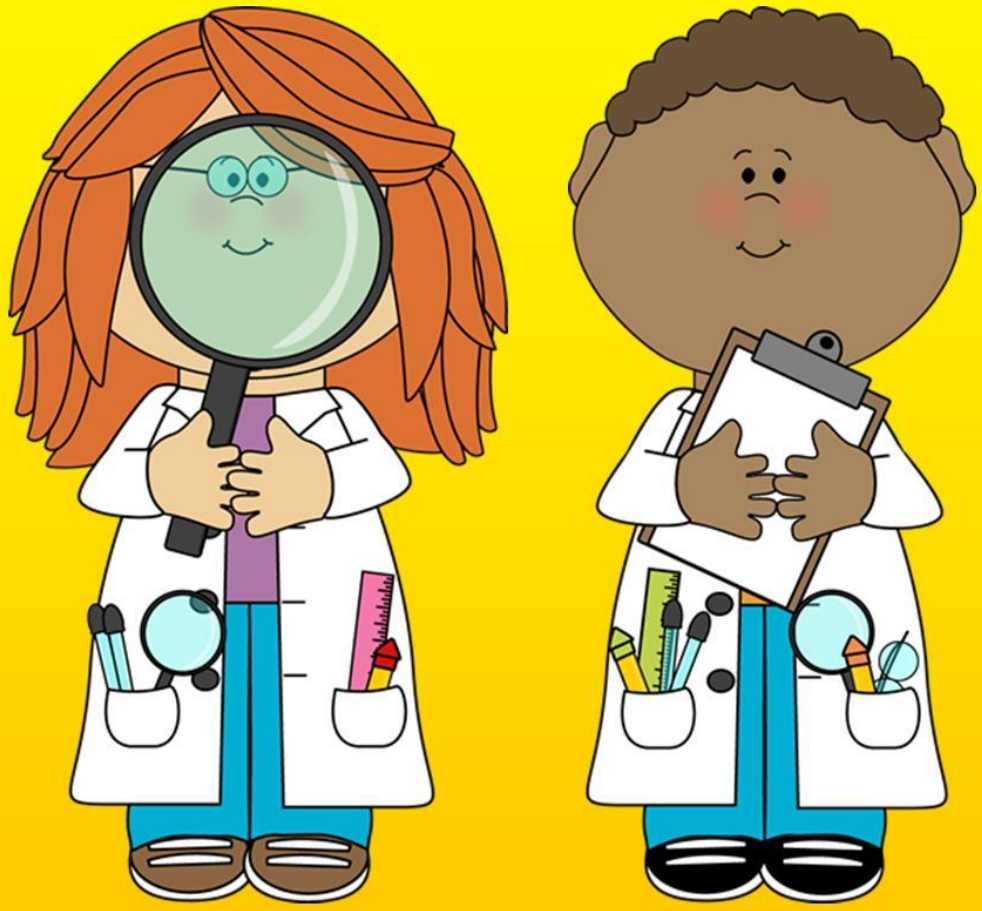
Simple Science Explorations
Grades 2-3



Hands-On Minds-On Publications

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Simple Science Explorations Grades 2-3

1	The Atoms Family: Students will identify the placement of atoms in solids, liquids, and gases by playing solid, liquid, and gas "atoms game".
2	Water Testing: Students will predict which type of water, hard or soft, will produce better suds for cleaning. Students will also follow a recipe to create hard and soft water.
3	Air Pressure: Students will follow the scientific method and demonstrate the forces of air pressure.
4	Food Webs: Students will identify how a food chain works and that animals depend on each other for survival.
5	Magnetic Attraction: Students will identify items that are magnetic and that not all metals are magnetic.
6	Sorting and Classifying: Students will identify ways to sort and classify items using attributes and physical characteristics.
7	What's The Matter: will identify the properties of all three states of matter. Student will follow the scientific method to verify their predictions.
8	Silly Putty: Students will identify the difference between a mixture, solution, and suspension.
9	Super Stem: Students will identify the function of stems as a transport system in plants. They will also compare stems in plants to veins in humans.
10	Parts of a seed: Students will identify the parts of a seed and their function. They will also compare a dry seed to a soaked seed listing ways to describe their physical properties.
11	Oxygen in air: Students will learn about the components present in air. They will find through investigation that a candle cannot stay lit without the oxygen.
12	Magnetic Poles: Students will identify the north and south pole of a magnet and use a compass to map the poles. They will also investigate how magnets attract and repel.
13	Density: Students will identify density as a property of matter. They will combine 3 liquids and predict which one will be the most dense.
14	Plant Leaves: Aloe & Onions- Students will identify the function of the leaf of plants. They will also identify how plants can be used for medicinal purposes.
15	Pollution & Oil Spills: Students will identify the effects of oil spills on the environment and wildlife.
16	Buoyancy & Salt Water: Students will examine that an egg will sink in water. By adding salt to water, students will identify that the density of the water will change, enabling the egg to float.
17	Solar Cooking: Students will identify solar energy as a renewable energy source.
18	Your Eyes: Students will examine the important role that both eyes play in sight.

LESSON 1
GRADE LEVEL: 2/3
ACITIVITY TITLE: The Atoms Family

ACTIVITY OBJECTIVES: Students will identify that the placement of atoms in solids, liquids, and gases by playing solid, liquid, and gas "atoms game".

MATERIALS: chalkboard or chart paper

ACTIVITY STEPS:

1. Explain that everything is made up of matter. Matter is made of molecules that are so small, they cannot be seen. The molecules are always moving whether they are a solid, liquid, or gas. Atoms are the basic component of molecules. Atoms combine together to form molecules.
2. Draw 3 boxes on the chalkboard or chart paper. Label one solid, one liquid, and one gas.
3. In the box labeled gas, draw a few dots scattered throughout the box. In the box labeled liquid draw several dots scattered evenly throughout the box. In the box labeled solid, draw many dots close together.
4. Explain that the dots are atoms. The dots (atoms) in solids are packed very close together. That is why cannot move. That is also why a solid generally does not change its shape.
5. In liquids, the dots (atoms) are spread out more. That is why you can move your fingers through a liquid.
6. In a gas, there are very few dots (atoms). This why a gas has no definite shape.
7. Explain to students that they are going to play a game and pretend they are atoms. Atoms just like children are always moving. Everything is made up of atoms, but atoms in solids, liquids, and gases move differently.
8. SOLIDS: Tell students that the atoms in a solid are very close together. Have a group of students act like atoms in a solid. They should huddle together in a very close area and try to move.
9. LIQUID: Explain that the atoms in a liquid are more spread out. Have students hold hands in groups of three as they move around a small area of the room. The room must be small enough that they will touch, but still move freely. Compare how they moved as the liquid to the solid.
10. GAS: Explain that a gas has no definite shape. Direct students to move freely throughout the room. As they move, they may explore all areas of the room, but they cannot touch each other. Molecules in a gas do not touch.
11. Discuss the difference from each round of the game.

EXTENSION: Draw a picture of a pencil, a cup of water, and a balloon. Have students copy them on their paper.

LESSON 2
GRADE LEVEL: 2/3
ACITIVITY TITLE: Water Testing: Hard and Soft Water

ACTIVITY OBJECTIVES: Students will follow the scientific method to compare properties of hard and soft water.

THE STUDENT WILL: Students will predict which type of water, hard or soft, will produce better suds for cleaning. Students will also follow a recipe to create hard and soft water.

MATERIALS:
Prior to the activity, you will need to get 2 baby food jars with lids, 2 tablespoons of laundry soap, 2 tablespoons of Borax (laundry soap), 2 tablespoons of Epson Salt, water, and two plastic spoons

ACTIVITY STEPS:

1. Read the information out loud and have students follow along. Have them predict whether hard water or soft water will produce the most suds and be better for cleaning.
2. Remind students that it does not matter whether their guess is correct or not, in science, we learn from our predictions.
3. Have students make their predictions.
4. This will be a leader demonstration. Following the directions in the procedure to make Hard Water and Soft Water. Invite students to help add the ingredients and shake.

EXTENSION:
Discuss how people filter their water to get the minerals out. Ask how many students have water that comes out of the refrigerator or if they use a special pitcher (Brita) that filters the water.

WRAP UP:
Have students go home and come back telling the group if they use any type of water filtration system.

Name_____ Date_____

Water Testing

Background Information: Pure water is usually not found anywhere on Earth. As rain water soaks into the soil is picks up minerals. Water that is full of minerals is called **hard water. Soft water** has very little calcium and magnesium in it. Water that is **distilled** is water that has been softened and has very few minerals in it.

Problem Statement: Which type of water will produce the most bubbles; hard water or softened water?

Hypothesis:

Materials: distilled water, Epson salt, borax, two baby for jars with lids for each group, graduated cylinders, syringe, jar 1 & jar 2 labels

Procedure:

1. Using the graduated cylinder to measure 100 ml of distilled water and pour it into the first jar.
2. Measure 100 ml of water in the second jar.
3. Add 1 teaspoon of Epson Salt to Jar #1- to make hard water
4. Add a pinch of Borax to jar #2- to make soft water.
5. Add 1/2 teaspoon of soap powder to jar #1- Hard water.
6. Add 1/2 teaspoon of soap powder to jar #2- Soft water.
7. Take both jars and shake for 30 seconds.
8. Observe which jar has more bubbles.

Draw a picture of each jar with the bubbles. Show which one had more bubbles.

JAR #1 Hard Water	**Jar #2 Soft Water**

Results: Which water had the most bubbles?

Conclusion: Was you hypothesis supported? Explain why or why not.

Think of your favorite water activity. Tell about why it is your favorite activity.

Draw a picture of yourself taking part in your favorite water activity.

LESSON 3
GRADE LEVEL: 2/3
ACITIVITY TITLE: Air Pressure

ACTIVITY OBJECTIVES: Students will follow the scientific method the demonstrate the forces of air pressure.

MATERIALS: plastic bottle from bottled water, funnel, modeling clay, water, sharpened pencil or stick

ACTIVITY STEPS:

1. Tell students that air is all around us and even though we don't see it, it is always there. Air pushes down on the earth. We can't feel the pressure because there is equal air pressure inside of our bodies pushing out.
2. Have students help you to follow the steps in setting up the experiment. Place the funnel in the bottle and press the clay around the funnel to attach the funnel securely to the bottle. Be sure there are no gaps or holes.
3. Have student predict whether the water will go through the hole of the funnel and into the jar when it is poured in.
4. Slowly pour the water in the funnel. A few drops might go into the bottle, but most will stay in the top of the funnel.
5. Students will think this is magic. Here is what happened. The bottle is filled with air. By attaching the funnel, it makes an air tight seal trapping the air in the bottle. There is no room for the water to come in.
6. Puncture a hole in the clay until the water races into the bottle. Explain that the water comes in because the air was released from the jar making room for the water to come in.

EXTENSION:
Fill a container with water. Take a cup and ball up a piece of paper towel. Turn the cup upside down in the water (straight down). Take out the cup and students will see the paper towel is still dry. This is because the air in the cup would not let the water in. Next do the same thing, but tilt the jar when you are putting it in the water. The paper towel will get wet because the air escaped from the jar letting the water in.

WRAP UP:
Tell students to try the extension activity at home

NAME_____ **DATE**_____

AIR PRESSURE:

PROBLEM STATEMENT: Will water pass through a funnel if there is an air tight seal between the funnel and the glass jar?

HYPOTHESIS:

MATERIALS: funnel, glass jar, water, modeling clay, sharpened pencil

PROCEDURE:

1. Put modeling clay around the top of the jar so that the funnel is held in place in the middle.
2. Smooth down the modeling clay. Make sure that there are no holes for the air to escape through.
3. Pour the water slowly into the funnel.
4. Using a pencil, make a hole through the modeling clay.

RESULTS: (Tell what happened when you poured the water into the funnel. Why did it happen? Tell what happened when the air tight seal was broken with the pencil.)

CONCLUSION: (Was your hypothesis correct? Why or why not?)

Draw an illustration of the experiment.

LESSON 4
GRADE LEVEL: 2/3
ACITIVITY TITLE: Food Webs
ACTIVITY OBJECTIVES: Students will identify how a food chain works and that animals depend on each other for survival.

MATERIALS: 10 sandwich bags or envelopes, bits of paper in two colors.

ACTIVITY STEPS:

1. Explain to students that we get energy from the food we eat. All living things we eat get energy from the sun. The sun gives energy to plants. When insects eat the plants, they get the energy the plants got from the sun. When larger animals eat smaller ones, they get the energy from what they eat.
2. Humans get energy indirectly from the sun when we eat plants or animals that got their energy from the sun. For example, grass gets energy from the sun. A cow eats the grass and gives the cow energy. We eat hamburger (cow) and get the energy from the grass the cow ate. It is like an energy chain.
3. Explain that in a food chain, animals survive by eating others. Plants are on the bottom of the food chain. We need a lot of plants to feed all the many things that eat them like insects or other plant eaters.
4. Choose half of the group to be grasshoppers, two or three to be hawk, and the rest to be mice. Spread out the colored paper bits on the ground, that will be the grass. Give each grasshopper a bag to be their stomach. When you tell them to, they will "eat" by picking up all the bits of paper and putting them into their "stomach" (bag). Hawks and mice watch.
5. Next, the mice will "eat" the grasshoppers. On your command, mice will "eat" the grasshoppers for 10-15 seconds. Go over rules for "eating". For a mouse to each a grasshopper, the mouse uses ONE FINGER to tap the grasshopper on the shoulder. When they are tapped, the mouse says "Thank you" and the grasshopper freezes and hands over their stomach bag.
6. Next the hawk can eat whoever is left in the same manner. Give them only 15 seconds to eat.
7. When the game is over, explain that if they got eaten, they died. Those who did not get eaten are losers as well. Explain that one of the colors in their bag is grass, the other color is pesticides. Pesticides are poisons to keep pests from eating our plants. The grasshopper who are still alive will see that they have pesticides in their bag. They will die. The mice who ate grasshoppers also ate the pesticides so they die too. The hawks ate the mice and grasshoppers. They will not die, but their eggs will be so brittle that their babies will die. In the end, everyone loses.

EXTENSION: Discuss the pros and cons of using pesticides. On the positive, they keep pests of our food. On the negative side, they kill and hurt animals all the way up the food chain.

WRAP UP: Have students talk with their parents about the importance of washing fruits and vegetables before eating them to get off any chemicals.

NAME _____ DATE _____

FOOD WEBS

A Food Web, is a set of interconnected food chains by which energy and materials circulate within an ecosystem. One type of food web is a grazing web. In a grazing web, materials pass from plants to plant eaters (**herbivores**) to flesh eaters (**carnivores**).

Food Chain

Grass ----------> grasshopper ---------- > mouse ---------- > hawk

In the food chain game, what animal ate the grass? _____

What ate the grasshopper? _____

What ate the mouse? _____

What animal was the highest on the food chain? _____

What animal was the lowest? _____

What is a herbivore? _____

What is a carnivore? _____

Tell why the hawks were unable to have healthy babies.

What animal were you in the game? Tell what happened to you.

What is meant by the saying, "In this game, nobody wins,"

Tell the advantages and disadvantages of pesticides.

LESSON 5
GRADE LEVEL: 2/3
ACITIVITY TITLE: Magnetic Attraction

ACTIVITY OBJECTIVES: Students will identify items that are magnetic and that not all metals are magnetic.

MATERIALS: magnets, items that are magnetic and items that are not (some examples include pennies, pencils, paper clips, brass fasteners, plastic straw, tacks, popsicle sticks, etc.)

ACTIVITY STEPS:

1. Go over the information in the box at the top of the page. Before copying, the activity sheet, fill in the names of the items that students will be testing. Place each item to be tested in a bag. If possible, have several bags and place students in groups to share the items.
2. Hold up each item and have students predict which ones will be attracted to a magnet.
3. Pass out magnets and let students take turns testing each item. Record whether they were magnetic or not.
4. Go over the findings as a group.

EXTENSION:
At the end of the activity, be sure that students know that not all metals are magnetic. A perfect example is a penny that is made of copper. Be sure students understand, in order to be magnetic, items must be made of iron, steel, cobalt, or nickel. Tell students to never touch a computer or VCR. Both a computer and a VCR record data magnetically. Touching them with a magnet would ruin material stored on the computer or on a video tape.

WRAP UP: If students have magnets at home, have them test items around the house and report back which ones were attracted to a magnet.

NAME_____ DATE_____

WHAT IS A MAGNET

BACKGROUND INFORMATION: A **MAGNET** is an object that **attracts** (brings near) metals such as iron and steel. The ends of a magnet are called **POLES**. A magnet has a **north pole** and a **south pole.** The poles are equal in strength. The north pole of one magnet attracts the south pole of another magnet. The south pole of a magnet attracts the north pole of another magnet. This is because opposite poles attract. The north pole of a magnet will **repel,** or push away, the north pole of another magnet. The south pole of a magnet will repel, or push away, the south pole of another magnet. This is because like poles repel.

PROBLEM STATEMENT: What kind of objects will be attracted to a magnet?

MATERIALS: magnet, 10 items that are examples of metals and non-metals

HYPOTHESIS: Predict which items will be magnetic.

PROCEDURE: 1. Test each of the items on your table. If it is attracted to the magnet, place a check in the magnetic section of the chart. If it is not attracted, place a check on the non-magnetic section of the chart. Also write what the objects are made of.

Name of item	The item is made of...	Magnetic	Non-magnetic

RESULTS: Write a sentence telling which items were magnetic and which were not.

The items that were magnetic were the
The items that were not magnetic were the

LESSON 6
GRADE LEVEL: 2/3
ACITIVITY TITLE: Sorting and Classifying

ACTIVITY OBJECTIVES: Students will identify ways to sort and classify items using attributes and physical characteristics.

MATERIALS: bucket of buttons

ACTIVITY STEPS:

1. Tell students that they are going to play a game. Tell them that you are going to "sort" them into groups by how they are the same or similar. Then point to students one at a time and direct each student to one group or the other. Direct all boys on one side and girls on the other. Ask students how they were sorted. Next, have students line up again and choose another way to sort the students: shoes with laces and no laces, long hair and short hair, shorts and no shorts, jewelry and no jewelry, glasses and no glasses, etc. Keep sorting and having students guess how they were sorted.
2. Tell students that scientists sort things into groups so that they can be experts at what they study. A botanist studies plants, a zoologist studies animals, a dentist knows about teeth, and a nutritionist studies food. You would not want a dentist to check your eyes, because they are not an expert in that field.
3. Next, pass out a baggie of buttons to each group of 4 students. Have students share ways to sort them with the group. List all ways on the board and have students list on their paper all the ways they come up with. Some include two holes vs. four holes, solid vs. striped, small vs. large, rimmed vs. smooth.
4. For each category, have students sort them into groups. For example, students would divide their buttons into two piles, one with two holes and the other with four holes. Count up how many in each group and record the data (each group will have different numbers). The mix them all up and sort another way. Keep going until all data is recorded.
5. Finally, instruct students to fill in the ways sorted on the graph and color in the bar graph for their data. Model an example before beginning.

EXTENSION: Have students discuss other things that they can sort in their everyday life.
WRAP UP: Have students go home and sort the clothing in their closet and bring their data to the group.

NAME _____ DATE _____

Classification Systems

Scientist use **classification systems** to make it easier to study branches of science. By dividing objects into groups, scientists become experts in their fields. An **attribute** is a characteristic used to group things.

ITEM BEING SORTED: BUTTONS

Name the different ways you can sort the buttons into two groups (Attributes).

Two holes	Four holes

Write the name of the items you are sorting. Sort the item by an attribute into two groups. Then count how many in each group and record the data on the data table.

Item being sorted:

Attribute	# in the group	Attribute	# in the group

Fill in the graph using the data on the table:

Graph Title

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ATTRIBUTE

LESSON 7
GRADE LEVEL: 2/3
ACITIVITY TITLE: What's The Matter?

ACTIVITY OBJECTIVES: Students will identify the properties of all three states of matter. Student will follow the scientific method to verify their predictions.

MATERIALS: 24 zip lock bags, any 8 small objects, (ie: penny, block, cork, crayons, buttons), water, 8 paper cups.

ACTIVITY STEPS

1. Fill 8 bags with water, blow air in 8 bags, and place a small solid object in 8 bags.
2. Give each student one square and go over the properties of matter on the attached page with the students.
3. Divide students in groups of 4 and give each students a number either 1,2,3, or 4. These are their job numbers. Call up #1 to pick up a solid, liquid, and gas bag and place them on the table for their group.
4. Call job #2 to pick up the bag with the solid object. Have them empty it the cup.
5. Ask students the following questions: Did the object change shape when it landed on the table? #2 Pick it up, can you put your finger through it? Can you see through it? If it doesn't change shape, you can't see through it, and you can't put your finger through it, what type of matter do you think it is? (SOLID)
6. Call #3 to pick up the bag with the air. Have them open the bag and pour it in the cup. Ask the questions in #5. Students should infer that it is a gas.
7. Call #4 to pick up the water bag and pour it in the cup. Ask the questions in #5. Students should infer that it is a liquid.

EXTENSION: Have students brainstorm ten items that are solids, 10 liquids, and 5 gases.

WRAP UP: Have students go home and look in their refrigerator and list 5 solids and 5 liquids that they use in their daily lives.

The entire universe is made up of matter. There are 3 states of matter. They are solid, liquid, and gas. Each state has specific properties that make them unique.

- A **SOLID** has definite shape and volume. It doesn't change shape easily. Another solid can't be passed through it easily. You can see a solid.
- A **LIQUID** has a definite volume, but it can change shape depending on the container it is placed in. A solid can pass through it easily.
- A **GAS** has neither a definite shape or volume. A solid passes through it easily. You usually cannot see it with your eye.

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LESSON 8
GRADE LEVEL: 2/3
ACITIVITY TITLE: Silly Putty

ACTIVITY OBJECTIVES: Students will identify the difference between a mixture, solution, and suspension.

MATERIALS: two baby food jars, 6 toothpicks, 6 paperclips, 6 pennies, bits of paper, water, ½ tsp salt, ½ tsp sugar, for each students: 1 tsp liquid starch, 2 tsp white glue, popsicle stick or stirrer, 3 oz. cup

ACTIVITY STEPS:

1. Pass out the attached descriptions to each student and go over the difference between a mixture, solution, and suspension.
2. Demonstrate the following, having the students be your helpers in the demonstration. Break the toothpicks in thirds and put them in one jar. In the same jar, add the paperclips, pennies, and bits of paper. Place the lid on the jar and shake it up. Ask students to tell you whether you just made a mixture, solution, or suspension. They should have said the jar was a mixture because each item kept their "identities".
3. Next, place water in the other jar and add the sugar and salt. Close the jar and shake it up. Ask students what was created here. They should say a solution because the sugar and salt dissolved and became part of the water.
4. Tell students that they are about to make a suspension. A suspension is "trapped" between two states a solid and a liquid.
5. Give each student a cup and a popsicle stick or stirrer. Next go around and add 2 tsp of white glue and 1 tsp on liquid starch to each cup.
6. Instruct students to mix with their stick until the starch is absorbed and spread evenly. When the mixture sticks to the stick, tell them to remove it from the stick with their finger. Continue to kneed it until it is no longer sticky.
7. They can store it in a plastic egg or film canister* overnight. If the putty gets hard or dried out, they can add a little bit of water..."

*If you go to the photo department of most places like Costco, Eckerd, Target, or WalMart and tell them you are a "teacher", they will give you the empty film containers for free.

EXTENSION: Ask students when the ingredients are combined to bake a cake, if the baked cake is a mixture or solution

- A **MIXTURE** is a combination of two or more substances that when mixed together still keep their separate identities.
- A **SOLUTION** is the combination of two or more substances. One is a liquid and the other appears to become part of the liquid and loses it own identity.
- A **SUSPENSION** is when the substances of a mixture do not combine. It seems to be between a liquid and a solid.

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LESSON 9
GRADE LEVEL: 2/3
ACITIVITY TITLE: Super Stems!

ACTIVITY OBJECTIVES: Students will identify the function of stems as a transport system in plants. They will also compare stems in plants to veins in humans.

MATERIALS: a stalk of celery or a white carnation, a clear cup or jar, water 10 drops of food coloring.

ACTIVITY STEPS:

1. Ask students what they think the stem of the plant is good for. Some ideas might be to hold up the plant, to give the plant strength, or they bring water from the roots.
2. Tell students that stems have many important functions in the growth of plants. One thing a stem does is act as a support system holding the plant upright so that it can grow toward the sun. Another important function is that a stem acts as a transport system. Water and minerals are carried through the stem to the roots and leaves of the plant. Students can observe the movement of liquids through the stem in this activity.
3. Cut off the bottom of the carnation stem or the celery stalk. Pour about 3 oz. of water in the cup. Add 8-10 drops of food coloring to the water. Place the flower or celery in the cup and leave it overnight.
4. Have students predict what they will see the next day.
5. The next day, discuss why the carnation or celery turned color (the colored water was transported through the stem.

EXTENSION: Discuss that our veins carry blood through our body. Have students find a vein in their arm. Veins transport blood just like the stem transports water and nutrients to the plant.

WRAP UP: Invite students to try at home with either a celery stalk or carnation.

LESSON 10
GRADE LEVEL: 2/3

ACITIVITY TITLE: Parts of a seed

ACTIVITY OBJECTIVES: Students will identify the part of a seed and their function. They will also compare a dry seed to a soaked seed listing ways to describe their physical properties.

MATERIALS: lima beans (dry and soaked), paper towels, hand lenses

ACTIVITY STEPS:

1. Soak ½ bag of large lima beans overnight in a container of water.
2. Go over the information on the top of the handout with students.
3. Pass out a paper towel, a dry lima bean, and a soaked lima bean to each child.
4. Be careful as the wet beans are very delicate.
5. Write two columns on the board and have student give you ways to compare the seeds.
6. Examples:

The dry seed…	The soaked seed…
The dry seed is small.	The soaked seed is big.
The dry seed is white.	The soaked seed is yellow.
The dry seed is smooth.	The soaked seed is wrinkled.
The dry seed is closed.	The soaked seed is opening.

7. After describing the beans, have students remove the seed coat from the soaked seed, open the two cotyledons, and use the hand lens to find the embryo. By looking closely, students might even see the beginnings of leaves coming from the embryo.

EXTENSION:

Use a ruler or tape measure to compare the sizes of the dry and soaked beans. Be sure to measure in centimeters.

WRAP UP:

Have students respond to the following prompt with the help of their parents or siblings.

Write about it:
Pretend you found a bag of magic beans. Explain what happened after you planted the beans.

Name_____ Date_____

Parts Of A Seed

Seeds are alike in many ways. They develop in the ovary of a plant and contain a little plant called an embryo. Seeds are covered by a thin outer coating called a seed coat. The seed coat protects the seed. The tiny seed has its own food. The food storage of a seed is called the cotyledon. Seeds are different sizes and shapes. A corn seed is a monocotyledon and has a tiny embryo inside, but since it has only one cotyledon, it cannot be split in half. A bean seed is a dicotyledon meaning it has two cotyledons and can be split in half. The embryo is between the two cotyledons.

In this activity, you will have a chance to compare a dry and soaked bean seed. One lima bean has been soaked overnight. The other one is a dry seed that has not been soaked.

Materials (per person): one soaked seed, one dry seed, a hand lens, a ruler or tape measure

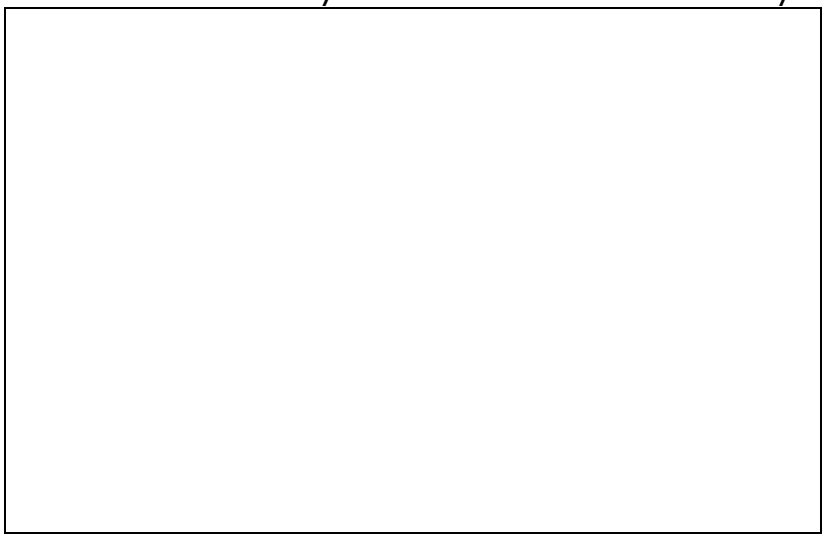
Procedure:

1. Lay out the soaked seed and the dry seed next to each other. Write down five observations of each seed on the chart below. Be sure to write down some physical properties to describe or compare the seeds.

The dry seed….	The soaked seed….
Draw the dry seed here:	Draw the soaked seed here:

(Procedure continued)

2. Carefully remove the seed coat.
3. Split the seed in two parts.
4. Look for the embryo in the middle. It may break off or fall out.
5. Draw the two cotyledons and the embryo here.



LESSON 11
GRADE LEVEL: 2/3

ACITIVITY TITLE: Oxygen in air

ACTIVITY OBJECTIVES: Students will learn about the components present in air. They will find, through investigation, that a candle cannot stay lit with out the air.

MATERIALS: candle, matches, 3 different sized jars

ACTIVITY STEPS:

1. Explain to students that air is a gas that is made up of different components. One component in air is called oxygen. We need oxygen to breathe. Plants produce oxygen. A candle needs oxygen in order to stay lit. Fire can also burn out the oxygen in air. When a fire has no more oxygen, it cannot stay lit and will go out.
2. Ask students to predict which candle will stay lit longer, the one under the large, medium, or small jar. Write tally marks on the board to show the student votes.
3. Light the candle and tell students once the candle is covered by the jar, to count how many seconds each candle stays lit. Record the data on the board (copy from attached worksheet).
4. You will find that the candle in the bigger the jar stayed lit the longest.

EXTENSION:

Explain to students that they should never play with matches and how fire extinguishers are used to put out fires.

WRAP UP:

Tell students to talk to their parents about their emergency plans in case they ever have a fire or other emergency in their home.

Name_____ Date_____

Oxygen in air

Problem Statement: Which candle will burn out faster; the one covered by the small jar, medium jar, or large jar?

Hypothesis: Write your prediction here:

Procedure:

1. Place a candle in a ball of clay
2. Light the candle
3. Place the jar on top of the candle
4. Time it to see how long it takes to go out
5. Repeat steps 1-4 for all three jars

jar size	small	medium	large
number of seconds			

Graph your data below:

Candle Graph

	20			
	19			
	18			
	17			
	16			
	15			
	14			
S	13			
E	12			
C	11			
O	10			
N	9			
D	8			
S	7			
	6			
	5			
	4			
	3			
	2			
	1			
		Small	Medium	large

Results: Tell how many seconds each jar took to extinguish the candle.

Conclusion: Was your hypothesis supported? Why or why not?

LESSON 12
GRADE LEVEL: 2/3

ACITIVITY TITLE: Mapping a magnet

ACTIVITY OBJECTIVES: Students will identify the north and south pole of a magnet and use a compass to map the poles. They will also investigate how magnets attract and repel.

MATERIALS:
two wand magnets, a compass, masking tape or white labels.

ACTIVITY STEPS:
1. Go over the information on the "Mapping a magnet" page.
2. Follow the steps listed in the procedure.
3. Give students a chance to investigate using the magnets.

EXTENSION:
Go on a magnet scavenger hunt. Give students a magnet and let the students find other things that are magnetic. IMPORTANT…Be sure that students know that they should never put a magnet near a computer, computer disks, or cd's.

WRAP UP:
Tell students to go home and have their parents help them to list or draw pictures of things around their houses that use magnets (electric can opener, refrigerator door, refrigerator magnets).

Mapping a Magnet

Just like the Earth has a north and south pole, magnets also have a north and south pole. A ***compass*** is a tool used to show direction. You can use a compass to map a magnet and find the north and south pole. When like poles are held together, they will ***repel*** (push away). When unlike poles are held together, they will ***attract*** (come together).

Problem Statement: What will happen when the north pole of one magnet is held next to the south pole of another magnet.

Hypothesis: What is your prediction?

_____

_____

Materials: two magnets, compass, masking tape

Procedure:

Step 1: Place a piece of tape on each side of the magnet.

Step 2: Hold the side of the magnet on the short side of the compass. Record where the red needle is pointing, either north or south. Mark "N" or "S" on the tape.

Step 3: Repeat step 2 for the other side of the magnet.

Step 4: Once you have mapped the magnet, make your predictions on the table and record what happened.

What do you predict will happen when you hold:	Are the poles alike or unlike?	What do you think will happen? Attract or Repel	Results: What happened? Attract or Repel	Was your hypothesis supported? Yes or No
North to North				
South to South				
South to North				
North to South				

LESSON 13
GRADE LEVEL: 2/3

ACITIVITY TITLE: Density

ACTIVITY OBJECTIVES: Students will identify density as a property of matter. They will combine 3 liquids and predict which one will be the most dense.

MATERIALS:
Food coloring (red & blue), bottle of cooking oil, light corn syrup, water, empty water bottle or glass jar, 3 Dixie cups (5 ounce)

ACTIVITY STEPS:

1. Something that describes matter is a property. A **physical property** of matter is one that can be observed or measured without changing the matter. Examples include size, shape, or color of an object. Mass and volume are physical properties of matter. **Mass** is the amount of matter an object has. **Volume** is the amount of space it takes up. Density is another property of matter. **Density** describes the amount of matter that is packed into a given space. You can compare the density of water with that of other types of matter. An object that is less dense than water will float. An object that is more dense, will sink.
2. Tell students that they will find out which liquid, oil, corn syrup, or water is the most dense.
3. Show students a bottle of water (mixed with blue food coloring), a bottle of corn syrup (mixed with blue food coloring) and a bottle of cooking (naturally yellow). Ask them to predict which liquid is the most dense and will sink to the bottom when mixed together. Make a tally on the board to show their votes.
4. Pour the blue water in a Dixie cup and pour the water in the jar or bottle. Next pour the oil in a cup and then into the jar or bottle with the water. Finally, fill a cup with the red corn syrup. Pour the corn syrup in the jar or bottle. Have students draw a picture of the bottle or jar showing the three colored liquids. Label the picture liquid layers. Have students label each liquid and write a sentence telling which one the most dense.

EXTENSION:

Try the same activity adding in other liquids like glue, maple syrup, and rubbing alcohol. They will all rest at different levels.

WRAP UP:

Encourage students to discuss the activity with their parents and encourage them to try it at home.

LESSON 14
GRADE LEVEL: 2/3

ACITIVITY TITLE: Plant Leaves & Plants used as medicines

ACTIVITY OBJECTIVES: Students will identify the function of the leaf of plants. They will also identify how plants can be used for medicinal purposes.

MATERIALS: aloe leaf (can be purchased in the produce dept. of grocery stores for about a dollar), hand lens (optional), onion cut in quarters

ACTIVITY STEPS:

1. Go over the information in the box at the top of the "Plant Leaves".
2. After students understand the function of plant leaves, discuss how plants can be used as medicines and review some of the ways that aloe is used.
3. Slice a cross section of aloe and give each student a piece. If hand lenses are available, tell students to look at the vacuoles which send water to the plant. The vacuoles are the tiny spots found just below the surface of the leaf.
4. Give students a chance to rub the gel of the aloe on their skin. Instead of wiping it off, tell them to rub it in until it disappears. Discuss how it feels and smells.
5. Ask students how many of them have aloe plants at home and where they are kept. Many will tell you that they are placed in the kitchen. This is because aloe reduces pain from burns and most burns happen in the kitchen.

EXTENSION:

Complete page two using a quarter of an onion. Remind students that the layers of an onion are the leaves of an onion.

WRAP UP:

Encourage students to share what they learned about aloe with their parents and ask their parents to get aloe plants for the kitchen. Also tell them to find out where the first aid kit is kept at home and to help parents make sure it is stocked with supplies.

Name_____Date_____

Plant Leaves

Plant leaves are very important. Leaves are the part of the plant makes food by photosynthesis. Leaves take in carbon dioxide from the air, water from the soil, and energy from the sunlight. During photosynthesis, the leaves use light energy to change carbon dioxide and water into food called sugar. Some plants are used for medicinal purposes. The leaf of the ALOE plant is often used to help heal burns. The ALOE leaf has a thick fleshy outer layer called the epidermis. The inner layer, the dermis has a gel like substance that can be put on burns. The leaf stores water for the plant in the vacuoles.

Activity 1:
Look at the cross section of the aloe leaf with a hand lens. Find the vacuoles where it stores the water. Make a drawing below and also describe how it feels.

Draw the cross section here, label the vacuoles.	Describe how the inside of the aloe leaf feels. Use a complete sentence.

Tell about how the aloe plant is used as a medicine.

A bulb is a flowering plant that grows under the ground. An example would be an onion. Onion bulbs may be round, somewhat flat, or oblong and are 1 inch to 6 inches across. Under its thin, papery cover, the bulb consists of many layers surrounding one or more growing points. In this activity, you will peel away the thin outer skin of the onion and count its layers. The inner layers of the onion are the edible part.

Problem Statement: How many layers will an onion have?

Hypothesis: Predict how many layers the onion will have.

Materials: wax paper, onion, paper towel, plastic knife

Procedure:

Step 1: Carefully peel away the thin outer covering of the onion.

Step 2: Peel away each layer and count the layers. Record your data.

Results: How many layers did your onion have?

Conclusion: Was your hypothesis supported?

Tell three things you learned today that you did not already know.

1.
2.
3.

LESSON 15
GRADE LEVEL: 2/3

ACITIVITY TITLE: Pollution & Oil Spills

ACTIVITY OBJECTIVES:
Students will identify the affects of oil spills on the environment and wildlife.

MATERIALS: a bird feather, cooking oil, container of water, hand lens
For extension activity: laundry soap, cotton, paper towel, an eye dropper, vegetable oil, food coloring, water, 4 metal pans

ACTIVITY STEPS:
1. Go over background information in the box on the top of the attached page.
2. Have students discuss how oil pollution can affect the ocean and wildlife.
3. Follow the steps listed in the procedure. After completing the activity, discuss how the oil changed the feather and how it can hurt birds.

EXTENSION:
In the next activity, students can explore how to clean an oil spill like the one they created. Follow the steps in the procedure to clean the oil spill.

WRAP UP:
At home, tell students to have their parents help them to pour oil on top of water to see that the oil is less dense and will sink to the bottom.

NAME_____ DATE_____

BACKGROUND INFORMATION: Oil pollution causes major damage each year our oceans and ocean wildlife. Some oil tankers carry 500,000 tons of oil. In 1989, The Exxon Valdes tanker ran aground near Valdez, Alaska. It spilled oil that spread for miles, polluting the water and killing the ocean wildlife such and fish, birds, and sea mammals. One way that oil spills affect marine life is by coating bird's feathers with oil. The oil makes it hard for the birds to fly and float. It also interferes with the bird's insulation so it cannot stay warm. Finally, when the birds clean themselves, they become poisoned by the oil on their feathers.

AFFECTS OF OIL POLLUTION

PROBLEM STATEMENT: Will oil on a bird's feather affect the bird?

MATERIALS: a bird feather, cooking oil, container of water, hand lens

PROCEDURE:

1. Examine the feather with the hand lens.
2. Open the feather by pulling apart the barbs (the strands attached to the shaft of the feather).
3. Close the barbs by running your finger down the barbs like a comb.
4. Drop the feather in water. Record what happened.
5. Dip the feather in water and repeat steps 2 and 3.
6. Dip the feather in oil and repeat steps 2 and 3.
7. Drop the oily feather in water. Record what happened.

RESULTS:

1. What happened when you dropped the feather in the water? Did it remain buoyant or did it sink?

2. Did the water have an effect on the feather? Did the barbs close after the were wet?

3. What happened when you dropped the feather in the oil? Did it remain buoyant or did it sink?

4. Did the oil have an effect on the feather? Did the barbs close after the were wet?

5. Give **3** reasons why oil spills are harmful to birds. Use complete sentences.

CONCLUSION: (Was your hypothesis correct?)

CLEANING AN OIL SPILL

PROBLEM STATEMENT: Which of the following items will remove the most oil from the water; laundry soap, cotton, paper towel, or an eye dropper?

HYPOTHESIS:

MATERIALS: laundry soap, cotton, paper towel, an eye dropper, vegetable oil, food coloring, water, 4 metal pans.

PROCEDURE:

1. Create an oil slick by adding 100 ml of cooking oil to each container of water.
2. Try to remove the oil using each item listed above.

RESULTS: Which item removed the most oil from the water?

Which item removed the least amount of oil from the water?

CONCLUSION:

WRITE ABOUT IT: **Oil spills cause great harm to our oceans and ocean wildlife. What consequences should there be for oil tankers that run aground and destroy our oceans by causing oil spills?**

LESSON 16
GRADE LEVEL: 2/3

ACITIVITY TITLE: Buoyancy and salt water

ACTIVITY OBJECTIVES:
Students will examine that an egg will sink in water. By adding salt to water, students will identify that the density of the water will change enabling the egg to float.

MATERIALS:
large plastic cup or container, water, hard boiled egg, tablespoon, salt

ACTIVITY STEPS:
1. Go over the background information. Remind student of the density experiment when they found out that something that is more dense than water will sink.
2. Point out the by adding salt to water, you can actually change the density of water.
3. Place an egg in a container and fill the container with water.
4. Have student predict how many spoons it will take to change the density of the water.
5. Stir in one tablespoon of salt and observe what happens.
6. Continue adding tablespoons of salt until the egg floats.

EXTENSION:
Ask student if they have ever gone swimming at the beach. Explain that the salt in the ocean makes it easier to float.

WRAP UP:
Have students try the experiment at home using another item like a marble.

Name_____ Date_____

Buoyancy and Salt Water

Background Information: When salt is added to water, it increases its density. This means that it is easier for items placed in salt water to float or remain buoyant. The more salt in water, the easier it is for objects to float in the water. This is why it is easier to float in oceans containing salt water. Divers often wear heavy belts to keep them from floating. When an egg is placed in salt water, the salt water is more dense than the egg causing it to float.

Problem statement:
How many tablespoons of water will it take to float and egg?

Materials: water, salt, egg, large container, spoon

Hypothesis: (How many tablespoons will it take to float the egg?)

Procedure:

1. Place an egg in a container and fill the container with water.
2. Stir in one tablespoon of salt and observe what happens.
3. Continue adding tablespoons of salt until the egg floats.

Results: (Tell how many tablespoons of salt it took to float the egg.)

Conclusion: (Tell whether you hypothesis was supported and why.)

Draw the cup with the egg before the salt was added.	Draw the cup with the egg after the salt was added.

LESSON 17
GRADE LEVEL: 2/3/4/5
ACITIVITY TITLE: Solar Cooking
ACTIVITY OBJECTIVES: Students will identify solar energy and as renewable energy source. Students will examine which will melt faster, ice in a solar cooker or ice not in the cooker. They will also identify which colors absorb more heat.

MATERIALS: Ice, shoebox, aluminum foil, black paint, brushes, tape

ACTIVITY STEPS:

1. Follow the directions and build the solar cooker.
2. Place a piece of ice in the cooker and time it to see how long it takes for the ice to melt.
3. Repeat by placing the ice outside the cooker on a white piece of paper.
4. Help the children to understand that the ice melted faster in the cooker because the foil reflects the heat and the black painted box absorbs more heat than the white paper.

EXTENSION:

Follow the directions to cook some of the solar cooking recipes.

WRAP UP:

Encourage students to build a solar cooker at home and make some yummy snacks.

BUILDING A SOLAR SHOEBOX COOKER

MATERIALS: shoebox, aluminum foil, tape, plastic wrap, black paint, brushes

PROCEDURE:

1. Paint the outside of a shoebox black.
2. When the paint dries, line the inside with aluminum foil.
3. Place item to be cooked on a piece of foil.
4. Place a thermometer inside the box.
5. Cover the top with plastic wrap and tape closed.
6. Prop the cooker on another box so that it sits on an angle facing the sun.

NACHOS & CHEESE: Place a small metal pan or on a piece of foil in the bottom of the cooker and remove the skewer. Put a layer of chips in the pan and top with cheese.

HOT DOGS: Place the hot dog on the bottom of the pan and place the cooker in direct sunlight.

SMORES: On a metal pan place a graham cracker. Lay two marshmallows on top. Place a Hershey bar on top of the marshmallows. Cook until chocolate it melted. You can also use a vanilla wafer with a marshmallow and Hershey Kiss on top.

NAME_____ DATE_____

BACKGROUND INFORMATION: Energy is available in two forms. **Potential Energy** is the stored energy found in such resources as coal, wood, and oil. **Kinetic energy** is found is such sources as heat light, sound, and motion. When potential energy is converted to kinetic energy, such as burning fuel to power a car, unwanted chemicals are released in the air. This is one of the causes of air pollution. Many of the resources used to produce kinetic energy are fossil fuels or non-renewable resources. This means they were formed over millions of years ago and when they are used up, there will be no more. One type of energy that does not cause air pollution and is renewable is solar energy. Solar energy uses the energy uses energy from the sun. Some homes have solar panels that collect and store the sun's energy for later use.

TYPES OF ENERGY & SOLAR COOKING

PROBLEM STATEMENT: How long will it take for ice to melt in a solar cooker?

MATERIALS: solar cooker, ice

HYPOTHESIS: (How long do you think it will take to melt the ice?)

PROCEDURE:

1. Set some ice on the bottom of the cooker
2. Record the time you placed the ice in the cooker
3. Record the time the ice melted.
4. Repeat the experiment with the ice on a white piece of paper out of the cooker. See which one melted faster.

Ice in the cooker	
Time Started	Time melted
Ice on white paper	
Time Started	Time melted

RESULTS: Tell which one melted faster and how long each one took to melt.

LESSON 18
GRADE LEVEL: 2/3

ACITIVITY TITLE: Your Eyes

ACTIVITY OBJECTIVES: Students will examine to important role that both eyes play in sight.

MATERIALS: Eye patch or bandana (optional), large ball

ACTIVITY STEPS:

1. Explain that our eyes allow us to see the world around us. They work together, but each sees an object from a different angle. Working together, our eyes allow us to see in depth. When only one eye is used to see, we lose our depth perception. This means that it is difficult for people to determine how far away or how close something is.
2. Line up students facing you about ten feet away. Throw a ball back and forth to each child. When they have caught and thrown the ball several times, instruct each child to close one eye or place an eye patch or bandana covering one eye. The other eye should be looking straight. Toss the ball to each child with their eye closed. It will be hard to catch the ball.
3. Repeat throwing the ball with both eyes open so that they can see the difference.

EXTENSION:
Talk about what is would be like to be blind. Blindfold one child in each pair and have them lead each other around the school. Be sure to discuss safety and do not do this around stairs.

WRAP UP:
With your parents, discuss what is would be like to live with a disability.