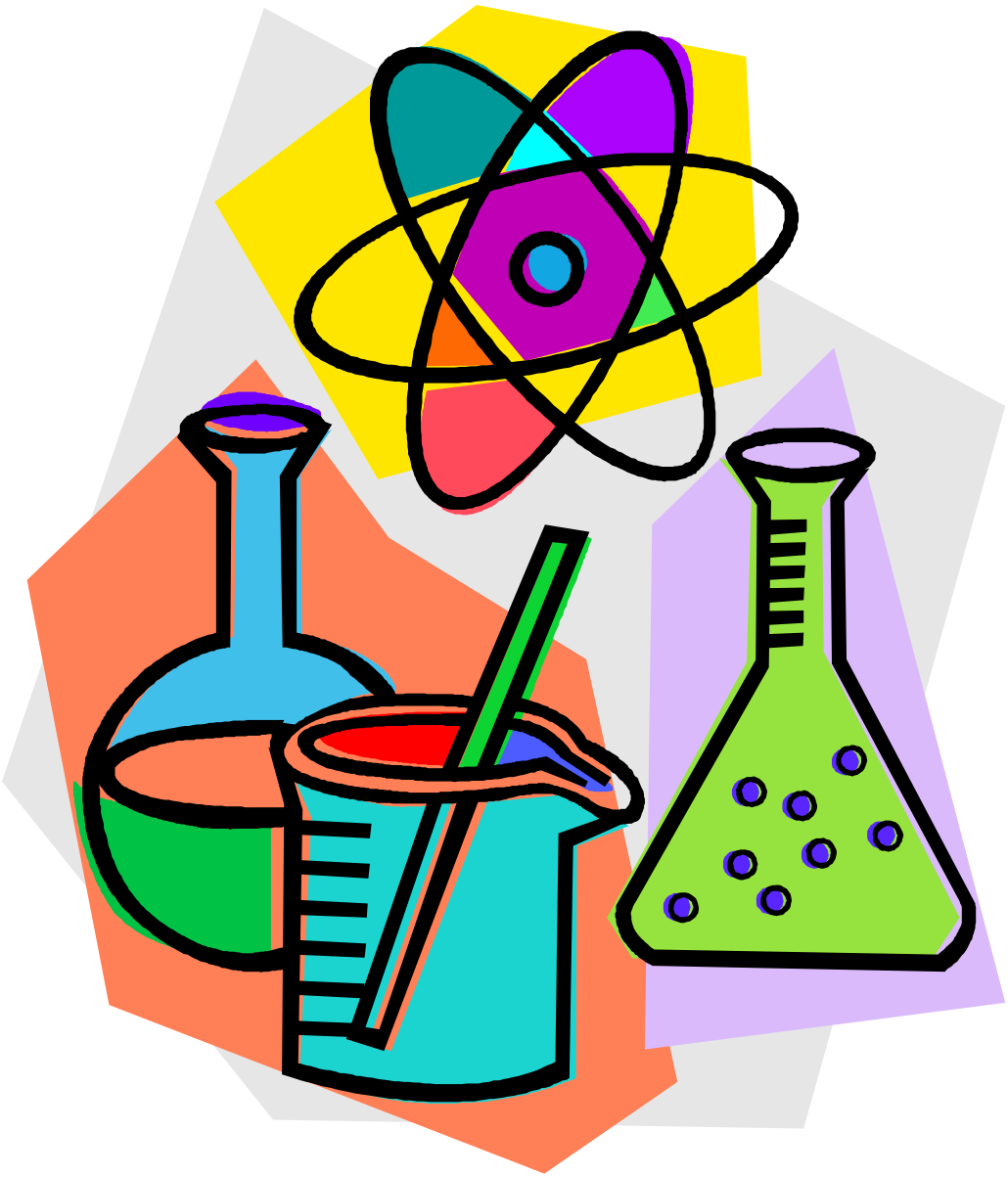
SCIENCE 10F



CHEMISTRY

A (VERY!) BRIEF HISTORY OF MATTER…

Scientist	What they believed	Diagram
Empedocles Dates:	- Matter is composed of four elements: _____ _____ _____ _____	
Democritus Dates:	- Matter is composed of tiny particles that cannot be _____	
Alchemists Dates:	- Attempted to change _____ into _____ - Looked for a substance that would give them eternal life	
Robert Boyle Dates:	- An element is a _____ _____ that cannot be broken down into similar substances	
Joseph Priestly Dates:	- First person to isolate _____ - Determined that air must be a _____	

Scientist	What they believed	Diagram
John Dalton Dates:	- All matter is made up of _____ which are too small to see - Each element has its own kind of atom. - Atoms of different elements are _____ - Compounds are created when atoms of different elements link to form _____	
Michael Faraday Dates:	- Charged atoms are called _____ - Matter must contain positive and negative charges - Opposite charges _____, and like charges _____	
JJ Thomson Dates:	- Called the "_____ _____" model. - The atom is composed of a positively charged material with the negatively charged _____ scattered through it	
Ernest Rutherford Dates:	- Atom is mostly _____ - Discovered the _____ of an atom - Small, positive nucleus with negative electrons scattered around the outside edge	
Bohr Dates:	- Electrons move in definite _____ around the nucleus, like planets - Electrons are in specific orbits called "_____"	

The Particle Theory of Matter

Principle	Illustration
1) All matter is made up of tiny particles.	
2) All particles of one substance are the same. Different substances are made up of _____ _____.	
3) Particles are always moving. The more _____ the particles have, the _____ they move.	
4) There are attractive forces between the particles. These forces are stronger when the particles are closer together.	

HOUSEHOLD HAZARD SYMBOLS

Symbol Meaning:

_____ _____ _____ _____

Product Examples:

_____ _____ _____ _____

_____ _____ _____ _____

Frame Meaning:

Inverted Triangle		
Octagon		

Workplace Hazardous Materials Information System (WHMIS)

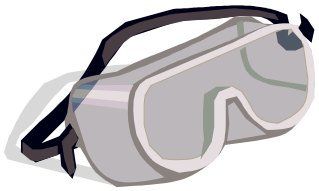
_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____

_____ _____ _____ _____



Assignment: Safety Map

Your mission, should you choose to accept it (and you will!) is to create a map that includes all of the safety features of your science classroom.

Start with a map of the room. Be sure to include:

- Desks and Chairs **/2**
- Counters and Cupboards **/2**
- At least 2 other permanent features that would help to identify the room **/2**

Add the following safety features in a way that makes them stand out:

- Fire extinguisher **(1)**
- Fire blanket **(1)**
- Office intercom button **(1)**
- Eye wash station **(1)**
- Gas shut off button **(1)**

Include the fire evacuation route (how you would get from your usual seat to outside if the fire alarm rang). **/2**

Underneath your map (or on the back) include the 3 safety rules you think are **most important** for a science lab/science classroom. **/3**

Map is neat, organized **/2**
Appropriate use of colour, detail **/2**

TOTAL **/20**

PHYSICAL PROPERTIES

Nelson Science 9 p. 16-18

What is a physical property?

Qualitative Property – a quality or change in matter that has no numerical quantity (ex. colour)

Quantitative Property – a quality or change in matter that can be measured (ie. mass)

Property	Definition/Meaning	Example & Counterexample
Hardness		
State		
Malleability		
Ductility		
Melting/ Boiling Point		
Crystal Form		
Solubility		
Viscosity		
Density		

CHEMICAL PROPERTIES

Nelson Science 9 p. 18-19

1) Define chemical properties.

2) How are chemical and physical properties different?

3) Complete the table.

Property	Definition/Meaning	Example
Combustability		
Reaction with acid		

4) Create a web or concept map about physical and chemical changes. You must use the words below and include 5 more from your notes or the text.

combustability	hardness	acid	solubility
flammable	gas	change	quantitative

HOW DENSE?

Density is the _____ _____.

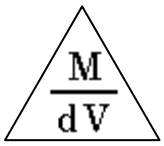
Mathematically, density can be described as:

Therefore, density measures how much mass is crowded into a given space.

Example) A piece of silver has a volume of 2.00 cm^3 and a mass of 21.0 g. What is its density?

Gold has a density of 19.3 g/cm^3. What is the mass of a 3.5 cm^3 sample?

Water has a density of 1 g/mL. What is the volume of a 200 g sample of water?



Density Calculations Worksheet I

1. Find the unknown quantity:

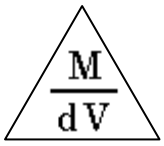
a) d = 3 g/mL V = 100 mL M = ?	b) d = ? V = 950 mL M = 95 g	c) d = 0.5 g/cm^3 V = ? M = 20 g

WORD PROBLEMS

1. A block of aluminum occupies a volume of 15.0 mL and weighs 40.5 g. What is its density?

2. Mercury metal is poured into a graduated cylinder that holds exactly 22.5 mL. The mercury used to fill the cylinder weighs 306.0 g. From this information, calculate the density of mercury.

3. What is the weight of the ethanol that exactly fills a 200.0 mL container?
The density of ethanol is 0.789 g/mL.



4. A rectangular block of copper metal weighs 1896 g. The dimensions of the block are 8.4 cm by 5.5 cm by 4.6 cm. From this data, what is the density of copper? (hint: find the volume of a block first)

5. What volume of silver metal will weigh exactly 2500.0 g. The density of silver is 10.5 g/cm^3.

6. Find the mass of 250.0 mL of benzene. The density of benzene is 0.8765 g/mL.

7. A block of lead has dimensions of 4.50 cm by 5.20 cm by 6.00 cm. The block weighs 1587 g. From this information, calculate the density of lead.

8. 28.5 g of iron shot is added to a graduated cylinder containing 45.50 mL of water. The water level rises to the 49.10 mL mark, From this information, calculate the density of iron.

Solubility

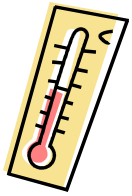
In general terms, solubility is the ability of a substance to dissolve. In the process of dissolving, the substance being dissolved is called the _____ and the substance in which the solute dissolves is called the _____. The resulting mixture is called a _____.

For example, if we put sugar into water it will dissolve.

_____ is the **solute**
_____ is the **solvent**
_____ is the **solution**

There are things we can do to increase the speed or rate at which a solute dissolves in a solvent. You have probably experienced many of these things in everyday life when you were making tea, hot chocolate from powder, or even kool aid.

- **Temperature** – the _____ the solvent, the faster the solute will dissolve
  Example)



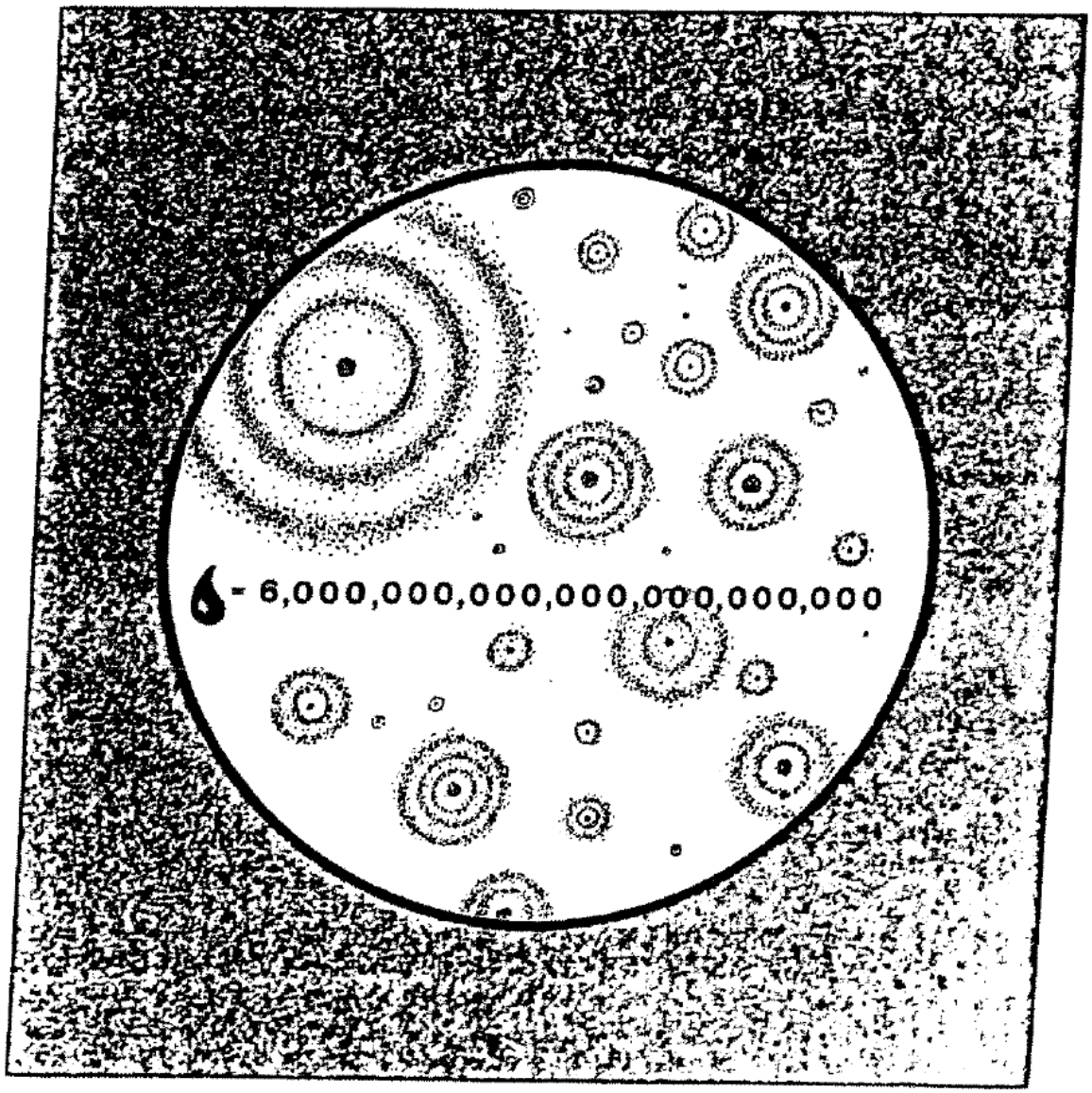
- **Surface area** – the _____ the surface area, the faster the solute will dissolve
  Example)

- ***Agitation*** – the more you agitate a solution, the faster the solute will dissolve
  Example)

ATOMS and ELEMENTS

What are atoms?

9



atom: smallest particle of a type of matter that has all of the same characteristics as that type of matter

LESSON 9 | What are atoms?

What is the smallest thing you can think of? A single grain of sand? A particle of dust?

Now try to imagine something so small that you would need millions of them to make one grain of sand! Imagine something so small that you cannot see it—not even with the most powerful microscope.

There is something that small: the **atom**. All matter is made up of atoms. All solids, liquids, gases, and plasmas are made up of these tiny particles.

Atoms are matter. One atom take up space—very, very, very little space. An atom also has mass—very, very, very little mass.

How small is the atom? Atoms are so small that in just one drop of water, there are about six sextillion atoms.

That's 6,000,000,000,000,000,000,000 atoms!!!

If you tried to count to six sextillion it would take you about one hundred trillion years—If you counted fast!

The idea of the atom is far from new. Many years ago, before there were any "real" scientists, there were philosophers [fi-LAHS-uh-furz]—people who did mental "investigations." They worked with ideas. Over 2,000 years ago, a Greek philosopher named Democritus [di-MAHK-ruh-tus] had the idea that all matter was made up of tiny parts. He believed that these parts could not be divided or destroyed. He named them *atoms*. In Greek, *atomos* means "indivisible"[in-di-VIS-uh-bul].

Democritus could not prove his idea. He couldn't even test it. So, it remained just an idea for many years. Today, scientists have proven that many of Democritus's ideas were correct. Everyday, more and more is discovered about the atom.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

_____ 1. An atom is very large.

_____ 2. Democritus named the atom.

_____ 3. Solids are made of atoms.

_____ 4. Liquids are made of atoms.

_____ 5. Gases are not made of atoms.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A	Column B
_____ 1. Democritus	a) a very small particle
_____ 2. matter	b) Greek philosopher who named the atom
_____ 3. philosophers	c) made up of atoms
_____ 4. *atomos*	d) people who think about things
_____ 5. atom	e) Greek word for "indivisible"

WHICH IS SMALLEST? WHICH IS BIGGEST?

Each group of words or terms below can be arranged by size. Write them in the correct order in the spaces below each group.

1. a piece of dust an atom an elephant

_____ (smallest) _____ _____ (largest)

2. the tip of a pin a dime an atom

_____ (smallest) _____ _____ (largest)

3. an atom a rock a pebble

_____ (smallest) _____ _____ (largest)

Figure E *John Dalton*

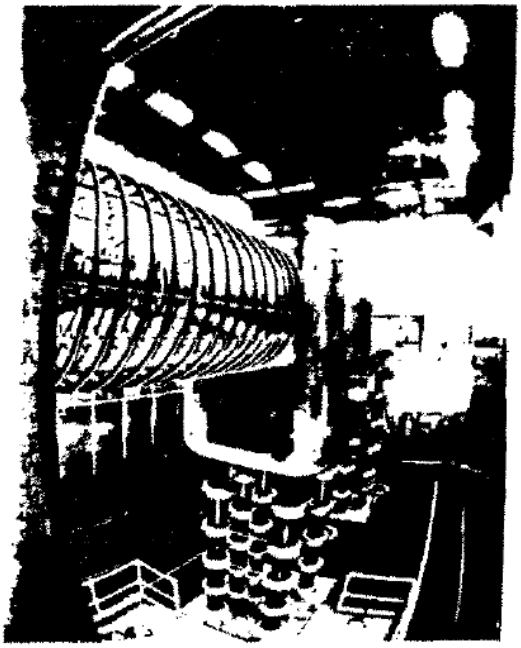


Figure F *Synchrotron*

In the early 1800s, an English chemist named John Dalton described his ideas about matter. Dalton's ideas were based on many scientific experiments and observations. The ideas formed a theory that led to our modern atomic theory.

You may wonder how we could know anything about a particle of matter that is too small to see and almost too small to measure. Scientists have learned how to study atoms. They study atoms by studying how matter behaves. They use very complicated equipment. However, you can learn about atoms by studying what scientists have learned.

The present atomic theory states:

1. All elements are made up of tiny particles called atoms.
2. Atoms of a given element are alike.
3. Atoms of different elements are different.
4. Chemical changes take place when atoms link up with, or separate from, one another.
5. Atoms are not created or destroyed by chemical change.

Democritus was on the right track over 2000 years ago. However, one important part of his idea has been proven wrong. Atoms *are* divisible. In fact, the "splitting" of the atom is the basis for nuclear [NEW-klee-ur] or atomic, energy.

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some answers may be used more than once.

alike	John Dalton	atoms
created	six sextillion	indivisible
different	small	destroyed
Democritus	2000	

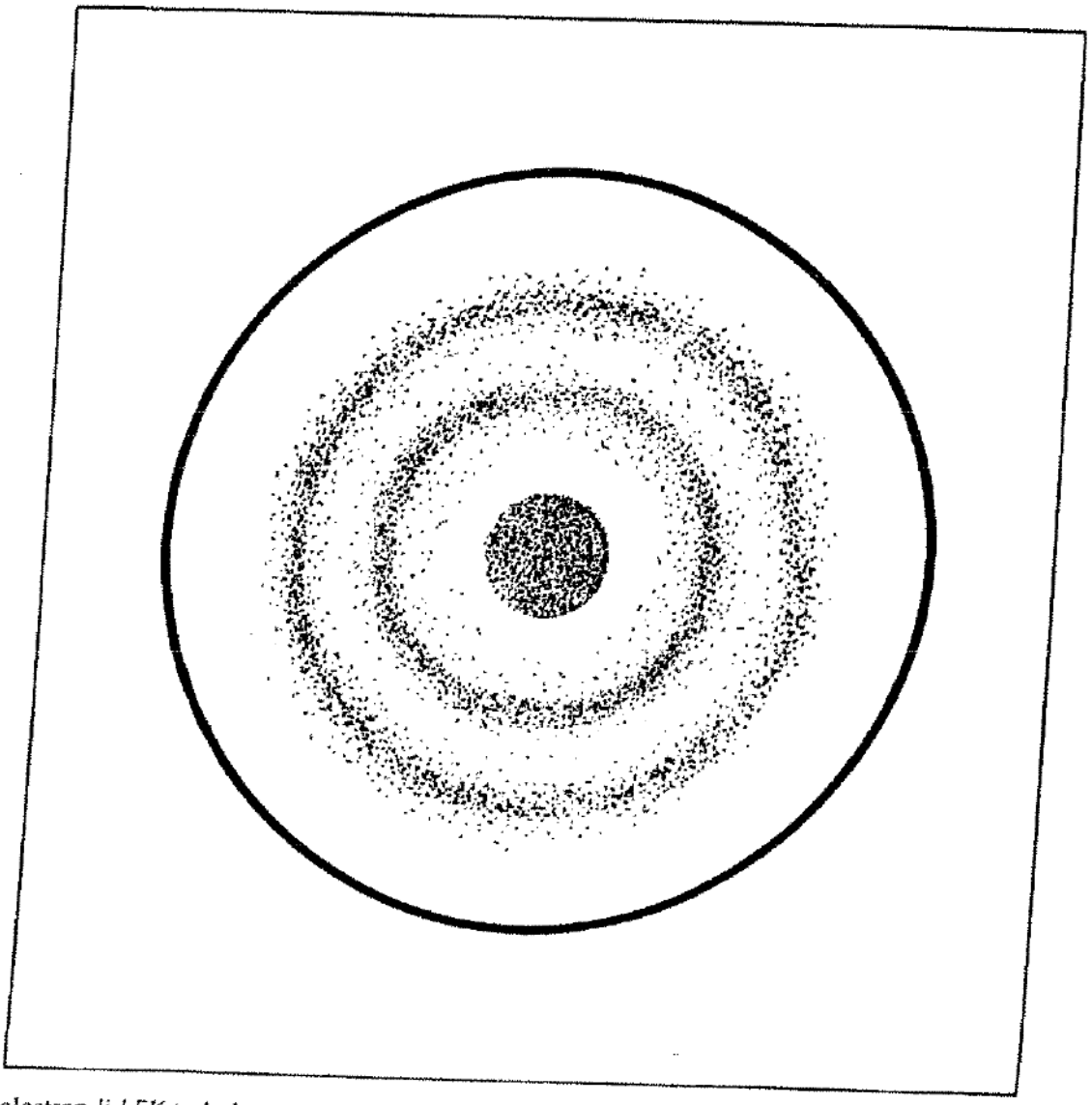
1. The atom was first thought of by a man named _____ more than _____ year ago.
2. In Greek, the word *atomos* means _____.
3. Matter that is indivisible cannot be _____.
4. An English chemist named _____ presented a modern atomic theory.
5. All elements are made of _____.
6. Atoms of a given element are all _____.
7. Atoms can not be _____ or _____ by chemical change.
8. Atoms of _____ elements are different.
9. Atoms are so _____ that we can not see them.
10. There are _____ atoms in a drop of water.

REACHING OUT

Why did it take 2000 years for scientist to confirm some of Democritus's ideas about atoms.

What are the parts of an atom?

10



electron [i-LEK-trahn]: a part of the atom that has a negative electrical charge; orbits the nucleus

neutron [NEW-trahn]: a part of the atom that has neither a positve or negative charge; is found in the nucleus

nucleus [NEW-klee-us]: central part of an atom, which contains neutrons and protons

proton [PROH-tahn]: a part of the atom that has a positive charge; is found in the nucleus

LESSON 10 | What are the parts of an atom?

People once thought that the atom was the smallest particle of matter in the universe. However, scientists now know that atoms are made up of even smaller parts. There are three different kinds of particles. They are: **protons** [PRO-tahnz], **neutrons** [NEW-trahnz], and **electrons** [i-LEK-trahnz].

Most of the mass of an atom is found in the central part of the atom, called the **nucleus** [new-KLEE-us]. The nucleus of an atom is made up of protons and neutrons. These particles are packed very tightly together in the nucleus.

Electrons are found outside the nucleus. They circle the nucleus very, very quickly. Electrons are very small and have almost no mass. The number of electrons in an atom is always equal to the number of protons in the nucleus of that atom.

Scientists have discovered that protons, electrons, and neutrons have different **charges**. You probably know that the word "charge" has something to do with electricity.

There are two kinds of charges. There are positive (plus) charges and negative (minus) charges. By studying atoms, scientists have learned that:

- PROTONS have positive (+) charges.
- ELECTRONS have negative (–) charges.
- NEUTRONS have no charges. They are neutral.

Since atoms have the same number of protons and electrons, the number of positive charges equals the number of negative charges. The opposite charges cancel each other out. Therefore, THE WHOLE ATOM HAS NO OVERALL CHARGE.

ATOMIC DIAGRAMS

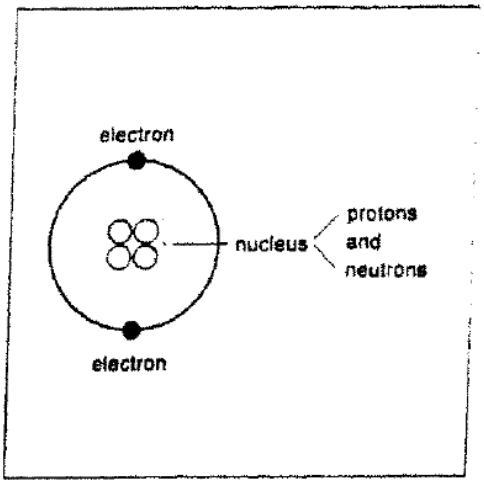


Figure A

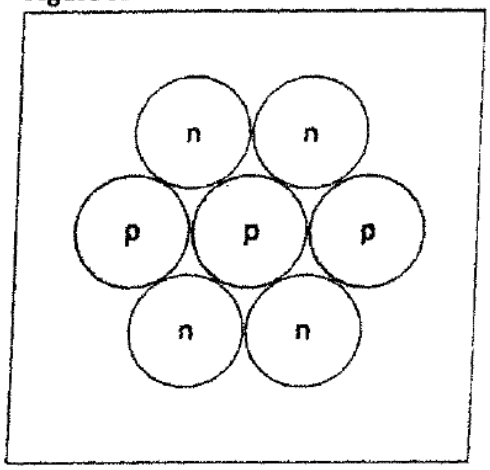


Figure B

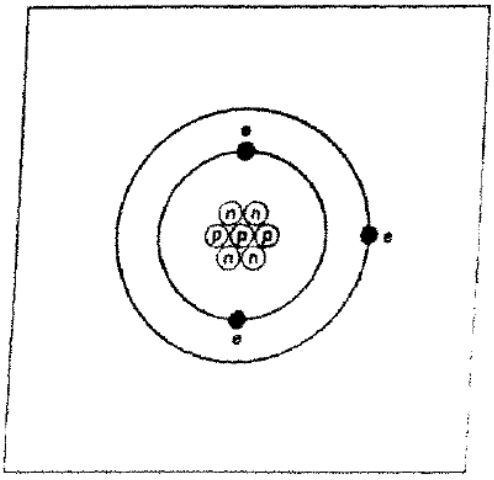


Figure C

The table below tells where the parts of the atom are found and what the charge of each part is.

Name of part	Where it is found	Charge
proton	inside the nucleus	+
neutron	inside the nucleus	0
electron	outside the nucleus	–

Figure B shows the center of a lithium atom. The center of an atom is called it nucleus.

1. Name the parts that make up a nucleus.

   _____

2. In the diagram, each "p" stands for _____ ; each "n" stands for a _____ .

3. How many protons are in a lithium nucleus? _____

4. How many neutrons are in a lithium nucleus? _____

Figure C shows a full lithium atom.

5. How many electrons does a lithium atom have? _____

6. How many positive charges are in the atom? _____

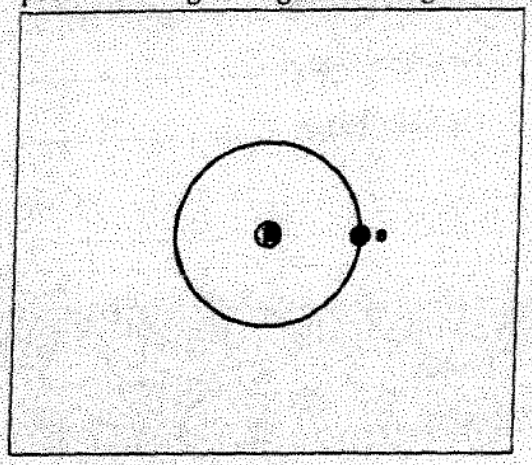
7. How many negative charges are in the atom? _____

8. What is the overall charge of the atom?

   _____

INTERPRETING ATOMIC DIAGRAMS

Below and on the following page are diagrams of six different atoms. In the spaces provided to the right of each diagram, fill in the number of protons, neutrons, electrons, positive charges, negative charges, and the overall charge of each atom.



Protons _____

Neutrons _____

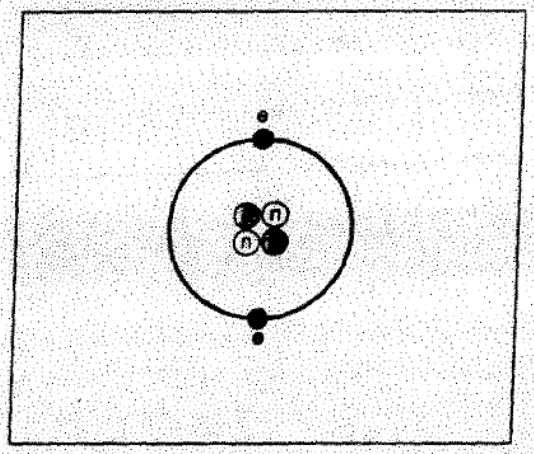
Electrons _____

Positive charge _____

Negative charge _____

Overall charge _____

Figure D *Hydrogen*



Protons _____

Neutrons _____

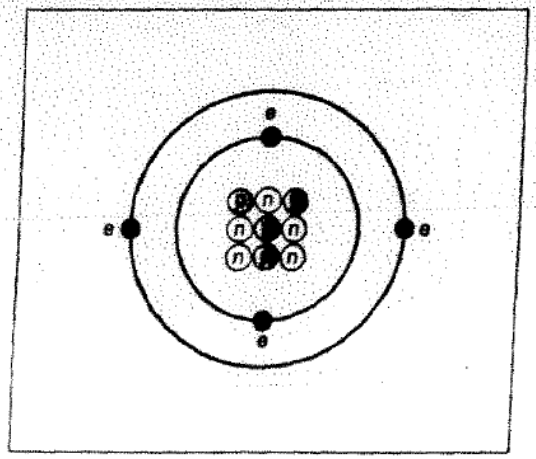
Electrons _____

Positive charge _____

Negative charge _____

Overall charge _____

Figure E *Helium*



Protons _____

Neutrons _____

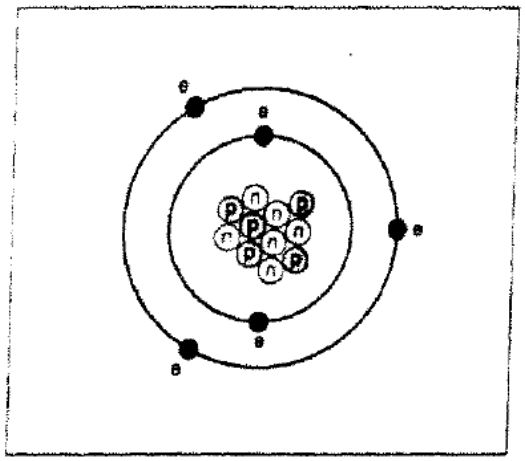
Electrons _____

Positive charge _____

Negative charge _____

Overall charge _____

Figure F *Beryllium*



Protons _____

Neutrons _____

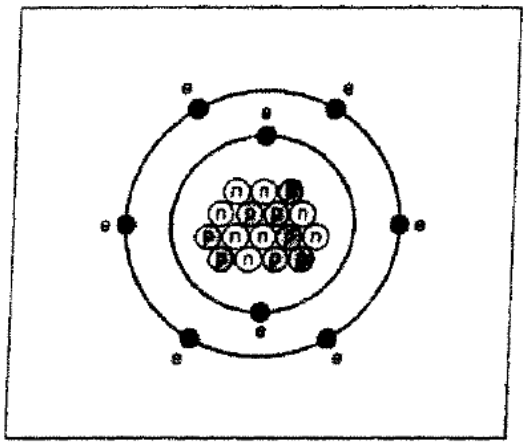
Electrons _____

Positive charge _____

Negative charge _____

Overall charge _____

Figure G *Boron*



Protons _____

Neutrons _____

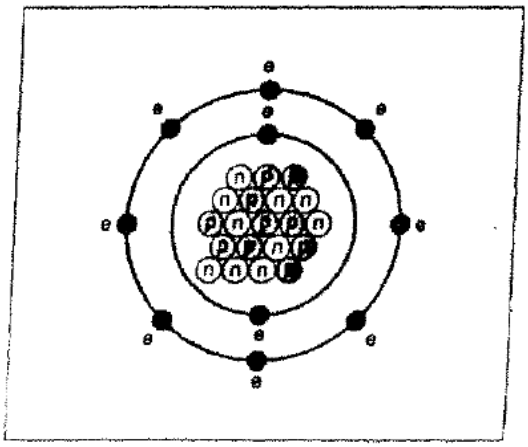
Electrons _____

Positive charge _____

Negative charge _____

Overall charge _____

Figure H *Oxygen*



Protons _____

Neutrons _____

Electrons _____

Positive charge _____

Negative charge _____

Overall charge _____

Figure I Neon

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some answers may be used more than once.

outside	neutrons	same	cancel out
protons	atoms	negative	electrons
nucleus	smaller	no	positive

1. All matter is made of tiny parts called _____ .
2. The center part of an atom is called the _____ .
3. A nucleus is made up of _____ and _____ .
4. Electrons are found _____ the nucleus.
5. Electrons are _____ than protons or neutrons.
6. The main parts of an atom are _____ , _____ , and _____ .
7. Since protons have a _____ charge, and neutrons have _____ charge, the nucleus will have a _____ charge.
8. Electrons have a _____ charge.
9. An atom has the _____ number of protons and electrons.
10. The plus and minus charges of an atom _____ each other.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

_____ 1. A proton is found outside the nucleus.

_____ 2. A proton has a negative charge.

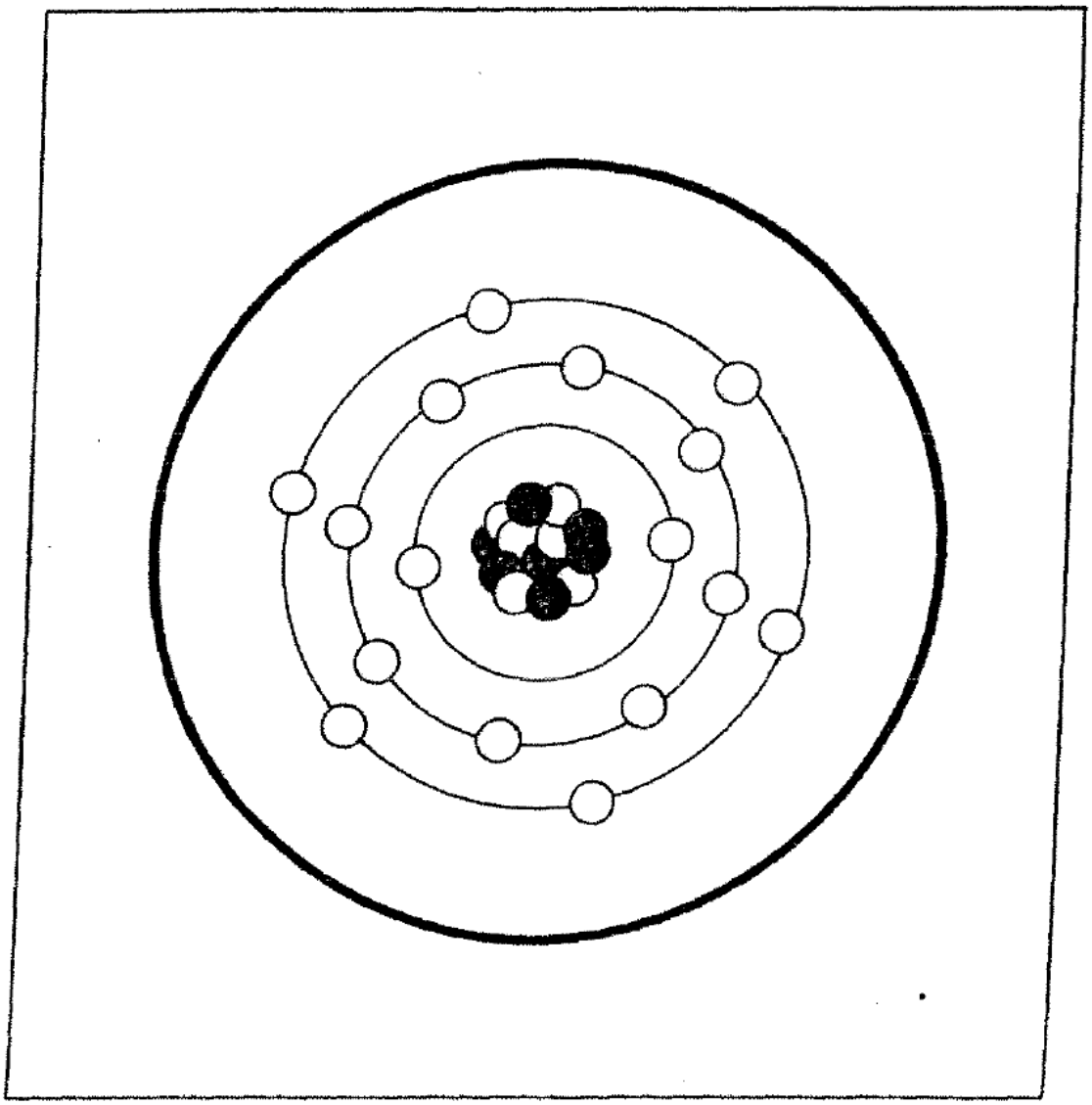
_____ 3. A neutron has a positive charge.

_____ 4. An electron has a negative charge.

_____ 5. An electron is found inside the nucleus.

How are electrons arranged in an atom?

11



shells: energy levels in which electrons are arranged around the nucleus

LESSON 11 | How are electrons arranged in an atom?

In the past, scientists believed that electrons circled the nucleus the same way the planets circled the sun. Today, however, scientists know that there is no exact path of an electron. The quick moving electrons form a "cloud" around the nucleus.

In the modern atomic theory, electrons are arranged into energy levels, or **shells**. Each electron shell is labelled with a capital letter. The first shell is the "K" shell. It is the shell closest the the nucleus. The "K" shell has the least amount of energy. The next shell is the "L" shell. After the "L" shell, comes the "M" shell, and so on.

Each shell can only hold a certain number of electrons.

- The "K" shell can hold up to 2 electrons.
- The "L" shell can hold up to 8 electrons.
- The "M" shell can hold up to 18 electrons.

The number of shells an atom has depends upon the number of electrons the atom has. In general, each shell must have its full number of electrons before a new shell starts. If there are more electrons than a shell can hold, a new shell starts.

MORE ABOUT ELECTRONS

Each picture below shows how electrons are arranged in certain atoms. Look at each diagram. Then answer the questions.

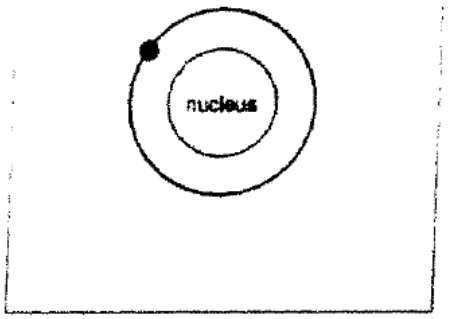


Figure A *Hydrogen*

A. Hydrogen is the simplest atom. It has only one electron.

1. How many electron shells does a hydrogen atom have? _____
2. What is this shell called? _____
3. Is this shell complete? _____

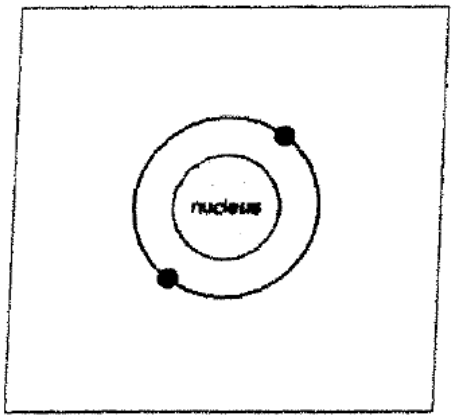


Figure B *Helium*

B. A helium atom has two electrons.

1. How many electron shells does a helium atom have? _____
2. What is this shell called? _____
3. Is the shell full? _____

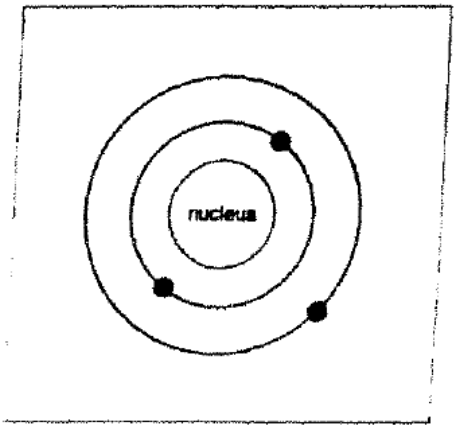


Figure C *Lithium*

C. A lithium atom has three electrons.

1. How many electron shells does a lithium atom have? _____
2. What are these shells called? _____
3. Which one is the inner shell? _____
4. Is the inner shell full? _____
5. Which is the outer shell? _____
6. Is the outer shell full? _____

WHAT DO THE PICTURES SHOW?

The pictures below show how electrons are arranged in two atoms. Look closely at each figure. Then answer the questions.

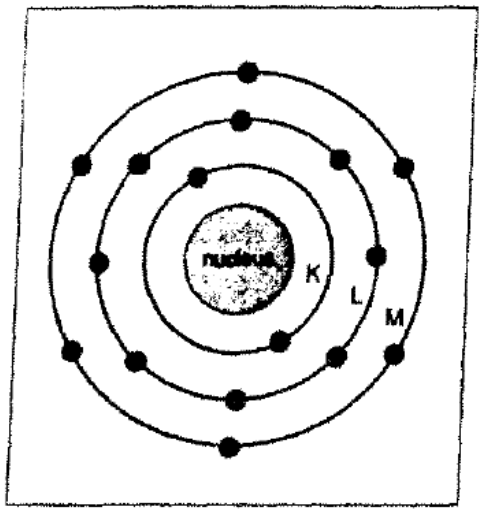


Figure D *Sulfur*

1. How many electron shells does sulfur have?

   _____

2. What is the first shell called? _____
3. How many electrons does this shell have? ____
4. Is this shell full? _____
5. What is the second shell called? _____
6. How many electrons does it have? _____
7. Is this second shell full? _____
8. What is the third shell called? _____
9. How many electrons does the third shell have? _____
10. Is this shell full? _____
11. How many electrons does sulfur have? ____

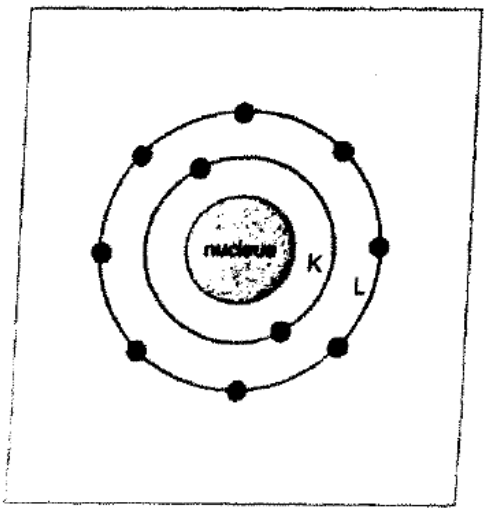


Figure E *Neon*

1. How many electron shells does neon have?____
2. What is the first shell called?_____
3. How many electrons does this shell have?____
4. Is this shell full? _____
5. What is the second shell called? _____
6. How many electrons does it have?_____
7. Is this second shell full?_____
8. How many electrons does neon have?_____

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A		Column B
_____	1. shell	a) closest shell
_____	2. 5 electrons	b) way electrons circle nucleus
_____	3. cloud	c) needs three shells
_____	4. 12 electrons	d) energy level
_____	5. "K" shell	e) needs two shells

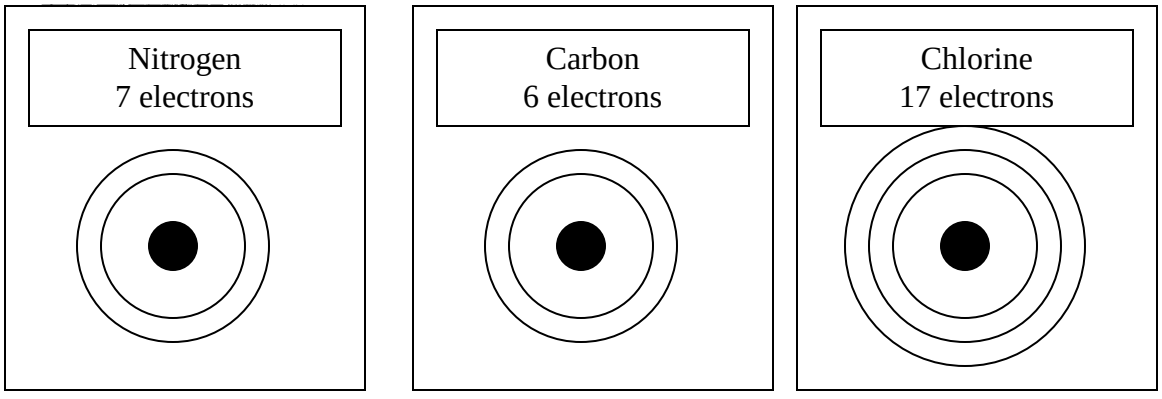
HOW MANY SHELLS?

How many shells are needed for each of the following? Write your answer in the space.

1. How many shells do 2 electrons need?_____
2. 4 electrons need _____ shells.
3. 10 electrons need _____ shells.
4. 16 electrons need _____ shells.
5. 20 electrons need _____ shells.

FILL IN THE ELECTRONS

Draw in the electrons on their proper shells. Make a small ball [●] to show an electron. The first one is done for you.



TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

_____ **1.** Every atom has at least one electron.

_____ **2.** Every atom has at least two shells.

_____ **3.** The first electron shell is the "L" shell.

_____ **4.** The "L" shell can hold 8 electrons.

_____ 5. The "L" shell always has 8 electrons.

_____ **6.** If there is an "L" shell, it means that the "K" shell is full.

_____ **7.** A full "K" shell has three electrons.

_____ **8.** A helium atom which has 2 electrons is a "full" atom.

_____ **9.** A shell must be full before a new shell is started.

_____ **10.** An atom with 10 electrons has 2 shells.

COMPLETE THE CHART

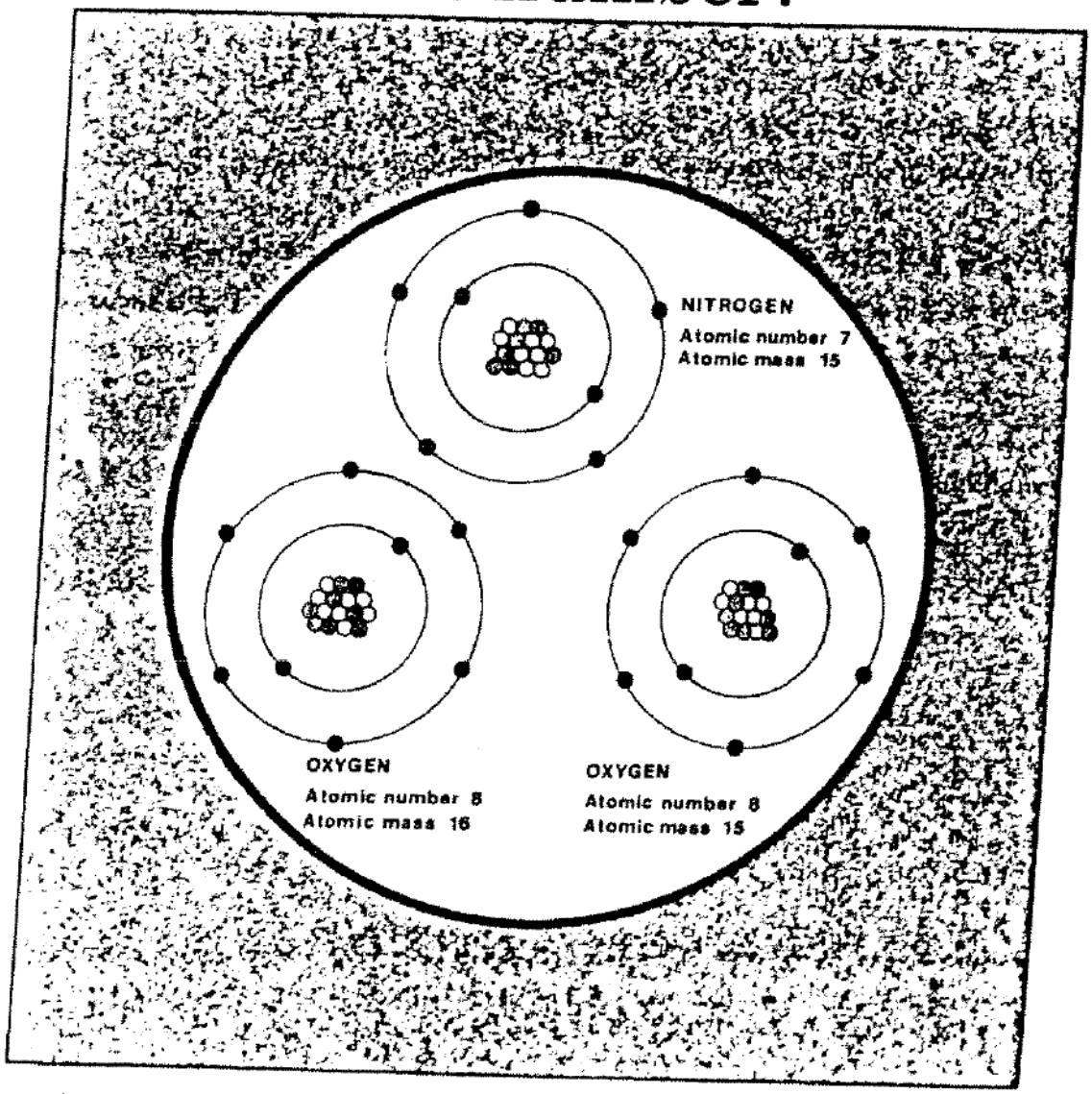
Complete the cart by filling in the missing information.

	Atom	Number of Electrons	Number of electrons in each shell			Is last shell complete? (Yes or No)
			K	L	M	
1.	Magnesium	12	2	8	2	No
2.	Carbon	6				
3.	Oxygen	8				
4.	Helium	2				
5.	Neon	10				
6.	Aluminum	13				
7.	Chlorine	17				
8.	Phosphorus	15				
9.	Argon	18				
10.	Beryllium	4				

ATOMS and ELEMENTS

What is the difference between atomic mass and atomic number?

12



atomic mass: total number of protons and neutrons in the nucleus of an atom
atomic mass units: units used to measure the mass of atoms
atomic number: number of protons in the nucleus of an atom
isotopes [Y-suh-tohps]: two or more atoms with the same atomic number but different atomic masses

LESSON 12 | What is the difference between atomic mass and atomic number?

Atoms of different kinds of matter have different numbers of protons and electrons. When scientists talk about different kinds of matter, they often refer to the matter by it's atomic number. The **atomic number** of an atom is the number of protons (and usually, the number of electrons) in the atom.

Scientists also describe atoms by their atomic mass. Scientists do not measure the mass of atoms in grams or ounces. They measure the mass of atoms in **atomic mass units** (a.m.u.). You can figure out the atomic mass of an atom by using the following information:

- Each proton has a mass of 1 a.m.u.
- Each neutron has a mass of 1 a.m.u.
- The **atomic mass** of an atom is the total number of protons and neutrons in the nucleus of the atom.

What about the electrons? Don't they count? Electrons are very light. Their mass is not counted in the atomic mass.

Sometimes two atoms of the same kind of matter do not have the same atomic mass. How is this possible? They have a different number of neutrons. All atoms of the same kind of matter always have the same number of protons. Thus, they all have the same atomic number. Atoms of the same kind of matter that have different numbers of neutrons are called *isotopes* [Y-suh-tohps].

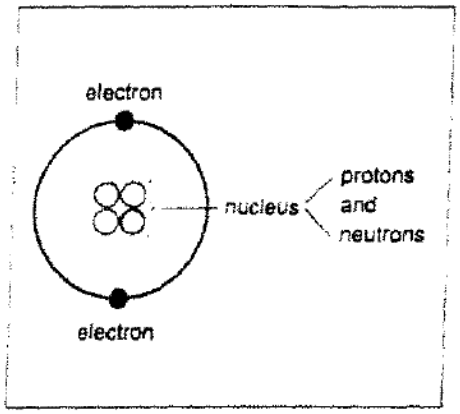


Figure A

NUCLEUS

PROTONS + NEUTRONS = ATOMIC MASS

Each proton has a value of one.

Each neutron has a value of one.

ATOMIC MASS, PLEASE

The diagrams below show six different atoms. Look at each one closely. Find the atomic mass of each atom. Write your answer in the space below the diagram.

Remember: atomic mass = protons + neutrons

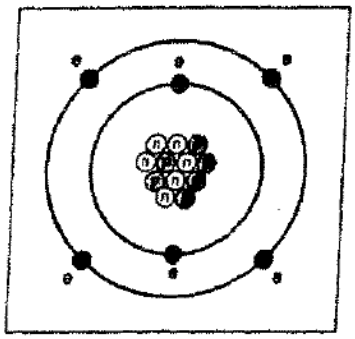


Figure B

Atomic Mass_____

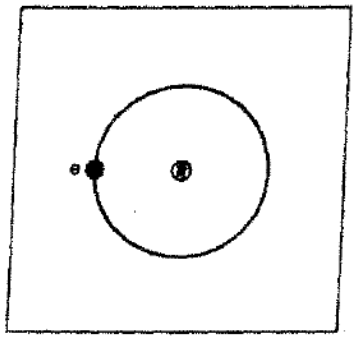


Figure C

Atomic Mass_____

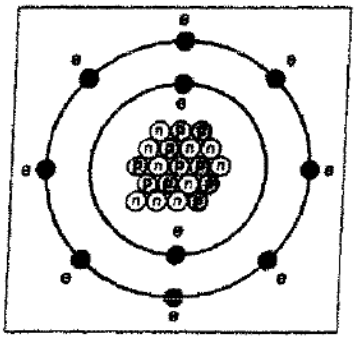


Figure D

Atomic Mass_____

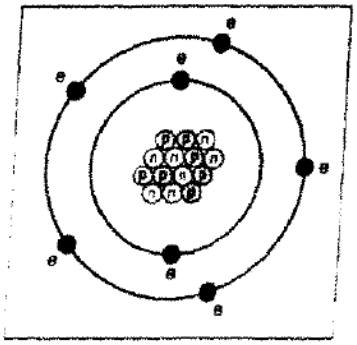


Figure E

Atomic Mass_____

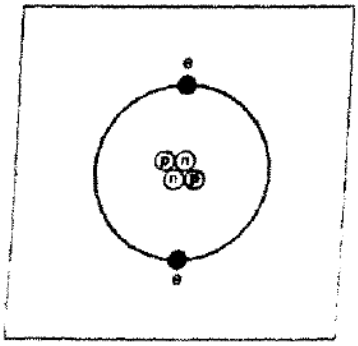


Figure F

Atomic Mass_____

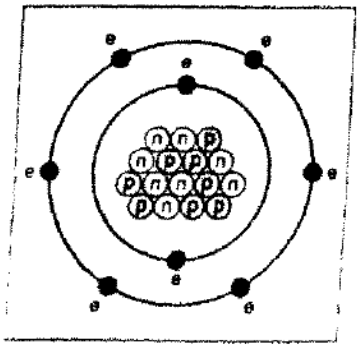


Figure G

Atomic Mass_____

COMPLETE THE CHART

Complete the chart by filling in the missing information.

Name of element	Number of protons	Number of neutrons	Atomic mass
1. cobalt	27	32	
2. zinc	30	35	
3. krypton	36	48	
4. hydrogen	1	0	
5. potassium	19	20	
6. gold	79	118	
7. arsenic	33	42	
8. sulfur	16	16	
9. iodine	53	74	
10. tungsten	74	110	
11. silver	47	61	
12. uranium	92	146	
13. lead	82	125	
14. calcium	20	20	
15. oxygen	8	8	

WHAT DO THE PICTURES SHOW?

Each picture below shows an atom. Some information is given about each atom. Use this informatio... to answer the questions about each atom.

REMEMBER, protons + neutrons = atomic mass

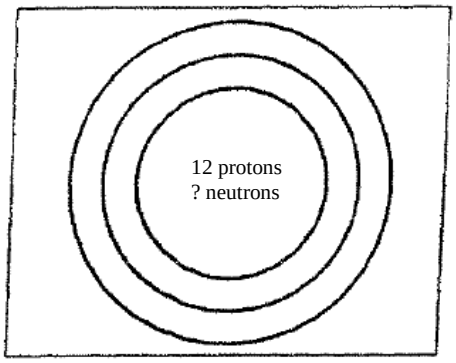


Figure H *Atomic mass = 24*

1. How many neutrons does this atom have?

   _____

2. How many electrons? _____

3. What is the atomic number? _____

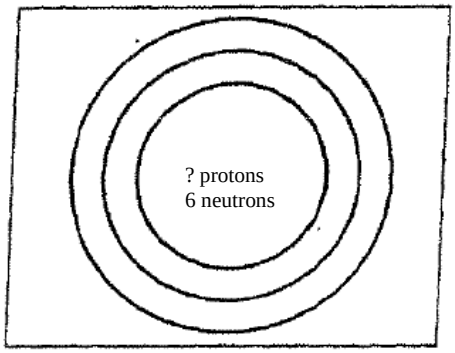


Figure I *Atomic mass = 11*

1. How many protons does this atom have?

   _____

2. How many electrons? _____

3. What is the atomic number? _____

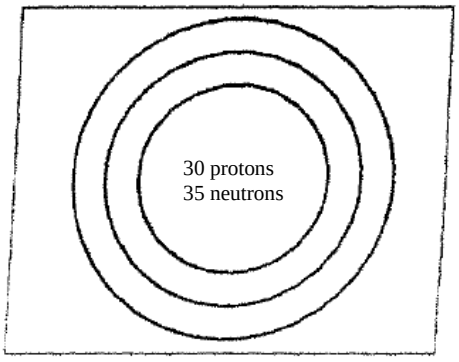


Figure J *Atomic mass = ?*

1. What is the atomic mass of this atom?____

2. How many electrons? _____

3. What is the atomic number? _____

COMPLETE THE CHART

Complete the chart by filling in the missing information.

	Kind of Matter	Protons	Neutrons	Atomic Mass	Electrons	Atomic Number
1.	Oxygen	8		16	8	8
2.	Sodium			23	11	
3.	Carbon		6	12		
4.	Phosphorus		16			15
5.	Potassium	19	20			
6.	Iron	26		56		
7.	Copper	29	35	64		
8.	Chlorine			35		17
9.	Boron	5	6			
10.	Aluminum		14	27		

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

_____ **1.** An atom has no mass.

_____ **2.** An electron is the largest part of an atom.

_____ **3.** All atoms have the same mass.

_____ **4.** All protons have the same mass.

_____ **5.** All oxygen atoms have the same mass.

_____ **6.** An oxygen atom has the same atomic number as a hydrogen atom.

_____ **7.** To find the atomic mass of an atom, we add the protons and electrons.

_____ **8.** The atomic number of an atom is the number of neutrons it has.

_____ **9.** Atoms of the same kind that have different numbers of neutrons are called isotopes.

_____ **10.** Atomic number = atomic mass.

SLA Student Learning Activity

Determining the Number of Atomic Particles

1. Each row in the table represents a different element. Use the information provided to fill in the required information for that element.

Number of protons in the atom	Number of electrons in the atom	Number of neutrons in the atom	Atomic mass of the atom	Atomic number of the atom	Element name	Chemical symbol
7	7					
6	6	6				
1	1	0				
						Ca
30		35				
	13		27	13		
9			19			
	23	28			Vanadium	V
	17		35	17		
	3					Li
	79					Au
	11		23	11		
	33			33		
					tin	
	19					K

2. Create a similar exercise to the one above and exchange with one of your classmates.

Protons	Electrons	Neutrons	Atomic mass	Atomic number	Element name	Chemical symbol

BOHR MODELS

Bohr models are used to show what one atom of an element looks like. They show how many protons, electrons, and neutrons are in the atom and where each is located.

How to draw a Bohr model:

Step 1 – Find out how many protons and electrons the atom has from the periodic table.

Example) Oxygen

Step 2 – Find out how many neutrons it has using the atomic mass and _____ atomic number.

Step 3 – Put the protons and neutrons in the center.

Step 4 – Fill electrons in to the electron shells in order. Remember the first shell can only hold ____ electrons. The second, third, and fourth shell can each hold ____ electrons.

You're done! Now try Potassium.

THE PERIODIC TABLE

The periodic table is a way of keeping track of all of the elements. Each element has a symbol. Some symbols are only one capital letter (Example), but some symbols are two letters. A two letter element symbol is always a capital letter followed by a small letter (Example).

The periodic table is arranged the way it is for a reason. Look at the imaginary periodic table you drew Bohr diagrams on. What do you notice about all the elements in the same column?

The columns on the periodic table are called _____ or _____. Each family has the same number of electrons in their _____. Each family also has a number (at the top of the column). This number is the same as _____. This is an easy way to double check your work when drawing Bohr models.

Some of the important families have names:

Alkali metals - Group ___

Alkaline Earth Metals - Group ___

Chalcogens – Group ____

Halogens - Group ____

Noble gases – Group _____

The rows _____ the periodic table are also numbered. There are called rows or _____ (hence the name). Look at your Bohr models again. What do you notice about the numbers of the rows? That's right! The number of the rows is equal to the _____ we need to put electrons in. Another easy way to check your work!

Now look at the periodic table in the back of your text. Green symbols represent _____. Think about metals you have seen. List some properties of metals.

The orange elements are called _____. List some properties of non-metals.

The purple elements are called _____. This means that they sometimes act like metals, and sometimes act like non-metals. They can't make up their minds! Right through the metalloids runs something called the _____. This separates metals (on the left side) from the non-metals (on the right side).

SCIENCE 10F

DRESS UP YOUR PERIODIC TABLE ASSIGNMENT

<u>Rationale:</u> You will be allowed to bring this periodic table with you to your chemistry test. It will count for 10 marks toward your test mark. If you do a good job and include all of the required information, it will be a HUGE help while you are writing AND help to boost your mark!

Read the following steps carefully to complete your periodic table.

1) Number the 'A' groups or families (up and down) of your periodic table. Ask your teacher for clarification!

2) Number the rows or periods (across) of the periodic table.

3) Using the periodic table in the back of your textbook, locate 'the staircase.' This divides the metals from the non-metals. Choose a bold colour and draw the staircase on your periodic table.

4) Right near the staircase are the metalloids. In your textbook, the metalloids are purple. **Line the edges** of the metalloids in a different color. DO NOT COLOUR THEM IN!

5) Create a legend so that you can easily remember what each colour represents!

6) Now, everything on the left side of the staircase is a metal (the green ones in the text). **Outline** the metals in a third color.

7) Finally, **outline** the non-metals in a fourth color.

8) Now we need to remember where the individual families are. Label the Alkali Metals, Alkali Earth Metals, Chalcogens, Halogens, and Noble Gases. Shade each family a different colour and include them on your legend.

COUNTING ATOMS

Obviously, there are more materials in the world than just the 100 or so elements on the periodic table. Individual atoms can combine with each other to form a group of atoms called a _____.

1. The symbol of an element represents one atom of that element.

Example) **Na** = **S** =

2. A _____ is a number written at the lower _____ corner **behind** the symbol of an element. If there is more than one atom 'stuck' together (in chemistry we call this _____), a subscript is used to indicate the number of atoms.

Example) F_2 =

H_2O = _____ atoms of Hydrogen
_____ atoms of Oxygen
Total # of atoms _____

$C_6H_{12}O_6$ = _____ atoms of Carbon
_____ atoms of Hydrogen
_____ atoms of Oxygen
Total # of atoms _____

3. A _____ is a number written in front of a chemical formula. It tells you how many _____ you have.

Example) **2** H_2O = _____ molecules of water
_____ total atoms of Hydrogen
_____ total atoms of Oxygen

4. A set of brackets around a few atoms with a subscript after, means that number applies to all of the atoms in the bracket.

Example) $Ca(NO_3)_2$ = _____ atoms of calcium
_____ atoms of nitrogen
_____ atoms of oxygen
_____ total atoms

Molecule(s)	**Number of each kind of atom**	**Total atoms in the molecule(s)**
Sn		
I_2		
3 Na_2O		
5 $CuSO_4$		
H_3PO_4		

CHEMICAL AND PHYSICAL CHANGES

_____ changes are those where no new substance is actually produced. These are often _____, so you can change it back to the original substance (or pretty close).

Examples)

Chemical changes are those where a new substance IS produced. It is usually difficult to reverse. There are some major clues that a chemical change has happened. These can include one or a combination of:

- _____ is given off or absorbed
- _____ is given off
- _____ is released (bubbles form)
- Color change

Examples)

Are the following examples of physical or chemical changes?

Toasting bread _____
Icing a cake _____
Melting ice _____
Milk going sour _____
Car rusting _____
Chopping down a tree ____

Identify each of the following as a Physical or Chemical Change.

Put a **P** next to **Physical Changes** Put a **C** next to **Chemical Changes**

1. A piece of wood burns to form ash. _____
2. Water evaporates into steam. _____
3. A piece of cork is cut in half. _____
4. A bicycle chain rusts. _____
5. Food is digested in the stomach. _____
6. Water is absorbed by a paper towel. _____
7. Hydrochloric Acid reacts with zinc. _____
8. A piece of an apple rots on the ground. _____
9. A tire is inflated with air. _____
10. A plant turns sunlight, CO_2, and water into sugar and oxygen. _____
11. Sugar dissolves in water. _____
12. Eggs turn into an omelette. _____
13. Milk sours. _____
14. A popsicle melts. _____
15. Turning brownie mix into brownies. _____

Choose 2 of the above examples and explain why you chose chemical or physical. Please choose one of each type of change. Back up your explanation.

Physical change explanation: _____
_____
_____
_____
_____
_____
_____

Chemical change explanation: _____
_____
_____
_____
_____
_____
_____

Periodic Table Puns Name _____

Use your imagination and the elements in the Periodic Table to solve each pun!
Example: Five cents - Nickel, Ni

1. What you do in a play _____ _____
2. What you do to a wrinkled shirt _____ _____
3. “Tasty” part of your mouth _____ _____
4. Someone who likes to start fires _____ _____
5. Superman’s weakness _____ _____
6. Your brother or mine _____ _____
7. Extinct _____ _____
8. Imitation diamond _____ _____
9. A type of flower _____ _____
10. Las Vegas lights _____ _____
11. Police _____ _____
12. Golden State _____ _____
13. Name of a goofy convict _____ _____
14. Mr. Mony's enemy _____ _____
15. What you do to flowers _____ _____
16. What you did to ripped jeans _____ _____
17. A “prize” element _____ _____
18. A very smart person _____ _____
19. Person from the big blue planet _____ _____
20. A fur seller _____ _____

Periodic Table Puns 2 Name _____

Use your imagination and the elements in the Periodic Table to solve each pun!

1. Not an exciting person _____ _____
2. Thanksgiving guests _____ _____
3. Get clean with this _____ _____
4. Drive away in style in a ____ _____ _____
5. Does a body good _____ _____
6. Proud to be an _____ _____ _____
7. Mickey's pal _____ _____
8. Warrior Princess _____ _____
9. A nice guy _____ _____
10. Someone who loves computers _____ _____
11. The first person in a race has the ___ _____ _____
12. $E = mc^2$ _____ _____
13. This man followed the yellow brick road _____ _____
14. How to tell a secret _____ _____
15. Monday night TV show _____ _____
16. A phrase from Dr. Suess _____ _____
17. What a doctor does to his patients _____ _____
18. Part of a whole _____ _____
19. Place for washing dishes _____ _____
20. Drink in an Al can _____ _____
21. Happens when you lasso a horse _____ _____
22. What a dog does with a bone _____ _____
23. A sinking ship _____ _____
24. What a cloud does _____ _____