



expanding  
your **horizons**

motivating young women in science + mathematics

# Workshop Leader Packet

Produced with the support of our friends at Chevron

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#Δ∞⊙Σμ3⊠⊙1597μ3÷δ+≥Na±1≠6f8+J4Δ2γ  
+8/4≈2π@Σ15±≠6f8+J4≈2π7@\*

# THE BASICS

*Workshops are the core of every EYH conference. This section is all about the basics, the “Meat & Potatoes”, of a great workshop.*

## First Off!

*Thank you for agreeing to become an Expanding Your Horizons workshop leader and welcome to the EYH family!*

**T**his packet has been designed to help you understand more about what is involved in participating in an Expanding Your Horizons conference. In this packet you will find useful information about how to plan an exciting, dynamic and interactive EYH workshop experience. In addition, you will also find resource materials to help you better understand the psychological needs of teenage girls. If you have any questions about any of the materials presented in this packet, please do not hesitate to contact The Expanding Your Horizons Network national office at: (510)430-2222.

More information can be found on the website: [expandingyourhorizons.org](http://expandingyourhorizons.org).

## Let's begin!

**E**YH hands-on workshops are the “meat and potatoes” of every EYH conference. In conference evaluations, students repeatedly report how much fun they had participating



*The girls learn that a career in science is possible and achievable!*

in the workshops. Hands-on, interactive workshops keep girls returning to conferences year after year.

A hands-on workshop involves activities that girls DO. As they participate, they find that math and science can be fun. They become more curious about math-related careers and see that a career in the sciences is achievable. It's the hands-on versus lecturing technique that produces these positive, often life-changing, results!!

## Great Hands-On Workshops!

**H**ands-on workshops provide a “can-do” experience that is too often missing in traditional science and mathematics classes. At EYH, girls see you, the professional woman, working with your hands and then they copy you. Even if they are not 100% successful the first time, this involvement gives the young women a positive sense of their capabilities. Many EYH veterans know that hands-on workshops are the heart of our program. But, developing great workshops requires preparation. This packet will give you some ideas about how to make your workshop shine.

This packet includes a number of workshop ideas and some ideas on an effective format. There are many ways to plan a fun hands-on workshop. It just takes a bit of thinking and a bit of creativity. We cannot stress enough the benefit of the approach being hands-on.

So why a hands-on approach? Here's why: The 1995 AAUW report "Growing Smarter" recognizes three of the key factors in girls' academic success. These are: a hands-on approach to learning, single sex setting for non-traditional activities, and exposure to female role models. We urge you to attend to all of these factors to maximize the impact of your workshop.

## Some Tips:

*No matter what your topic, your workshop will shine, if you keep some of these tips in mind.*

1. Prepare more than you think you need. Have some puzzles and brain-teaser activities ready in case some of the girls finish early.
2. Be sure that enough materials are available for every group or each girl.
3. When possible, determine your room size before you plan your workshop. Don't assume your workshop will be held in a science lab. Some conferences don't have access to these types of facilities.
4. Bring an extra person or two to help you lead your workshop. Enlist the help of a friend!
5. Plan an activity to ensure everyone has a positive experience.
6. Don't make the workshop too long or complicated. Every participant should have the opportunity to feel successful!
7. Stress that the young women should take as much math and science as possible in high school and beyond, to best prepare for a satisfying career.
8. Talk frankly about your job likes and dislikes and give examples of how you use math and how often.
9. Leave plenty of time for questions, and *frequently check-in with the girls* to make sure they are understanding the content you are presenting.



*Girls learn about electronics through hands-on experiences making LED jewelry*

10. Make your wrap-up brief. If you like, encourage the young women to contact you if they have additional questions about the workshop activity or about what you do in your job.
11. *Don't give the girls the answers to all their questions right away.* Give them time to work it out for themselves. Don't overdo it and let it become frustrating. Let them work it out. Help them think it through logically.
12. And, extremely important ... don't forget to have fun! If the girls see you enjoying yourself, they will have fun as well. Remember, we want them to leave your workshop with an enhanced attitude toward math and science.
13. Talk with someone else who has previously led a hands-on workshop for teens. The EYH Network can put you in touch with workshop leaders if need be.
14. Think of an activity that girls will have FUN doing and will help them understand what you do.

## Practice makes perfect!

*Be sure everything works as expected. Be sure you have enough time for your introduction, your activities, and questions.*



Clearly state how the hands-on activity relates to what you do everyday! Begin your activity helping the young women understand how it relates to what you do each day, or how the concepts relate to knowledge you need to do your job effectively.



Set up enough equipment, stations, or work areas so that there are not more than four girls in any one group. If there are too many girls, some will just sit back and watch with a bored look on their faces.



Encourage teamwork. Too many girls may result in detachment, but one girl by herself may experience a problem and have difficulty working alone.

## What do I say at the start of my workshop?

It is very important that you spend a small amount of time thinking about how you will introduce your workshop. It is **IMPERATIVE** that you begin your workshop with an introduction about yourself.

It's **VERY** important for you to talk about your background and about why, for example, you decided to study math. The young women want to hear about you!

## Typical layouts for workshops:

First, young women spend 10 to 15 minutes rotating through each of several stations. Each station features different but related activities.

Second, young women work continually at a single activity that has two or more phases.



*Introduce yourself! The young women want to hear about you!*

## Here are some ideas you might want to talk about:

*Where do I work?*

*How long have I been at my current job?*

*What classes did I take in high school and college that helped prepare me for my job?*






*What other types of work did I do before the job I now have?*

*What advice would I give young women who are interested in a similar career?*

*How does my family life impact my job?*

## Career Panels

*Some EYH conferences have career panels as a part of their conference experience. If you've been asked to participate on a career panel, here are some tips to help you plan what to say:*

-  Find out how many girls you will be addressing and how long you will have to address them.
-  Talk about what you like about your job and what you don't like.
-  Talk about some people who influenced and mentored you. How did they help you achieve your goals?
-  Is your salary satisfactory? Let the girls know!
-  How do you combine your personal life with work?



*Career panels are an integral part of an EYH Conference.*

# SAMPLES & EXAMPLES



*A catchy title and upbeat delivery can really grab their attention*

## Workshop Examples

*The following are several examples of successful hands-on workshops that professionals have presented at EYH conferences. These may provide insight into how to customize your own workshop most effectively. Note the catchy workshop titles for the conference brochure.*

**Career:** Veterinarian

**Title:** “Oh, You’re Such An Animal”  
or “The Great Animal Detective”



**B**ring in several “calm” animals on the day of the conference, animals such as cats, dogs, rabbits, guinea pigs, rats, and/or birds. Ideally, be joined by a female animal technician. Together, discuss the different levels of science training required for your work.

*Using these workshop examples to help plan your hands-on workshop, you can make ‘em say WOW!*

After instruction, and with assistance from professionals, have the attendees work in teams listening to the animals’ heartbeats and lung function and using instruments to check the animals’ ears. Have them watch you give a shot and then perhaps duplicate this action by giving a shot to an orange. You can then discuss how to keep an animal calm during the examination, what to look for in healthy vs. sick animals, and why different kinds of animals have different heart rates.



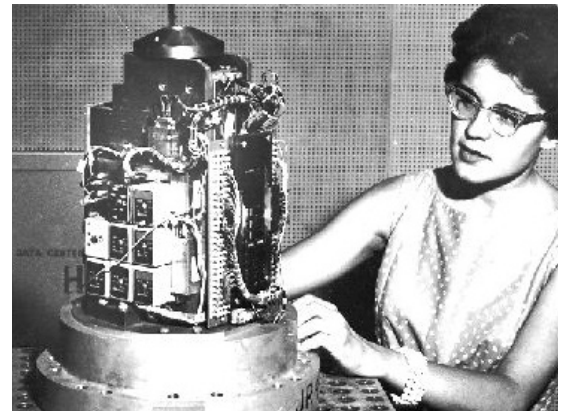
**Career:** Forensic Scientist

**Title:** “The Science of Sleuthing”  
or “The Mystery of Science Files”

**B**ring various materials to illustrate scientific detective skills. Bring microscopes and blown-up photos of hairs to discuss the difference in various hair

types. Have the girls attempt to identify the difference between human hair and animal hair. Have them then examine each other's hair strands and see if they can identify whose strand belongs to whom. Have the girls scrape a dried substance from a fabric and try to figure out what the substance is. Discuss how a forensic scientist matches threads from a crime scene.

Perhaps have the young women fingerprint each other to see if they can figure out "who done it" from fingerprints they have lifted from material.



*Betty Carrell was one of the first woman engineers. In this 1961 photograph she is examining a telemetry package in an environmental testing lab.*

## Check-in, not out!

*During your workshop, it will be helpful to periodically "check-in" with the students. You may want to ask them a series of open-ended questions, such as:*

- How is the pace of the workshop?
- What questions do you have about the material?
- What are you learning that you didn't know before?
- What about this workshop did you find the most interesting?



*Demonstration of sonic wave principles at a recent San Diego EYH*

**Career:** Engineer

**Title:** "Turn Up the Heat!"

**T**his is a very practical workshop where the students see how science, mathematics, and engineering affect their everyday world. Design a workshop based on energy-efficient buildings. Then do something hands-on to illustrate temperature and thermal conductivity. Discuss insulation and what makes some materials good insulators and some not. In one workshop, the presenter had a number of hot plates all turned to the same warm, not hot, setting. The students put different materials on top of the hot plates and, after a few seconds, put their hands on the materials to see which were conducting heat. The presenter had sheets of copper, aluminum, and steel (all of the same thickness), fiberglass insulation, glass, and sheet rock. The participants discussed home lighting, i.e. how to get the same level of lighting in a home using different types of light bulbs, and note which types used the least amount of energy.



## Title Wave

*Want to create a great title to attract the girls to your workshop? Here are some ideas:*

### Accounting/Investing/Banking

- Banking: Our Job Has Interest
- Real Women Figure It Out
- Accounting: Not Just Numbers
- How to Make a Million

### Agriculture

- A Wide Open Field
- Can You Dig It?
- Let's Dig In and Get Our Hands Dirty

### Architecture

- You've Got to Draw the Line Somewhere
- Spaced Out
- Building Your Future

### Astronomy

- Are There Stars in Your Eyes?
- Starlight, Starbright, First Star I See Tonight
- Funtime with Sunshine
- Want to be an Astronaut?

### Auto Mechanics

- Miss Goodwrench
- You Can Fix It

### Aviation

- Just Plane Fun!
- The Sky is NOT the Limit

### Biochemistry

- In Search of Your Origins

### Biology

- CELLebration
- Honey I Shrank the...
- What Would Your Skin Say If It Could Talk?
- Going Batty

### Botany

- Many Faces of Fungi
- Flower Power
- Get A Blast From Protoplasts
- SEX in Plants

### Chemistry

- Kitchen Table Chemistry and Junk
- Ooey Gooley Polymers

### Computer Technology

- Love at First Byte
- A Bit of Basic Goes a Long Way
- First Byte of the Apple
- We Have Designs on You

### Construction

- If I Had a Hammer

### Dentistry

- Tooth or Consequences
- The Tooth, The Whole Tooth, and Nothing but the Tooth
- More Than Drill, Fill and Bill
- Dental Hygienist: More Than Just a Cleaning Lady

**Drafting**

- You've Got to Draw the Line

**Ecology**

- Snails, Beetles, and Flies, OH MY!
- Rainforest on a Roof
- Waste Not, Want Not
- Pesticides, Are They Getting to You?

**Engineering**

- The Chicken or the Egg?
- Women Engineers (We Don't Drive Trains)
- Testing Spaghetti Strength

**Engineering: Aerospace or Piloting**

- Cleared for Takeoff!
- Beyond the Horizon
- The Sky Is Not The Limit!
- Tinkertoys and Airplanes

**Engineering: Civil**

- Designing the Road to Your Future
- You Build?
- You Gotta Know the Territory

**Engineering: Electrical or Electricity**

- Conduct Your Way Through Engineering
- You Light Up My Life
- Shocks and Surprises

**Engineering: Mechanical**

- Ms. Goodwrench: Space Age Mechanic
- Springs and Swings
- The Shape of Speed

**Engineering: Petroleum**

- From an Oil Derrick to Your Lipstick Tube
- Let's Get Crude

**Entomology**

- Beauty and the Bugs
- Don't "Bug" Out - They're Just Insects

**Firefighting**

- The Heat is On
- Feel the Heat! Catch the Action!
- Smoke Gets In Your Eyes
- You Light 'Em, We Fight 'Em (smoke jumper)

**Fisheries**

- Wild Work

**Forensics**

- Who Took the Cookie From the Cookie Jar?
- Invisible Evidence
- How to Make Crime Pay
- Wild Work

**Mathematics**

- Earthquakes and Geometry
- Magic Squares
- Mung Beans And Mathematics
- 'Mean' Big Brothers and 'Modal' Little Sisters
- Geometric Creations

# WORKSHOP DESIGN

Learn how to format an engaging workshop from these examples:

## Workshop Formats

Once you have decided on a workshop theme and title, it's important to plan the workshop format. We have provided a few samples for your review. Each is 60 minutes long. These examples are designed to help you present and pace your workshop, as well as help you get a better idea of an effective workshop format.

### Something Fishy

**Career:** Marine Biology



**Supplies:** Marking pens; 11" x 17" yellow and gray colored paper; pencils; masking tape; plastic probes; one whole fish per 2 students; worksheets; career information sheets and follow-up activity.

#### I. Introduction and Career Definition:

*Time: 15 minutes*

**H**ello, my name is Dr. Karen Fisher and I am a Marine Biologist. I am here today to show you some things I do as part of my job. But, before we dive in, I would like us to talk about how I became a Marine Biologist and what exactly Marine Biologists do at work.

My interest in Marine Biology began in junior high school when I first saw the ocean. Later in high school I went to a Marine Biology science camp. I remember thinking it was exciting because I got to do different experiments and learn a lot about fish. I would like to spend a few minutes

talking to you about what I do in my daily work. Then I would like you to talk to the person next to you about two things.

First, try to come up with a definition of a marine biologist that you both agree with. Please write your definition on the gray sheet of paper. Second, please list three things you think a marine biologist does. Write these three things on the yellow sheet of paper. Let's take a few minutes for this.

#### II. Collecting information:

*Time: 2 minutes*

**I**would like your attention now, please. Would one of you please bring your definition to this wall and tape it up with masking tape. The other person, please take your list of three tasks to that wall, and tape them up.

### brain candy

*If you yelled for 8 years, 7 months and 6 days, you would have produced enough sound energy to heat one cup of coffee.*

**III. Using information:***Time: 2 minutes*

Let's look at these definitions for "marine biologist." I see many of you have a pretty clear definition of what the term "marine biologist" means. It is, in fact, someone who studies plants and animals from the sea.

Now let's look at the things you think a marine biologist does. This is a pretty good list. I do some of these things, like [points to examples from lists]. I also [continues with list of things that she does on her job].

**IV. Hands-on activity:***Time: 35 minutes*

Now that you know some of the things I do as a marine biologist, let's do something that is part of my work.

In front of each pair of you is a whole fish in a tray, a plastic probe and a worksheet. The worksheets contain questions like how many fins are on the fish? Where are the eyes located? Where is the mouth located? What kinds of teeth are in the mouth? Each group has a different kind of fish, and all of these fish can be found at the local fish markets. This is what you will do for the next 25 minutes. Please look at the worksheets. These worksheets are to be used to record information about your fish, and using the observations about your fish, to describe the habitat of your fish, the place where it lives. At the end of the 25 minutes, we will discuss your observations and conclusions.

First, let's answer one question on the worksheet together. How many fins are on your fish? [Many girls call out answers.] Write this number down in the appropriate space on the worksheet.



*Show the girls your favorite aspects of your career, then let them try!*

Are there any questions? [Wait at least 30 seconds.]

If not, let's go to work.

*During the time that the girls are working with the fish, Karen Fisher walks around the room interacting with the girls about their observations, etc. She answers questions, clarifies information, and helps girls draw conclusions from observations.*

**V. Closing:***Time: 15 minutes*

Please stop working with your fish now. I would like to hear from each group about the observations and conclusions you developed about the habitat of each fish. Would one group like to go first? [Waits 30 seconds, no volunteer.] OK, then I would like this group to give us their observations about their fish.

[Two girls report observations.] Now what was your description of your fish's habitat? [Girls answer.] Thank you. Now let's hear from this group.

*All groups finish reporting observations and habitat description.*

I have enjoyed sharing some things about my job as a marine biologist with you today. Here is some more information about what marine biologists do, and some additional activities about body structure and functions that you can do using plain old fish from you local fish market. Thank you for your time.



*A good workshop should be interesting and fun for all participants*

## Chemixtures & Chemysteries

**Career:** Chemist

*In this activity, the students will be mixing a mystery liquid (cabbage juice) with mystery powder (citric acid and baking soda) to see what happens.*

**Supplies:** Baking soda, citric acid, large zipper bags, small zipper bags, red cabbage juice (to make: boil a few purple cabbage leaves in a liter of water for 5 minutes, discard leaves, refrigerate or freeze until needed), goggles, paper and pencils to record observations.

Before the conference make the following for each pair of students: 2 large bags, each with 30 grams of baking soda and 20 grams of citric acid; 1 small bag with 30 milliliters of cabbage juice, 1 small bag containing 30 milliliters of water.

### I. Introduction:

*Time: 5 minutes*

**H**ello. My name is Dr. Elly Mentz. I am a chemist. Today, we are going to practice a bit of science detective work. But, before we begin, I would like us to talk a little about how I became a chemist and what exactly chemists do at work. My interest in chemistry started in my high school chemistry class when we did our first lab experiment. I remember thinking it was exciting because I got to try different things and learn from my choices. Now, I work in a laboratory at NASA.

### II. Defining Career:

*Time: 5 minutes*

I've introduced myself and my job; why don't we try to come up with a definition for what a chemist is. [Write down students' answers on chalkboard.] Good. Those are great definitions. When asked, I sometimes describe a chemist as [give a definition you like]. Now I want to hear some ideas about what you think a chemist does at work. [Write down about 5 responses.] This is great. I do some of these things [point to list] and I also [elaborate with job specifics].

### III. Hands-on Activity:

*Time: 40 minutes*

**O**K, one quick thing before we start, each of you needs a partner. I would like one of you from each pair to fold a piece of paper in half. We will be performing two experiments and need to record our observations separately. At the top on the left side write "Mystery Liquid," on the right side write "Water." Now, we are ready to be chemdetectives!

Begin by putting on your goggles. One of you will be the recorder for the first half of our experiment. Then you will switch. I want both of you to make observations for both parts of the experiment. Let's make a few now.

Why don't you and your partner take a minute or two and record a few observations about the mystery liquid and the powder: e.g., check for smells, colors, and whether the liquid is warm or cold.

*Wait for them to write down observations.*

Now, carefully open the small bag with the purple liquid inside. Have your partner open one of the large bags. Gently pour the small bag of mystery liquid into the large bag and seal the large bag shut. Turn the bag over so the powder and liquid mix. Record all the changes in color, smell, volume, temperature. . .write down anything and everything!

*Give them time to notice the transformation!*

Wow! That was exciting! I am going to write some of your observations on the chalkboard. Someone tell me something you noticed before the materials were mixed? [Listen to remarks.] OK, how about observations made during the reaction? What about after the reaction calmed down? Do we have any guesses about what the mystery liquid might be? What about what the powder might be? [Students might guess the liquid is vinegar and the powder is baking soda.]

Now, trade jobs. If you recorded last time, now you will perform the experiment and your partner will be the recorder. We will repeat the experiment as before, but this time use the bag of water. Remember to be careful pouring it into the larger bag. We want to try and repeat our experiment exactly as before so we can learn by comparing the results.

*Wait for the girls to perform the experiment*

Can I have your attention? I want to record your observations. Who wants to tell me what they noticed? Did anyone else notice that too? Now does anyone have a new guess about what the mystery liquid is? How about the powder? Did this experiment tell us anything about the mixture?

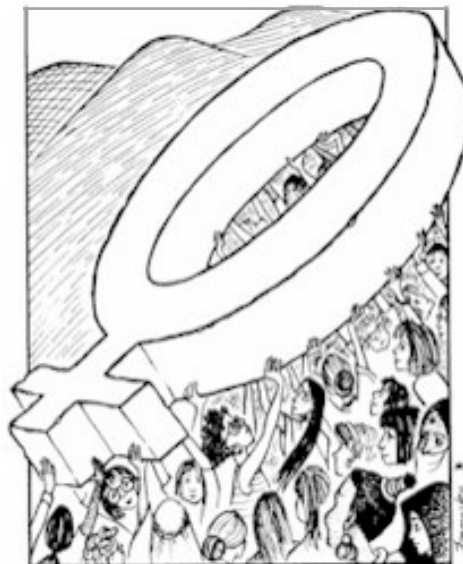
*Allow for some guessing about the substances before revealing their identities to the students.*

#### IV. Closing:

*Time: 40 minutes*

OK, I promise not to keep you in suspense any longer. The purple mystery liquid is actually cabbage water. I boiled a few purple cabbage leaves in water. A liquid acid and a dry base mixing, as in a vinegar and baking soda volcano, didn't cause the reaction. It was actually caused when we wet a dry acid and a dry base. The reaction was ready to go in the bag, and all it needed was water to allow it to get going. In this case the dry acid and base were baking soda and citric acid. In place of citric acid we could have used tartaric acid (cream of tartar) or crushed vitamin C tablets. So, if you want to show your friends how to do this, you might already have the ingredients you need at home.

I hope you enjoyed being chemdetectives. Of all the parts of my job, performing experiments and analyzing results, like we did today, are two of the best!



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## Sample Workshop Planning Sheet

Use this mini-lesson planning sheet to help you plan and create your own workshop.

**Session Title:** “Root Beer, Cheese, and a Kiss”

**Target Grade Level:** Grade 6 – 8

**Start Time:** 9:00am    **End Time:** 10:30am    **Room:** S215

### Goals of the Workshop:

- To help girls learn a little about what chemists do
- To provide a hands-on science experience that is fun

### Workshop Objectives:

- The girls will learn about different types of mold and mold spores
- The girls will make their own root beer and each be able to take home one bottle

### What I Want to Share About Myself:

- I love my job because it’s so much fun to play with different ingredients!
- I like to skydive.

### Activities and Timeline

- 5 min.** Introduce self; tell about job
- 5 min.** Overview of activities; group girls for rotations
- 40 min.** Girls rotate through activity stations (mold, intro to root beer, cheese) 10 minutes per station, 2 minute cleanup
- 10 min.** Students begin to make their own root-beer
- 10 min.** Examine final mold spores
- 5 min.** Clean up
- 10 min.** Wrap-up: “Now that you’ve seen mold close up, what other types of mold can you think of?”  
“What other things undergo a fermentation process?”  
“What do you think you learned?”

### Resources/Materials Needed:

- 25 12oz bottles
- 25 bottle caps
- 1 bottle capper
- 1 gallon root beer extract
- 1 10 gallon plastic tub
- microscope
- 2 large wooden spoons
- 3 bags sugar
- cheese
- mushrooms
- paper towels
- timer

# THE GIRLS

*Teenage girls are all different. This section will help you in working with adolescents.*

**T**o help you prepare your presentation, we want to remind you what it was like to be a teenage girl and to refresh your memory about her world. Your audience primarily will be girls aged 12 to 17. Your Program Committee contact can tell you the actual age range in your workshop.

Behavioral and thinking patterns, rather than age, indicate the development stage of the girls. Some will demonstrate more cognitive development than others. They will be more mature. The attention span of the girls will vary greatly as well. Watch students as their minds begin to wander, especially when you are talking directly to them. If you notice wondering eyes, or excessive talking, consider this as a signal to move on to the next step.

Girls in early adolescence are very focused on themselves. Early adolescents tend to think that they are special or different, that no one understands how they feel and, at the same time, that nothing bad can happen to them. They believe that everyone else is watching them at all times and passing judgment on their appearance and their behavior. They also are watching everyone else.

## Who are adolescent girls and, how do I work with them?

*Presenters serve an important purpose in the lives of many young women who attend EYH workshops. We know that many workshop leaders do not interact with young women on a regular basis and therefore may not appreciate the importance of their roles as models for the young women who meet them. Being a role model is one of the most important functions you can perform as an EYH conference workshop leader.*

## DID YOU KNOW?

**A typical conference attendee, having been born after 1990, will most likely have never...**

- ...seen an 8-Track tape or a cassette tape
- ...played Pong
- ...lived in a world without cell phones
- ...had a Pet Rock





*In early adolescence girls begin to seek the company of adults other than parents who can serve as role models and provide support and guidance.*

## Girls Are Different From Boys

Research indicates that many adolescent girls experience a genuine, substantial drop in self-esteem and self-confidence. Though boys also experience a drop in self-esteem at this age, the experience is much greater for girls. Lowered self-esteem for girls is accompanied by a loss of enthusiasm for math and science, a decline in performance on standardized science tests vis à vis boys, less confidence in their academic abilities, and fewer aspirations to professional careers.

### Other Differences

- Girls are more likely than boys to be concerned about their physical appearance.
- Girls are twice as likely as boys to be depressed. Their depression is often linked to negative feelings about their bodies and their appearance. It might also be due to new raging hormones.
- Teen girls are often less assertive and less aggressive than boys, and more dependent on others for approval and support.
- Girls at this age are more sensitive to pressure to conform to sex roles than are younger girls.

- Girls begin to become more accommodating to what they perceive as appropriate feminine behavior.
- Girls are less likely than boys to have access to computers and other forms of advanced technology.

**Remember:** In your position as a role model your messages of encouragement can do a great deal to bolster the sagging self-confidence of the young women you meet. You can shape the lessons taught to girls about themselves, their place in school, and their future in society. Be as positive as you can about them and their opportunities.

**Your message will be heard!**

### At this age girls are beginning to:

- form their own identities
- learn about romantic intimacy
- strive toward self-reliance
- develop a value system



*Girls vary a great deal at this stage.*