"you know more science than you think"

by

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Six Basic Science Process Skills

1. Observing - using your senses...sight, hearing, smell, touch and taste to collect information. Always record your observation as you work through your experiment. (age 2 +)

2. Measure - an extension of your observational skills because there are times when your senses can't provide you the precise information.

3. Classifying - helps to identify the traits or properties of objects, people and events. Use when you collect your test items.

4. Predicting - a guess... the key to making successful predictions is to recognize patterns.

5. Comparing - when children share information, they must identify, match, sort, group and distinguish likenesses from differences by verbalizing.

6. Exploring - children learn from "hands-on" experiences. They learn to relate factors and develop an understanding of cause and effect.

Open-Ended Questions

Open-ended questions are questions that cannot be answered with a "yes or no" (ex: What is the difference between an ant and a spider? Than... Are ants and spiders different?).
Open-ended questions mostly begin with What, When, Where, Who, How or Why. They encourage further exploration and independent thinking.

Examples of open-ended questions:

- What do you notice about_____? instead of What is this?
- How are _____ and _____ alike? and How are they different?
- Can you describe what happen to _____? Or What would happen if?
- How else could you use_____?
- What different groups might _____ be a part of?
- What do you think might happen if you put _____ first?
- How many _____ do you think there are?
- Can you think of a new way to do _____?
- What do you think cause _____ to change?
- What did you notice about _____? What do you like and dislike about?

Open-ended questions

Open-ended questions are questions that cannot be answered with a "yes" or "no" answer. It stimulates further explorations and independent thinking. Open-ended-questions begin with "what, when, where, who, how or why." When used in one of the following areas it helps students think about a problem in a new way.
Color Mixing Experiment See Activity in book "The Frugal Scientist" or use simple color mixing activity

- **Knowledge:** What are the three primary colors?
  Name two secondary colors?
- **Comprehension:** How are the colors purple and green alike? And different?
  Describe how you made the color green?
- **Application:** Explain what happened when you mixed the colors purple and green?
  Demonstrate how to make three different shades of green.
- **Analysis:** What colors would you get if you mix two secondary colors?
  Describe how to use primary colors to obtain tertiary colors?
- **Synthesis:** Create the color gray
  How many drops of blue and red did you use to create purple?
- **Evaluation:** What did you learn about mixing colors?
  What was the most difficult color to make?

Open-Ended Questions

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Open-ended questions mostly begin with What, When, Where, Who, How or Why. They encourage further exploration and independent thinking.

Examples of open-ended questions:

- What do you notice about ***THIS COLOR*** ? instead of What ***COLOR*** is this?
- How are ***PURPLE*** and ***GREEN*** alike? and How are they different?
- Describe what happen ed ***WHEN YOU MIXED PURPLE AND GREEN***? Or What would happen if?
- How else could you use ***SECONDARY COLORS***?
- What ***COLORS WERE USED TO CREATE THE COLOR GRAY***?
- What do you think will happen if you ***MIX TWO SECONDARY COLORS***?
- How many ***DROPS OF BLUE AND RED DID YOU USE TO CREATE THE COLOR PURPLE***?
- List new ways to ***MIX PRIMARY COLORS***?
- What do you think cause ***COLORS*** to change?
- What did you notice about ***COLOR MIXING***? What do you like and dislike about IT?

A-E-I-O-U

A : ADVENTURES
We are going on an Adventure—outdoors in the garden/playground/classroom. We need our magnifying glasses.

E: EXPLORE
We are going to Explore with our magnifying glasses. What do you see?

I: INVESTIGATE
We will use our magnifying glasses to Investigate. Plants/creepy crawlers/ soil or rocks.

O: OBSERVE
We Observe (see/look) closer at objects with our magnifying glasses. Things look big/bigger.

U:UNDERSTAND
We Understand when we Explore, Investigate, and Observe. Lets go on another Adventure!

Johnny Appleseed

Materials

apples
plastic knife
paper plate
plastic bags
paper towel
tape

Procedure

Hold up the apple and ask your students if they know what it is. Ask them to tell you what they know about the apple. Now ask questions referring to the five senses. Investigate similarities and differences of other fruits.

Can you see an apple?	•Name the color or colors.
Can you smell an apple?	•Describe the smell.
Can you touch an apple?	•Describe the texture.
Can you taste an apple?	•Describe the taste in contrast to other fruits.
Can you hear an apple?	•Describe the sound of biting into an apple compared to biting into other fruits.

Before cutting into the apple, have students predict what they will find inside. Have them guess how many seeds are inside the apple (write it down on the board), then count the number of seeds. Who was the closest? Observe the *oxidation* process (turning brown) of the apple. Place the seeds in a dampened paper towel inside a plastic bag. Zip it up and tape it to a sunny glass window. Now observe the *germination* process. Don't forget to count the number of days until the *seedlings* sprout. Follow up this exercise by planting the seedling and watching it grow. Some seedlings will germinate and some will not.

Explanation

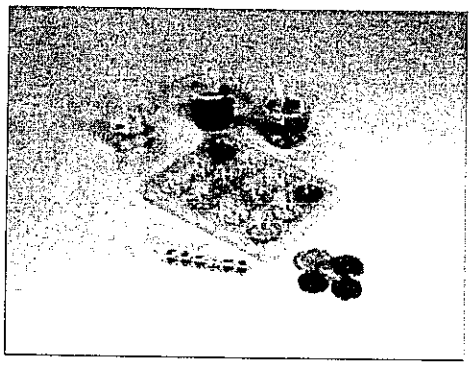
Children need direction in using their senses to investigate the world around them. Although our senses are immediate, it is imperative to the scientific process to break down the experience of observing and analyzing. This process will allow children to understand just how much information scientists get using the five human senses.

COLORS

Materials

★ *food coloring*
★ *water*
★ *several small cups*
★ *pipettes*
★ *pennies, nickels, dimes, quarters*
★ *Each student will need about 6 small containers or test tubes or one color mixing tray.*

Procedure



1. Fill 3 containers with water. Add food coloring to each. Make one red, one yellow and one blue. Use the pipettes to transfer the primary colors (red, yellow, and blue) to color mixing tray (or small cups.)

2. Now have fun mixing and making new colors in your color mixing tray (or small cups.) What color do you get when you mix blue and yellow? Red and blue? Red and yellow? Try making colors you see around you: in a book, on the walls, or outside.

3. Keep a record of what new colors you mix and how many drops of each color you need to make your 'new' color. See data collection chart on following page.

MORE TO DO:

1. Put drops of water on a penny. Count the number of drops it takes to cover the penny before the water spills over. Try this with a nickel, a dime and a quarter.

Explanation

The primary colors are red, yellow, and blue. When you mix two primary colors, you will get a secondary color. When you mix secondary colors you will get tertiary colors.

Surface tension is the tendency of liquid molecules to bond together. When water is dropped onto the waxed paper and the penny, the water molecules bond together, which prevent them from spilling.

KALEIDOSCOPE

Materials

★ *black construction paper*
★ *crayons*
★ *tape*
★ *clear acetate paper / report sheet cover*
★ *markers*
★ *3x5 index cards*
★ *thumbtacks*
★ *paper clips*
★ *scissors*

Procedure

1. Roll the black construction paper into a cylinder form (not side to side, but top to bottom so finished length is 8 1/ 2 inches) and tape on the sides to hold together.

2. Design any pattern on the index card, being sure to use lots of bright colors. Be sure to color the entire white index card. Do not use black or brown markers. Use a thumbtack and place a small hole in the center of the colored index card. Unfold a paper clip leaving one end with a curve, the other straightened. Slide the straightened end of the paper clip into the hole in the index card so that the card can spin freely.

3. Slide the paper clip (again the straightened end) into one end of the construction paper tube (place the clip in between the layers of rolled up paper and move the paper clip around clockwise until it is secure.) Look inside the scope as you spin the index card around. What do you see?

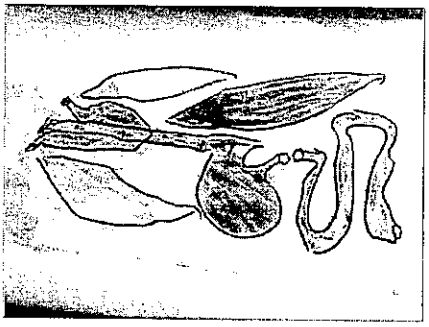
4. Now roll up clear acetate paper (just enough to fit inside the tube without being doubled) and place it inside the tube. Look inside the scope again. What do you see now?

BODY ORGAN APRON

Materials

★ *permanent marker*
★ *crayons: red, blue, purple, green, brown*
★ *book on anatomy (Usborne's "Human Body" is an excellent reference)*
★ *aprons or bibs: you can make these out of old shower curtains, cloth, plastic, dental bibs.*

Procedure



1. Cut out the appropriate size of body apron for each student.
2. Using the book of reference as a guide, draw an outline of each of the 5 main body organs (with a permanent marker) onto the apron.
3. Locate the organs at approximately where they would be in your body.
4. Label each organ and discuss it's function with your students.
5. Allow students to use crayons to color each organ: red for heart, blue for lungs, purple for liver, green for stomach, and brown for the intestines.

Explanation

This activity introduces students to the fundamentals of anatomy. Students will be able to locate their organs when their aprons or bibs are on. Play a game ... find that organ.

ROCK COLLECTING & TESTING

Materials

★ *assorted rocks*
★ *penny*
★ *magnifying glass*
★ *paper towel*
★ *scale*
★ *water*
★ *cup*

Procedure

1. Go on an outdoor adventure and collect a variety of rocks.
2. Wash them in a cup of warm water.
3. Dry them using a paper towel.
4. Examine each rock for their shape, color, size and texture.

Examine each rock using the following tests:

1. Hardness: Scratch the rocks using your fingernail, a copper penny and another rock. Did parts of the rock crumble? Soft rocks will crumble.
2. Size and Weight: Compare the size of the rock to the weight of the rock. Use a scale or use your hands. Does the rock seem to be too heavy for its size?
3. Color: What color is the rock? Is it only one color or has many colors?
4. Texture: How does the rock feel? Is it smooth, grainy, or sandy? Use your magnifying glass to observe.

More to do

Display your rock collection.

TERRARIUM WORLD

Materials

★ *2-lb. clear plastic container w/lid*
★ *charcoal for plants*
★ *pebbles*
★ *potting soil*
★ *plants (philodendron)*
★ *fresh green moss (out doors)*
★ *water*
★ *small pine cone*

Procedure

1. Place a small amount of pebbles (1 / 4 cup) and charcoal (1 / 8 cup) together on the bottom of the container, followed by 1 cup of potting soil.
2. Carefully insert your plants into the soil.
3. Give the plants about 1/3 cup water and cover with moss.
4. Place the lid on securely.
5. After a short time you will begin to notice mist and water droplets on the lid.
6. Do not remove the lid or add any more water.

Explanation

In an enclosed terrarium, the environment inside becomes a moist micro-climate ideal for humidity loving plants. Plants grown under glass tend themselves. When their leaves give off water vapor, it condenses inside the container and runs back down to moisten the roots of the plant. While the plants use the carbon dioxide in making food, they simultaneously release oxygen, which they then use to convert food into energy in a process that replenishes the carbon dioxide. AVOID FULL SUN.

CAPILLARY STAR

Materials

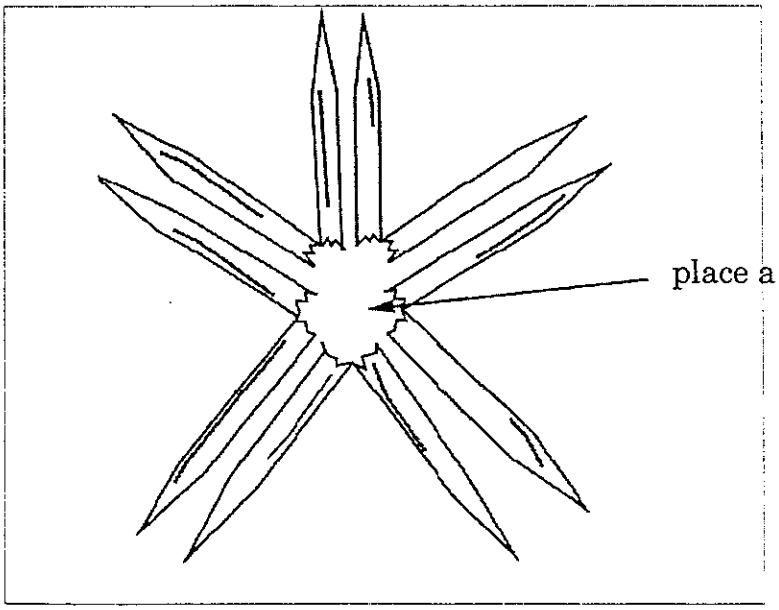
★ *5 flat toothpicks (Foster's®)*
★ *cup of water*

Procedure

1. Take 4 or 5 toothpicks and bend them in half until they partially break, leaving them in a V-shape.
2. Place the 5 V-shaped toothpicks on a smooth surface with their broken points as close together as possible (see diagram.)
3. Dip your index finger in the water and allow one drop to fill in the center of the toothpick star. Watch what happens!

Explanation

Trees are made of wood. Wood has capillaries (small holes) inside to carry water from the roots and throughout the tree. Water moves slowly through the capillaries to needed parts of trees and plants.



Science Center

Science Centers should allow students an opportunity for interactive play and discoveries. Displaying interesting materials encourages children to explore the science process skills, observing, predicting, describing, communicating, comparing, measuring and classifying.

Your Center should incorporated other curriculum areas. (ex: ***Music***: Discovering different sound, pitch and frequency through musical instruments. ***Social Studies***: Investigating the different sound of animals, people, objects and technology in our daily lives. ***Science***: Explore how sound travel through different medium.) The science center should display interesting objects that make percuiclar sounds, pictures of things that make sound, and several musical instruments.

When setting up a Science Center you need:

1. A ***Display area*** for science items. Tables are ideal for objects that are supply by the teacher, students, parents and local businesses. Interactive materials should be placed on this table so the students can explore.

2. ***Storage area***: Small bookcase or shelves so the students have access to the materials. Storing items in clear shoe boxes with labels are helpful to locate. Group items that are alike (magnets, magnifying glasses, rocks, thermometers, etc..). Be sure the children place the items back in the proper container.

3. ***Window***: Windows are useful for experimenting with plants, prism, color paper and animals.

Students should be responsible for keeping the science area clean, caring for the animals and science materials.

Teachers are responsible for keeping the science center interesting by changing the items and displaying it with new materials relating to the curriculum. Keeping the science center interesting will encourage the students to probe and ask questions as they interact with the materials this will lead them to find the answers to their questions.

Materials in the Science Center:

First see what items you already have that are recyclable. (ex: trays, cups, bottles, magnifying glasses, and posters). Make a list of all the items needed for the classroom science center for the entire school year. Make copies and post the list in the science center. Give one to each parent asking kindly for any donation. Tap into other resources local businesses, doctors' offices and local supermarkets. One way that really works when asking for free items...walk into the source with a smile on your face ask for the manager. While shaking the managers hand introduce yourself as Ms.so and so from the ABC school in the community. Tell her you are conducting a science project and would like to know if she would be "KIND ENOUGH" to donate what ever it is you need. Now

the key word here is "kind enough" this is putting the pressure on in a nice way. If she says NO thank her anyway for her "KINDNESS" in considering the offer. Shake her hand and leave her your business card. You would be surprise how often they do call. Also, ask if you can have the items at a discount price and let her know that you will give the store credit in your school news letter. Please, please, please have the students send thank you notes this will help to establish a good relationship. Keep your needs low and asking periods far an in between.

Resources:

Framing shops for old damaged colorful heavy card stock.
Camera shops for canisters and disposable camera.
Butchers for foam trays and diaper cloth.
Doctor office for lots of goodies.
Dentist for bibs and teeth.
Print shops for boxes of precut paper in all sizes.
Hardware stores for broken bags of grass seeds and rocks.
There is no telling who has what and are throwing it away or would love to donate it to a local school. ASK...ASK...ASK...Don't be afraid!

List of materials needed:

Magnets	Magnifying glasses	Posters	Measuring cups
Scales	Canisters	Spoons	Food coloring
Bags	Coffee filters	Sponges	Egg carton
Trays	Batteries	Funnels	Buckets
Baking Soda	Bones	Seeds	Compass
Fur	Hourglass	Aquarium	Old Magazines
Calendar	Soil	Craft sticks	Prism
String	Rocks	Pulleys	Texture assortment
Stethoscope	Tree barks	Sea shells	Books
Pipettes	Forceps	Beakers	Plastic cups
Petri dish	Sorting trays	Mobile	Plastic bottles