

PROJECT IDEAS

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- Look in *FOSS Science Stories* or books in the library for ideas about projects you might like to present to the class.
- Find out if each mixture makes a solution with water: flour, baking soda, alum, cooking oil, rubbing alcohol, or any other material you'd like to test.
- Research diatomaceous earth. Where does it come from? How is it used?
- Research sodium chloride. How does salt get to the table? Why are some people on low-salt diets?
- Find citric acid. It's in many of the foods we eat. Read product labels and list products that contain citric acid.
- Research citric acid. What citrus fruits is it found in? How is it important in our diets?
- What effect does temperature have on saturation? Try experimenting with different temperatures of water—hot, iced, and so forth.
- Try dissolving a second material in a saturated salt solution. Will it dissolve? Will a third material?
- Investigate baking powder. What are the ingredients in baking powder? How does it react in water? How are baking powder and baking soda the same and how are they different?
- Investigate drinks. Many liquid products (for example, soft drinks) are complex solutions made of several materials dissolved in water. The order in which the ingredients appear on the label corresponds to their relative amount in the product. The substance listed first is the most concentrated, the second the next concentrated, and so forth. Bring the product to class and report on its contents in terms of concentration.
- Investigate limiting chemicals. Is the baking soda all used up in the reaction between calcium chloride and baking soda? Design an experiment to find out.
- Design a new filtering system for separating mixtures.
- Mix up a new mixture or solution and take it apart.
- Design a crystal mobile. Use the crystal formula in the home/school connection or research a new one using table salt, rock salt, sugar, Epsom salts, or borax.
- How do they get the fizz in soda? (See the resource *Soda Science: Designing and Testing Soft Drinks*.)
- Investigate rock candy. How is it made?
- Design an experiment that results in a new precipitate.

NOTE: You may collect and analyze information for your project using sound recorders, computer research, and cameras.

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 1: SEPARATING MIXTURES

Andy had a box of animal crackers. He counted them out and found 20 cookies:

- 7 elephants
- 6 tigers
- 5 monkeys
- 2 zebras

If Andy put all the animal crackers back into the box and took one out without looking, what is the probability of his choosing

- a. an elephant? _____
- b. a tiger? _____
- c. a monkey? _____
- d. a zebra? _____

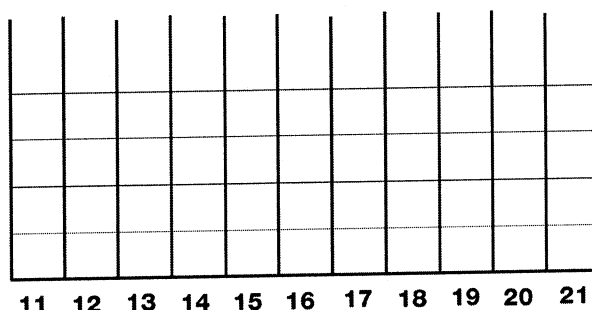
Does the sum of the probabilities a , b , c , and d equal 1?

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 2: REACHING SATURATION

A science class was doing an experiment to determine how much salt it takes to saturate 50 ml of water. Here are the groups' results.

Group 1 — 14 g
 Group 2 — 16 g
 Group 3 — 15 g
 Group 4 — 14 g
 Group 5 — 15 g
 Group 6 — 12 g
 Group 7 — 14 g
 Group 8 — 20 g



Can you make a histogram of the class results?

Review the data and the histogram to determine these numbers.

Mean _____

Median _____

Mode _____

Range _____

DEFINITIONS

Mean is the total divided by the number of groups. Mean is the same as average.

Median is the number that is in the exact middle when the numbers are arranged from smallest to largest.

Mode is the number that occurs most often.

Range is the largest number minus the smallest number.

Date _____

INVESTIGATION 3: CONCENTRATION

Flavor	Cherry	Grape	Orange	Berry
Room 14				
Boys	4	3	2	8
Girls	7	2	1	3
Room 15				
Boys	3	2	2	7
Girls	6	3	0	5
Room 16				
Boys	6	3	0	7
Girls	6	2	2	5

[illegible]

Cherry _____% Grape _____% Orange _____% Berry _____%

MATH EXTENSION—PROBLEM OF THE WEEK**INVESTIGATION 4: FIZZ QUIZ**

Rachel was interested in the reactions that produce carbon-dioxide gas. She wondered if there was some way to predict how much gas a reaction would produce. She did the series of seven experiments recorded below and measured the amount of carbon dioxide released by each one.

Baking soda	Calcium chloride	Carbon dioxide
1 spoon	1 spoon	800 ml
1 spoon	2 spoons	1600 ml
1 spoon	3 spoons	1600 ml
2 spoons	1 spoon	800 ml
2 spoons	2 spoons	1600 ml
2 spoons	3 spoons	2400 ml
3 spoons	1 spoon	800 ml

Based on Rachel's experimental results, answer the questions.

1. How many milliliters of gas would be produced if 3 spoons of baking soda reacted with 3 spoons of calcium chloride?
2. How many milliliters of gas would be produced if 2 spoons of baking soda reacted with 1.5 spoons of calcium chloride?
3. Rachel wanted to produce exactly 2000 ml of carbon dioxide. How much baking soda and calcium chloride should she use?

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 1: SEPARATING MIXTURES

Materials

Make a mixture known as oobleck. You will need

- 1 Mixing bowl
- 1 Spoon
- 1 Measuring cup
- Cornstarch
- Water

1. Put about a cup of cornstarch in the mixing bowl.
2. *Slowly* add water to make a mixture, stirring as you go.
3. When the starch is all wet, it will turn into oobleck.

Explore the properties of oobleck.

- Is it a solid or a liquid?
- What happens when you place solids, like coins or spoons, on the surface?
- What happens when you try to push your hand gently into the oobleck? When you try to push your hand hard and fast into the oobleck?
- Pick up a handful of oobleck. Can you hold it?
- Can you cut a ribbon of oobleck with scissors?
- What happens to the properties of oobleck when you change the amounts of the two ingredients in the mixture? More water? More cornstarch?

NOTE: If you want to keep oobleck to work with it another day, store it in a covered container in the refrigerator.

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

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 2: REACHING SATURATION

Did you know you can make your own silly putty right at home? Here's what you will need.

Materials

- 20 ml White household glue (Colored glue won't work.)
- 5 ml Saturated borax solution (See Step 1.)
- Water
- 1 Plastic bag
- Food coloring
- 2 Plastic cups or small jars (Baby-food jars work great.)

PROCEDURE FOR SILLY PUTTY

1. In a plastic cup mix 15 ml (1 tablespoon) of borax with enough water to dissolve it (about 40-50 ml). This will make a saturated solution.
2. In a separate plastic cup mix 20 ml (4 teaspoons) of white glue with 5 ml (1 teaspoon) of water and a few drops of food coloring.
3. Add 5 ml of the saturated borax solution to the cup of glue.
4. Mix the mixture for a few minutes and watch what happens.
5. Now test your silly putty for stretching, bouncing, newsprint transfers, and so forth. How long will it stretch? How high will it bounce? Record your observations and bring them to class.
6. Place the putty in a plastic bag to preserve it.

HOME/SCHOOL CONNECTION

INVESTIGATION 3: CONCENTRATION

You can grow some crystals in your home laboratory. Choose one of the approaches described below. Use safe laboratory procedures when working with chemicals.

ALUM OR EPSOM SALTS CRYSTALS

1. Evaporate an alum solution and save the crystals (see Step 3).
2. Prepare a supersaturated alum solution by dissolving alum in very hot water (close to boiling) until no more will dissolve. Cool the solution. Pour it into a jar.
3. Tie one alum crystal to the end of a thread. This is the seed crystal.
4. Hang the seed crystal in the jar of supersaturated alum solution and wait several days for the crystal to grow.
5. Remove the crystal, make another supersaturated alum solution, cool it, pour it into the jar, and put the crystal into the solution. Repeat this process for bigger and bigger crystals.

BLUING CRYSTALS

Materials

- | | |
|---------------|-----------------------------|
| 1/4 cup | Water |
| 2 tablespoons | Bluing |
| 2 tablespoons | Salt |
| 2 tablespoons | Ammonia (without detergent) |

- 1 Plastic cup or jar
- Food coloring
- 1 Small lump of clay (if you use pipe cleaners)
- Pipe cleaners, charcoal, sponges, or a paper-towel tube

1. Make a solution with the water, liquid bluing, salt, and ammonia.
2. Place a lump of clay on the bottom of the clear plastic cup or jar. Push three or four pipe cleaners into the clay. Put drops of food coloring on the tips of the pipe cleaners.
3. Pour the solution into the cup so that it covers the clay and all but 1 cm of the pipe cleaners.
4. Set the cup where it will not be bumped or disturbed. Crystals will start to form in a few hours.

NOTE: The solution may be poured over broken charcoal, sponges, or sections of cardboard paper-towel tubes instead of clay and pipe cleaners. Whichever material you use, part of it must extend above the surface of the liquid.

OBSERVATIONS

Draw and write about the crystals.