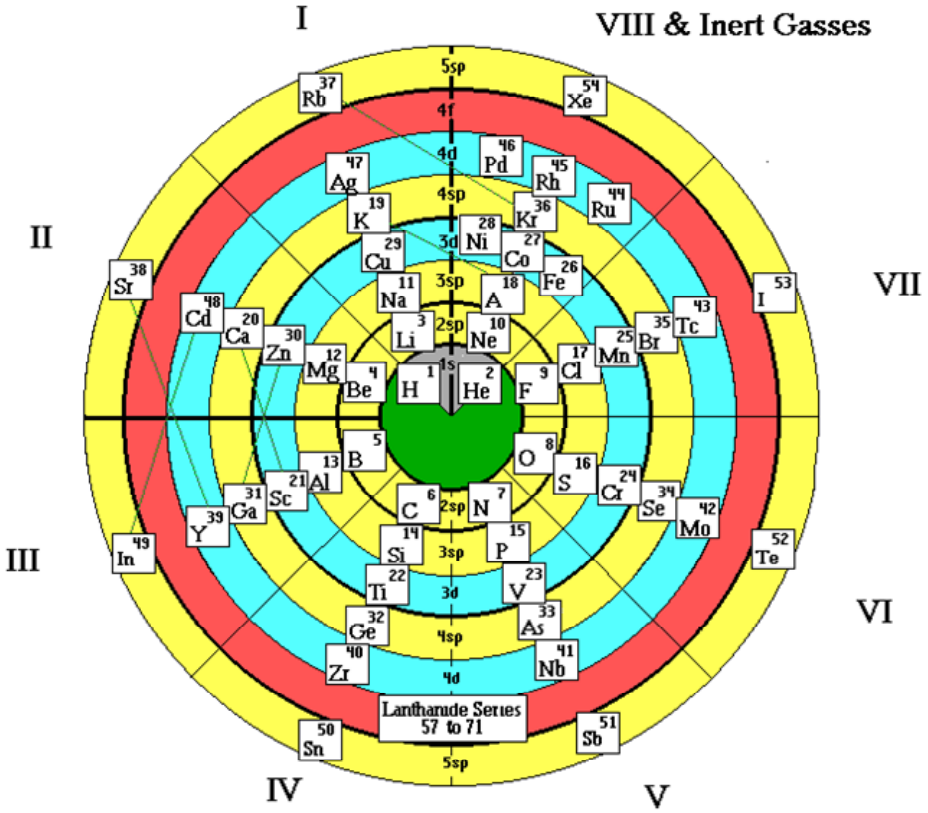
- What do we use this element for?
- What kind of compounds does it form?
- How important is it?
- Where do we find these elements?
- How plentiful is it?
- How was it discovered?

In this activity, you will see how chemists/artists came up with their own representation of the periodic table. Then you will design your own periodic table according to its metallic character, size and reactivity.

Before you start the activity, try to take a look on the different faces of the periodic table according to artist's/chemist's view:

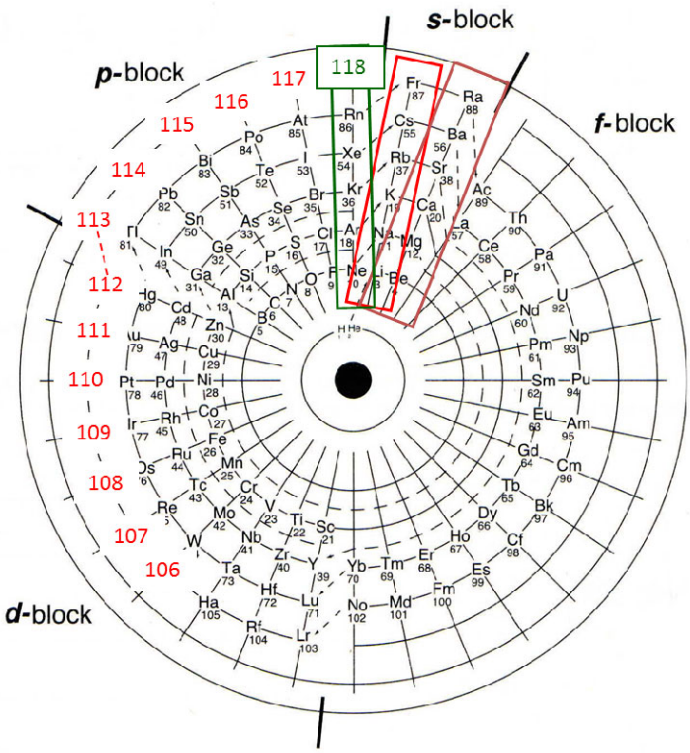
Enjoy the show!



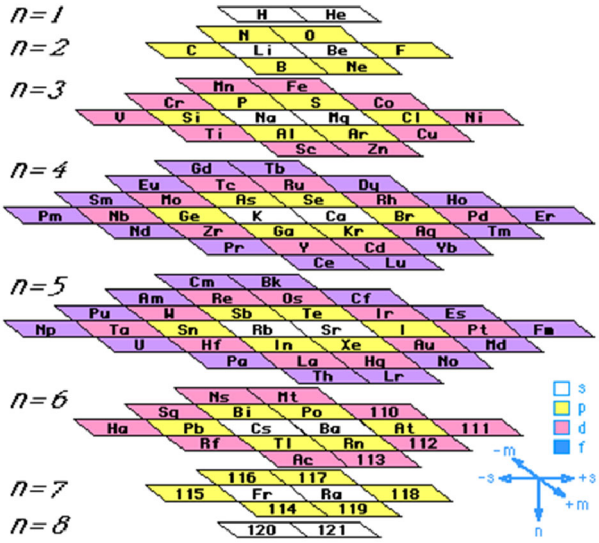


Dutch Periodic Table

Strong, Journal of Chemical Education, Sept. 1989, page 743



Stowe's Periodic Table



Now, are you challenged to design your own periodic table?

The 3D Periodic Table

1. Prepare a board of (19cm x21 cm) using any package cartoon.
2. Cut out a portion of the periodic table and paste it on the board constructed from step 1.
3. Using a ballpoint, make a hole on the center of each square to represent an element in the periodic table.
4. Cut bamboo sticks or drinking straws in various lengths proportionate to the magnitude of the property to be illustrated. You may use the following scale,
   Electronegativity: 1cm = 1 electronegativity unit
   Atomic radius: 2cm = 1 Angstrom (A^0)
5. Use a different color for each property.
6. Insert the bamboo sticks or colored drinking straws into the appropriate holes on the carton board.
7. Refer to the table below for the correct values of electronegativity and atomic radius. Add 0.5 cm for the depth of the hole.

Element	Atomic Radius, A	Electrone-gativity	Element	Atomic Radius	Electrone-gativity
Li	1.52	1.0	F	0.71	4.0
Be	1.11	1.6	Cl	0.99	3.2
B	0.88	2.0	Br	1.14	3.0
C	0.77	2.6	I	1.33	2.7
N	0.75	3.0	At	1.40	2.2
O	0.73	3.4			

Processing Questions:

1. What is the general trend in atomic radius across a row of elements? How do you account for this?

2. What is the general trend in atomic radius down a column of elements? How do you account for this?

3. What is the general trend in electronegativity across a row of elements? How do you account for this?

4. What is the relationship between atomic radius and electronegativity? How do you account for this?

Complete a weeklong “chemical treasure hunt” finding what elements exist in the community and marking the periodic table with push pins for every element found locally.

After doing the activity, how is arrangement of the elements in the periodic table important?

End of FIRM UP:

In this section, the discussion was about the properties of a periodic table of elements.

Go back to the previous section and compare your initial ideas with the discussion. How much of your initial ideas are found in the discussion? Which ideas are different and need revision?

Now that you know the important ideas about this topic, let’s go deeper by moving on to the next section.

DEEPEN

- *Your goal in this section is to take a closer look at some aspects of the periodic table of elements. This is part where in you will describe the periodicity of the different properties of the elements. Many of the elements have been put to practical uses or affected society in important ways since their discoveries.*
- *In this topic you will be to answer the following questions:*
  How might you use what you have learned so far about trends in your day to day life?
  How is the periodic table arranged? Why is it arranged that way?

ACTIVITY 8. Chemistry-Music Video Analysis

Can you now think of the answer to the question: "How are elements arranged?"

Click the Music Video entitle "Elemental Funkiness" to view how properties of the elements vary periodically.

http://www.youtube.com/watch?v=1PSzSTilu_s

PROCESS QUESTIONS:

1. How do you relate atomic numbers to elements properties?

2. How did the singer describe the Group 1 and Group 2 elements?

3. What is common in elements of Transition Metals?

4. What does it mean when the singer says “the elements vary periodically”?

ACTIVITY 9. Think-Like-A-Chemist

After learning the concept, “the elements vary periodically”, how are the elements arranged in the periodic table?

Most chemists operate in two worlds of work. One is the macroscopic world that you see, feel, and touch. Chemists also operate in the microscopic world that you cannot directly see, feel, or touch.

- The *macroscopic* world involves lab gowns — chemical reactions and weighing out things like sodium chloride to create things like hydrogen gas. This is the world of experiments.
- In the *microscopic* world, chemists work with theories and models. They may measure the volume and pressure of a gas in the macroscopic world, but they have to mentally translate the measurements into how close the gas particles are in the microscopic world.

If you are a Chemist, how would arrange the elements in the Periodic Table?

Henry Moseley was known as the “Father of the Modern Periodic Table”. Henry Moseley studied under Rutherford and brilliantly developed the application of X-ray spectra to study atomic structure; Moseley's discoveries resulted in a more accurate positioning of elements in the Periodic Table by closer determination of atomic numbers

In this activity, experience to act like a chemist in such a way you can investigate how elements are discovered.

“Trust me, I’m a Chemist…”

The activity is about the factors that will inhibit the discovery or creation of new elements in the future. Use any resources that will help you in answering the following situations:
Situation #1:

Air was once thought of as a pure element—it didn't seem to our human senses to be “made up” of anything, so the idea made sense. With advances in laboratory equipment and techniques, however, Joseph Priestley was able to prove that air is actually a combination of elements. Discuss how scientific discoveries can change our sometimes-simple ways of perceiving the world.

Situation #2

The ancient Greeks reasoned that wood was made up of different amounts of the four basic elements (as they saw them): earth, air, fire, and water. Justify if it is reasonable.

Situation #3:

Discuss what characteristics make an inorganic element valuable to human society. Is it the element's rarity, usefulness, monetary worth, or another measure of value? Explain why different inorganic elements were more prized at different points in human history. Which inorganic elements do you think are the most valuable today? Why?

Situation #4:

The element hydrogen is a highly flammable gas, but when two atoms of hydrogen are combined with one atom of oxygen, the result is water, which certainly doesn't burn. Explain how such different compounds can exist and yet still contain the element hydrogen. How can you determine how certain chemical compounds will react?

Process Questions:

1. What are the properties of the substances stated in each situation?

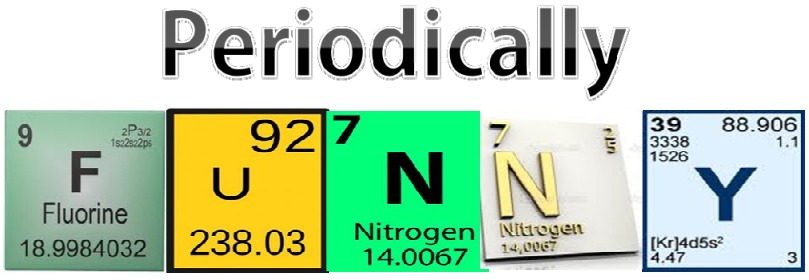
2. How did the situations help you think like a chemist?

3. If you're to create an element, what properties will you feature in your element?

ACTIVITY 10. Periodic Trend Map

Based from the previous activity, we learned that one reason that the periodic table is valuable, is that there are many patterns in it that allow a knowledgeable person to use it as a tool. Chemists are able to find new applications for elements and their compounds and create new materials. As we move across and down the table, we see a regular variation in many physical and chemical properties of the elements. Understanding why these patterns exist allows us to predict chemical behaviors and utilize them for our benefit.

In this section, you will get to understand the purpose of the location of the elements in the periodic table.



In this activity, you will be amazed on how the elements are purposely arranged in the periodic table. Observe how the properties vary periodically!

Watch the following clips to understand the trend in the periodic table:

This clip explains what electronegativity is, and how and why it varies around the Periodic Table.

http://www.youtube.com/watch?v=93G_FqpGFGY

This clip proves that the two statements below are incorrect.
http://www.youtube.com/watch?v=bPB0xThmpkg&feature=related

Correct the statements using the space below.

The electron affinity is the removing the electron.

_____

The electron affinity is the opposite of electronegativity.

_____

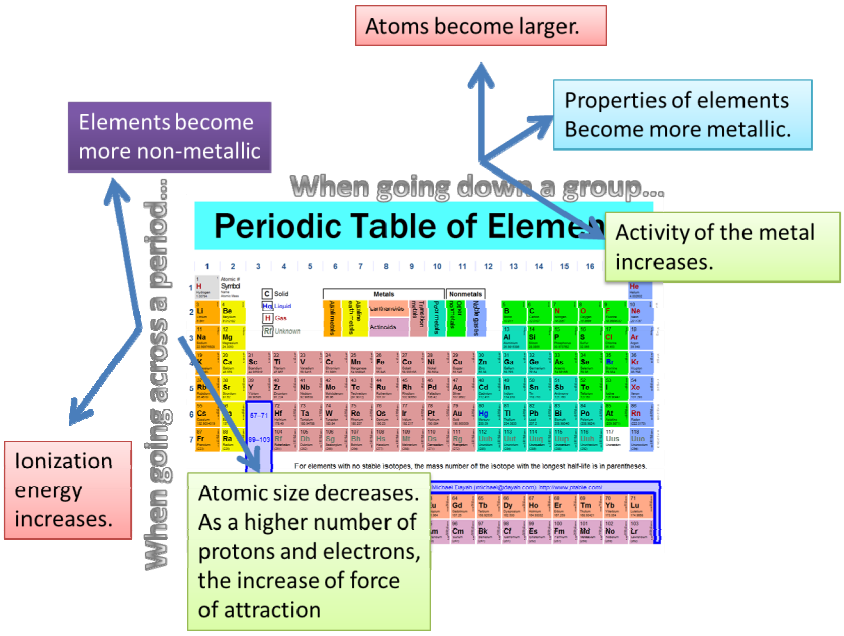
This clip is about the periodic trend of the atomic radius.

http://www.youtube.com/watch?v=ba2yN2HtPTA&feature=related

This clip is about the Periodic Trend of Ionization Energy

http://www.youtube.com/watch?v=8F9nA4Fg3Rw&feature=related

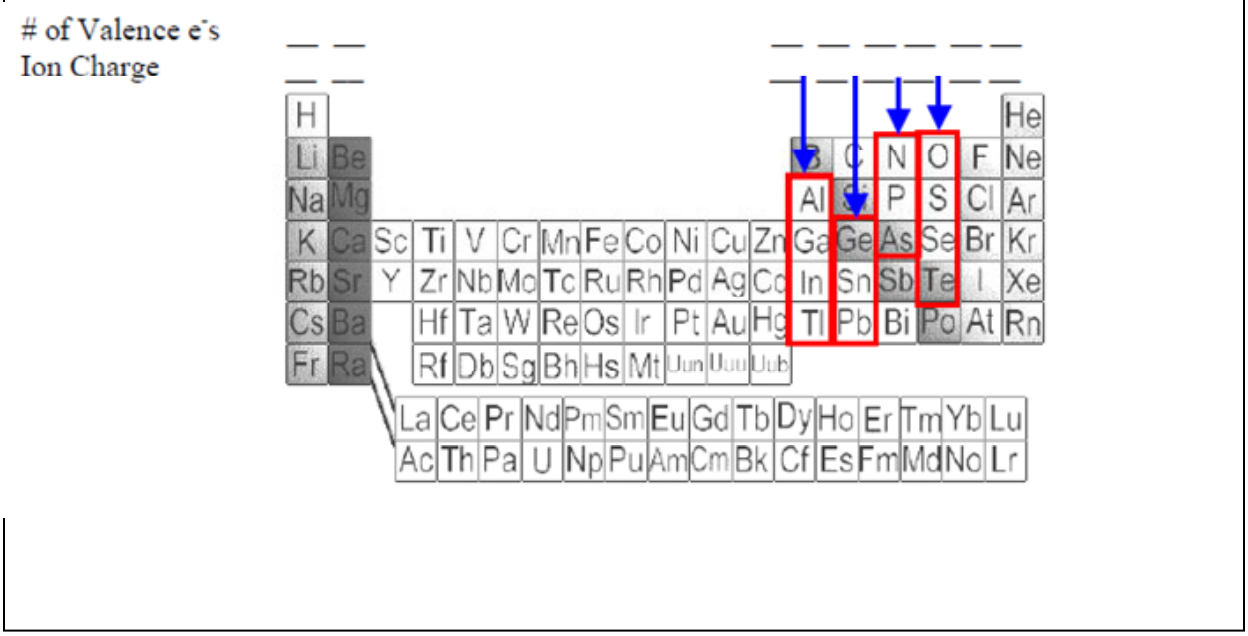
Part 1. The concept map below will further guide you in understanding the period trends, create statements using the concept map.



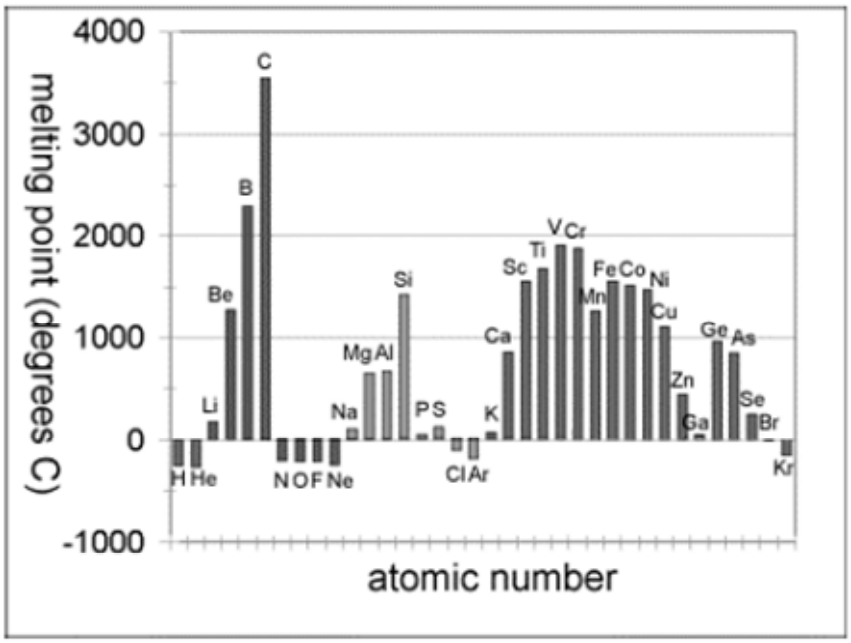
Statements:

1. _____
2. _____
3. _____
4. _____
5. _____

Part II: On the following diagram of the Periodic Table, list the number of valence electrons and the most common ion charge in Groups 1,2 & 13-18.



Part III. Look at the following graph showing the melting points.



Answer the questions below:

1. Look at the melting points of the elements Li, Na and K (Group 1). The melting points of the Alkali Metals appear to be (*higher/lower/about the same as*) _____ the melting points of other metals.

2. What is the general trend in melting points of the Alkali Metals as you move down the column from Li to K? (*increase/decrease*)

_____

3. What can you say about the bonds that hold the atoms together as you move down the column of Alkali Metals?

4. What is the general trend in melting points of the Halogens as you move down the column from F to Br? (*increase/decrease*)

_____

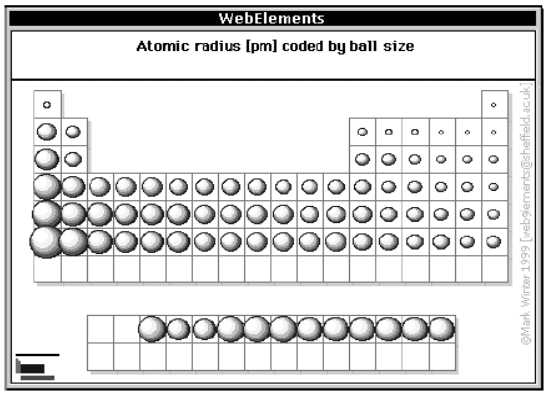
5. What is the general trend in melting points of the Group 16 elements as you move down the column from O to Se? (*increase/decrease*)

6. What is the general trend in melting points of the Noble Gases as you move down the column from He to Kr? (*increase/decrease*)

7. Do non-metals have the same melting point trend as metals?

8. Look at the elements in Period 2 (LiàNe). What is the trend in melting points as you move from Li on the left side toward C in the middle of the Periodic Table Is the same trend observed for Period 3 from Na to Si?

_____



Part IV.

Try to answer the question below:
Why the periodic table is considered to be one of the greatest scientific constructs?

"How the elements are arranged?"

The periodic table has guided chemical research including the discovery of new elements. This ability to lead scientific inquiry over a 130 year span can lead in answering the question:

Use the information on the picture to answer the questions below:

1. What is the general trend in atomic radius (size of atoms) as you move from left to right across any Period? (*increase/decrease*)
_____

2. As you move from Li to Ne, electrons are filling (*the same/different*) _____ energy levels(s). This may help explain why atoms *don't* get bigger as you move to the right within a period.
As you move across from Li to Ne, what is happening to the number of *protons* in the nucleus? _____.
What do the protons do to the electrons?_____.

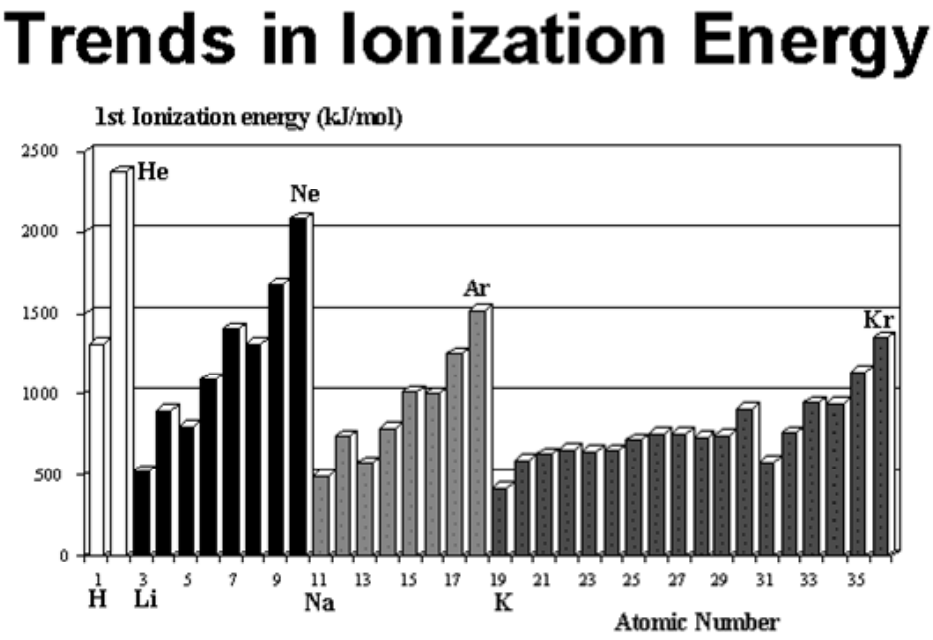
Suggest a reason why the atoms in a period actually get *smaller* as you move from left to right.

3. What is the general trend in atomic radius (size of atoms) as you move *down* a vertical column (group)? (*increase/decrease*)

_____

Suggest a reason for this trend. (*Hint: are electrons filling up the same energy level (orbitals) as you move down a column?*)

Part V:



1. Keeping in mind the trend in atomic radius, as you move from left to right across a period, suggest a reason for this trend.
2. What do you think is the reason for this trend based on atomic radius, the distance and the force of attraction between the nucleus and the outer electron?

After doing the activity, answer the question below:

What does electron arrangement have to do with ionization energy?

Worksheet # 4 Periodic Trends Worksheet

After learning the concepts in periodic trends, try to do the worksheet below: Use the periodic table and your knowledge of periodic trends to answer the following questions.

1. Which atom in each pair has the larger atomic radius?
   a) Li or K b) Ca or Ni c) Ga or B d) O or C
   e) Cl or Br f) Be or Ba g) Si or S h) Fe or Au

2. What is the periodic trend for atomic size from top to bottom in a group? from left to right in a period?

3. Why do atoms get smaller as you move left to right in a period?

4. Which element in each pair has a larger ionization energy?
   a) Na or O b) Be or Ba c) Ar or F d) Cu or Ra
   e) I or Ne f) K or V g) Ca or Fr h) W or Se

5. Explain the relationship between the relative size of an ion to its neutral atom and the charge on the ions.

6. Which particle has the larger radius in each atom/ion pair?
   a) Na, Na+ b) S, S2- c) I, I- d) Al, Al3+

7. What is ionization energy? What is first ionization energy?

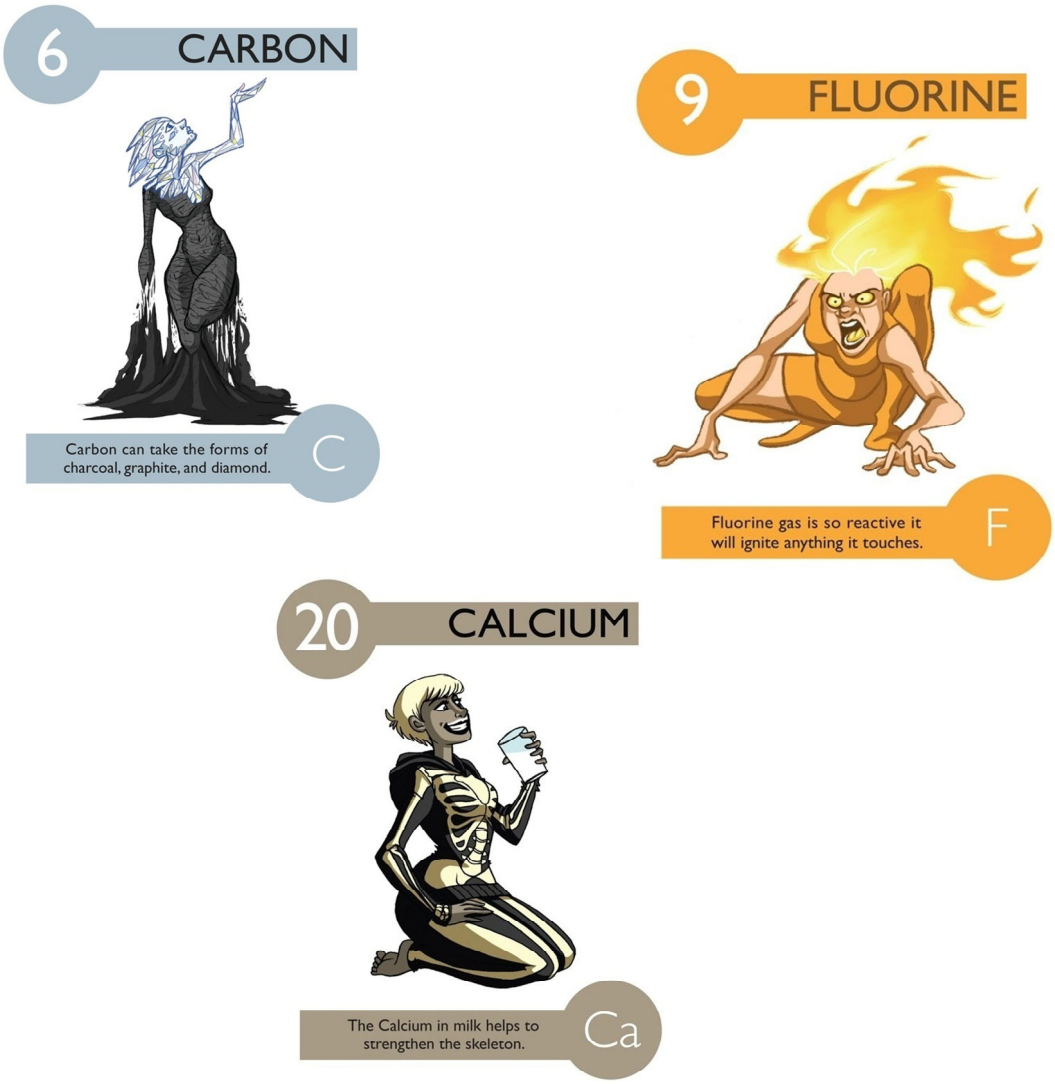
8. What is the periodic trend for first ionization energy?

9. Arrange the following groups of elements in order of increasing ionization energy.
   a) Be, Mg, Sr b) Bi, Cs, Ba c) Na, Al, S

10. Which element in each pair has a higher electronegativity value?
    a) Cl, F b) C, N c) Mg, Ne d) As, Ca

ACTIVITY 11. Museum of Elements (Level 3)

In this section, you will apply the concepts learned from the previous activities. You will get the chance to showcase the uses of elements and its arrangement.
The graphics below are taken from www.buzzfeed/donnad/cartoon-elements-make-learning-the-periodic. Try to reflect on the following questions: What do the pictures imply? Are the illustrated elements in character according to its properties and uses?



You've been asked by the Board of Directors of Museo Philippines to make First Museum of Elements to help design an exhibit about the element categories of the periodic table! The Board feels that people *don't know enough about or appreciate the elements,* and they're hoping that you can pull together a selection of examples from a category of elements that will amaze and educate the audience.

You will create a poster design using Museum Box based on your research of your category of elements and some specific elements in your category. You will present the exhibit to inform others of your category.

PROCESS QUESTIONS:

1. Why have you chosen such category?

2. What practical applications of the elements would you recommend to the audience?

3. How would you relate the uses of the elements to its properties?

4. How would you relate the uses of the elements to its periodic arrangement?

End of DEEPEN:

What new realizations do you have about the topic? What new connections have you made for yourself?

Now that you have a deeper understanding of the topic, you are ready to do the tasks on how to arrange and the explain the properties of the elements in the periodic. section.

TRANSFER

Your goal in this section is apply your learning of the arrangement of elements to real life situations. You will be given a practical task which will demonstrate your understanding.

ACTIVITY 12. Chemistry Apps

Now that you have identified the properties of elements using the periodic table, you can apply the concepts in constructing your own periodic table using multimedia presentation.

In the digital world, you see that a certain technological product can have many functions or multifunctional. Apps are made for little SMARTPHONE SOFTWARE PROGRAMS that keep you connected to someone or something at all times.
If given a chance, can you make an “app” related to chemistry?
How can you relate periodic table in terms of one’s health? In industries?
How will you use the arrangement of elements in the periodic table?

DESCRIPTION:

Mobile Tablet Interface Group is seeking an Interactive designer with interface and prototyping experience who possesses a passion for great design and shows an exceptional eye for detail. The designer will conceive, design and develop Chemistry Application in the Mobile Tablet product line that relates to its uses in the society.

The Interface group asked your company to make a prototype application. As the Periodic Table Designer of Publishing House, you are asked to present your design through an interactive powerpoint presentation of the Periodic Table of Elements with the uses and hazardous effects of the elements in one’s health, industry and environment. Your presentation should have the following components:

1. Content:
A. Group Number and Group Names
B. Period
C. Blocks (s, p, d, f)
D. USES of elements in one’s health, industry and environment. (Choose 10 elements only)
E. Hazardous effects of the elements in one’s health, industry and environment (Choose another 10 elements.)

2. Label the groups, blocks and other features in interactive PTE properly.

Your Interactive Presentation will be checked using the Rubric below:

CRITERIA	Outstanding 4	Satisfactory 3	Developing 2	Beginning 1	RATING
Comprehensive	The presentation is supported with updated and valid evidence, facts and ideas are updated.	The presentation is adequately supported with valid evidence, facts and ideas	Incomplete presentation of facts and evidences.	The presentation is superficial and not comprehensive .	
Accuracy	The content is written clearly and correctly with a logical progression of ideas and detailed supporting information.	The content is writtencorrectly with logical progression of ideas and supporting information	The content is vague in a conveying a point of view and does not create a strong sense of purpose.	The content is inaccurate. It lacks a clear point of view and logical sequence of information.	
Social Responsibility	Gives clear and iinsightful information of the element's uses and effects to one's health, environment and industry.	Gives clear information of the element's uses and effects to one's health, environment and industry.	Gives limited information of the element's uses and effects to one's health, industry and environment.	Gives no information of element's uses and effects to one's health, industry and environment.	
Impact	The Impact is high. The graphics, sound and/or animation assist in presenting an overall theme and enhance understanding the concept, ideas and relationships.	Impact is just right. The graphics, sound and/or animation visually depict material and assist the audience in understanding the concept, ideas and relationships.	Impact is jminimalt. The graphics, sound and/or animation assist less partially in presenting an overall theme.	Impact is absentl. The graphics, sound and/or animation are unrelated to the content.	
				OVERALL RATING	

End of TRANSFER:

In this section, your task was to create a chemistry application to be used in mobile tablet.

How did you find the performance task? How did the task help you see the real world use of the topic?

You have completed this lesson. Before you go to the next lesson, you have to answer the following post-assessment.

POST-ASSESSMENT:

It's now time to evaluate your learning. Click on the letter of the answer that you think best answers the question. Your score will only appear after you answer all items. If you do well, you may move on to the next module. If your score is not at the expected level, you have to go back and take the module again.

1. The alkali metal elements are found in _____ of the periodic table.
   A. Group 1A
   B. Group 2A
   C. Group 3A
   D. Period 7

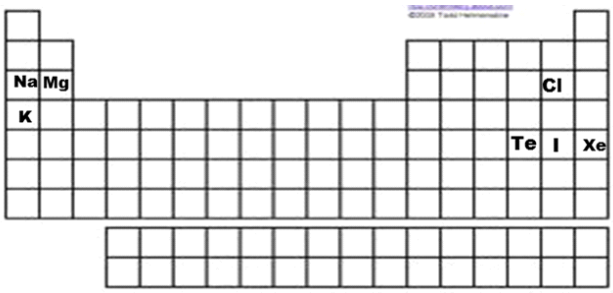
2. An element in the upper right corner of the periodic table is _____.
A. either a metal or metalloid
B. definitely a metal
C. definitely a non-metal
D. either a metalloid or a non-metal

3. Which statement best describes Group 2 elements as they are considered in order from top to bottom of the Periodic Table?

A. The number of principal energy levels increases, and the number of valence electrons increases.
B. The number of principal energy levels increases, and the number of valence electrons remains the same.
C. The number of principal energy levels remains the same, and the number of valence electrons increases.
D. The number of principal energy levels remains the same, and the number of valence electrons decreases

B. The energy levels are represented by the period numbers. Period 1 means one energy level, period 2 means 2 energy levels. Valence electrons remain the same.

4.



Iodine is a nonmetallic element. Using the diagram above, which element will have the same chemical behavior as of Iodine?

A. manganese (Mn)
B. Tellurium (Te)
C. Chlorine (I)
D. xenon (Xe).

5. Which of the following elements below has atoms with the smallest atomic radius?
A. Q
B. T
C. R
D. Y

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Q												T				W	Y
	S												U		V		
																X	
R																	Z

6. Which sequence correctly places the elements in order of increasing ionization energy?
A. H → Li → Na → K
B. I → Br → Cl → F
C. O → S → Se → Te
D. H → Be → Al → Ga

D. IE increases from left to right.

For numbers 7-8: Refer to this portion of the periodic table in answering the questions

IA IIA IIIA IVA VA VIA VIIA

Li	**Be**	**B**	**C**	**N**	**O**	**F**
Na	**Mg**	**Al**	**Si**	**P**	**S**	**Cl**
K	**Ca**	**Ga**	**Ge**	**As**	**Se**	**Br**
Rb	**Sr**	**In**	**Sn**	**Sb**	**Te**	**I**

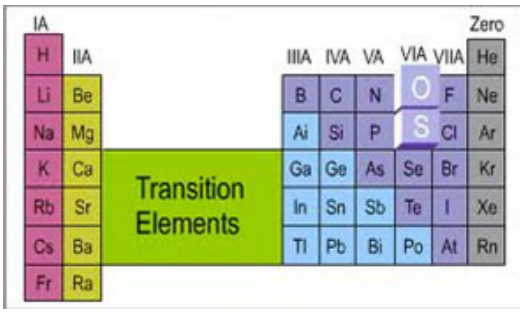
7. Which of the following elements has the smallest atomic size?
   A. F B. Li C. Rb D. I

8. Which atom needs the lowest ionization energy to become an ion?
   A. Ca B. Sr C. Ga D. In

9. Element M reacts with chlorine to form a compound with the formula MCl_2. Element M is more reactive than magnesium and has a smaller radius than barium. This element is _____.

   A. Sr B. K C. Na D. Be

10. Based on its position in the periodic table, the element sulfur would be expected to have how many valence electrons?



   A. 4 B. 6 C. 8 D. 16

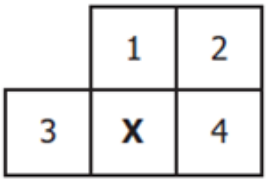
11. The Science Department is putting up an exhibit of elements and you are asked to classify the sample of elements in the lab. Which of the following classification of elements is correct?

A.	W – Transition Group	Barium – Representative Group	Cm – Inner Transition Group	Element X with an atomic number 10 – Noble gas
B.	W – Representative Group	Barium – Transition Group	Cm – Inner Transition Group	Element X with an atomic number 10 – Halogen
C.	W – Group IVB	Barium – Group 3	Cm – Transition Group	Element X with an atomic number 10 – Group 6
D.	W – Transition Group	Barium – Group 2B	Cm – Inner Transition Group	Element X with an atomic number 10 – Noble gas

12. A chemist is examining an unidentified element sample with oxidation states of +2, +3, +6. The element has a shielding effect similar to that of potassium (K). Which statement about the unidentified element is most likely true?

A. It has the same number of neutrons as potassium.
B. It is a transition metal from the same period as potassium.
C. It is one of the heaviest elements in potassium's group.
D. It is a mix of three unstable isotopes of potassium.
.

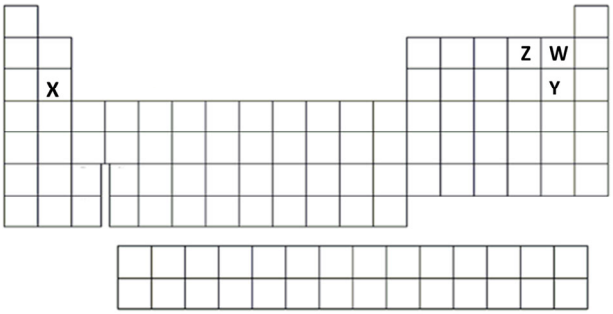
13. **Small Periodic Table Section**



The picture shows a small section of elements from the periodic table. Which element has one more proton than element X?

A. 1 **C.** 2
B. 3 **D.** 4

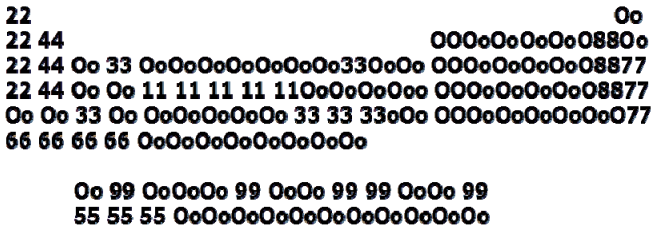
14. Based from the location of the elements in the periodic table, which of the following is most likely to gain electrons in a chemical reaction?



A. X C. W
B. Z D. Y

Please refer to the following:

Below is a hypothetical periodic table. It is divided into group/family of elements (vertical column) and period (horizontal row).



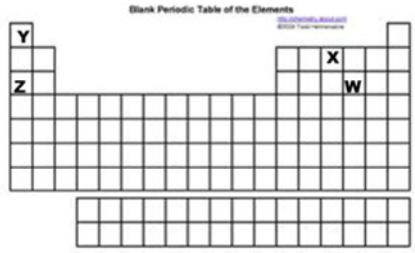
15. What could be said of the elements marked with 22 in the periodic table above?

A. They are in the same group.
B. They are in the same period.

C. They are alkaline earth metals.
D. They are noble gases.

16. Which property best describe the elements represented by number 77?
A. They have a stable octet.
B. They are salt formers.
C. They react instantly with nonmetals.
D. They donate electrons.

17. Refer to the periodic table below:



Which of the following table provides the correct information of the properties of the elements?

A.

Element	Atomic number	Number of protons	Number of neutrons	Mass number	Electronic configuration
W	16	16	16	32	2, 8, 6
X	7	7	7	14	2, 5
Y	1	1	1	2	1
Z	3	3	2	1	2, 1

B.

Element	Atomic number	Number of protons	Number of neutrons	Mass number	Electronic configuration
W	16	16	16	32	2, 8, 6
X	7	7	7	14	2, 5
Y	1	1	1	2	1
Z	11	11	12	23	2,8, 1

C.

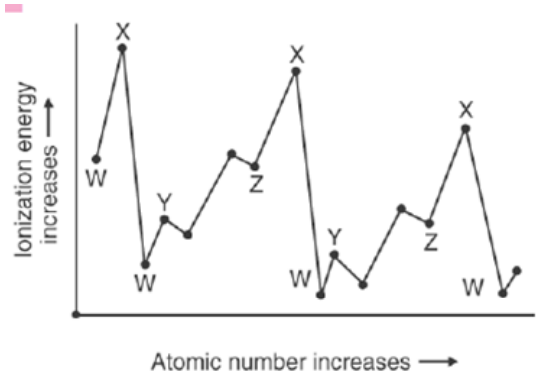
Element	Atomic number	Number of protons	Number of neutrons	Mass number	Electronic configuration
W	7	16	16	32	2, 8, 6
X	16	7	7	14	2, 5
Y	1	1	1	2	1

Z	**11**	**11**	**12**	**23**	**2,8, 1**

D.

Element	Atomic number	Number of protons	Number of neutrons	Mass number	Electronic configuration
W	**16**	**16**	**16**	**30**	**2, 7, 7**
X	**7**	**7**	**7**	**14**	**2, 6**
Y	**1**	**1**	**1**	**2**	**1**
Z	**11**	**11**	**12**	**23**	**2,8, 1**

18.



The chart above shows the relationship between the first ionization energy and the increase in atomic number. The letter on the chart representing the noble gases is _____.

A. W
B. X
C. Y
D. Z

19. Imagine you have to carry on the work of Dmitri Mendeleev and identify the some elements below. You have to convince the rest of the scientific community where to place these elements within the periodic table by using periodic trends.

Which among the group of elements are in correct order for increasing atomic radius?
A. Be, C, Cl, Kr
B. H, C, Mg, K
C. Ca, P, Ne, B
D. Ne, B, Al, Cs

20. Based from the previous choices, which group of elements will you present to the scientific community that shows increasing metallic property?

GLOSSARY OF TERMS USED IN THIS LESSON: (List in alphabetical order the key terms and give their definitions)

actinide.
Elements 89-102. Electrons added of actinide atoms go into the *5f* subshell. Unstable elements.

alkali metal. (alkaline earth metal) alkali metal element.
The Group 1 elements, lithium (Li), sodium (Na), potassium (K), rubidium (Rb), cesium (Cs), and francium (Fr) react with cold water for form strongly alkaline hydroxide solutions, and are referred to as "alkali metals". Hydrogen is *not* considered an alkali metal.

alkaline earth. An oxide of an alkaline earth metal, which produces an alkaline solution in reaction with water.

alkaline earth metal. (alkali metal)
The Group 2 elements, beryllium (Be), magnesium (Mg), calcium (Ca), strontium (Sr), barium (Ba), and radium (Ra) form alkaline oxides and hydroxides and are called "alkaline earth metals".

atomic radius. Atomic size; covalent radius; atomic radii. Compare with ionic radius.
One half the distance between nuclei of atoms of the same element, when the atoms are bound by a single covalent bond.

block. A region of the periodic table that corresponds to the type of subshell (s, p, d, or f) being filled during the Aufbau construction of electron configurations.

first ionization energy. (IE,IP) first ionization potential. The energy needed to remove an electron from an isolated, neutral atom.

group.
A vertical column on the periodic table, for example, the halogens. Elements that belong to the same group usually show chemical similarities, although the element at the top of the group is usually uncommon.

halogen. group VIIA; group 18.

An element of group VIIA (a. k. a. Group 18). The name means "salt former"; halogens react with metals to form binary ionic compounds. Fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At) are known at this time.

ionic radius. Compare with atomic radius.
The radii of anions and cations in crystalline ionic compounds, as determined by consistently partitioning the center-to-center distance of ions in those compounds.

ionization energy. (IE,IP) ionization potential. Compare with adiabatic ionization energy, vertical ionization energy, electronegativity, and electron affinity.
The energy needed to remove an electron from a gaseous atom or ion.

lanthanide contraction.
An effect that causes sixth period elements with filled 4f subshells to be smaller than otherwise expected. The intervention of the lanthanides increases the effective nuclear charge, which offsets the size increase expected from filling the n=6 valence shell. As a consequence, sixth period transition metals are about the same size as their fifth period counterparts.

lanthanide. Compare with actinide and inner transition metals.
Elements 57-70 are called lanthanides. Electrons added during the Aufbau construction of lanthanide atoms go into the *4f* subshell.

metal. metallic. Compare with nonmetal and metalloid.
A metal is a substance that conducts heat and electricity, is shiny and reflects many colors of light, and can be hammered into sheets or drawn into wire. Metals lose electrons easily to form cations. About 80% of the known chemical elements are metals.

nonmetal. (metal,metalloid) non-metal.
A nonmetal is a substance that conducts heat and electricity poorly, is brittle or waxy or gaseous, and cannot be hammered into sheets or drawn into wire. Nonmetals gain electrons easily to form anions. About 20% of the known chemical elements are nonmetals.

periodic law.
The periodic law states that physical and chemical properties of the elements recur in a regular way when the elements are arranged in order of increasing atomic number.

periodic table.
An arrangement of the elements according to increasing atomic number that shows relationships between element properties.

periodic trend.

A regular variation in element properties with increasing atomic number that is ultimately due to regular variations in atomic structure.

period.
Rows in the periodic table are called periods. For example, all of the elements in the second row are referred to as 'second period elements'. All elements currently known fall in the first seven periods.

representative elements.
Elements of the s and p blocks.

second ionization energy. (IE,IP) second ionization potential. The energy needed to remove an electron from an isolated +1 ion. The third ionization energy would be the energy required to remove an electron from an isolated +2 ion, and so on.

transition metal. transition element; outer transition element.
An element with an incomplete *d* subshell. Elements which have common cations with incomplete *d* subshells are also considered transition metals. Elements with incomplete *f* subshells are sometimes called "inner transition elements".

REFERENCES AND WEBSITE LINKS USED IN THIS LESSON:

For Periodic Table Worksheets:

http://teach.valdosta.edu/lwood/chem1211/Exam_keys/fall2003/key3.pdf

RS•C *Royal Society of Chemistry Student Sheets – Chemical Misconceptions – Revising the Periodic Table probe*

For Periodic Table Worksheets
http://www.nclark.net/PeriodicTable
For Sources of Periodic Tables:
http://education.jlab.org/itselemental/tableofelements.pdf
http://www.sciencespot.net/Media/chemprdtable.pdf
http://www2.ucdsb.on.ca/tiss/stretton/CHEM1/audust.html
http://www2.ucdsb.on.ca/tiss/stretton/CHEM1/elemrid1.html
http://www.chem1.com/acad/webtext/atoms/atpt-6.html#ORG
http://www.pinoychemteacher.org/content/Convention2011/OralPresentations/NecorOP.pdf
http://www.ptable.com/
Misconceptions in chemistry

http://www.periodicvideos.com/videos/QA_misconception.htm

For Video Clips

http://www.bbc.co.uk/bitesize/standard/chemistry/elementsandreactions/periodic/revision/1/

"Elemental Funkiness"

http://www.youtube.com/watch?v=1PSzSTilu_s

http://birdieguy.blogspot.com/2010/12/chemistry-humor.html

http://vchemistry.blogspot.com/2010/06/chemistry-cartoons.html

https://missmiller5.wikispaces.com/Chemistry+Jokes

For Graphics/Images:

Coloring the Periodic table

http://geraghty.weebly.com/uploads/1/3/5/6/13564507/chemistry-periodic_table_activity.pdf

Boy Pick-up

http://mixofeverything.blogspot.com/2012/05/boy-pick-upthe-movie-press-con.html

http://dribbble.com/shots/373871-Boy-Pick-Up

Chemystery

http://www.aftonchemical.com/insight/pages/_chemystery.aspx

Music

http://entertainment.desktopnexus.com/wallpaper/122948/

Blocks of PTE

http://www.geekalerts.com/periodic-table-building-blocks/

Graphics:

http://www.google.com.ph/imgres?q=how+they+made+the+periodic+table&um=1&hl=fil&sa=N&biw=1366&bih=664&tbm=isch&tbnid=u-B44YygiCDGgM:&imgrefurl=http://blog.snehilkhanor.com/2011/12/12/how-the-really-made-the-periodic-table-tech-fun/&docid=IgJMd3lHKcg_-M&imgurl=http://blog.snehilkhanor.com/wp-content/uploads/2011/12/How-they-really-made-the-periodic-table.

http://en.wikipedia.org/wiki/The_Day_the_Earth_Stood_Still_%282008_film%29

http://hawaii.hawaii.edu/math/Courses/Math100/Chapter4/HomeWork/HW411Sol.htm

http://www.travelforboomers.com/2012/01/30/treasure-hunting-for-lost-miles/

Periodic Trends Activity

http://colgurchemistry.com/Chem11/pdfs/Microsoft%20Word%20-%20Inclass_Pertabtrends_doc.pdf

Designs of the periodic table:

http://www.glencoe.com/sec/science/chemistry/mc/pow/chapter06.shtml

http://deltabiology.com/2012/coolest-periodic-table-of-elements/

http://home.windstream.net/eperley/periodic.htm