-Gr→ade ③ +Sc.+*i*enc.+*e*:
C°h]emi°s.+t]r→y
③⑦ L*es.+s.+*ons.+

Course Description – Students will create a notebook and study chemistry through experimentation, demonstration, readings, videos and a variety of activities. They will learn about the periodic table and many of the elements, studying their structure and use. Students will model the structure of atoms and molecules and will explore the states of matter, discovering the properties of solids, liquids and gases. They will create and observe different types of chemical reactions and experiment with acids and bases.

Materials:

- 1" 3-ring binder with blank and lined pages
- 3 dividers labeled: Definitions, Elements, and Experiments & Activities
- Consider buying goggles and rubber gloves (disposable gloves they use in hospitals). The most dangerous thing they will be using household cleaners, but they are chemicals and it would be good to be protected against splashes and spills as well as to build a good habit.
- *Experiments will have various needs outlined before each*

Adapted from Easy Peasy All-In-One Homeschool for a daily or more comprehensive curriculum please check it out

Table of Contents

#1 - Intro to Chemistry

Materials: notebook - ***you will need this for every science lesson***

1. Watch: The Magic School Bus: "Gets Ready, Set, Dough" (S1, E09)
2. **Label** your notebook "Chemistry" and create 3 dividers labeled: Definitions, Elements, and Experiments & Activities
3. On the first page of your notebook define and illustrate:
   * **A note on definitions:** *If you are illustrating you may find it helpful to put one definition per page so there will be room. Further, if you are moving forward in this manner it may have a better presentation if you use unlined pages and simply add a few lines at the top for the child to write the definition on.*
   - **Chemistry** - the study of matter and the changes that take place with that matter.
   - **Matter** - anything that has mass and takes up space.
   - **Mass** - the amount of matter of "stuff" is in an item

#2 - Atoms

Materials: piece of aluminum foil

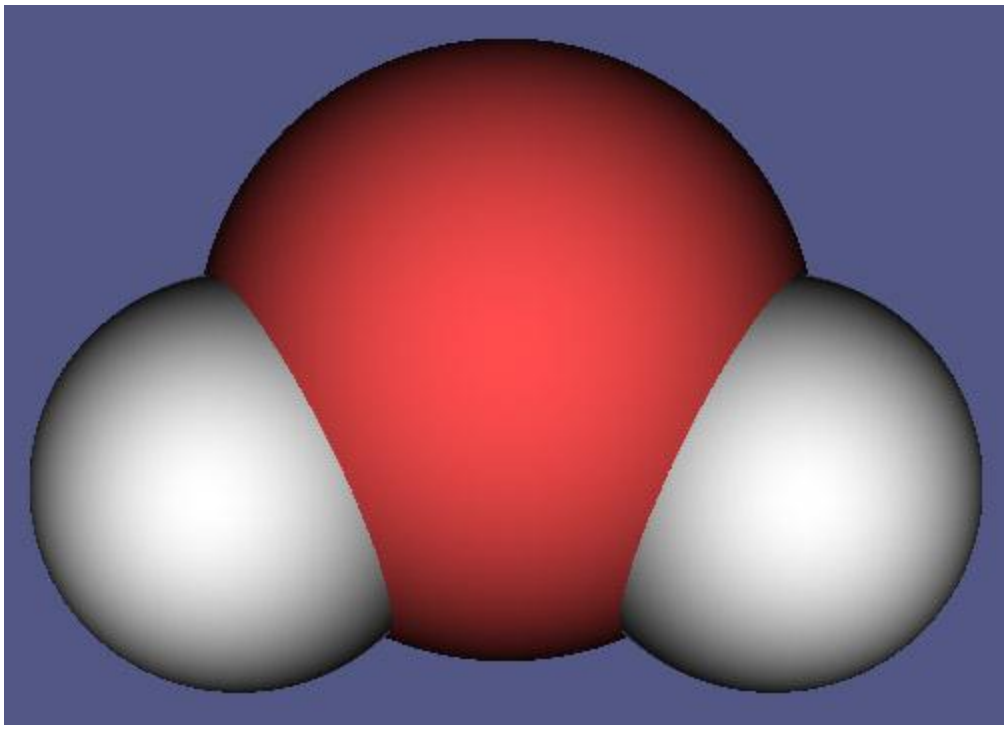
1. Have the child take a small piece of aluminum foil. Rip it in half. Again. And again and again and again until you can't any more. If you could keep ripping it until it was the smallest piece of aluminum in the world, that would be an **atom**, an aluminum **atom**. Everything in the world is made up of atoms. Different types of atoms come together in different combinations called **molecules** to make up everything you see in the world.
2. Take a look at how small atoms are. (Click on Nanolab and Zoom. We'll do more on this site later. If it's not working, you can watch this video. Get permission to watch it on youtube.)
3. Atoms are so small that five trillion hydrogen atoms would fit on the head of a pin. That's 5,000,000,000,000 atoms.
4. On a new page in your "Definitions" section, define and illustrate:
    - Atom - building block for all matter

#3 - Atoms 2

1. Watch the video on atoms and molecules. It's okay if you don't understand everything.
2. Print out the "Atoms" page from the companion printouts - page 16
3. Fill in the blanks on the worksheet. Alternately, if you have room on your atom page you could add your own illustration or update the illustration you previously made.
4. On a new page(s) in your "Definitions" section define and illustrate:
    - **Nucleus** - the positively charged center of an atom
    - **Electron** - a negatively charged part of an atom outside of the nucleus
    - **Proton** - part of the nucleus of an atom with a positive charge
    - **Neutron** - part of the nucleus of an atom with a neutral charge

#4 - Molecules

1. When different types of atoms come together in different combinations they are called **molecules**. They make up everything you see in the world.
2. Probably the most famous **molecule** is H2O. Have you ever heard of it? It means two hydrogen atoms and one oxygen atom getting together. When they do, they make water! All water you see are H2O molecules. Here's a picture of a water molecule.
3. Not everything in the world is hydrogen or oxygen. Those are the elements that other things are made from.
4. Build other molecules. Click on Nanolab and Build.
5. Watch: Magic School Bus "Meets Molly Cule" (Season 4, Ep 1)
6. On a new page in your "Definitions" section define and illustrate a water molecule:
    - **Molecule** - Any atoms that are connected



#5 - Moving Molecules

Materials: Ivory soap, microwave

1. We've been learning about **atoms**, which make up the elements everything in our world is made up of. When atoms are combined, it is called a **molecule**. When molecules heat up, they get excited and move around a lot. This is what happens when water turns into water vapor (or steam). When molecules cool down, they slow down to mostly stopped. This is what happens when water turns into ice. Ice, water and steam are all H2O. They are all made of water molecules. It is the same **matter**. They are just each in a different **state of matter.**
2. Watch the molecules get excited. Click on Nanolab and then Transform.
3. Experiment: "Soap Souffle"
   Place an opened bar of Ivory soap in the microwave on a microwavable plate. Turn the microwave on for one minute. Watch what happens. You are exciting the water molecules that are inside the soap causing them to move around! If you don't have a microwave, you can watch the video to see what happens. (Ivory is special because it floats when other bars of soap sink. That's because it has a lot of air inside of it.)
4. Complete an Experiment page and put it in your notebook (Experiments & Activities)

#6 - Surface Tension

Materials: cup of water, coins, milk, o or ball shaped cereal, food coloring, oil, dish soap

1. We've looked a little at how molecules bond together. Let's do an experiment to watch it in action.
2. Experiment: "Surface Tension"
   Fill a cup with water to the very top. Guess how many coins you'll be able to drop in before it spills. Start dropping in coins (or something else). How many did you get in? What is holding the water in place is called **surface tension**. What's happening is that the water molecules on top are attracted to the water molecules under them and cling to them.
3. Complete an Experiment page and put it in your notebook (Experiments & Activities).
4. More molecule fun:
   - Want to watch molecules attract again? Get a bowl milk. Sprinkle in a hand full of O shaped cereal or ball-shaped cereal. Do they race towards each other and touch each other? This is a big picture of how molecules attract each other.
   - Now let's watch molecules repel or run away from each other. Pour a spoonful of water into a bowl. Add food coloring if you like. Add drops of oil to the water. What happens? The water seems to run away. What is happening is that the water molecules are attracted to the water molecules and the oil molecules are attracted to the oil molecules, so they stay separate. Add some dish detergent. What happens? The water and oil molecules are both attracted to the dish detergent molecules. That's

how grease gets off your dishes and into the water.

#7 - Sound Waves

Materials: tongue depressor, rubber band about 3 in. by 1/4 in., 2 index cards, 3 feet of string or yarn, scissors, tape or hot glue

1. Another way to move molecules, other than to excite them by heating them up, is to cause them to vibrate. When there is a sound, it moves the molecules in the air, causing them to vibrate. They start crashing into other molecules and make them vibrate too and those crash into the molecules next to them so that they start vibrating and that's how sound travels from one place to another.
2. Make a sound wave. Tie a strong string to a doorknob and walk back until the string is straight or take the plug of your vacuum cleaner in your hand and stretch out the cord. Move your arm up and down and send waves down the string or cord. That's how sound travels, in waves.
3. Title a page in your notebook "Sound Waves" then draw them (Experiments & Activities).
4. Experiment: "Buzzing Hornet" - **pages 14-15 from companion printouts**
5. Read about this experiment, watch the video and try it if you have what you need. (It will ask for your email address before you can watch the video. Use a junk email address. She sends out experiment videos, but she sends lots of advertisements too!)
6. Complete an Experiment page and put it in your notebook (Experiments & Activities).

#8 - States of Matter

Materials: printout

1. What makes water turn into steam? Play this game to learn.
2. Just about everything you see in this world is a **solid**, a **liquid** or a **gas**. These are called "the states of matter."
3. Water is a solid when it is ice, a liquid when it is water, and a gas when it is steam.
4. For more practice do this online activity on states of matter.
5. Print out this worksheet on solids, liquids and gases and fill it in. Title it "States of Matter" and put it in your notebook in your "Experiments & Activities" section.
6. Tell a parent or an older sibling what you think makes something a solid, a liquid or a gas.

#9 - Solid

1. We're going to go back and look at the different states of matter. Specifically we're going to look first at solids.
2. Read about solids.
3. On a new page(s) in your "Definitions" section define and illustrate
    - Solid - matter that retains its shape and structure when not confined.
4. Play the game. You'll use each material once in the game.

#10 - Gas

Materials: candle, glass, baking soda, vinegar

1. Today you're going to read about gases
2. On a new page(s) in your "Definitions" section define and illustrate:
    - **Gas** - consisting of particles that will fill a container of any shape or size, as its molecules will always spread out evenly
3. This experiment shows gas being produced and taking up space. Read and do the experiment and complete an Experiment page and put it in your notebook (Experiments & Activities).

#11 - Liquids & Viscosity

Materials: 5 different liquids, 5 clear cups or bowls

1. Now we are going to be looking at liquid. You have learned how liquid moves and fills containers and can't really be compressed (or pushed down) much. We're going to look at some specific things about liquid:
    - **Viscosity** is the measure of how a liquid resists flowing. Liquids move right? You put them in a container and they spread out and fill it. If you poured water in a bowl, it would spread out quickly and fill the space. Water has **low viscosity**. Honey you got from the fridge and poured into a bowl has a **high viscosity**. It resists flowing. It moves slowly.
2. Watch this video. Which one has the lowest **viscosity**? The one at the end on the right or left? (answer:)
3. On a new page(s) in your "Definitions" section define and illustrate:
    - Liquid - consisting of particles that are free to flow. Has a defined volume, but not shape.
    - Viscosity - how resistant a liquid is to flowing.
4. Design an experiment to test the viscosity of at least five different liquids. Based on your observations rate them from the lowest to highest viscosity. Complete an Experiment page and put it in your notebook (Experiments & Activities).

#12 - Density

Materials: slice of bread, water, cooking oil, dish detergent, honey, etc., jar or tall clear glass, three glasses, food coloring

1. Take a slice of bread (no crust). Squash it. Your slice of bread became **denser** when you squashed it. **Density** is the measure of how much something weighs for the space it takes up. Your bread didn't change its weight, but it changed how much space it took up. It became **denser**. The bread was less **dense** to begin with.
2. A rock is **denser** than water. It is heavier for the space it takes up than water is. So a rock sinks in water.
3. We can compare the **density** of liquids by seeing if one sinks into the other.
4. On a new page(s) in your "Definitions" section define and illustrate

Density - a measurement of how solid something is

5. Experiment:
    - Set up three glasses. Get three liquids of varying densities (i.e. honey, dish soap, corn syrup, water, lamp oil, alcohol).
    - Put the first liquid in. Then **slowly** put in the second.
    - Does the second sink through the first or sit on top? If it sits on top, it is less dense. If it sinks, it is more dense.
    - Test the other two combinations. Make a list of your liquids from the most dense to the least dense.
    - Now pour them all into the jar slowly, one at a time, the most dense first, the least dense last.
    - You can test another liquid and try and make a taller tower of liquids.

- Get a tall glass or jar that you can see through or a skinny glass flower vase would work well. Put the most dense on the bottom, then the next and so on. If there is more than one clear liquid, color one with food coloring.
- Here's a video of an experiment like this.
- Complete an Experiment page and put it in your notebook (Experiments & Activities).

#13 - Buoyancy

Materials: bowl of water, 10 things you can drop in that bowl of water

1. **Buoyancy** is the ability something has to float. If something is **buoyant**, it can float. If you want to hear this word read to you, click on this and then the little speaker icon next to the word.
2. Something is **buoyant**, or can float, if it is less **dense** than water.
3. On a new page(s) in your "Definitions" section define and illustrate:
    - **Buoyant** - ability to float in a fluid
4. Play "Does it float?!" Try out things from your home. Fill a bowl, tub, or pool with water and drop things in. Check off on your list if they are **buoyant** or not.
    - Complete an Experiment page and put it in your notebook along with the data sheet (Experiments & Activities).

#14 - Capillary Action

Materials: cups, food coloring, paper towels, blocks

1. **Capillary action** is water being drawn along a solid. It happens because the molecules of the liquid are attracted to the molecules of the solid and that pulls the liquid along.
2. On a new page(s) in your "Definitions" section define and illustrate:
    - Capillary Action - water being drawn along a solid
3. Experiment: "Water Ladder"
    - Read through the third section of "Investigating Science with Paper," by Laurence B. White, Jr. about Absorbing Paper, do some of the experiments to see it in action. I suggest beginning with the Water Ladder on page 12.
    - Complete an Experiment page and put it in your notebook ((Experiments & Activities).

#15 - Plasma

Materials: grape, microwave

1. Watch: What is Plasma?
2. On a new page in your "Definitions" section define and illustrate:
    - **Plasma** - a fourth state of matter present in stars, occurs when atoms' electrons become free
3. Experiment: "Plasma Grape"
   If you have a grape and a microwave, then you can create plasma. Plasma is another state of matter. It's what you get when you excite molecules even more than in a gaseous state. Slice a grape in half longways but leave a little skin so you can open it like a book. Open it and place it in the microwave. Turn the microwave on and be ready to turn it off. In 10-15 seconds you should see plasma shooting off the grape! Turn off your microwave after those 10-15 seconds. Don't let the grape cook longer. If you don't have a microwave, you can watch a video of the experiment.
    - Complete an Experiment page and put it in your notebook (Experiments & Activities)

#16 - Elements

1. Watch: They Might Be Giants "Meet the Elements"
2. Print out this periodic table (or page 4 in your companion printouts file) and put it in your notebook in your "Elements" section. This is called the **periodic table of elements**. Each box is one element. Everything in the world, including you, is made up of these elements. They are listed on this table in order of their weights. Number one is hydrogen. It is a gas. It is the lightest element. We will start focus on the 18 that make up most of the matter in the Universe: Hydrogen, Helium, Lithium, Beryllium, Boron, Carbon, Nitrogen, Oxygen, Fluorine, Neon, Sodium, Magnesium, Aluminum, Silicon, Phosphorus, Sulfur, Chlorine, and Argon
3. On a new page in your "Definitions" section define and illustrate:
    - **Element** - A pure substance made from a single type of atom
4. If you have brainpop watch Periodic Table of Elements and do any activities of interest.

#17 - Hydrogen

Materials: 9 volt battery, water, salt, electrical cap, lighter

1. Read about hydrogen.
2. Print out Elements Lap book pages from the companion printouts file (pages 5-10). Cut out H and hydrogen pocket. Place it on a blank page by itself and put it in your notebook (Elements).
3. Experiment: "Separating Water Elements Using Electrolysis" - pages 11-12 from companion printouts
4. Complete an Experiment page (page 2 from companion printouts) and put it in your notebook (Experiments & Activities)
5. Draw a picture and/or write and add details about hydrogen inside booklet and place back in pocket.

#18 - Chemical Reactions

Materials: seltzer water, bleach, food coloring

1. Experiment: "Chemical Reactions"
    - Fill a glass halfway with seltzer water. (If you don't have it then just use regular water. The reaction just takes a bit longer. Add a drop of food coloring. Pour in bleach and watch the color disappear.
    - The color disappears because the oxygen molecules in the bleach and the oxygen molecules in the water bond together.
    - If you can't do it yourself, watch the video.
    - Watch this video of a neat chemical reaction. This is sulfuric acid being poured into sugar. The acid reacts with the sugar and takes all the H2O out of the sugar. That leaves only carbon!
2. Complete an Experiment page and put it in your notebook (Experiments & Activities).
3. On a new page(s) in your "Definitions" section define and illustrate:
    - Chemical Reaction - when two or more molecules interact and the molecules change

#19 - Oxygen & Exothermic Reactions

Materials: Empty 16 oz. soda bottle, Dawn dish soap, food coloring, yeast, funnel, pan/tub, splint

1. Read about oxygen and/or watch a video on oxygen
2. Cut out your O and oxygen pocket. Place it on a page titled **"Nonmetals,"** put it in your notebook (Elements). Oxygen is part of what we breathe. We need oxygen for our bodies to work. It is another **element** in our world and is number 8 on the **periodic table** because one atom of oxygen has 8 protons in it. We'll learn later about protons. Write or draw inside your oxygen card. And place in your pocket.
3. Experiment: "Elephant Toothpaste" - page 13 from companion printouts
4. Complete an Experiment page and put it in your notebook (Experiments & Activities)
5. On a new page in your "Definitions" section define and illustrate:
    - **Catalyst** - A substance that increases the rate of a chemical reaction without itself being consumed or changed
    - **Exothermic** - A chemical reaction that gives off heat

#20 - Endothermic Reactions

(Materials for L: 1/2 c. milk and heavy cream and salt, 1/4 c. sugar, vanilla, 2 c. ice, qt. size ziplock bag, gallon size ziplock bag)

1. On a new page in your "Definitions" section define and illustrate:
    - **Endothermic** - A reaction that lowers the temperature of the product.
2. Try this yummy experiment.
3. While you are eating, tell someone the difference between an endothermic and an exothermic reaction.

#21 - Endothermic vs. Exothermic

Materials: cup, thermometer, vinegar, baking soda, steel wool

1. Experiment: "Exothermic or Endothermic?"
    - You are going to combine different materials and test to see if the reaction is **exothermic** or **endothermic**.
        - Vinegar is acetic acid, and baking soda is sodium bicarbonate. The reaction between acetic acid and sodium bicarbonate makes solid sodium acetate, liquid water and carbon dioxide gas. Pour 2 teaspoons of vinegar into a plastic cup. Place the end of the thermometer in the vinegar until a stable temperature can be recorded. Leave the thermometer in the cup, and add 1/2 teaspoon of baking soda to the vinegar. Watch the thermometer and record the temperature. Is this an exothermic or endothermic reaction? ( )
        - Vinegar dissolves the protective coating on steel wool that keeps the steel from oxidizing and rusting with oxygen in the air. Place the steel wool and a thermometer in a covered, dry plastic cup to get a stable temperature measurement. Remove the thermometer and soak the steel wool in vinegar for approximately one minute to dissolve the protective coating. Remove the steel wool from the vinegar and squeeze out all the excess liquid. Wrap the steel wool around the thermometer and place both back into a covered, dry cup. Record the

temperature over several minutes. Is this an exothermic or endothermic reaction? ( )

- Complete an Experiment page and put it in your notebook (Experiments & Activities).

#22 - Sodium

Materials: salt, sugar, magnifying glass, Epsom salt

1. Read about sodium.
2. Molecules have different shapes. Take some salt and sugar and compare them with a magnifying glass. Do you see their shapes? If you don't have a magnifying glass, here are some pictures. Salt Sugar
3. Place it on a new page titled **"Alkali Metals,"** in your notebook (Elements).

#23 - Magnesium

Materials: Epsom salt, water, "magic" candles, lighter

1. Magnesium is a metal and is found in the earth's crust and in seawater. It is used in building airplanes.
2. Read about magnesium.
3. Watch the video on magnesium.
4. Experiment: In a small, deep container (small jam jar would work well) pour 1/2 cup of the hottest water that comes from your faucet. Stir in 1/2 cup of Epsom salt. Stir for one minute (there should be some Epsom salt crystals at the bottom still) and then place in the refrigerator. In three hours you should have crystals. (In case you can't grow them, here's a picture of Epsom salt crystals. You can click on it to see it bigger.)

   - Epsom salt is magnesium sulfate, $MgSO_4$ That means that each molecule of magnesium sulfate is made up of one atom of magnesium, one atom of sulfur and 4 atoms of oxygen. The crystals are lots and lots of molecules joining together.
   - Cut out your magnesium piece and fill it in and add it to your collection. Place it on a new page titled **"Alkaline Earth Metals,"** in your notebook (Elements).
     - Draw a picture of what a magnesium atom might look like. It is number 12 on the periodic table so it has 12 protons and electrons. Draw a nucleus with 12 + signs in it for the protons. Now draw a ring around it with two electrons (-) on it. That's all the first level can hold. Now draw a second ring around that. The second level can hold 8 electrons, remember? Draw

eight electrons on the second ring. That's 10 electrons. Now draw a third ring around the atom. How many electrons should you draw on this one? It needs 12 and you've only drawn 10 so far. This last level or its **valence shell** needs 2 more drawn in, but it wants 18! That's why it will bond with the other atoms.

5. Complete an Experiment page and put it in your notebook (Experiments & Activities). Your question is, "What do salt crystals look like?"
6. Look at this picture of enormous crystals.
7. Have Epsom salt left over? Try this! (You can save some for later as well, a tablespoon should do..
8. See magnesium in action: Light "magic" candles. The way they work is that when you blow out the candle the wick is still hot but not hot enough to continue burning the candle, but it is hot enough to light a special material that has been placed on the wick (usually magnesium - magnesium burns white and is added to fireworks to make them brighter, so when you see white sparks that is the magnesium burning). The magnesium, and just afterward, the wick, can be relit with the heat of the wax vapor and the hot wick.

#24 - Helium

1. Watch the video on helium.
2. The next element on the periodic table you will work on is helium. Helium is a gas. You may have heard of helium balloons. Those balloons that float away if you let go of them are filled with helium. They float because they are lighter than air. Remember the lighter the element, the earlier it is on the chart. Helium is number 2. So if helium floats, do you think hydrogen balloons float too? Of course! Hydrogen is lighter than helium. That's why it is number 1 on the chart. So helium is number 2 on our periodic table. That means it has 2 **protons** in its **nucleus**, center. That means it also has 2 **electrons** flying around it.
3. You can also see that helium molecules are lighter than oxygen or carbon dioxide molecules by breathing in helium from a helium balloon and then saying something (But only try it once! It's not good for your brain cells. And do NOT breathe it straight from the tank, which can cause bubbles in your brain and kill you.). When you speak, you breathe out helium from your lungs along with the sound. Because sound can travel faster through thinner air, and the helium is lighter, or thinner, than regular air, the sound travels to your ears faster and so it sounds different, as if you were a mouse or a chipmunk.
4. Cut out helium pieces. Place it on a page titled **"Noble Gases,"** put it in your notebook (Elements). Write or draw inside about helium. You could also draw a helium atom inside.

#25 - Carbon

Materials: candle, metal spoon, lighter

1. Read about carbon. It's another element that makes up our world.
2. Watch this video on carbon
3. Experiment: Light a candle and let it burn for one minute. The hold a cold metal spoon over the flame. Black gunk will get on the spoon. That is carbon. (Because all living things are made of carbon you can see carbon when you burn your food too!) There will also be droplets of water because wax is made from hydrocarbon molecules (long chains of hydrogen and carbon atoms). When the wax gets hot the heat breaks the molecules in to smaller molecules which mix with oxygen in the air. This mixing makes different molecules, all made of carbon, hydrogen and oxygen.

Carbon mixes with oxygen to make carbon dioxide and carbon monoxide

Hydrogen mixes with oxygen to make water

Some of the carbon doesn't mix with anything and that shows up on the spoon as the black gunk.

Complete an Experiment page and put it in your notebook (Experiments & Activities).

4. Cut out your carbon pieces and write or draw about carbon. Place it on the **"Nonmetals"** page in your notebook (Elements).

#26 - Neon

1. Read about neon. You see neon in many lit up signs.
2. Cut out your neon piece. Draw or write inside and add it with your others. Place it on the **"Noble Gases"** page in your notebook (Elements).

#27 - Aluminum

1. Read about aluminum.
2. Watch the video on aluminum.
3. Look at aluminum.
4. Find aluminum in your home. Ideas: aluminum foil, drinking cans, pots and pans, knitting needles, crochet hooks, light fixtures, hamster cages, camera tripod and the metal bands around your coffee pot
5. Cut out and draw/write inside your aluminum piece. Place it on a new page titled **"Poor/Basic Metals,"** in your notebook (Elements).

#28 - Silicon

1. Read about silicon. The circuits in your computer are made from silicon.
2. Watch the video on silicon.
3. Look at silicon.
4. Cut out your silicon piece and draw/write inside of it and include it with your others. . Place it on a new page titled **"Metalloids,"** in your notebook (Elements).

#29 - Chlorine

1. Read about chlorine.
2. Watch the video on chlorine
3. Cut out and fill in your chlorine piece. Place it on a new page titled **"Halogens,"** in your notebook (Elements).
4. Recall we made chlorine gas as a secondary reaction in our Separating Water Elements Using Electrolysis" experiment.

#30 - Lithium

1. Read about lithium.
2. Watch Get Lithium Metal from an Energizer Battery
3. Cut out and fill in your lithium piece. Place it on the **"Alkali Metals"** page in your notebook (Elements).

#31 - Phosphorus

Materials: 20 oz. brown colored soda, 2% milk

1. Read about phosphorus
2. Experiment: "Invisible Soda"
    - Open a fresh, new bottle of brown-colored soda. Carefully, pour 2% milk into the bottle until the bottle is completely full. Replace the cap and screw it on tightly.
    - Observe the mixture in regular intervals (such as every 30 min.)
    - What's happening: Slowly, the milk will settle on the bottom and the soda will become clear. The separation happens because of a reaction between phosphoric acid in the soda and proteins in the milk. The phosphoric acid molecules attack to the milk proteins increasing their density and separating them from the rest of the liquid. The remaining liquids, having less density than the phosphoric acid and milk molecules, float on top.
    - Go further, try different types of milks
    - Complete an Experiment page and put it in your notebook (Experiments & Activities).
3. Cut out and fill in your phosphorus piece. Place it on the **"Nonmetals"** page in your notebook (Elements).

#32 - Sulfur

Materials: tarnished silver, foil, boiling water, baking soda or washing soda

1. Read about sulfur
2. Cut out and fill in your sulfur piece. Place it on the **"Nonmetals"** page in your notebook (Elements).
3. Experiment: "Cleaning the Silver"
    - Line the bottom of a pan (deep enough to cover your silver) with foil or use a disposable aluminum pan. Place the silver on top of the aluminum. (The silver and the aluminum must be in contact because a small electric current flows between them during the reaction) Pour boiling water in to the pan until the object is completely covered. Add the soda, about 1 c. per 1 gallon of water.
    - What's happening?: The tarnish will disappear quickly, it may need to be repeated for heavily tarnished items. Silver tarnishes because of a chemical reaction with sulfur-containing substances in the air. The silver combines with the sulfur to form silver sulfide, the black tarnish on silver. When aluminum oxidizes the silver gains electrons and the tarnish is "transferred" to the aluminum via a chemical reaction.
    - Complete an Experiment page and put it in your notebook (Experiments & Activities).

#33 - Beryllium, Boron, Nitrogen, Fluorine, and Argon

Materials: Sugar cookie dough, cookie cutter, regular and mini M&M's, white icing, icing gel (the kind for writing)

1. Read about beryllium, boron, nitrogen, fluorine, and argon in your companion printouts - page 17-18
2. Cut out and fill in your beryllium (Alkaline Earth Metal), boron (Metalloids), nitrogen (Nonmetal), fluorine (Halogen), and argon (Nobel Gases) pieces. Place them on the appropriate pages page in your notebook (Elements).
3. Create delicious models of these five elements
    - Rollout sugar cookie dough, use a bowl/cup/ cookie cutter that is about 4 inches across. Put circles on cookie sheet.
    - Use three different colored M&M's to represent protons, neutrons, and electrons. The protons and neutrons should be represented by normal sized M&M's. The electrons should be represented by mini-M&M's.
    - Option 1: Place your protons and neutrons in the middle of the cookie. Using a knife or toothpick drag outer circles in the dough and place electrons along the lines. Then bake according to the recipe.
    - Option 2: Bake the cookies. Once cool, frost with the white icing and smooth. Nestle your protons and neutrons in the center. Use the writing gel icing to draw ring(s) around the nucleus and place electrons as appropriate.
    - Eat!

- Source: Susan's Homeschool Blog

#34 - Acids & Bases

Materials: baking soda, vinegar, ketchup, lemon juice, mustard, pickle juice, orange juice

1. Watch: Compounds: Acids & Bases
2. On a new page(s) in your "Definitions" section define and illustrate
    - **Acid** - have a sour taste and dissolve many materials, in water it will release a hydrogen ion
    - **Base** - have a bitter taste and tend to be slimy or slippery, in water it will release a hydroxide ion
3. Experiment: "Acids & Bases"
    - Place 1 Tbsp. of baking soda in a tall clear container. Add vinegar. Vinegar reacts with baking soda because it is an **acid**.
    - Let's see what else reacts with baking soda. Gather some supplies: ketchup, tomato juice, honey, water, lemon juice, mustard, pickle juice, orange juice, whatever else you want to try that you have in the house)
        - Count up how many things you have. Get a cup for each one.
        - Put some baking soda into each cup.
        - Put some ketchup (or whatever) into the first cup and place the ketchup bottle behind the cup so you know what you put in that cup.
        - Observe the reaction.
    - Record the reaction on your sheet, acid testing sheet.

- Complete an Experiment page and put it in your notebook with the data sheet (Experiments & Activities).

*** Make the red cabbage indicator today to be ready for the next lesson.

#35 - Acids & Bases 2

Materials: red/purple cabbage, disposable cups, coffee filters, hydrogen peroxide, window cleaner, water, vinegar, etc.

1. Experiment: "Acids & Bases 2"
    - Try the experiment. Get your disposable cups. Put a small amount of several different types of liquids in there. Hydrogen peroxide, window cleaner, water, vinegar, try some drinks from the fridge, egg white, whatever else you want to try (with permission). Always be SUPER CAREFUL when using cleaners. They can use powerful and harmful chemicals. Wear goggles and rubber gloves if you have them.
    - Put a little indicator into each cup.
    - Record the results. PH test sheet
2. Complete an Experiment page and put it in your notebook with the data sheet (Experiments & Activities).
3. If you can't do this at home, here's a video of the experiment.
4. For more Acid and Base fun play at the juice bar. Do the first challenge.

#36 - Carbon Dioxide

Materials: baking powder, ingredients for any quick bread if you like

1. Do you remember what element the C is the symbol of? If not, go look on your periodic table.
2. What does O stand for?
3. O2 shows dioxide. "di" is latin for two.
4. So what is CO2? (answer: ( )
5. CO2 is the chemical compound released when you mixed baking soda and vinegar.
6. Is CO2 a liquid, solid or gas? (answer:

)
7. Baking *powder* is an acid and a base together. You can make something similar by combining the base, baking soda, with the acid, cream of tartar.
8. When you add any liquid to baking powder, it causes the acid and base to react, and CO2 is made.
9. The gas bubbles get caught in the batter or dough you are making and fill it with gas. This filling is what we call rising.
10. Put a spoonful of baking powder in a small amount of water and watch what happens.
11. Bake some quick bread. Don't stir too much or you will release all the gas!

#37 - Science Fair

1. Choose a question to answer.
2. Design an experiment to answer the question. You can use an existing experiment, but think of a way to expand it and try it with new things or in a new way.
3. Do the experiment.
4. Record the experiment.
5. Present your experiment. You could make a video, a poster, a book or use this experiment book to write and draw in for your project.
6. Take a look at other kids' experiments.
7. Here are some experiment ideas based on what we've just been learning.