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BASTEC Connection

Bay Area Science & Technology Education Collaboration

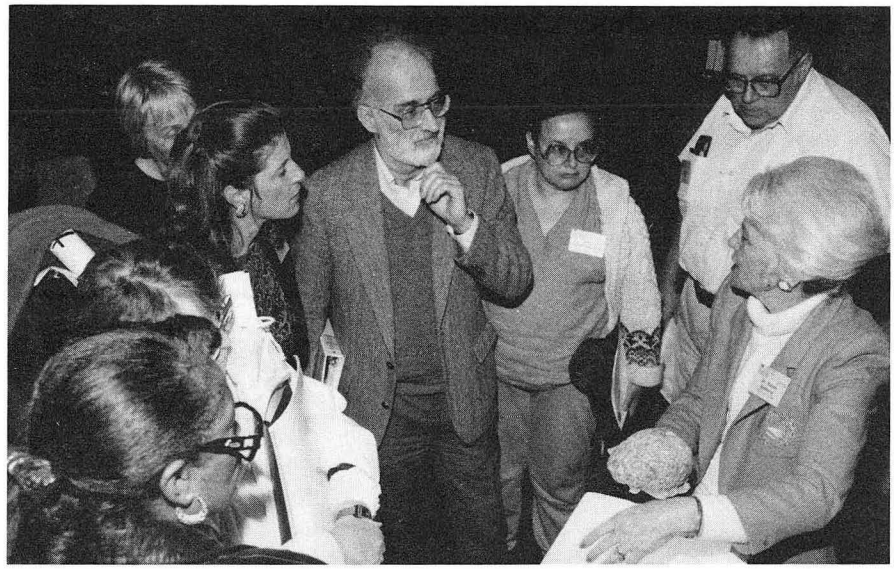
A publication for science, mathematics and technology teachers in the OUSD

Diamond Dazzles at BASTEC Mini-Conference

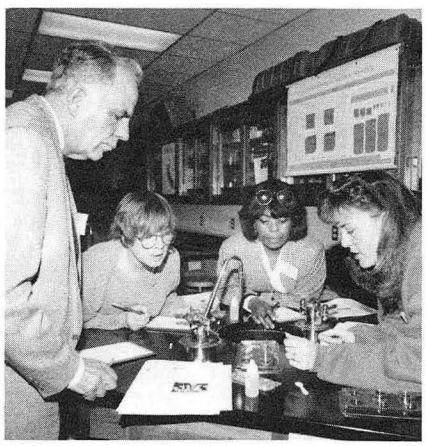
On January 31, over 450 teachers attended the day-long BASTEC Mathematics/Science/Technology Mini-conference at Oakland High School. Sixty workshops and sessions offered teachers a variety of choices including tessellating with crackers, predicting the range of distance traveled by popping popcorn, exploring the uses of HyperCard, and learning about the properties of water through a variety of hands-on experiments. The teachers also enjoyed the keynote presentation of Dr. Marian Diamond, a world-renowned brain researcher, professor of anatomy at U.C. Berkeley, and Director of the Lawrence Hall of Science. In discussing "The Brain and Its Potential," Dr. Diamond used an actual human brain to help illustrate the most recent developments in studies of the brain. Teachers responded to her presentation with an array of enthusiastic comments, such as, "The keynote speaker, Marian Diamond, was worth the whole day," and, "Dr. Diamond was excellent. It is nice to have a speaker who is dynamic, interesting, and relevant."

Exhibitors from various Bay Area science resources were present, including the Lindsay Museum, San Francisco Bay National Wildlife Refuge, East Bay Municipal Utility District, Marine Science Institute, Friends of the River, the Sierra Club Bookstore, National Organization of Black Chemists and Chemical Engineers, Computerland/Apple Computer and the African Scientific Institute.

In addition to the Oakland teachers, representatives from three other school districts attended the day-long session as observers. The Richmond and Pleasanton school districts have since held conferences of their own. ▲



Approached by members of the audience after her presentation, Marian Diamond discusses her exploration of the human brain in greater detail.



The variety of workshops at the BASTEC Mini-Conference provided new ideas to hundreds of teachers.

Curriculum Development Underway

Last September, OUSD superintendent Richard P. Mesa asked BASTEC to assist with the development of a science curriculum for the district in alignment with the new California State Science Framework. A Curriculum Development Subcommittee of BASTEC was formed. This committee is currently co-chaired by Dr. Helen Quinn (*see feature article on page 3*) of the Stanford Linear Accelerator Center, Dr. Mike Reynolds of Chabot Science Center, and Ms. Beth Napier of McClymonds High School.

The committee's first task was to reorganize the framework into grade-level clusters, K–3, 3–6, 6–9, and 9–12. At the 1992 Mathematics/Science/Technology Mini-Conference, teachers met in these grade clusters for an overview of the Science Framework and to sign up for curriculum development team meetings. Seventy teachers attended the first of four Saturday sessions to assist in breaking down the framework into a scope and sequence document. Five teachers and one teacher-leader for each grade level cluster will meet for two weeks in the summer to complete the document for the District and to preview materials. Parent volunteer-engineer Debbie Del Mazo will assist with the committee's work. For further information on how to become involved, call Dr. June Hopkirk at (510) 486-4146. ▲

Profiles

Hawthorne Elementary School

Fishing for Success

Cathy McKay uses trust (and trout!) in her personal approach to science education

By Maureen Nassiri

"Here's where the trout go," Cathy McKay, science prep teacher at Hawthorne Elementary School, beamed as she stood in front of a refrigerator.

I didn't know if she was talking about tonight's dinner or a fish specimen, but she really had my interest. The trout turned out to be eggs which need to be kept in a well-vented refrigerator. They hatch and become fry—baby fish—hopefully about 150 of them. Later they will be released into a local stream with great fanfare; last year the story made the *San Francisco Chronicle*. During their infancy, however, they will be looked after by some very protective little "scientists" who take their responsibility seriously.

Cathy McKay makes her science teaching very real. The children learn to call the room "the lab." Jars and tops are equipment, and are cared for with the proper respect. In the three years she has been at Hawthorne, Cathy McKay has been building science vocabulary, structuring games to increase concentration, and encouraging risk-taking. The children vote for the most likely outcome of the experiments and very often a lone vote is the correct one. Cathy uses every opportunity to support this kind of individuality. Ironically, she herself was one of the people who found science intimidating. One day while on a field trip she realized she was enjoying what she was doing and understood it. She decided to take the risk and minor in science.

Cathy makes use of everything she can get her hands on and encourages others to search the closets of their schools. "There's wonderful stuff packed away there," she says. She uses the BASTEC Resource Center and has received two BASTEC grants. She also attends the BASTEC mini-conferences and makes use of her membership in the National Science Teachers Association. She says although the cost is $35 per year, the bi-monthly newsletter is full of teaching ideas. She is also hopeful that the California Science Teachers Association meeting in San Jose October 2–4, will provide a lot of material for teachers. She herself overflows with one idea after another and would be happy to share her sources and experience with others.

One of Cathy McKay's most important goals is to do what she can now to keep her students in school longer. She recently took three girls to Lawrence Hall of Science for a day to encourage them to aim higher. "Most of us can remember one or two teachers who helped us make a major shift in direction," Cathy says. One of the girls now wants to be a doctor.

Being a science prep teacher enables her to have repeated contact with the students over the years. It is this personal relationship that she uses to provide a point of trust and encouragement, and she hopes this trust and encouragement will make a difference in their lives.

Cathy McKay can be reached at Hawthorne Elementary School at (510) 533-6960. ▲

A live owl helps Cathy McKay explain animal behavior to one of her curious students.

Principal Profile: Arlene Graham

By Maureen Nassiri

Walking into the principal's office at Hawthorne Elementary School is like stepping into a kaleidoscope. Principal Arlene Graham is a woman whose colors and dimensions move swiftly. One moment she is quietly describing why Hawthorne School is a place children can feel comfortable and learn, and next she is inviting others in to add their opinions. Two or three conversations start simultaneously and one is swept along in the excitement of teachers who love what they are doing. In the midst of all this Arlene Graham snags a lonely student and asks her how many more math problems she has to do. She strikes a bargain with her and sends her off home to do the negotiated twenty more. The child lights up and Arlene Graham returns to the whirl of simultaneous conversations.

You can tell immediately that she prefers this spontaneous approach to dealing with people. She has a tremendous amount of energy, and it appears that she is not alone. When I ask her what she looks for in teachers, she says, "You can see it almost immediately—a kind of unrestrainable enthusiasm, creativity, and energy." She adds with a laugh, "It can be quite a lot of fun leading a whole group of leaders!"

She has a committee to recommend teacher candidates and credits this with building strong consensus and cooperation. It is obvious that the teachers I met feel free to contribute. Arlene insists that everything that happens at Hawthorne must make sense and be arrived at through open exchange. What she does not mention is the obvious respect and concern that is in every sentence she says to a person. Nor does she acknowledge that the success of even the best team ultimately depends on the judgment and character of its leader.

The conversations quiet to a single discussion between Arlene and myself. She begins to talk thoughtfully about the ways she has eliminated burdensome policies. Her goal is to substitute alternatives that improve teaching without a lot of paperwork. She praises Hawthorne's Tribes program for building a sense of personal responsibility in each child. Arlene describes how BASTEC has supported the school science program through grants, enriches

continued next page

Optimism, Determination Fuel Helen Quinn's Journey

By Maureen Nassiri

People might think it's a pretty straightforward path to becoming a well-respected physicist...

Profiles
Stanford Linear Accelerator Center

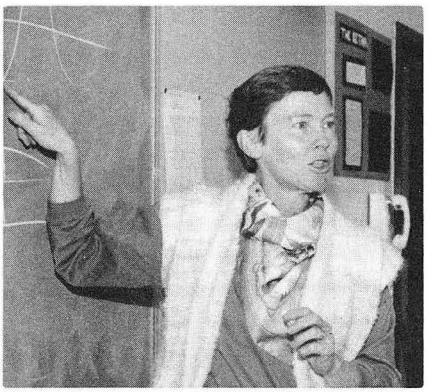
...an exceptional student is given excellent academic preparation and all obstacles move aside. In her crisp Australian accent Helen Quinn might say, "Oh really! How I wish it were that easy." She is one of the ten prominent woman scientists recently interviewed in *Discover* magazine and is co-chairperson of the BASTEC Curriculum Planning Committee.

Helen Quinn strikes a person immediately as a good sport with a firm sense of values and discipline. She credits much of that to her upbringing, in a home where she enjoyed rowdy, animated discussions over dinner with her father and three brothers—while her mother moderated. Her father, a self-taught design engineer, enjoyed his spunky daughter immensely. Helen learned how ideas can develop in such a lively exchange.

Once she was in college, Helen found her longtime interest in science growing, and majored in meteorology. At the beginning of her third year at Melbourne University, her father took a job in Belmont and she followed the family to California. She applied to Stanford University as a physics major. Even there, she found being a woman was something of an obstacle. She was told that most physics departments were reluctant to admit women into graduate school because it was assumed that they would marry and leave. They added indelicately that in her case they did not think that would happen, and she was accepted.

Helen did marry, and she and her new husband, also a physicist, both applied for post-doctoral work in Germany. Both were accepted, but when the formal letter of acceptance arrived it was addressed to her husband only. The salary allotted to him was a full American scale salary, and Helen was given less than a German scale salary (a misunderstanding she remedied once she arrived). To add to the problem, she was assigned to a scientist who gave her very little choice of study areas. She never worked comfortably with him and describes this first year as "frustrating and fruitless."

The stay in Germany completed, Helen's husband got a position at Tufts University in Massachusetts. She was confident she could easily find work in the Boston area, but this was not to be the case. Helen speaks more soberly about this time of her career. It was a period when she was extremely discouraged and disheartened. She decided to leave physics and pursue teaching. She took several courses toward her credential, but soon realized she missed physics immensely.



Despite its many detours and diversions, Helen Quinn's life has been kept on track by a love of science.

Having met Dr. Sheldon Glashow of Harvard University while in Germany, she approached him about the possibility of using a desk in the physics department there. This meant committing herself to getting a job in physics—hopefully at Harvard. It was a prospect that did not look promising at all. As things turned out, she went to Harvard just as her area of study was beginning to become popular again. By demonstrating her ability, she was able to get a job—through the "back door," as Helen refers to it. In the meantime, she and her husband had their first child and Helen spent many seminars sitting in the back of the room with the baby. In her office she worked with her little girl beside her in a bassinet.

Helen became an associate professor at Harvard and was granted a Sloane fellowship to do research. She had never seriously thought of doing research in her early college years. As she puts it, "I didn't think I was ambitious enough."

After completing his work at Tufts, Helen's husband decided to study decision analysis at Stanford. Helen was able to use her Sloane fellowship there for six months. At the end of the six months, however, she found herself interested in working with Stanford's linear accelerator and decided to stay, where she remains today as a senior scientist. Again, Helen had carved out an exceptional job through the "back door."

Helen Quinn's remarkable optimism has enabled her to make progress in her professional life and to remain sincerely committed to her family. Once, when her eleven year old son became seriously ill, Helen says it brought her research to zero for almost a year. Even then, Helen carried her confident, mature acceptance of difficulties, as she has along her entire path to achievement. Coupled with her appealing buoyancy, it makes her a truly exceptional person. ▲

Arlene Graham *cont'd*

teachers' professional development, and helps them gain recognition for their work. She says it has encouraged teachers to take the initiative, knowing they can rely on BASTEC's support. "And besides," she adds, "it makes the whole school feel important when the Department of Energy people come to see us."

All through our conversation she could not resist sharing the particularly good teaching ideas people have had. It seems that Arlene Graham is a devoted teacher who also has excellent administrative skills. Her love of teaching gives her an intuitive understanding of how to go about running a school. Coupled with her clear and consistent guidelines of behavior, this intuitive understanding yields very promising fruit.

According to Arlene Graham, "These Hawthorne children are the future leaders of our city and our country... and I tell them to go live up to that responsibility." ▲

Space Shuttle Coordinate Graph

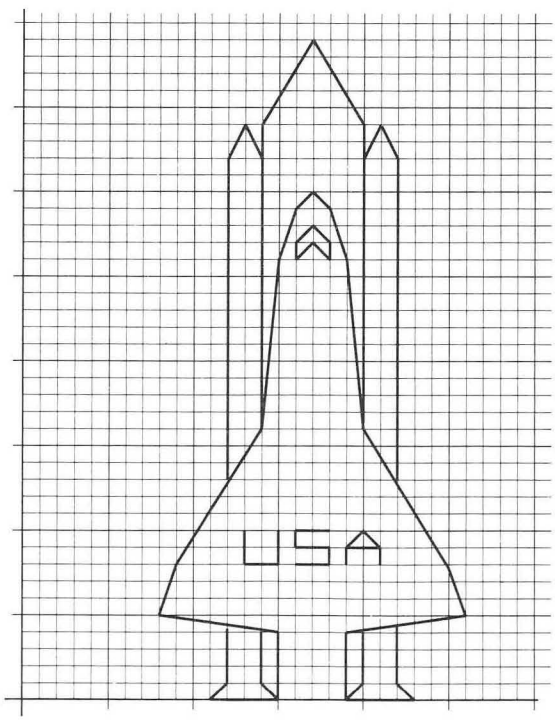
- This activity is meant as an application of coordinate graphing skills rather than as an introduction to these skills.
- An overhead of the graph can be made, and the first few points and lines done together as a class.
- A picture of what the completed graph should look like when finished is shown below.
- Students may find it easier to keep their place if they make a check after each ordered pair as it is plotted.

Procedure

- Define and discuss graphs at a level appropriate for your class. Discuss the key question: "how do you build a coordinate graph?"
- Students use the ordered pairs listed to plot the first two coordinate points. Students draw a line segment connecting the two points using a ruler. Students plot the third coordinate point and draw a line segment from the second point to the third point.
- Students continue this procedure until all the points have been plotted and connected.
- Students follow the same procedure for each part until all parts are completed.

Extensions

- Have students draw other pictures on the coordinate plane and make a list of the ordered pairs used for their coordinate points. Students can exchange lists and graph each other's pictures.
- Have students draw the space shuttle using a different scale.
- Have students keep a journal chronicling one of the space shuttle missions.



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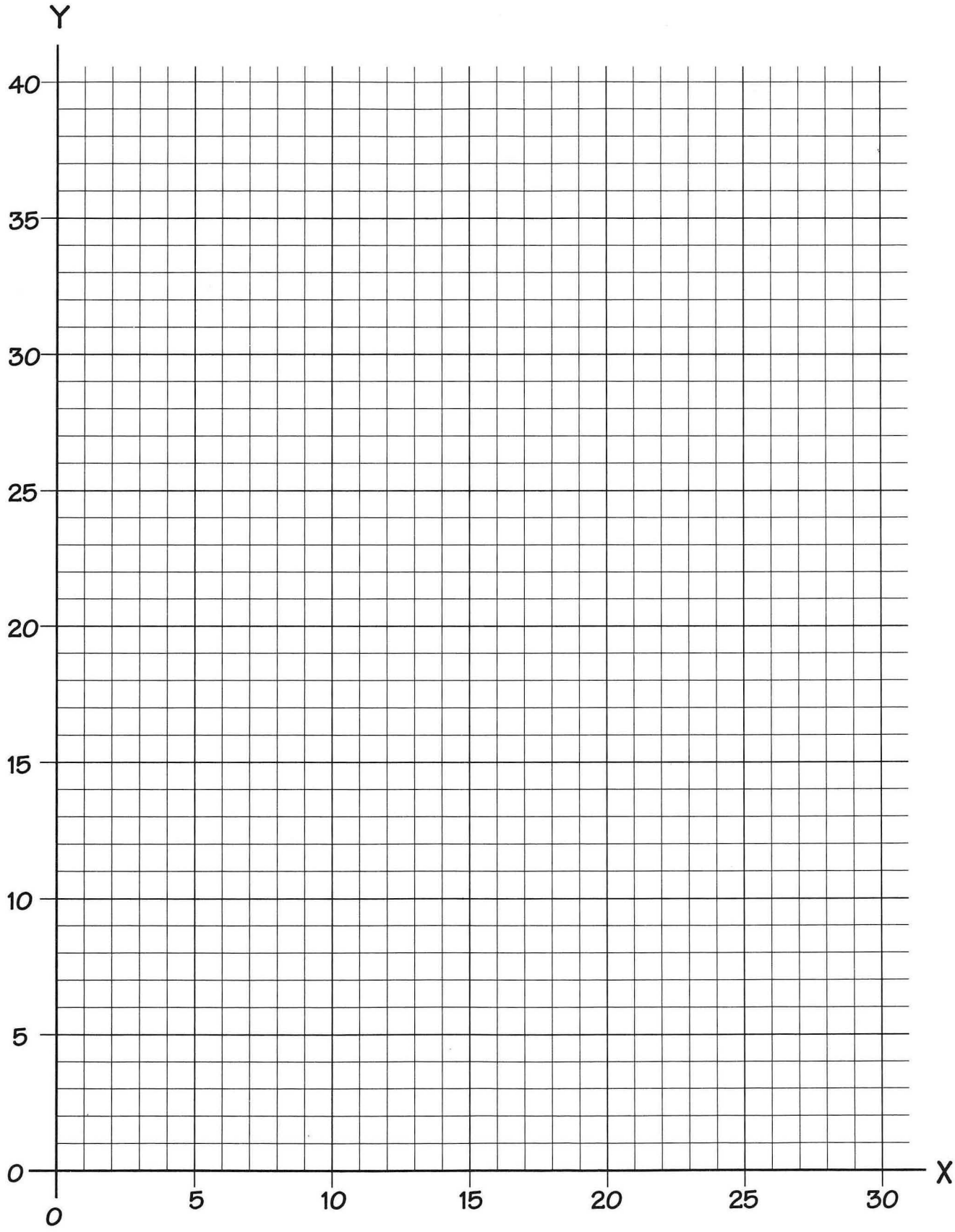
This activity is reprinted from the AIMS Newsletter, AIMS Educational Foundation; P.O. Box 8120; Fresno, California; 93747-8120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The Science Framework in Action: BASTEC Resource Center

By Dale Koistinen - Chabot Science Center

The following activities relate to Section F in the new *California Science Framework*. This section is called "Energy: Electricity and Magnetism" and is found on pages 67–72. Two major groups of content-oriented questions are asked in this section: (1) *What is electricity and magnetism? What are they like, and what are their basic properties? How do they interact?* and (2) *How do we use electricity and magnetism?* The activities developed here can be used in the grades K–3, 3–6, and 6–9 strands. The materials and equipment available at the BASTEC Resource Center are indicated by (*) and are either free or loan items. ▲

Activity One

Grades K–3

Framework Question
How do they (magnets) interact?

Framework Theme
Systems and Interactions

Materials Needed
two bar magnets with north-south designation*
swivel stand* or string

Procedure
Place one magnet on swivel or suspend by string. Bring the other magnet near the first. Observe what happens if (1) two north poles come together, (2) two south poles come together, (3) a north and a south pole come together.

Activity Two

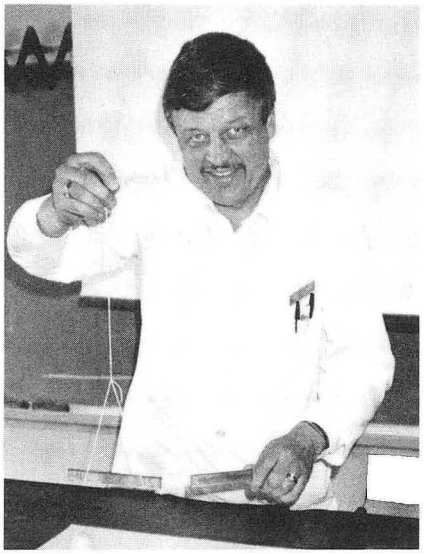
Grades 3–6

Framework Question
What are they (magnets) like and what are their basic properties? How do they interact?

Framework Theme(s)
Systems and Interactions, Patterns of Change

Materials Needed
two bar magnets*
iron filings*
overhead projector
blank overhead transparency*

Procedure
Place one bar magnet on the projector. Cover it with a blank transparency, sprinkle iron filings over the transparency. Notice the pattern. Where does the magnet appear to be the strongest? The weakest? Repeat the same procedure using two magnets end to end, leaving about a one-inch gap. Try north to north, south to south, and north to south. What happens to the filing pattern in the gap? Why?



The Chabot Science Center's Dale Koistinen demonstrates the interaction of magnets.

Activity Three

Grades 6–9

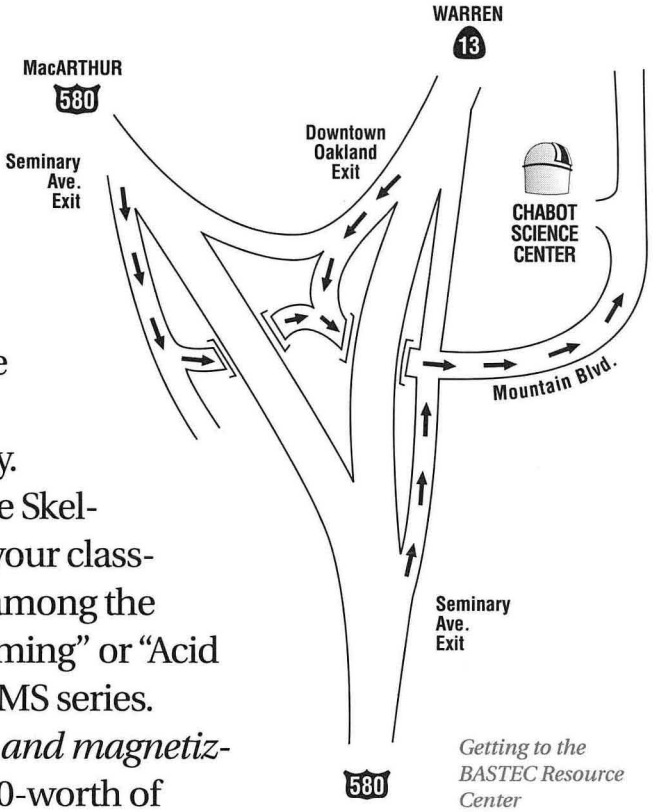
Framework Question
How do we use electricity and magnetism?

Framework Theme(s)
Energy, Systems and Interactions

Materials Needed
large steel nail
1 meter of magnet wire*
2 meters of magnet wire*
2–4 D-cell flashlight batteries
10–15 paper clips

Procedure
Make an electromagnet by tightly winding 1 meter of wire around the steel nail. Leave about 5 cm of each end of the wire unwound and push the insulation back about 1 cm, exposing bare metal. Connect 2 batteries together and then connect the ends of the electromagnet wire to the batteries. Try picking up some paper clips. Repeat the activity using different numbers of batteries and the different length of wire. What factors determine the strength of an electromagnet? Extend this activity by using the electromagnet you have made in Activity Two above.

Science Shopping

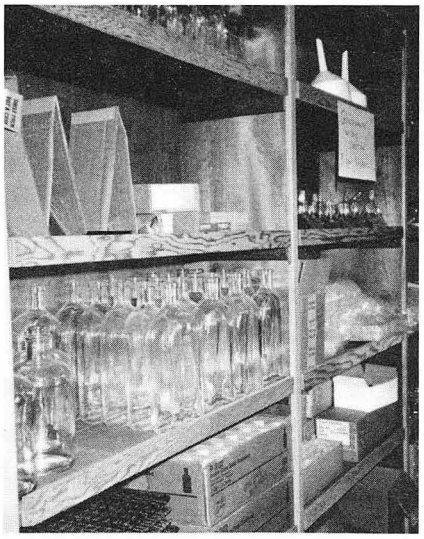


Getting to the BASTEC Resource Center

Visiting the BASTEC Resource Center can be a "hair-raising" experience—but only if you check out the equipment for static electricity. While you're there, say "hello" to Socrates the Skeleton, who would love to follow you back to your classroom, but in any case will help you choose among the many colorful booklets such as "Global Warming" or "Acid Rain" from the Lawrence Hall of Science GEMS series. *Books, beakers and bottles; models, magnets and magnetizers...* This list goes on to describe the $70,000-worth of equipment waiting for your classroom.

See Dale Koistinen's article on *The Functional Framework* for ready-made experiments demonstrating science framework concepts. All the material for these experiments can be found at the BASTEC Resource Center.

Tapes, test tubes and teacher's guides...



BASTEC Resource Center

Tuesday
3:00 pm – 5:00 pm

Wednesday
3:00 pm – 5:00 pm

Thursday
3:00 pm – 5:00 pm

BASTEC Participants

Oakland Unified School District
Lawrence Hall of Science
Department of Energy National Laboratories:
- Lawrence Berkeley Laboratory
- Lawrence Livermore National Laboratory
- Sandia National Laboratory, Livermore
- Stanford Linear Accelerator Center

Colleges and universities:
- CSU Hayward
- Holy Names College
- Laney College
- Samuel Merritt College
- UC Berkeley/MESA

Other organizations:
- Alameda County Soviet Exchange Studies
- Chabot Science Center
- Interface Institute
- National Organization of Black Chemists and Chemical Engineers
- East Bay Computer Using Educators
- African Scientific Institute
- USDA Forest Service
- East Bay Consortium
- American Association of University Women
- Edna McConnell Clark Foundation - STRETCH

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