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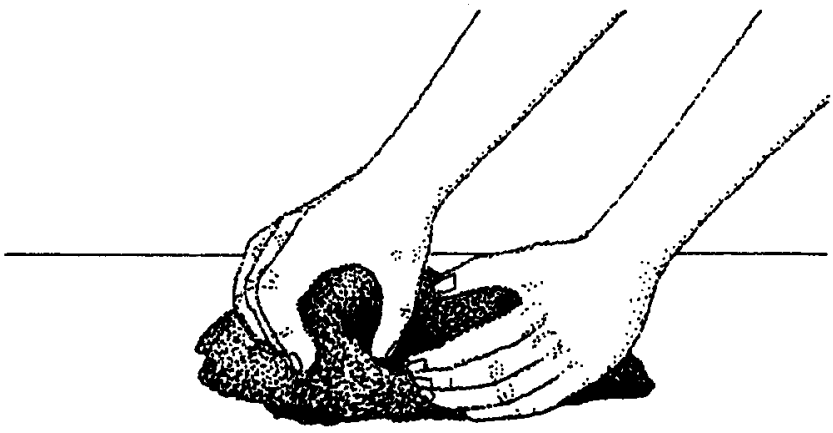
Introduction

Hands-on Science has been designed to assist the teacher in sharing with children the truly enjoyable nature of science. The hands-on activities offer students a chance to explore, test and explain natural phenomena. Students are carefully guided through a series of experiments. The worksheets that accompany teacher directions for each activity frequently direct students to make and test predictions. Often the results of the experiments will surprise and delight children. It is the authors' hope that, through these activities and experiments, students will become intrigued by the mysteries of our natural world.

Incorporating more hands-on activities in lessons may seem daunting to science teachers who already feel overwhelmed by the amount of material they are expected to cover. This book makes planning lessons based on hands-on activities easier. Most of the activities are short and can easily be completed in less than one class period. Almost all of the supplies that are called for are inexpensive and readily available in a supermarket or chemist.

Organised around five important process skills, this book can be used by teachers to develop a particular process skill (e.g. Making Models) or to pinpoint a particular subject (e.g. Clay Boats). Although we have included activities that are simple to perform, understanding them fully will push your students to grasp what is happening on a molecular level.



Controlling Variables *Dancing Raisins*

Concepts

- Carbon dioxide from a carbonated liquid will attach to a solid.
- The buoyancy of substances in carbonated liquids may be changed by the attachment of carbon dioxide bubbles.
- Carbon dioxide bubbles burst upon contact with air.

Objectives

- To develop an understanding of how to control variables
- To develop skills of hypothesising, interpreting data and graphing
- To introduce students to the concept of density

Materials

- plastic cups, raisins, large bottle of lemonade

Vocabulary

- carbon dioxide, variables, controlled experiment, dependent variable, independent variable, density

Background information

The raisins are slightly denser than the lemonade and sink to the bottom of the container. When enough carbon dioxide bubbles attach to the raisins they will rise to the surface. Once on the surface, the carbon dioxide bubbles break on the top side of the raisin, causing the raisin to rotate and sink back to the bottom.

This experiment has been designed to give students practice with both controlling variables and testing ideas. Middle years students often do not think of experimentation as a method of testing ideas. It is very important that students be encouraged to generate and test their own ideas. Emphasise the importance of holding everything constant except for the variable chosen to test.

To assist students in interpreting the data obtained from their experiment, have each student or group of students prepare a large bar graph of their results, which they then share in a report to the class. Classmates should ask the presenters/student researchers questions, much as scientists would at a convention. Questioners will want to determine if the students were measuring what they were purporting to measure.

It is also important for students to develop ownership of their experiment. Try brainstorming a list of variables, for example. so students find their own, unique ways to control and/or change the outcome.

Allowing each student or small group of students to select the variable they want to investigate will help establish student ownership of their experiment.

Teaching Suggestions

Have students conduct their experiments in groups of two or three. During the brainstorming session, record all of the students' suggestions and encourage many different ideas.

Take care that the lemonade and raisins are fresh. Dehydrated raisins and lemonade that has lost carbonation will not work. Cold lemonade usually works the best. You may want to provide the students with thermometers and encourage them to try different temperatures. The important point here is that students learn to control the variables in their experiment.

The students may not realise that not all raisins from a given package are of the same density and that they need to match the raisins in both the control and experimental containers. Experimental error may be high, and the students may need to repeat their experiment several times. Talk about experimental error with students before and after they conduct their experiments.

Notes

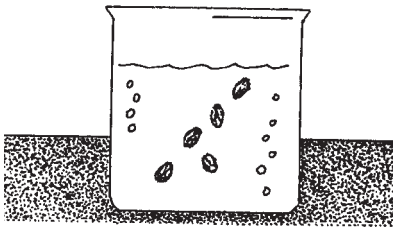
Student Worksheet

Dancing Raisins

Name _____

Investigating

Fill a plastic cup or glass beaker about $^3/_4$ full with lemonade. To this liquid, add 4–5 raisins.



What is happening to the raisins? _____

Note what the raisins do when they reach the surface. What do you think causes this?

_____

Experimenting

Now design and conduct an experiment to make these raisins 'dance' faster. Here is a list of possible experimental changes that may make the raisins dance faster:

- change temperature of the lemonade
- change the type of liquid (e.g. tonic water)
- cover the container
- add baking soda

Pick *just one* of these variables and conduct a controlled experiment to see what happens. Remember the only thing different should be the one variable you have chosen to experiment with. Place the control and experimental containers side by side.

The variable I have chosen to investigate is _____

The only thing different between the control and the experimental is_____

_____

Record the number of times the raisins dance in each container during a 5-minute period and record your results here:

Experimental _____
Control _____

Reporting Results

Make a bar graph on another sheet of paper to represent your data. Then share your findings with the class. What have you concluded?

_____

_____

