Name _____ Date _____ **Activity Sheet 1**

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

(The chemicals used in this activity are isopropyl alcohol and salt.)

The Density of Liquids

1. Find the mass of the vials labeled *Water, Salt Water,* and *Alcohol.* Fill the vials with 40 mL of the liquid indicated on the label. Calculate the mass of each sample of liquid (mass of liquid = mass of vial plus liquid – mass of vial). Record all data in the table.
2. Calculate the density of each liquid (density = mass/Volume).
3. Observe and record the float height of the dowel in each liquid.

Data Table
The Density of Liquids

Liquid	Mass of Vial (g)	Mass of Vial + Liquid (g)	Mass of Liquid (g)	Density (g/mL)	Float Height (cm)
Alcohol					
Water					
Salt water					

4. List the liquids in order of increasing density.

_____

5. Which has a greater mass: a liter of water or a liter of salt water? Why?

_____

_____

6. Which has a greater volume: 1,000 g of water or 1,000 g of alcohol?

_____

7. Which has greater density: 100 g of water or 1,000 g of water?

_____

8. List the liquids in order of increasing float height of the dowels.

_____

9. Describe the correlation that exists between the density of a liquid and the float height of a dowel in that liquid.

_____

_____

Name _____ Date _____ **Activity Sheet 2**

Pressure and Volume of a Gas

1. Record your data in the table.

Number of Books	Mass of Books (kg)	Units of Air Pressure	Volume of Air (cc)
0			
1			
2			
3			
4			

2. Graph your data from the table. Be sure to label both axes.

Based on your graph, what can you conclude about the relationship between the pressure of the air in the syringe and the volume that the air occupies?

_____

_____

3. Draw a diagram of how the air molecules might look in a syringe whose plunger is fully extended.

4. Draw a diagram of how the air molecules in that same syringe might look if the plunger were pushed down halfway.

Name _____ Date _____ **Activity Sheet 3**

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

(The chemical used in this activity is salt.)

Solutions and Suspensions

Session I—Activity 3

1. Add one-half cup of water to the cup containing sand. Add one-half cup of water to the cup containing salt. Stir the mixtures with separate stirrers. Describe the appearance of each mixture.

Salt and Water

Sand and Water

2. Assemble the funnel and filter paper according to your teacher's instructions. Combine the sand/water and salt/water mixtures and pour through the filter and funnel. Describe the filtrate.

Session II—Activity 4

3. a. Once the filtrate has evaporated, retrieve your aluminum pan. What do you see in it?

b. Which of the two solids (salt and sand) was once part of a homogeneous mixture? What is this kind of mixture called?

c. Which of the two solids was once part of a heterogeneous mixture? What is this kind of mixture called?

d. What property of salt allows it to be separated from sand using a filter?

Name _____ Date _____ **Activity Sheet 5**

Atomic Structure

1. Choose an atom from the list on the board. Make a model of this atom. Use one length of fishing line to string together the beads representing the protons and the beads representing the neutrons in the nucleus. Use the pipe cleaners to hold the beads representing the electrons in rings around the nucleus. Connect the model pieces with the other length of fishing line.

2. Fill in the blanks for the atom you built:

   Name of Element _____ Symbol _____

   Atomic Number _____ Mass Number _____

   Number of Electrons _____ Number of Protons _____

3. Classify the three main subatomic particles according to mass, charge, and location in the atom.

	Mass	Charge	Location
Proton	_____	_____	_____
Neutron	_____	_____	_____
Electron	_____	_____	_____

4. What is an isotope?

_____

_____

_____

_____

_____

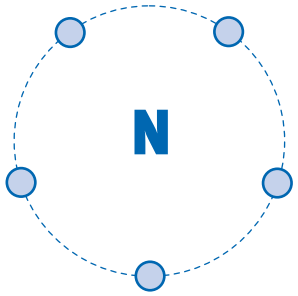
5. Using your model pieces, build an atom of lithium. Now modify your model to represent an isotope of lithium with a mass number of 8. Draw both models in the space below.

lithium –6 lithium –8

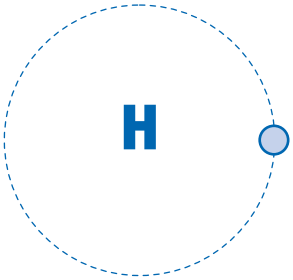
Name_____ Date_____ **Activity Sheet 6, Part A**

Making Molecules

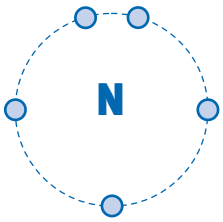
1. This nitrogen atom has five electrons in its outer energy level.
How many more does it need to complete the level? _____



2. This hydrogen atom has one electron in its energy level.
How many more does it need to complete the level? _____



3. In the space below, add hydrogen atoms around the nitrogen atom until all of the atoms have complete outer energy levels. (Recall the diagram of CO_2 your teacher drew on the board earlier.) Draw circles around the pairs of electrons that are being shared by the atoms.

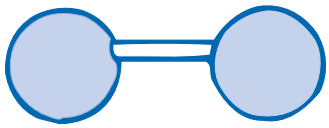


Name_____ Date_____ **Activity Sheet 6, Part B**

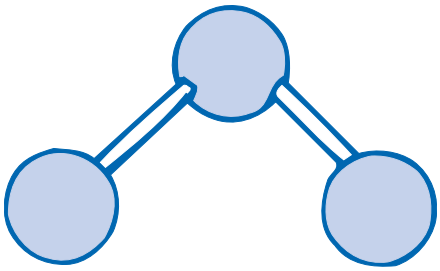
Making Molecules

4. Make the molecules listed below from the materials in your trough, according to the following rules:

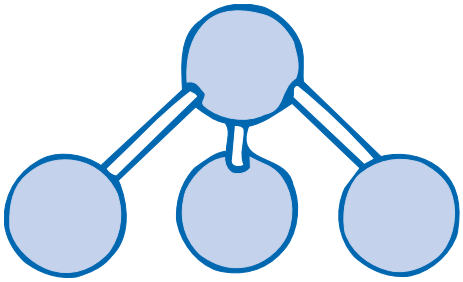
- Molecules with two atoms are always linear.



- Molecules with two atoms on either side of a central atom have a bent shape.



- Molecules with three atoms around a central atom are shaped like a pyramid.



a. CO_2	**b.** H_2O	**c.** NH_3	**d.** N_2	**e.** NO_2	**f.** CuO

5. List any molecules you made that are pure elements. _____

6. List any molecules you made that are linear. _____

7. List any molecules you made that are bent. _____

8. List any molecules you made that are pyramid-shaped. _____

9. List any molecules you made that are covalent compounds. _____

10. Using the colored balls and pipe cleaners, create a molecule that you have not seen before. On the back of this sheet, give the formula for your molecule, give the molecule a name, and provide any other information you can about it.

Name_____ Date_____ **Activity Sheet 7**

Chemical Equations

1. Use your model pieces to form as many molecules of H_2 as you can. Use your model pieces to form as many molecules of N_2 as you can. Use these molecules of H_2 and N_2 to form molecules of ammonia (NH_3). You may use as many N_2 and H_2 molecules as you want, but you may not have any single atoms of either element left over. Also, you cannot use any single atoms of H or N as reactants.

   Use what you learned from experimenting with the models to balance the following chemical equation:

   _____N_2 + _____H_2 → _____NH_3

2. Use your model pieces to make a molecule of Cu_2O. This chemical reacts with carbon to form CO_2 and copper metal (Cu). Use your models to show this reaction. Then balance the following equation:

   _____Cu_2O + _____C → _____Cu + _____CO_2

3. If you needed to get six atoms of copper out of the reaction you modeled in step 2, how many molecules of Cu_2O would you need to start with?

   _____

4. Complete this sentence:
   In a chemical reaction, the number of atoms of an element in the reactants must equal

   _____

   _____

   _____

5. Which of the substances that you modeled today are atoms? Which are molecules?

   _____

   _____

   _____

Name _____ Date _____ **Activity Sheet 8**

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

(The chemical used in this activity is salt.)

Oxidation

Session I—Activity 8

1. Set up steel wool in five plastic cups according to the outline on the board. Place a lid on all of the cups except Cup 5.

   a. Which cup(s) do you think will produce rust first? Why?

   _____

   b. Which cup(s) do you think will not produce rust at all? Why?

   _____

2. Observe the cups every day for 5 days. Record your observations in the table below. Use the following rating system:

   o no rust ++ some visible rust
   + brownish color +++ evidence of a lot of rust

Date	Time	Cup Number				
		1	2	3	4	5

Session II—Activity 9

3. Which sample began to rust first?

   _____

4. Which other sample(s) rusted?

   _____

5. Which sample(s) did not rust?

   _____

6. What factors must be present in order for rusting, a form of oxidation, to occur?

   _____

7. What factor speeds up rusting?

   _____

Name _____ Date _____ **Activity Sheet 10**

Plant and Animal Cells

1. Look at image 1 (animal cells) on the microslide strip and draw a cell like the ones you see. Label the *nucleus*, *cytoplasm*, and *cell membrane*.

2. Look at images 2 and 3 (plant cells) on the microslide strip and draw a cell that is a combination of the two images. Label the *nucleus, cytoplasm, chloroplasts, cell membrane,* and *cell wall*. Color in the chloroplasts with your green-colored pencil.

3. How are plant and animals cells similar?

_____

_____

_____

4. How do plant and animal cells differ?

_____

_____

_____