

2011-2012 School-Year Report & Program Evaluation: Accomplishments and Impact

CRS works to nurture students' understanding of the world around them by connecting classroom teachers with scientists, museums, enrichment providers, and professional development programs in order to bring more science learning experiences to students. CRS also helps individuals and organizations involved in science education to work together and become stronger partners for teachers and schools.

Our goal is simple: help teachers give elementary and middle school students more opportunities to "do science" – to ask questions, test ideas, get their hands on real science activities.

As one teacher wrote to us this year: *CRS, through its newsletter, professional development opportunities, BASIS volunteers, and more recently its "Science Superstar" challenge, helps to keep science within teachers' radar. We are so busy teaching the basics, it is easy to forget the (immense) value of science ... for every student. CRS is the voice that reminds us, 'hey, don't forget to include science in your classroom this week!' The value of that voice is immeasurable.* -Lorraine Mann, OUSD, Kindergarten & Science Lead Teacher

Says OUSD Principal John Melvin: *From my view, I see that through CRS, students understand the connection between learning in the classroom and the outside world. Students thus understand that science is used by adults in their daily lives and can be used for practical purposes. CRS sends a message to students and the school community that science instruction is important; we see time and money invested in this effort to bring science instruction to life.*

Through our work, CRS aims to achieve the following:

- More elementary and middle school students have hands-on science experiences
- Teachers have the tools and confidence they need to teach science
- Information about local science resources, including personalized reports, are available, accessible, and easy to use
- Science professional development resources are available & teachers know about them
- Students become engaged in learning science experiences that connect to the real world, and across the curriculum
- Scientist volunteers develop their skills in communication about science, helping to improve scientific literacy in the community

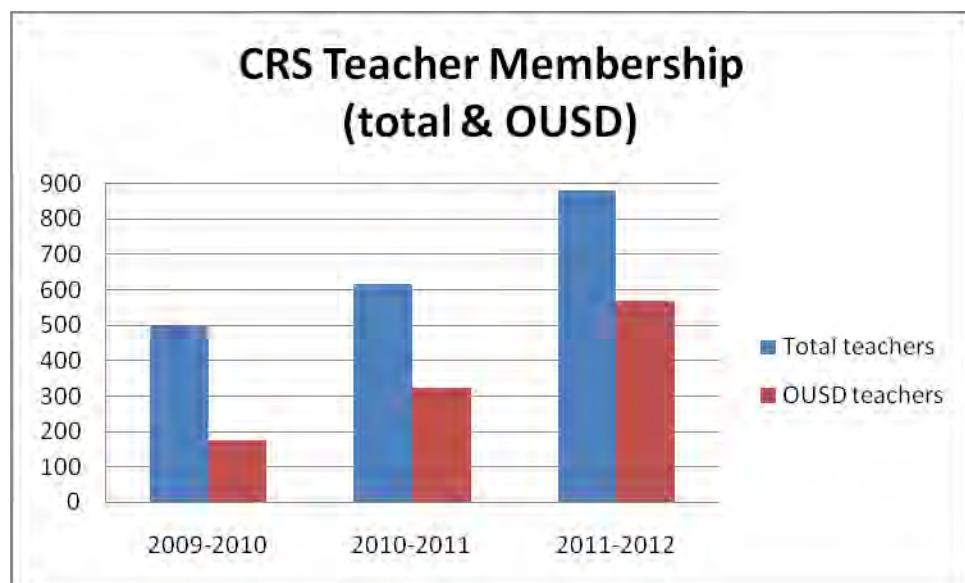
2011-12 Summary:

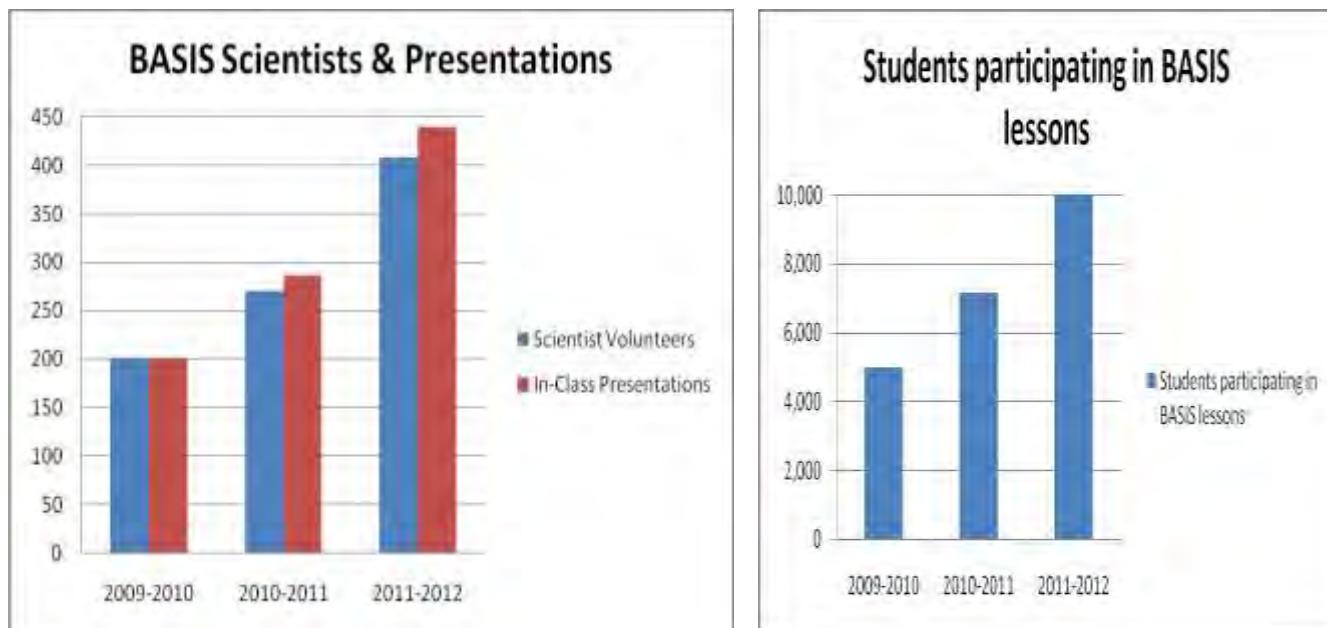
Implementing the next phase of our 2010 Strategic Plan, CRS effectively achieved our program goals for the 2011-12 school year. CRS met or exceeded all anticipated program benchmarks, growing both our teacher membership and our scientist outreach program (BASIS) by over 40%.

Direct teacher membership grew to 878 teachers (up from 615 the prior year). Those teachers work with **20,000 students**. All **Berkeley Unified School District K-5 classroom teachers** (over **245**) were served, through a membership sponsorship by the Berkeley Public Education Foundation. In partnership with

Oakland Unified School District, CRS services reached all of the 63 elementary schools in the district, directly serving **566 OUSD teachers (including all 70 lead science teachers)**. (The remaining OUSD elementary teachers had access to CRS information services through their lead science teachers.) CRS plans continued outreach to OUSD schools in the coming fall to add more teachers to the direct service roster. Individual and whole school members spanned from Richmond and West Contra County through Alameda County cities such as San Lorenzo, Castro Valley, Hayward, and Fremont.

During the more than **447 free in-class BASIS presentations** made this year (up from 286 the previous year), our **400+ active scientist role models** (up from 270 the previous year) all-together made a total of more than 1,400 visits to classrooms, engaging in hands-on **science learning activities with more than 10,000 students**. Overall, CRS experienced a successful and impactful year of bringing science resource information and services to an increasing number of teachers, and bringing meaningful, hands-on science experiences to thousands of students. CRS also expanded our connections with the science partners in our community, participating in the Bay Area Science Festival, the Gateways STEM Cradle to Career Initiative through Cal State East Bay, Science at Cal, and the Bridging the Bay science workshop for afterschool science providers, and more.





CRS provided the following services to all member teachers:

- 12 Monthly ScienceBlast Email newsletters delivered directly to each teacher's email inbox, with easy click-through links to a wealth of science resources and information.
- Quarterly Comprehensive Science Resource & Educator Opportunities Guides (up-to-date listings of exhibits, material and lesson planning, professional development opportunities, websites, more)
- Invitations to Science Field Trips for Teachers twice per year. This year, the Fall event was at Hayward Shoreline Interpretive Center; Spring event was at East Bay Regional Park's Lake Temescal. Each event featured free take-away resources, available consulting assistance, and regional science providers highlighting their programs and services.
- Round the clock access to the online resources which include teaching tools, lesson plans, tips, treasure trove websites, and the CRS Science Resource Database, a curated, searchable online database covering the comprehensive array of Bay Area science programs, services, funding opportunities, and more.



- Customized science research based on individual teacher requests. **This year the total number of teacher personalized support requests – not including requests for BASIS presentations -- increased to more than 220.** Teachers asked for CRS support in finding specific information about field trips, in class enrichment providers, lesson planning and activities, websites, background information, grant and professional development opportunities, and more. In addition, CRS responded to more than 35 connection and support requests from partner organizations and others in the science education community.

These direct services to individual teachers increased the quantity and quality of hands-on, standards-based science learning for more than 20,000 students in the East Bay, particularly in high need, underserved public schools.

Free, In-Class, Hands-On Science Lessons: Bay Area Scientists in Schools (BASIS) Program



In addition to the information, personalized support, and events, teacher members were invited to apply for standards-based in-class science lesson presentations by our BASIS scientist volunteers. These are offered, at no additional charge, on an as-available basis to supplement CRS science support and to build teacher knowledge and enthusiasm for incorporating science into their classrooms by demonstrating the power of scientific activities for engaging all kinds of learners in hand-on,

exciting, and ‘real world’ science experiences.

This year CRS recruited, trained, and placed over 400 scientists who provided over 447 BASIS presentations (up from 286 the prior year), bringing exciting hands-on science experiences to over 10,000 students, and representing over 2,000 hours of volunteer time supporting teachers and students. Because they generally work in teams, these 447+ classroom presentations resulted in more than 1,400 scientist role model interactions with students and teachers. List of CRS lesson topics is at the end of this report.

Evaluation of Impact

For individual program elements, CRS has a robust program evaluation protocol in place. Teacher satisfaction, and their perception of benefits to teaching and classroom, are measured through evaluations filled out after every BASIS presentation and professional development event. Comments and feedback data from teachers, volunteers, and students are monitored regularly, so that any issues needing attention are promptly identified.



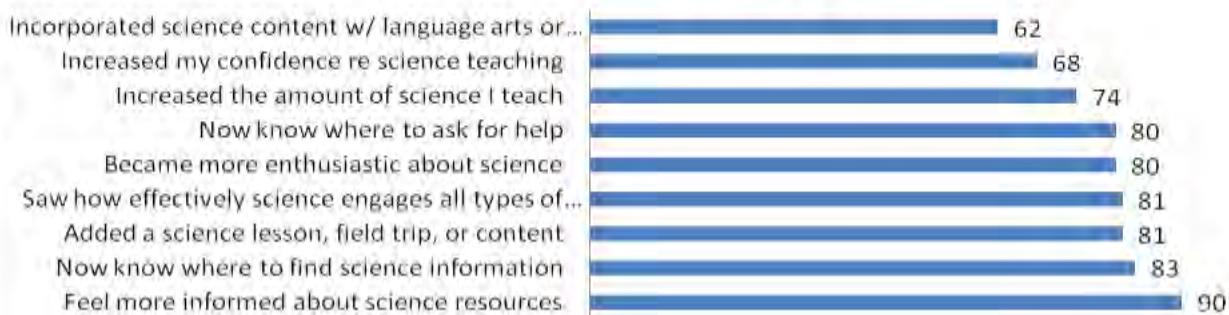
Responses over the years have consistently shown this program to be a substantial success, rating very highly in areas of teacher and scientist volunteer engagement and satisfaction.

Summary of Teacher Responses:
On the year-end survey, yet again **nearly all (97%) teachers reported that their students respond positively to science experiences**, yet most of these teachers also indicate they spend “too little” time teaching science. However, **survey responses do indicate that overall teachers are becoming more confident and enthusiastic about including science learning experiences for their students and that CRS services help to increase both the quality and quantity of science in their classrooms.**

The vast majority of teachers indicated that CRS services helped them to do

more science and improve their science teaching, as well as allowing them to “see how effectively science activities engage all kinds of students” and spurred them to add a new science lesson, field trip, or other experience for their students this year. As a direct result of CRS support services, **90% of teachers indicated they “feel more informed about science resources,”** and 80% indicated they became more enthusiastic about science teaching, and that CRS services helped them find (science) information and “know where to ask for help with resources and planning”. The majority of teachers (68%) indicated CRS helped to increase their confidence about teaching science.

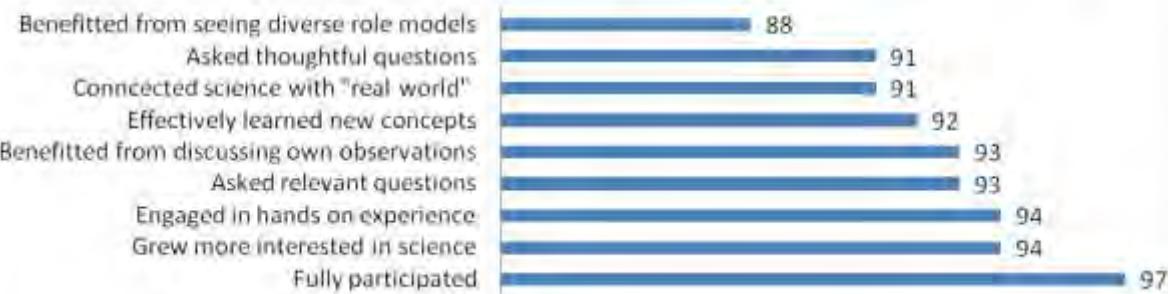
Percentage of teachers who indicated “As a result of CRS services, I...”:



Teachers who had BASIS in class presentations were even more likely to indicate they increased the amount of science they teach, with **90% reporting that “observing my students’ engagement in the BASIS activity encouraged me to include more hands-on science activities in my classroom.”** Three quarters of these teachers indicated they benefitted from the help teaching science content that they will be able to continue using in their own teaching, and that observing the presentation enabled them to understand their students’ science knowledge and interest. And, **nearly three quarters (72%) of the teachers indicated they were surprised by at least one of their students** “participating or demonstrating skills above his/her typical classroom level” and that has **“shown me a new way to engage this student through hands-on activities.”**

Regarding BASIS lessons, 99% of teachers indicated they would like to have a BASIS presentation again, with over 92% of teachers indicating the lessons were structured well, age appropriate, and were well managed. **Teachers and students valued the content, vocabulary, hands on activities, opportunity to share ideas and ask questions, and the chance to learn about individual scientist’s backgrounds and work in science.**

Percentage of teachers who indicated that during BASIS presentations, their students:



As to **impact on students**, teachers who had BASIS presentations and/or used CRS services to bring additional science lessons, field trips or other experiences to their classes this year indicated that their **students were engaged in hands on experiences (94%) and effectively learned new science concepts (92%)**. A majority of these **teachers agreed their students benefitted from discussing their own science observations and ideas (93%)**, **asked thoughtful questions (91%)**, **grew more interested in science (94%)**, **connected what they learned with the “real world” (91%)** and **came to understand more clearly that science is a process rather than just a collection of facts**. The majority of teachers who had BASIS lessons indicated their **students practice scientific skills such as observation, prediction, drawing conclusions, and communicating results**. Teachers expressed particular enthusiasm for the diversity of the scientist presenters, with 88% indicating the lesson helped dispel student stereotypes of “who” is a scientist, showing that scientists are people of different genders, ethnicities, and backgrounds. About 80% of teachers reported that presentations were beneficial to students

because they were **relevant to the lives and learning interests of their students**. During BASIS lessons, teachers reported that their students were **fully participating (97%) and asking relevant questions (93%)**.

Teachers indicated they are spending more time teaching science, with only 18% indicating they teach 2 hours or less per month (less than once per week), and more than half of the teachers indicating their students get 6 hours or more per month (at least twice per week) of science instruction. About one third of teachers indicate they teach science at least once per week, with an average of 3-4 hours per month. This represents a gradual continuation of the increase in science teaching we measured last year among the teachers CRS serves. Likewise, a slight increase (from 70 to 74%) of teachers indicated their principals support the importance of science teaching. This underscores a growing awareness, particularly in the Oakland schools we serve, regarding the importance of science in elementary classrooms.

Representative Comments from Elementary Teacher Members:

Throughout the year, and on the end of year and post-presentation evaluations, teachers share their thoughts, concerns, and feedback with CRS. As a learning organization, we take these comments to heart and work diligently to address the changing needs of teachers, and the tremendous range of needs our teachers articulate. Regarding the **BASIS program**, the comments are overwhelmingly peppered with the phrases: **phenomenal, fabulous, my kids loved it, thank you, and MORE PLEASE!!** Here are some representative teacher comments:

- CRS is the greatest, best-coordinated, one-stop science education resource I've ever come across in 20 years in public schools. The volunteers are fabulous, and the variety of services CRS provides is amazing. Thank you, CRS, and keep up your vital work in providing rich, hands-on, relevant science experiences for children. ----Mark Zucker, Manzanita SEED, Oakland, Grade 5.
- I work in a high poverty area of Oakland where all the problems associated with urban poverty and lack of resources manifest in the schools. Science investigations and hands-on learning are more important to these students than to students in other neighborhoods. My students don't get to play and investigate the natural world around them in their off-school hours because there is very little open space and because their neighborhoods are too dangerous to be out in; many parents can't get their kids to open areas or summer camps; parents themselves don't know of or cannot take advantage of educational experiences for their kids. Schools in these high poverty and immigrant communities are restricted by their school districts to accelerated learning models which are, in fact, paper and pencil or computer drills. They deprive the students of authentic learning experiences in the real world . They also restrict teachers to drill and kill type methods which are ineffective and frustrating. Teachers know that kids are hard-wired to learn about science because they want to learn about themselves and the world. CRS has helped me to bring scientists to teach my class in experimental and investigative ways. CRS has connected me with resources to fund field trips. CRS has

given me consistent updates on workshops and other resources for teachers. My teaching of science...of all subjects...has improved. . ----- OUSD, 3rd Grade Teacher

- This was a wonderful and exciting lesson for our class! The thorough lesson plan was very useful especially since it was available in advance of the lesson. This allowed us to plan properly. I was delighted that there were six volunteers, one for each group! Each volunteer was needed and was greatly appreciated. The children were excited and engaged in the lesson. It was a pleasure to witness the triumphant and surprised expressions on the faces of many students who experienced the successful outcomes of their structures! Thank you for the treats! This made for an even greater impact for our students! OUSD, 2nd grade teacher
- I teach science for many reasons. It is the hook that gets my students excited about school. I can tie it to all other curricular areas -- students are much more willing to work hard on writing, math, art, and reading when the work is teaching them about the world around them. I also know that learning to think like a scientist -- asking questions, predicting, testing ideas, discussing with others, persisting through difficulties -- will help my students be successful in all areas of life, even if they don't choose to become scientists. I know that the world NEEDS scientists who view it through all different cultural lenses. My African American, Yemeni, Latino, and Cambodian scientists, boys and girls, will enrich our country with their own unique perspectives on scientific inquiry. Last, I know that early science education will be the ticket to a better future for many of my students. It will get them into college, it will make them look and sound better in job interviews, it will give them the knowledge they need to make sense of the world and to stand tall in the face of difficult circumstances. CRS has been immensely helpful in my development as a science educator. The model lessons taught by real scientists have taught me important science content and have exposed me to ways of teaching science. -- OUSD lead science teacher
- This was outstanding! I highly, highly recommend this presentation, and the presenter was, in one student's words, "awesome." He had good control, kept the lesson moving, and created a good balance with content and hands-on activities. -- BUSD, 4th grade teacher
- The BASIS lessons are a great way to integrate science into the classrooms. It's really wonderful to have real scientists volunteer their time to talk about their work and share their knowledge with the students. I wish there were more opportunities for them to come! ---OUSD, Grade 5 teacher
- BASIS volunteers were extremely knowledgeable and well-prepared and engaged my entire class with grade-level appropriate science investigations. It was fabulous. --- OUSD, 2nd grade teacher

- The volunteers were fantastic. I cannot thank you enough for letting them share with my students. I heard from many parents that their children came home excited about fungus! We've studied plants a lot, so this was a great twist. I plan to do this lesson every year
- The students loved the presentation. All (remarkable) were enthusiastic and engaged in the hands-on activities. Their written responses reflected a deeper understanding of electricity, magnetism, protons, and electrons.
- I love that the program offers diverse presenters! (in many ways) Kids need examples of what answers you're looking for, like differentiating different forces & actions/reactions. I loved these enthusiastic & positive presenters.

CRS Volunteers Say:

The students were remarkably bright, well behaved, cooperative, and inquisitive. Some students were inquisitive enough to propose more experiments they wanted to examine based on the hands-on demos.

--Miriam Bowring

At the end of the lesson, I asked the kids to raise their hand if they thought science was fun. Everyone did. After the lesson, one girl ran up and hugged me and asked if I could come teach about science every day! --Joan Rueter

I grew both professionally and personally when I visited Community United Elementary, in Oakland. Many of the students were Spanish speaking, and they were curious to speak Spanish with me. We all had a great time talking about insects in Spanish, and it helped me realized how important it is for Latino students to have Latino role models. It encouraged me to create a lesson for next year in Spanish. --Lisa Fernandez

I really enjoy showing the students a different side of science and describing to them how anybody can be a scientist. It doesn't matter where you are from or your background. I enjoy the interactions with the eager students and listening to their suggestions. --Falina Williams

It is a great opportunity to practice teaching and to effectively communicate our knowledge of science. It is also very exciting when students come up with questions/answers you would never think about

--Naomi Kohen

BASIS volunteering gives us practice at explaining our interests in a way that the general public can understand, it reminds us how fun teaching can be, it helps us translate our research.

--Tali Hammond

This was a great "back to the basics" for me. Not to mention that the fresh and unabashed way that the students asked questions reminded me of two things: A) not everything needs to be complicated to be interesting and B) there's no shame in asking lots of questions! --Hilda Buss

It's heartening to be reminded of the wide-eyed fascination with science and engineering that I felt when I was a kid, before this all became "work". I find I return to my own lab with more enthusiasm (and less cynicism) after hanging out with the kids. Thanks for organizing all of this to give me this opportunity. --Cathy Wong

I really like interacting with the kids and watching the moment when the science clicks and changes their understanding of the world. --Terry Lang

Working with the students has been very rewarding, and their enthusiasm has been great. I think that the most exciting response has come from teachers, though, who are eager to include more science in their curriculum and to learn more about science themselves! Every teacher we met with had a number of great questions about plant biology.

--Jake Brunkard

Representative frequent student comments included:

It was fun! I learned a lot. Science rocks!

It was cool, especially the magnets.

This was the best science ever! Can we have science like this every day?

It was cool to learn about the stuff they are doing in their labs.

It was so fun and mesmerizing. You guys made me really want to learn more about chemistry.

Thank you for coming on your own time and teaching us so much about elements. I thought this was really fun and I love science now.

This was an interesting and special experience that I will always remember. When I get older now I might want to work as a scientist.

"Please, please, please, please, please come again someday."

In addition to these K-5 Science Connections Program accomplishments, CRS work during the 2011-12 school year included:

Workshops for educators, including:

- Hands-on Activities for Afterschool Providers, through Alameda County Office of Education
- Use of Vernier Probe Technology, for 4th and 5th grade teachers, Berkeley Unified School District

Hands-on outreach, science activity tables for students, families, and teachers, including

- Science at Cal, UC Berkeley
- Cal Day, UC Berkeley
- OUSD Science Fair, Chabot Space and Science Museum
- Bay Area Science Festival presentations at AT & T Park and local farmers markets
- Assistance with various school site Family Science events

Establishment of the Science Super Star Recognition Program

- More than one dozen teachers (including one entire school) took the challenge and increased the amount of science learning, planning, and engagement across the curriculum in their classrooms.
- CRS worked with local businesses and museum partners to secure donations including a daylong whole school visit from the East Bay Regional Parks' Mobile Aquarium, a class field trip to Exploratorium, passes to other museums, books, activities, Flip video cameras, and more.
- Enthusiasm after the pilot year is high, with more teachers indicating a desire to participate next year.

Ongoing work of the CRS Advisory Council on Elementary Education

- Bay Area thought leaders in science, education, academia, business, and philanthropy
- Action oriented, focused on solutions to challenges in elementary science education

CRS & BASIS scientists developed and presented lessons on more than 90 topics, including:

3rd Grape From the Sun	Food Webs Alive!
All About Volcanoes	Fossil Formation
Alternative Energy	Four Seasons
Animal Adaptations	Fruit Comes from Flowers
Animal Body Structure and Habitat	Gak!
Animal Cells	Gears in Motion
Animals and Their Habitats	Germs and Your Body
Around the Water Cycle	Global Ocean Currents and Fluid
Balloon Rocket Cars	Densities
Bones, Muscles, and How We Move	Glow in the Dark Science
Brain Science	Green Polymers
Build A Bug	Happy Feet Heading Home?
Chemistry of Soap	Heat Conduction: It's so cool!
Clipfish	Hidden Colors
Clouds Everywhere	How to Get Renewable Energy from the Sun
DNA Discovery	How to Think Like a Scientist
Drawing the Seasons	Insect Physiology
Eggs Eggs Everywhere	Legos of the Universe
Electricity, Magnetism and the Wall Socket	Let There Be Light!
Energy: States of Matter	Light and the Electromagnetic Spectrum
Energy: The Currency of Science	Magical Water
Energy Race	Magnetic Attraction
Exploring States of Matter	Magnets are Sweet
Feel Dead Brains	Materials and Structures
Follow the River to Clean Waters	Matter
Food Chains and Population Dynamics	Melting, Freezing, and More!
Food Chains and Webs	Mountain Building
Food Webs	

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| Natural Selection in Predators and Prey | States of Matter: Sublime Suds/ Ice Cream Science |
| Oobleck | The Butterfly Life Cycle |
| Organisms Need Energy: Food Webs | The Different Faces of Water |
| Our Solar System | The Parts of a Flowering Plant |
| Our Visual Interpretation of Light | The World Around You |
| Parts of a Plant | Using Our Senses |
| Plant Life Cycles | Vision & Tricks our Eyes Play |
| Plant Structure and Diversity | Water You Waiting For? Dive right into the wonders of water |
| Plastics, Recycling, and Composting | What's in Your Water? |
| Polymer Possibilities | What is color and how do we see it? |
| Properties of Materials | What is Renewable Energy? |
| Properties of Matter that Matter | What Makes up a Flower? |
| Resource Use and Conservation | Where Dinosaurs Live |
| Seasons! | Where They Live: Create a Habitat |
| Seeing is believing? | Who Needs Energy? |
| Soils: The Ground We Stand On | Why Do Animals Migrate? |
| Solar Winds | Worm Compost: Turning waste into soil |
| Sound | You Are What You Eat! Diet & Teeth |
| Space Exploration | Zap, Crackle, Pop: Static Electricity |
| Spooky Spiders and Wacky Webs | |
| Spring Science Program | |