

Breakwater School
K-5 Science Curriculum Overview
April 23, 2006

Science at Breakwater is about exploring, observing, experimenting and problem solving. Process skills like observing, measuring, interpreting data, inferring, and graphing are important skills for children to develop in their elementary years. Our activity-oriented approach to science is meaningful to students, as it shows them that science is what scientists do - not just an encyclopedic collection of facts.

The Breakwater science curriculum makes use of two programs developed by the National Science Foundation: "Elementary Science Study" (ESS) and "Science, A Process Approach" (SAPA). A number of other curriculum units developed by our science teacher integrate science with other subject areas, and are taught in collaboration with classroom teachers. Some related topics are incorporated into the daily classroom curriculum, while some are covered mostly in science class.

We also offer a series of "Science Challenges" over the course of each year for students to work on at home. These are always optional for younger students, and sometimes required for older students. Students who have completed a Science Challenge have a chance to demonstrate their creations to the school community, and students who complete all Challenges in a year are invited to join a field trip to the Boston Museum of Science.

Children are natural scientists. By providing them with appropriate hands-on materials, we can lead them to investigate and better understand the world around them, as described on each of the following pages.

Kindergarten

Kindergarten students have a science block once a week, and are invited to participate in three Science Challenges during the second half of the year. Kindergarten science topics usually cover:

- Animal Homes
- Plants and growing things
- The changing seasons
- All about arthropods
- Pond and streams and Bubbles

In addition to the regular science activities, science experiences directly related to the year's classroom themes are often developed. For instance, when the children were learning nursery rhymes, the Science teacher devised some "science challenge invention days" during which the students solved problems based on selected nursery rhymes, including:

- Designing a suit of armor for Humpty Dumpty
- A Rube Goldberg machine to help "Jack be nimble, Jack be quick, Jack glide over the lava pit". Jack had to use balls, tubes, ramps, bottles, balloons (and some chemical reactions to go with them), rolling hoops, pulleys, and a swing to get to safety.
- The other "Jack and Jill" did not have to go up the hill, after the class created a special rope, pulley and ramp apparatus to get the "water" from the well without going up the hill.

Each spring the Kindergartners also take part in the school-wide Earth Week festivities, celebrating the earth and its unique ecosystems.

First and Second Grades

First and Second graders visit the science room twice a week, and are encouraged to explore science at home by participating in all of our Science Challenges. By the end of Second Grade, students should understand the following about the nature of science:

- When conducting investigations in science, results may be different than expected. Results between classmates may differ too. It is learning from these differences that leads to new discoveries.
- Science tools such as thermometers, magnifiers, scales, rulers and balances are measuring devices that provide more specific information than students will get from simple observation. Both tools and simple observation are valuable to discovery.
- It can be fun, messy, and challenging... but everyone can do science.
- When engaged in science, working and sharing with a team can lead to results that may have been missed by solo exploration.

Topics that are studied during these two years include:

- Water and aquatic life
- Growing things
- Technology and invention
- Earthworm and soil study
- Structures
- Weights and measurement

In addition, science offerings are often created to complement the themes of study in the classroom that year.

Third, Fourth, and Fifth Grades

Third, Fourth, and Fifth graders visit the science room twice a week, and are encouraged to explore science at home by participating in all of our Science Challenges during the year. Fifth graders are required to complete at least two of the Science Challenges. The science curriculum in these grades includes study of:

- Chemistry
- Geology
- Weather
- Botany
- Technology & Motion
- Electricity
- The Human Body
- Natural History & Survival
- Pendulums

By the time they graduate, all Breakwater students are familiar with the following scientific concepts:

- Scientific investigations may take many different forms, including observation, use of the five senses, collecting specimens for analysis, and conducting experiments. Investigations can focus on physical, biological, and social questions.
- Scientific experimentation and observation require precise record-keeping and careful data collection.
- Scientific investigation often raises as many questions as it answers. Scientists are always looking for new data to support their hypotheses.
- Scientists are engaged in many different kinds of work, and there are scientists all around us.