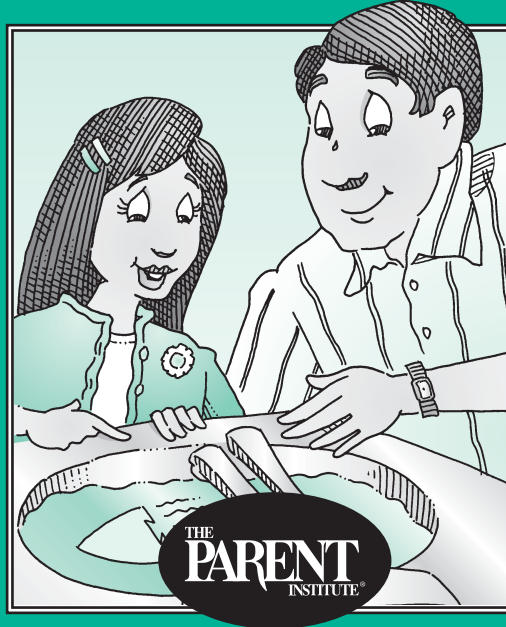


# What Parents Can Do at Home *to* Help Students With Science

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One of a Series of Booklets for Parents



**C**hildren have a natural curiosity about the world around them. Whether they are asking questions (“Why is the sky blue?” “Where does the sun go at night?”) or trying to figure out how things work, children and their parents use science to understand the world.

A basic knowledge of science is critical in today’s highly technological age. Our children will live in a world very different from today’s world. They’ll need to know more science and technology to be successful on the job and to make their way in a rapidly changing environment.

Interest in science begins at home. As a parent, you can play a crucial role in helping your child develop a positive attitude about science. You don’t need to be a scientist yourself to help spark your child’s interest. This booklet includes games, activities and suggestions that use everyday experiences and materials around the home. Use them to ignite your child’s interest in science, practice the scientific method and understand the useful role science plays in our lives.

Whether you are looking for fun ways to learn “science in the sink” or trying to figure out how to do a science fair project, this booklet can help you make science come alive for your child.\*



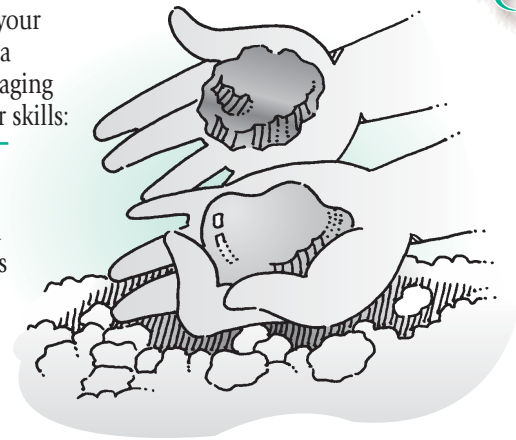
*Every child is unique, so we often use the singular pronoun. We’ll alternate using “he/him” and “she/her” throughout this booklet.*

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## Demonstrate the Scientific Approach to Everyday Events

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**Y**ou can encourage your child to think like a scientist by encouraging her to develop four skills:



- 1. Observing.** Encourage your child to notice the small details in the world around her. Ask questions like, “What shapes do you see in that spider web?” “Does this rock feel different from that one? How?”
- 2. Classifying.** Every time you help your child put things into groups based on common characteristics, you are encouraging scientific thinking. When you’re doing laundry, you might say, “Let’s sort all the socks by color.” When cleaning up, ask, “Can we put away all the toys with wheels?” Encourage your child’s natural tendency to collect, sort and classify rocks, leaves, shells, insects or other things from nature.
- 3. Predicting.** Scientists make predictions about things that *might* happen based on what they know about how things *have* happened. You and your child can do the same thing: “If we leave this ice cube on the counter, what do you think will happen to it? How long will it last as an ice cube? Is there somewhere else we could put it to make it last longer?”
- 4. Quantifying.** Science involves measurement. Encourage your child to start thinking like a scientist by asking questions like these: “Who is the shortest person in the family? By how much?” “How many steps will it take to cross your room?”

# Teach Your Child to Be a Good Observer



**M**ost science starts with careful observation. Your child may want to observe:

- **How long** it takes for a dandelion or a rose to come into full bloom.
- **The moon** every night. Keep track of when it rises. Keep a picture chart of how the moon changes during the month.
- **How the spin cycle** in the washing machine gets the water out of the clothes.
- **A kitten grow** into a cat. Keep a record of the changes. Or if there is a new baby in the family, watch how he changes during the first year of life.
- **How fast people grow.** Ask a group of friends to record their height every day for three or six months. Is it true that kids “shoot up overnight”?

When you walk with your child, make sure you stop to notice the world around you. Talk about what you see. Ask questions: “Why did the ants build their house there? Why do the birds fly away in the winter?” Then see if you can come up with answers together.



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# Science Should Lead To Explanations

**S**cience is about learning through careful observation and experimentation. This booklet describes many interesting experiments you and your child can do. Science is not simply watching. Science is trying to explain what causes things to happen—and what doesn't. Try the experiments in this booklet to trigger curiosity in your child. Then encourage your child to do further research and experiments.



## Do Science-in-the-Sink

While you're preparing dinner, your child can be learning many important things about science. Together, you can:

- **Collect a number of objects** from around the kitchen: a sponge, a spoon, a plastic container, a can of soup. Now have your child make predictions. Which will sink? Which will float? Test and see.
- **Put several inches of water in the sink.** Give your child a glass that's a little shorter than the depth of the water in the sink. Have your child plunge the glass upside-down straight to the bottom of the sink. Water will try to rush in, but it can't. What keeps it out? (*Air*)
- **Fill a container with about two cups of water.** Put it on a sunny window sill or a radiator. Now measure it daily for the next few weeks until it's gone. Where did it go? (*It evaporated.*)

### The Scientific Method

Scientists everywhere use a basic approach — an approach you can use with your child. It's called the Scientific Method and it consists of four steps:

1. State the problem.
2. Form a hypothesis.
3. Test the hypothesis.
4. Draw conclusions.

## Try These 'Egg-Speriments'

**T**he ordinary egg can be the basis for many interesting science experiments. Here are just a few:

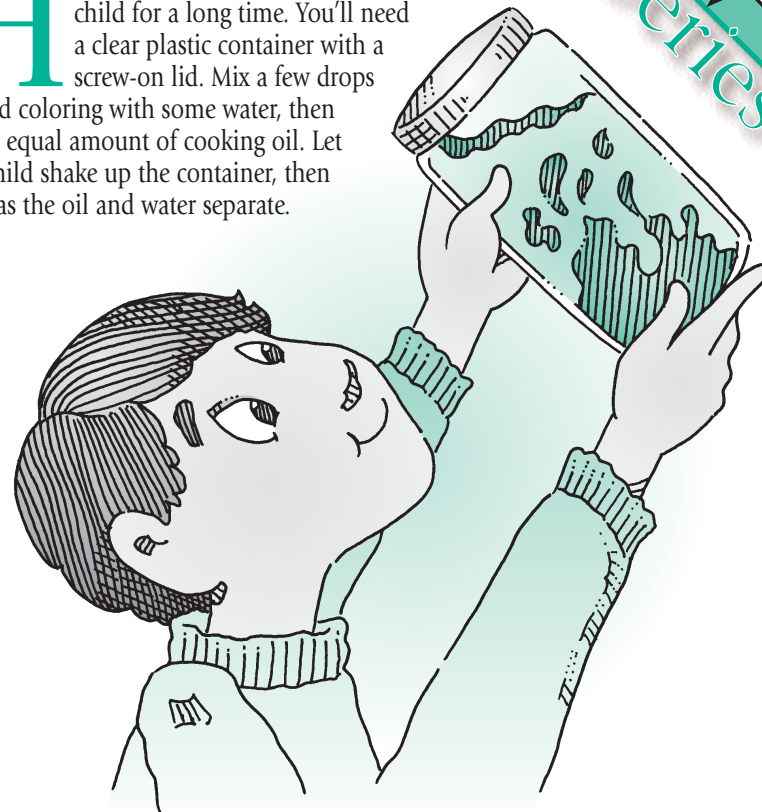
- **Fill a jar with water.** Gently drop an egg in the water. It sinks. Now slowly add salt to the water. The egg floats!
- **Hand your child an uncooked egg.** Ask your child if it's possible to crack the egg using just one hand and applying equal pressure from all sides. It isn't—although we think of eggs as very fragile, they're actually built to take pressure. (Remember, hens have to *sit* on them.) But if your egg has even a tiny crack, this experiment won't work, so hold it up to a light first to check it.



- **Put an uncooked egg,** still in its shell, into a clear glass jar with a mouth wider than the egg. Fill the jar with white vinegar. Cover it and let it sit for about two weeks. Have your child watch to see what happens—little bubbles will form on the shell. This is a sign that the acid in the vinegar is slowly dissolving the egg's alkaline shell. If your child is *very* careful, she can touch the egg while all this happens, but if she's too rough, she'll break the egg. After about two weeks, the egg will be bigger. Now let your child empty the jar in the sink, rinse it and hold the egg gently. It's rubbery—it may even bounce, if your child is gentle enough. What has happened to the egg? Figure it out together.

## Do Oil and Water Mix?

**H**ere's an activity that can occupy a child for a long time. You'll need a clear plastic container with a screw-on lid. Mix a few drops of food coloring with some water, then add an equal amount of cooking oil. Let your child shake up the container, then watch as the oil and water separate.



## Let Your Child See How Things Work

When you are making household repairs or working on the family car, make sure you include your child as an observer or, better yet, a helper. Give your child a ball point pen and let him take it apart to find out how it works. The next time you slice an apple, see how many seeds it has inside. Then help your child keep records: Do all apples have the same number of seeds?

Of course, there are some rules. First, your child must be careful—some parts can be sharp. Second, your child must *not* take things apart by himself. He must ask permission first. Finally, this kind of exploration can be messy, so it's best to wear old clothes.

# Give Your Child a 'Third Eye'

A magnifying glass will give your child a chance to look at the world in a whole new way. Buy an inexpensive magnifying glass with a handle. Now let your child look at sugar, hair, rocks and anything else that strikes her fancy under the magnifying glass.

## Take a 'Micro-Hike'

Sometimes, children seem to pass through the world without really seeing it. You can open your child's eyes by taking her on a "micro-hike." All you need is a three- to five-foot string, a magnifying glass and some open ground.

Ask your child to lay out a "trail" for the hike with the string. Now hand her the magnifying glass. Say, "I want you to use your



imagination to shrink yourself down to the size of an ant. Don't allow your eyes to get more than one foot above the ground."

Then let your child observe the natural wonders available in even a tiny spot

of earth. Ask questions to get your child's imagination going: "What kind of world are you traveling through right now? Who are your nearest neighbors? Are they friendly? What is that spider going to do—eat you or take you for a ride?" Later, you may want to challenge your child to write a story or a letter about your micro-hike.

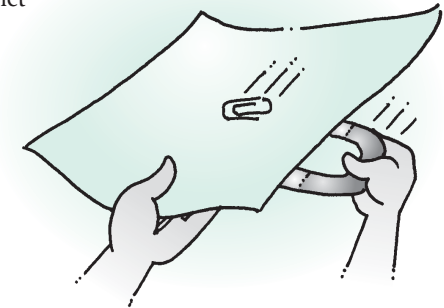
Older kids can do the same thing at school with a microscope and a drop of pond water. Tiny, even microscopic, worlds we are not even aware of are all around us—and a micro-hike is an exciting way to explore them.

# Experiment With a Magnet

Magnets are something of a mystery to children. Give a child a magnet and he may occupy himself for days. First, let him see what metal things are attracted to magnets. Try the doorknob, some paper clips, some nails or the silverware.

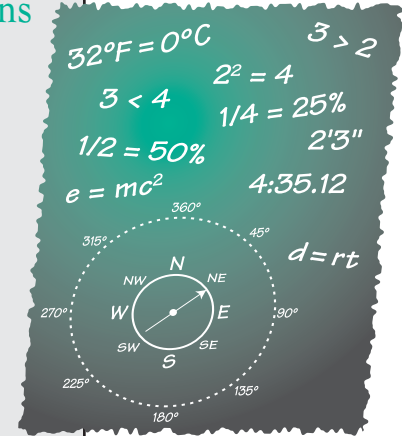
Although paper and glass aren't attracted to a magnet, the magnetic force will pass through them. Have your child put a paper clip on top of a piece of paper. Then tell him to move a magnet underneath the paper. The paper clip will move. Then have him try it again with a paper clip in a glass—even if the glass is filled with water, the clip will still follow the magnet.

(Be sure he doesn't use the magnet around computer monitors or televisions, credit cards or other cards with magnetic strips, as these are very sensitive to magnetic interference.)



## Teach Children Scientific Symbols and Expressions

Science and math courses at the middle and high school level often include a heavy dose of graphs and equations. As your student is reviewing homework in these courses, make sure he rewrites the symbols, equations and graphs until he's familiar with them. That way, he won't get to the test and wonder, "Does the exponent go here or there?"



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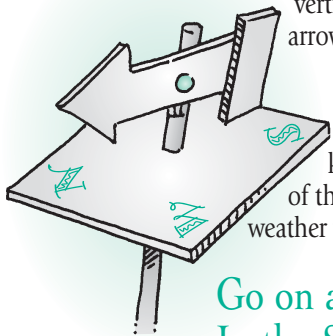
# Be a Weather Watcher

**H**elping your child become aware of the changes in the weather is an enjoyable way to introduce him to some of the basics of science. Here are some weather activities you can do with your child:

- **Keep a temperature graph.** Have your child record the temperature each day for a month. (Or use the temperature listed in your local newspaper.) Have him note whether the day was sunny, cloudy or rainy. Which was the hottest day? How many rainy days were there?
- **Measure the rain.** You'll need a glass or plastic jar with a wide mouth, straight sides and a flat bottom (like a peanut butter jar), a ruler and a permanent marker. On the outside of the jar, have your child use the ruler to create a "measuring stick." Mark off each quarter inch. Then have him keep track of the amount of rainfall.

- **Make a wind gauge** out of a piece of cardboard. Label each corner: N (for north), S (for south), E (for east) and W (for west). Cut a hole in the center of the cardboard and push it onto a wooden dowel rod.

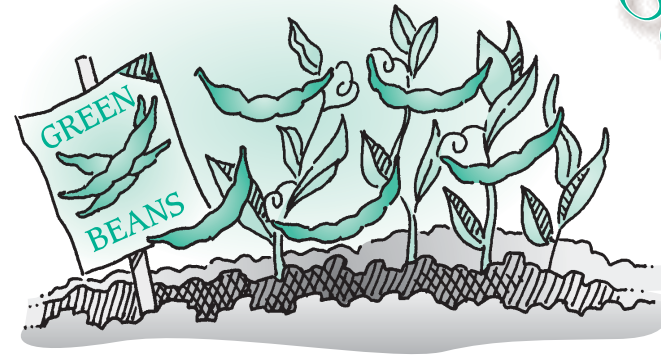
Then cut out a cardboard arrow and tape on a vertical tail (to catch the wind) to the tail. Fasten the arrow loosely to the dowel with a thumbtack. Now stick your wind gauge into the ground with the N facing north. (You can use a compass for that.) When the wind blows, have your child keep track of its direction. And remember, part of the fun and educational value is adjusting the weather vane to make it work.



## Go on a 'Scavenger Hunt In the Sky'

Take a walk with your child on a clear night. Look for all the things you can see in the sky: the North Star, constellations, visible planets. Can your child see any man-made objects in space? With your child, make a record of the things he sees and have him try to come up with his own list of things to find in the night sky.

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# Plant a Garden

**C**hildren of all ages love to watch things grow. Encourage your child to start a small garden. An older child may want to learn about organic gardening or about growing plants in containers. She may also want to experiment with growing various herbs to use in cooking. If your child can't plant a garden outdoors, help her make a box garden. You'll need:

- a box with sides that are about four inches high
- a plastic shopping bag
- a stapler or tape
- dirt or potting soil
- a teaspoon or spray bottle for watering.

Help your child cut one side and the bottom of the plastic bag. Then have her open it up and spread it along the inside of the box. This will keep the water from leaking through the box. Staple or tape the plastic to the edge of the box. Fill the box with moist dirt. Look in your kitchen for a few things you know will grow. Soak dried beans overnight and plant them. Cut the top off a carrot and set it in the dirt. Ask, "What else do you think might grow?"

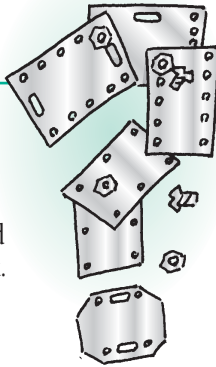
If your child wants to plant something that you don't think will grow, say, "Let's see what happens." Children learn more by trying out their ideas than by having someone tell them what will happen. Help your child keep track of what you've planted. Have her set the garden in a sunny window and water frequently. While you're waiting, visit the library and look for books about things that grow. (Don't forget about *Jack and the Beanstalk!*)

# Learn With a Science Fair Project

A school science fair project is a great way to learn about science. Here's a step-by-step method that can help your child plan and carry out a science project.

## Step 1: Do some initial observing.

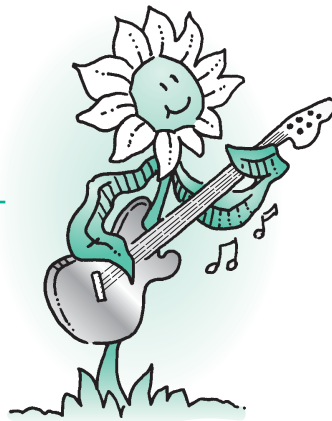
All science starts with observation followed by questions. Why did that happen? What caused that? How does that work? The first step in any science project is to have your child write down something he has wondered about. Encourage him to write as many questions as possible. Then narrow the choices to something of special interest.



**Step 2: Gather information.** Now your child needs to learn what he can about what he wants to investigate. He should go to the library or go on the Internet. Be sure he keeps track of where he got his information—he'll need that later.

## Step 3: Develop a hypothesis.

A hypothesis is a statement of how or why your child thinks something works. "I believe that plants exposed to rock music will grow less than plants exposed to classical music."



## Step 4: Test the hypothesis.

Have your child use these guidelines for experiments:

- Use a *variable* to test the hypothesis. For example, expose one plant to rock music, one to classical music and one to country music.
- Change only one thing in each experiment. Leave the rest the same. To test how plants react to music, change only the music. The soil, type of plant, pots, watering times, location and anything else should be the same for each plant.
- Make sure to have one *control* item for comparison. For example, grow one plant that is exposed to no music at all.

**Step 5: Make sure you have the materials and equipment.** This is a step that often frustrates science fair participants (and their parents) because they tend to put it off until the last minute. Make a list of the things needed for the experiment and set a time to get them.

## Step 6: Do the experiment and record the data.

The data may be the amount of chemicals used, how long something took to grow, changes in size and so on. If your child is not recording data, she is probably not doing a science experiment.



## Step 7: Record other observations.

In addition to recording data, your child may make other observations about things she notices or problems she encounters. She should keep careful notes of everything she does and everything that happens. Observations are important when drawing conclusions.



## Step 8: Summarize your results and draw conclusions.

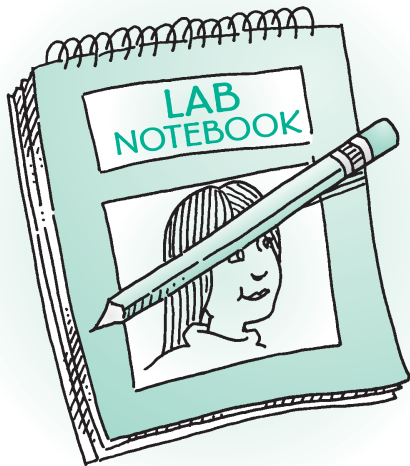
Your child may create tables or graphs to show the data. She may also make a written statement of what occurred during the experiments. Finally, have her answer her original question: Was her hypothesis correct? And what if the science project doesn't work? Your child will have learned something anyway. Thomas Edison tried hundreds of different materials for his light bulb. Each time one didn't work, he didn't give up. He just figured he was one step closer to finding a material that *would* work. That's an attitude that scientists need.



# You Can Still Help With Science Homework

**Y**our child is taking advanced biology, chemistry, physics or earth science. Perhaps you never took the course, or perhaps you've forgotten most of what you did learn. There are still things you can do to help your child with science homework. Here are some suggestions:

- **Be sure she keeps up.** Students who mastered challenging science courses usually say it's because they did their studying *every day*. "Once you get behind, it's just too hard to catch up," says a high school senior. "Believe me—it's easier just to keep up." Let your child know you expect her to study every day.



- **Encourage your child to keep everything organized** in a lab notebook. Many teachers grade their students' lab notebooks. Even if your child's teacher doesn't, it's important to get in the habit of keeping all lab assignments together. Learning comes not just from textbooks, but from lab work as well. It's important to be able to study and use lab information easily.

- **Stress tying new knowledge** to things your child already knows. Your child already knows that rubbing her hands together warms them. That can help her understand how friction produces heat. Science knowledge builds on earlier work.

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Even the youngest children have a lively curiosity about the world around them. Parents can help keep that sense of wonder alive. They can help strike the sparks of interest. Most importantly, parents can help children learn—and that's what science is all about!

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