

A Guide for Parents  
Grades 4–7



# Science Can Take Her Places!

Encouraging Your Daughter's Interests  
in Science, Math, and Technology



Sally Ride  
Science

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## As your daughter grows up . . .



Expect her to succeed in math, science and technology

Encourage her natural curiosity about how things work and why

Empower her to explore math and science

“ Though neither of my parents was a scientist, both of them embraced my passion. They bought me a simple chemistry set and books about the planets, and spoke to my teachers to make sure that I received the support I needed. They launched me toward a career in science.”

SALLY RIDE, AMERICA'S FIRST WOMAN IN SPACE



## Dear Parent or Guardian,

Encouraging your daughter's interests in math and science has never been more important. Science, math, and technology play a greater role in our lives than ever before. And students who have a solid foundation in these areas are prepared to pursue a wide range of exciting opportunities in high school, college and beyond.

Yet too many students – particularly girls – become discouraged from following their interests in math and science. Some face lingering stereotypes; others simply aren't encouraged (as boys might be).

Early adolescence is a critical period for shaping attitudes and outlooks. Research shows that it is during this time that many girls turn away from math and science. The good news is that there are many ways that you can encourage your daughter to stay involved.

Neither of my parents were scientists, but that didn't matter. They encouraged me to explore the things that interested me. And they encouraged me to be curious, to ask questions, and to think about things for myself. All of these things helped me to become a scientist and an astronaut.

This guide provides you with the facts about girls and science, and practical ways for you to encourage your daughter's interests in science, math, and technology. My love of science launched me into space. Science can take your daughter places, too.

**Reach for the stars!**

  
Sally Ride

# The Facts: Girls and Science

A lot of attention has focused on the so-called “math and science gap” between boys and girls. The truth is that girls and boys start their education with equal interest and ability in math and science. But over time, a higher percentage of girls drift away from these subjects, even though they have not lost their aptitude for them.

## Early Interests

In 4th grade,

68% of boys and 66% of girls  
report that they “like” science!<sup>1</sup>

So in elementary school, both boys and girls are curious about the world and the way it works.

## Early Aptitude and Achievement

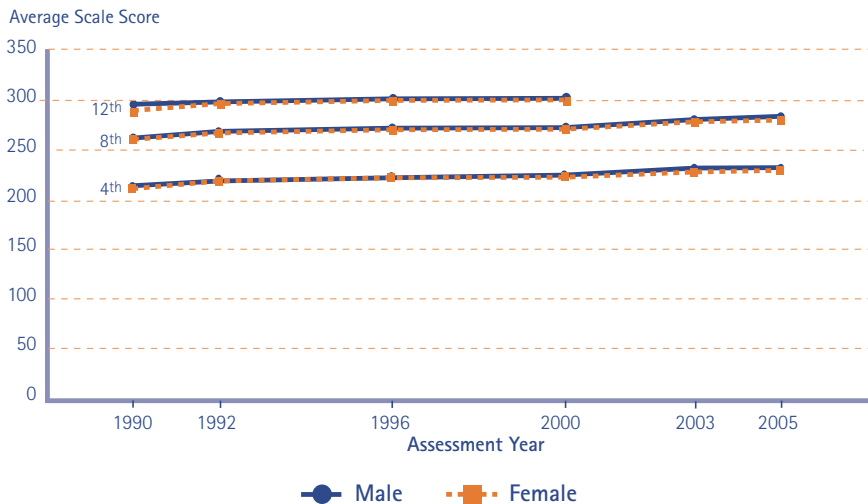
Results from the National Assessment of Educational Progress (NAEP) in mathematics and science show very little difference between boys and girls.

- In mathematics, there was virtually no difference in scores between girls and boys in 4th, 8th, and 12th grade (1990 through 2005)<sup>2</sup>.
- In science, the results fluctuated<sup>2</sup>: in 1996 there was no gap between 4th or 8th grade girls and boys; boys scored slightly higher in 2000. In 12th grade, boys scored only slightly higher in 1996, and the gap narrowed further in 2000.

And throughout school, girls and boys show the same aptitude for math and science.



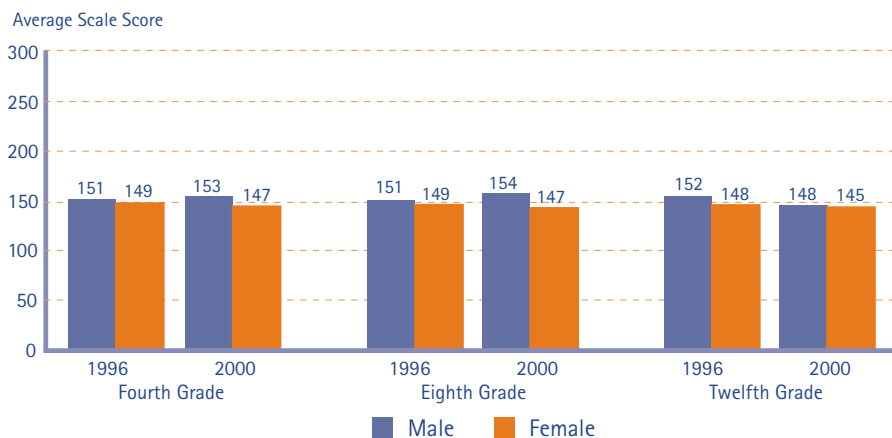
**Average NAEP scale scores (range 0 to 500) in math for fourth-, eighth- and twelfth-graders, by gender, 1990, 1992, 1996, 2000, 2003 and 2005.**



“Although there is a common perception that males consistently outperform females in mathematics, NAEP mathematics scores have not shown this...the gap between average scores has been quite small.”

(National Center for Educational Statistics, *Trends in Educational Equity for Girls and Women*, 2000).

**Average NAEP scale scores (range 0 to 500) in science for fourth-, eighth- and twelfth-graders, by gender, 1996 and 2000.**



As this chart shows, at all grades there is only a small gap in science achievement.

## Do Girls “Naturally” Steer Away From Science?

**No!** The argument that girls and women aren’t interested in certain professions is an old one, but it simply isn’t true. For perspective, here are some statistics.

### Percentage of women

|                 |           |               |
|-----------------|-----------|---------------|
| Law School      | 5% (1970) | 48% (2004-05) |
| Business School | 4% (1970) | 45% (2004-05) |
| Medical School  | 8% (1970) | 50% (2003-04) |

The percentages have gone up significantly in the last three decades.

There’s a similar story in sports.

### Percentage of girls involved in high school sports

|           |               |
|-----------|---------------|
| 4% (1970) | 42% (2003-04) |
|-----------|---------------|

In 1970, many people concluded that girls and women were simply not interested in law or business or medicine – or in sports.

But, in fact, girls and women were always interested. Changes in societal norms and slowly dissolving stereotypes have resulted in more opportunities and, in turn, more girls and women pursuing their interests.

In 1970, nearly all doctors and lawyers were male. So very few girls growing up thought of law or medicine as viable career options for them.



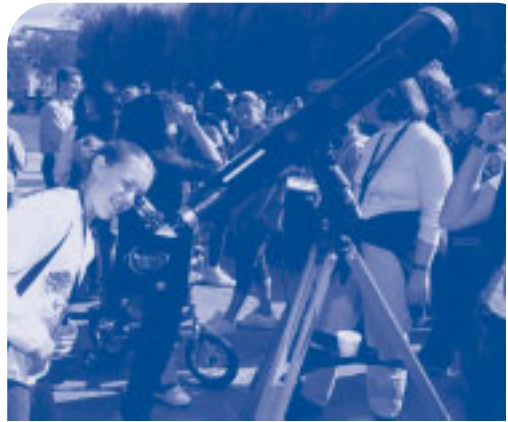
# Times Have Changed

Some fields, such as engineering and physics, started from very, very low percentages. In 1970, less than 1% (less than 1 in a hundred!) engineers were females.

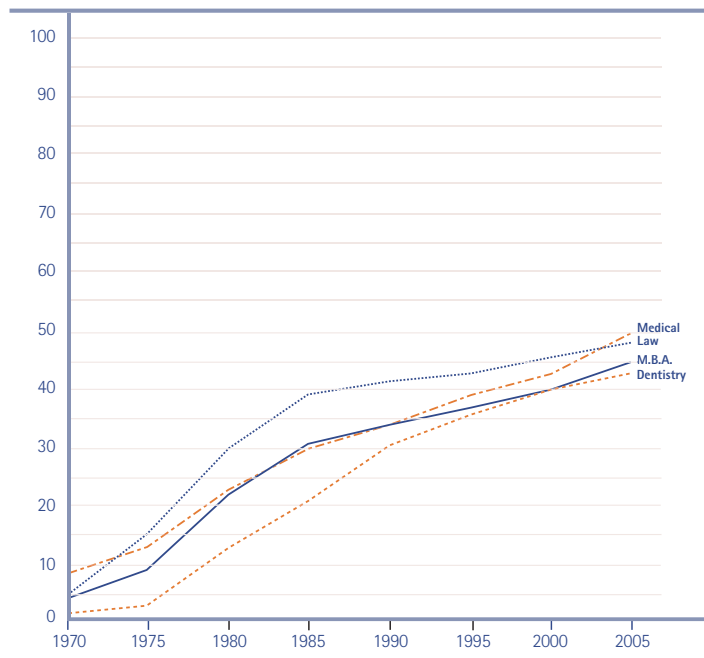
Today women make up . . .

- 11% of engineers
- 20% of scientists

That's an enormous increase in only three decades, and the percentages are still going up. It seems reasonable to expect that the growth in science and engineering will continue just as it has in law and medicine.



Percentage of professional degrees awarded to women, 1970 to 2005.



## But There's Still a Problem

Although through 4th grade, equal numbers of girls and boys say they like science and math . . .

- By 8th grade, girls' interest in math and confidence in their math abilities have eroded, even though they perform as well as boys in this subject.<sup>3</sup>
- By 8th grade, twice as many boys as girls show an interest in science and engineering careers.<sup>3</sup>
- By high school, even girls with exceptional preparation in math and science are choosing careers in science and math in disproportionately low numbers.<sup>3</sup>

“Many girls don't picture themselves as future scientists or engineers. They don't put a female face on these professions because they rarely see real-life or media images of female scientists.”

(National Science Foundation,  
*Biennial Report to the United States Congress, 2002*)



Your daughter

# Why?



The decline in interest in science and math by some girls as they grow older stems primarily from social pressures and societal stereotypes.

## As They Grow Up . . .

- Girls absorb messages that science is more appropriate for boys than for girls even though they perform as well as boys in science in school.<sup>3</sup>
- Girls pick up on subtle signals from their parents and teachers that certain fields are not for them.<sup>4</sup>

The results are disconcerting: as girls turn away from science and math, they close the door on opportunities in these areas.

- Women currently make up 49% of the college-degreed workforce, but only 25% of the science and engineering workforce.
- Of the 10 fastest growing occupations, 8 are science, math, or technology related.

## The Good News

When girls are encouraged to pursue their interests in math and science, they are more likely to stay involved. And there are many ways that you can encourage your daughter.

can pursue any career she chooses!

# Tips for Home

## As She Grows Up . . .

Children learn gender-related stereotypes in many ways, but research shows that significant adults, especially parents, play a strong role in influencing their children's attitudes.

While parents can provide both positive and negative messages to their children, parents may unknowingly convey beliefs that math, science, and technology are more appropriate for boys than for girls. For example, three recent studies found that

- Parents of elementary school students perceived boys as more competent than girls in science and viewed science as more important for boys than for girls.<sup>4</sup>
- Parents of 11 - 13 year olds were more likely to believe that science was more difficult for daughters than for sons.<sup>5</sup>
- Parents and children rated girls' competency in math lower than boys beginning in third grade, even though there was no difference in math achievement.<sup>6</sup>

While none of us wants to discourage our children, we may unconsciously do so through our own ideas about math, science and gender roles.



## What You Can Do

### Setting the Stage

Children's views of science begin at home. Here are some ways you can make sure your daughter develops a positive attitude about science.

- Talk to your daughter about the things she likes to do and her dreams for the future. She may not always speak up about her interests or aspirations on her own.
- Examine your own views about science, math and gender. Could you be unconsciously reinforcing negative attitudes?
- Have high expectations for your daughter. Expect her to be interested in and do well in math and science, and let her know how you feel.
- View yourself through your children's eyes. Do you unintentionally convey messages that may reinforce gender stereotypes?
- Be aware of your daughter's interactions with her peers. How are they influencing her decisions?

## Have high expectations for your daughter.



"Compared to boys, fewer girls report they talk to their parents about science and technology issues".

(American Association of University Women,  
*How Schools Shortchange Girls*, 1998)

## As She Grows Up



It is important for your daughter to feel that she is a participant in, not just an observer of, science.

“Girls’ attitudes about scientists and engineers have been influenced by the lack of female scientists shown on TV, in books, and in movies. In the absence of role models, many girls do not think of themselves as “doers” of science”.

(Mendoza & Johnson, *Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology*, 2000)

# Encourage

“When given the space and encouragement they need to explore possibilities...girls can emerge with the confidence and competence to pursue whatever avenue they might choose.”

(Phillips, *The Girls Report: What We Know and Need to Know About Growing Up Female*, National Council for Research on Women, 1998)

To “dissolve the mystique” around science and math, and to build confidence in problem-solving, encourage your daughter to explore — and to make mistakes.

## What You Can Do

Give your daughter “permission” to let out her natural interest in science. Here are some ways to stoke her curiosity!

- Break down the mystique surrounding science. Science is part of everyday life.
  - ▲ Encourage your daughter to explore the science and math all around her
  - ▲ Provide your daughter with opportunities to ask questions
- Encourage your daughter to dig into science. Let her know that it is okay for things to get messy, dirty or wet. Science is fun!
- Send the message that science is for girls. There are plenty of women making important contributions to science. Check out biographies of women scientists; talk about the exciting work they’re doing.
- Support your daughter’s involvement in informal science activities. Good informal science activities (for example, astronomy clubs, science camps) are effective in fostering girls’ interests in science.
- Encourage your daughter to experiment. Trial-and-error helps build confidence in problem-solving skills—and it’s part of science!
- Take your daughter to science centers and museums. Provide her with opportunities to explore science in fun, hands-on ways.
- Give your daughter practical experience tinkering with things.
  - ▲ Have your daughter help fix appliances that are broken, put furniture together, install software on the family computer, or change a bicycle tire.



# Support

## Tips For School

School plays an important role in your daughter's academic achievement and career aspirations.

Without even knowing it, your daughter's teachers and friends may convey subtle messages about who a scientist is, which students are "naturally" good at certain subjects, and what learning styles are best. Be aware that schools sometimes reinforce stereotypes.

Considerable research has shown which strategies are most effective in engaging girls in science and math.<sup>7</sup> These include

- Hands-on activities
- Introduction of role models
- Activities involving teamwork and collaboration
- Activities that have an application to the real world
- Activities that encourage problem solving

Research has also shown that these strategies are not only good for girls, they're good for all students. Your daughter's teachers should be aware of this, and be using these methods.

## Stay involved in



## What You Can Do



Stay involved in your daughter's education. This will help you understand how she feels about math and science and what kind of support she's getting at school. Also, find out what math and science classes she should be taking at each grade level to keep her options open.

- Advocate for your daughter. Make sure her teachers are well trained in research-based teaching strategies including gender equity strategies.
  - ▲ While teachers don't intentionally favor boys in their classroom, studies show that classroom practices can benefit some students over others. Teachers should receive specific training in promoting gender balance in their classroom.
- Pay attention to classroom materials. Are posters, textbooks and handouts gender fair?
  - ▲ Do science textbooks introduce female as well as male role models?

## your daughter's education.

- Inform yourself about resources at your daughter's school.
  - ▲ Does the school have an adequate supply of lab equipment, computers, and Internet connections?
  - ▲ Does the school provide after-school science activities or clubs? Are girls actively encouraged to participate in these?
- Participate in parent meetings. These are good times to ask your daughter's teachers questions such as
  - ▲ What is my daughter expected to know in math and science at this grade level?
  - ▲ What are my child's strengths in these areas? Where does she need help?
  - ▲ How can I best support my child in math and science?

## Resources

Encouraging your daughter's interests in math and science will help her to succeed in school and to prepare for her future. But you don't have to do it alone. Here are some resources that can help.

**Sally Ride Science** ([www.sallyridescience.com](http://www.sallyridescience.com)) is dedicated to keeping girls' interests in science, math and technology alive through its innovative science programs and publications.

### Programs

#### Science Festivals

One day events for girls in grades 5 – 8, their parents, and teachers.

#### TOYchallenge™

A national toy design competition for girls and boys in grades 5 – 8.

#### Science Camps

Week-long, sleep-over camps for girls entering grades 6 – 9.

### Publications

#### Science Books

Learn about the wonders of Earth, the mystery of Mars, and more.

#### Science Career Books

Explore cool science careers, meet living scientists, and investigate your own interests.

#### Science Newsletter

Read the latest science stories, hear from scientists, and test your wits.

Find out about science programs in your community. Some organizations to contact include: Girls, Inc., Girl Scouts, YWCAs, science centers, and science museums. You may contact the Association of Science-Technology Centers ([www.astc.org](http://www.astc.org)) for a science center or museum near you. Here are some other science resources.

**National Academy of Science** ([www.iwaswondering.org](http://www.iwaswondering.org)) hosts a website for girls about the accomplishments of ten contemporary women in science.

**National Council of Teachers of Mathematics** ([www.nctm.org](http://www.nctm.org)) hosts a webpage with family activities.

**National Science Foundation** ([www.nsf.gov](http://www.nsf.gov)) offers reports on the latest research on girl's and women's participation in math and science.

**National Science Teachers Association** ([www.nsta.org](http://www.nsta.org)) hosts a webpage with many resources and links for parents.

**NASA Quest** (<http://quest.arc.nasa.gov/>) connects kids to NASA scientists, research, and activities.

**Science News for Kids** ([www.sciencenewsforkids.com](http://www.sciencenewsforkids.com)) is a website devoted to science stories and activities for children of ages 9 to 13.

**The Why Files** ([www.whyfiles.org](http://www.whyfiles.org)) is a website created by the University of Wisconsin with well-researched descriptions of the science behind current news stories.

**TryScience** ([www.tryscience.org](http://www.tryscience.org)) is a website hosted by a consortium of 400 science centers, with science activities and resources for children, parents and educators.

**WonderScience** ([www.chemistry.org](http://www.chemistry.org)) is a webpage with chemistry activities for kids in 4th grade and up, hosted by the American Chemical Society.

### Take Time To Share Science



Science is part of our everyday lives, from waking up to the rising Sun to cooking meals in the kitchen. So there are lots of opportunities to share science with your daughter. And if you're not a scientist – that's okay! Just have fun being with your daughter, wondering and learning together.

How do fish breathe underwater?

Why does the Sun rise in the east and set in the west?

How are shadows made?

## Thinking Like a Scientist

Science is a way of understanding our world. It's all about asking questions and searching for answers. Many of the skills your daughter uses every day are the skills of a scientist – observing, asking questions, gathering information, interpreting information, sharing information, and coming up with new questions. These are important skills to have, no matter what career your daughter chooses to pursue.

Many of the skills your daughter uses every day are the skills of a scientist . . .





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in Science, Math, and Technology

### A Guide for Parents Grades 4 – 7

For additional copies of this guide or its companions, *Science Can Take Her Places! A Guide for Parents* (Grades K – 3) or Spanish versions of these guides, please

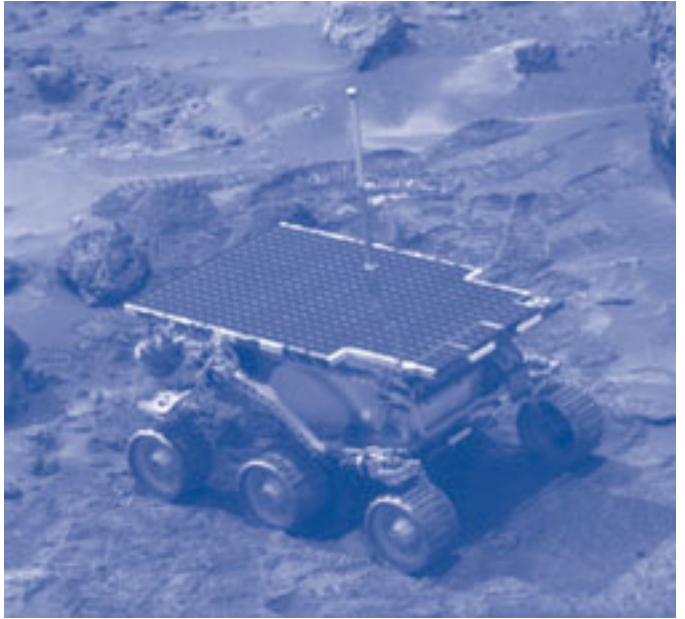
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