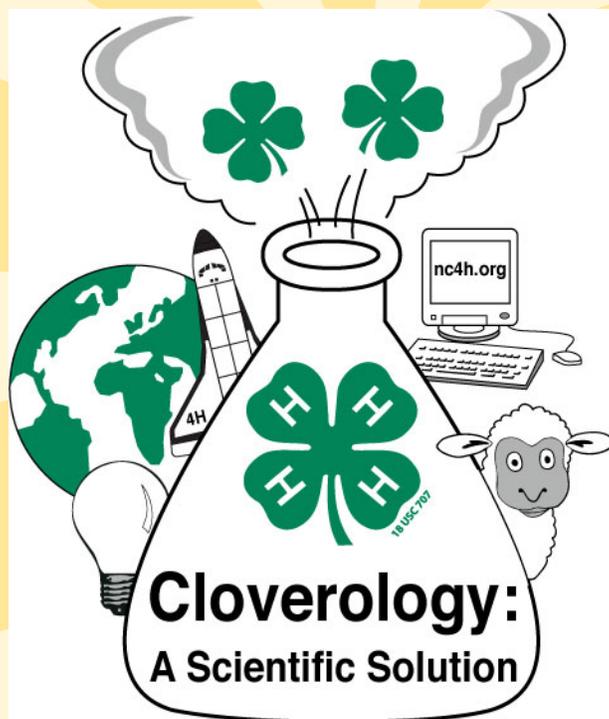


Science, Engineering & Technology Family Back Pack # 9



4-H After School Program
University of California Cooperative Extension

Hydrometer



Educational Question: Can you float a straw better in salt water or fresh water?

Supplies

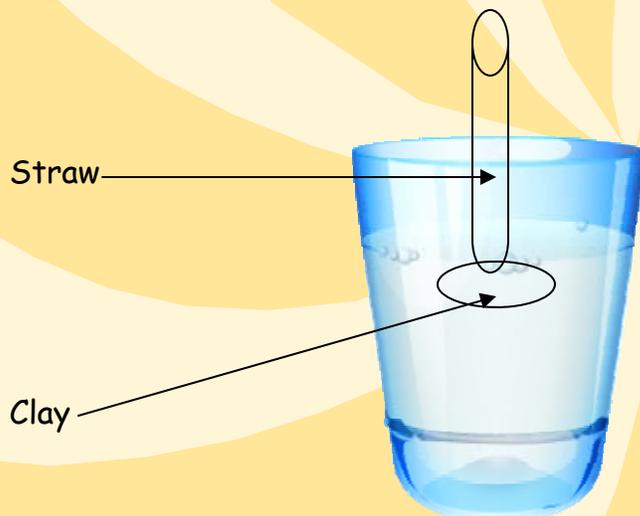
- Two identical, tall clear glasses of water
- 1/2 cup of salt
- A spoon
- A plastic straw
- Scissors
- Plasticize clay (the kind that doesn't dry out)
- Thread

Directions:

1. Set the two glasses of water on a table and add the salt to one of them. Stir the salt water, then let it stand while you make your hydrometer.
2. Cut the straw so it's just a little shorter than the glasses you are using. Roll a chunk of Plasticize into a small ball about the size of a marble and stick it securely on the end of your straw.
3. Now try to float the straw, clay end down. (note: you may have to add or remove some clay to get it to balance). Be sure that the connection between the clay and the straw is tight or the straw will fill with water.
4. When the straw floats well, take it out of the water and tie a piece of thread around its middle.
5. Float it in the water again and slide the thread up or down the straw

Hydrometer Continued

6. Now float your hydrometer in the glass of salt water. Where is the thread? Does your hydrometer float higher, in the fresh water or the salt water?
7. Your hydrometer measures the density of liquids. The more dense a liquid is, the higher your hydrometer will float. Which liquid was more dense?
8. Try other liquids with your hydrometer such as fruit juice, milk, oil or vinegar.



Kaleidoscope Fun



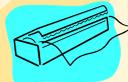
The Kaleidoscope has been in the United States for many years. It has been a popular toy among children of all ages. Most Kaleidoscopes are round and in a tube form with a peephole in one end. When you look through the peephole and rotate the tube you see an ever-changing variety of colored patterns.

Educational note: If you have ever looked into a Kaleidoscope and wondered what makes these incredible designs it is all based on the use of mirrors and their reflections:

Here is a small Kaleidoscope you can make with your family. It takes about an hour to put together. Children will need some assistance from an adult.

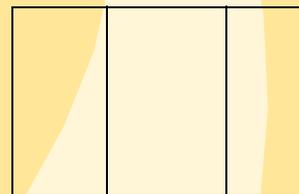
Supplies needed:

- A clean quart-size milk carton
- Scissors
- Mirrored contact paper which can be bought in a roll at the hardware store.
- Masking tape
- Plastic wrap
- Two rubber bands
- Little pieces of ribbons in different colors
- Wax paper or tracing paper.



Directions:

1. Cut apart the milk carton so that they have three connected sides

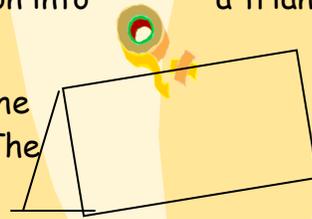


Kaleidoscope Fun

2. Using the three-sided milk carton as a pattern, cut out a piece of the mirrored contact paper and stick it to the milk carton. One side of your milk carton should be shiny now.

3. Fold your milk carton into a triangular tube shape, with the shiny part on the inside.

4. Now look through the tube and see how a reflections from the mirrors make symmetrical patterns out of everything you look at through the tube.



5. Stretch a piece of plastic wrap over one end of your tube and fasten it in place with a rubber band.

Rubber band



Plastic wrap

6. Cut the ribbons into tiny pieces.

7. Put the little ribbons pieces on top of the plastic-wrap end of your tube. Carefully place a piece of wax paper or tracing paper over the same end, and fasten it with a the second rubber band. The pieces of ribbon are now sandwiched between the plastic wrap and the wax paper.

8. Look through the open end of our tube. Shake your tube to move the pieces of ribbon and change the pattern you see. Each time you shake the tube, the pieces of ribbon will move and form a different pattern.

Question

Do you ever see the same pattern twice?



Bubble Fun

Educational Note: Look for each bubble's unique beauty

Supplies needed:

- Baby food jars
- Liquid dishwashing Soap
- Water, measuring cup
- Food Coloring

Directions:

1. Fill baby food jars 3/4 full of water
2. Add 1 1/2 teaspoon dishwashing liquid
3. Add 1 1/2teaspoon food coloring
4. Mix gently
5. Find different items to use as bubble blowers such as cookie cutters, glasses etc, Study all of the shapes and sizes
6. Suggestions: Dip bubble blowers in solution and blow over construction paper. As bubbles break and hit the dry paper they will form a splatter design.



Other Bubbles

Supplies Needed:

- Plastic Milk Gallon container
- warm water
- Clear dishwashing detergent
- Glycerin (purchase at a Pharmacy)

Directions

1. Pour 2/3 cup dishwashing liquid into milk jug.
2. Fill the jug nearly to the top with warm water.
3. Add 2 tablespoons glycerin to mixture. You may need more
4. Replace cap and shake gently. Let solution sit for a while.
5. Pour into open container and see what item you can use to make unseal bubbles. (Cookie cutters, straws, hoops and son on). Recipe provide by Y.E.S Curriculum.

Shadow Fun

Educational Note: Have you ever had your shadow follow you? Or have you ever followed your shadow? Shadows are like rainbows, you need certain conditions to make them appear. On cloudy days you don't see shadows, but they magically appear on a clear day. If you stand with your back to the sun, you are sure to see your shadow. Light cannot go through your body or go around it. When you block the sunlight, it makes a shadow. Other things around you make shadows. See if you can find them. Below are some activities you can do to learn more about shadows.

Time in the Sun with your Shadow

Supplies Needed:

- A piece of chalk
- A sunny day

Directions:

1. Early in the morning on a sunny day, go out on the sidewalk or driveway and look for the shadow of something large and stationary, like a tree or the edge of a building. Trace the shadow on the pavement with chalk.
2. Trace it again after half an hour, and again an hour later. Did the shadow move?
3. Check in on the shadow just before sundown. Is it where you thought it would be?

Suggestions

Your shadow is sometimes bigger than you are, sometimes it is smaller. When the sun is low in the sky, your shadow is long and tall. When the sun is overhead at noon, your shadow is short and wide. Noticing how your shadow changes as the day goes by can help you estimate the time. You can keep a shadow record of something that doesn't move around.



Shadow Fun

Educational Note: A silhouette is a shadow portrait, of person cutout of someone's shadow profile. The word come from the French Minister of Finance, Etienne de Silhouette (1709-1767) who made shadow portraits as a hobby. Before photography was invented, people went to studios who drew silhouette. It took less time then sitting for a painter.

Supplies Needed:

- A friend or family member
 - A chair
 - A lamp with its shade removed
 - Tape or thumb tacks
 - One large sheet of white paper
 - A pencil
 - A black marker or black crayon
 - Pencil
- Scissors
Black paper (optional)



Directions:

1. Place a chair close to a blank wall. Leave enough room between the wall and the chair for you to pass between them
2. Turn the chair sideways, so that when your friend or family member sits in it his or her cheek is facing the wall.
3. Place the lamp about eight feet away from the wall and at about the same height as your friend's or family member's head. Darken the room as much as possible by closing the door and drawing the shades, curtain or blinds.
4. Move the lamp closer or farther away from your friend's or family's members head until the shadow on the wall is sharp and clear. Can you focus the shadow so the outline of the person is clear?
5. Once you have a sharp shadow profile, tack or tape the paper onto the wall so that the shadow falls on it.
6. Carefully trace the shadow outline onto the paper with sharp pencil.

Shadow Fun

7. Getting your friend or family member to sit perfectly still will be the hardest part. It might help to give your friend something interesting to look at or some music to listen to.
8. When you finish drawing your shadow portrait, its outline can be colored in with black crayon or marker.
9. You can also cut out the drawing with scissors and mount it on a sheet of dark-colored paper.
10. You can also cut out the silhouette on black paper and cut out and mount on white paper.



Terrific Terrarium

Educational Note: *The study of plants is part of Earth Science.*

Supplies needed.

Plastic wrap or clear acetate

$\frac{1}{2}$ gallon milk carton

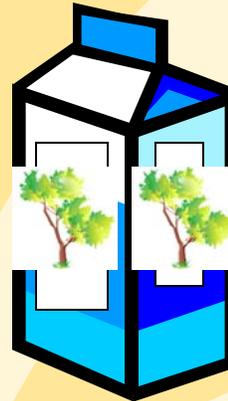
Scissors

Tape

Soil and pebbles

Long-handled spoon

Plant



1. Directions:

Wash out the milk carton with soap and water and let it dry.

2. Cut out rectangular windows from all four sides of the carton and make 4 even windows. Be sure to leave some of the milk carton surface on each side for support.

3. Cut four pieces of plastic wrap or acetate to fit over each window. Tape the plastic wrap in place.

4. Place a layer of pebbles in the bottom of the carton.

5. Pour a thick layer of soil over the pebbles.

6. Make a hole in the soil with the spoon. Put the plant in the hole and pat the dirt around the plant firmly with a spoon. Be sure to cover the roots.

7. Close the top of the carton and tape it securely. (Moisten the soil slightly).

8. Watch your plant grow through the clear windows. If too much moisture forms, untape the top of the carton to let air in. If your terrarium is successful, try making another one for a friend.