FINAL
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MATH SCIENCE NETWORK
Mills College
5000 MacArthur Blvd.
Oakland, CA 94613
(510) 430-2222

May 8, 1995

Barbara Hastings
NASA Ames Research Center
JAS:241-1
Moffett Field, CA 94035

Re: Grant # NAG 2-335
Principal Investigator: Dr. Cynthia E. A. Palmer

FINAL SUMMARY OF RESEARCH

This document constitutes the Final Report of the Math/Science Network to **NASA Ames Research Center** regarding Grant NAG 2-335. Thanks to the generous support of **NASA Ames** this past year, and for many years previous, the Math/Science Network and our flagship program, **Expanding Your Horizons in Science and Mathematics™**, continue to succeed at encouraging young women to take courses in mathematics, science, and technological subjects.

One of the primary indicators of our success is the number of conferences held nationwide in any given year. In 1983-84, the year before we received the **NASA Ames** Grant, only 60 Expanding Your Horizons™ Conferences took place.

NASA Ames support under grant NAG 2-335 began during the 1984-85 conference cycle, with an original grant dated 11/1/84. In that conference year, the number of Expanding Your Horizons™ Conferences increased to 73 sites, an increase of 20% over the previous year.

Since 1984, the number of **Expanding Your Horizons™** sites has risen steadily. Contact with our sites, supported by NASA, enabled the Resource Center to engage in a constant cycle of materials improvement. Including many sites who have used our materials every year, over 95% of **Expanding Your Horizons™** sites continue to rate the packet materials developed and distributed by the Math/Science Network as important to the conduct of their conference. Many sites tell us that they could not host

a conference without the Organizational materials to frame their conference, and without the Student and Adult materials to distribute to attendees. (Packets enclosed)

The number of **Expanding Your Horizons in Science and Mathematics™** (EYH) Conferences held during the 1993-1994 conference year remained steady at **128**, a number achieved in the face of declining local support from school districts, state departments of education, and corporations. Conferences were held in **32 states**, more than ever before. The current conference cycle, 1994-1995, during which NASA funding ceased, will see, we estimate, close to 140 registered sites!

Both the Network office and local EYH organizing committees worked extremely hard over the past decade to maintain and support as many EYH sites as possible in the face of recessionary pressures. We redefined much of our conference material, sought out additional low-cost publications and souvenirs for the sites, and provided additional information to help sites in fundraising, publicity, workshop development, and student recruitment.

This past year the office redoubled its efforts to support current sites, to reinitiate conference volunteer committees in areas where no registered conferences occurred last year, and to extend EYH to new sites, especially to states and communities without an EYH conference. This concentrated effort produced conferences in new states and an expanded presence of EYH conferences in the Southeast and Mountain states.

Since the first conference was held at Mills College in Oakland, California in 1976, we estimate that over 340,000 girls have attended EYH conferences. Over 230,000 of these girls attended conferences during the period of NASA support.

During the 1993-1994 conference cycle, we estimate that at least 36,300 girls attended EYH conferences. Of these girls, we estimate that at least 8,000 girls, approximately 22%, were members of minority groups. We continue to develop materials and to work with local groups to develop outreach strategies to traditionally under represented groups.

Support from NASA was instrumental in the development of outreach to minority girls. With that funding we helped sites to develop small mentoring programs with professional women mentoring young women students. We also used that funding to develop materials to help sites hone outreach to minority communities, as well as to educate our staff to be better able to provide telephone support to sites intent on increasing the participation of under represented groups.

An additional primary indicator of our success is the number of requests for listings of the Network in resource material, and requests for written contribution and testimony regarding **Expanding Your Horizons™** from various levels of government.

This past year the Network was invited to testify about **Expanding Your Horizons™** to the House Committee on Science, Space, and Technology subcommittee on Energy. A panel of four groups testified at a hearing entitled "Women and K-12 Science and Mathematics Education." Dr. Rebecca Failor, past President of the Board of Directors of the Network, testified on June 28, 1994, and noted the support of EYH by **NASA Ames Research Center** as part of that testimony. (Enclosed- Testimony of Dr. Rebecca Failor).

We consider another, somewhat unexpected, measure of our success to be the fact that, even after a decade, materials developed for 1985 and 1986 conferences continue in use in school districts throughout the country. Telephone calls this past year brought this fact to our attention. One district even requested that we send them updated salary information so they could continue to use the material !

Travel funds provided by **NASA** made possible visits to Washington and Montana, enabling a Network representative to engage in in-depth conversations with conference organizers, both new and old. Those visits provided us with comparison between sites supported by organizations, such as AAUW supported sites in Washington, and those supported by state agencies, such as sites in Montana.

The visits also provided us with new ideas, suggestions, feedback, criticism, and requests that would have been hard to gather in a telephone call or at a workshop leaders conference. The visits provided us with information about the different needs of conferences split between high school and middle school students, the different needs of conferences entirely composed of 7th grade girls, the difficulties and solutions to drawing girls from wide geographical areas, and other data and information unique to personal contact.

Indicators of the success of **Expanding Your Horizons in Science and Mathematics™** lie many places. They lie in the continuously increasing number of conferences. They lie in the continuously increasing number of girls and adults who attend those conferences, the expansion of the geographic area where conferences take place, and the enthusiasm of the girls who attend and the women who serve as role models. They lie in the long term devotion and dedication of volunteers and paid staff who organize the conferences, the partnership of private and public enterprises that fund the local conferences, and in the increasing recognition that the nation is better served when all of its citizens are equally encouraged to study mathematics and science and to pursue careers in those fields.

NASA Ames provided invaluable support for the national coordination of **Expanding Your Horizons™**, for the development and production of the materials distributed to students and adults attending conferences, and for production of organizational materials distributed to the grass-roots groups and other groups who organized the conferences.

We are extremely grateful to the decade of support from **NASA Ames** and for its dedication to increasing the participation, retention, and advancement of girls and young women in mathematics, science, and technology. We look forward to some measure of a continuing relationship with **NASA Ames** for many years to come.

Cynthia E. A. Palmer Ph.D.

Cynthia E. A. Palmer, Ph.D.
Principal Investigator

cc: Aaron Hatch, Technical Officer
NASA Center for Aerospace Information
File

Expanding Your Horizons in Science and Mathematics

Adult Packet
1994

Compiled for EYH Conferences by:
Math/Science Network
Mills College
5000 MacArthur Blvd.
Oakland, CA 94613

Adult Packet Content List

A Parent's Math and Science Resource

Women's Association Listing

Excerpt from "Real Girls Don't Do Maths" by Sue Willis

What is Family Math?, EQUALS, Lawrence Hall of Science, Berkeley, CA

Startling Statements, EQUALS, Lawrence Hall of Science, Berkeley, CA

Articles (4):

" Women Scientist, Engineers Seek More Equitable Industrial Environment," February 8, 1993, *Chemical & Engineering News*

"Key Issue: Mentoring," March 13, 1993, *Science*

"Creative Solutions: Foundations Lend a Hand," March 13, 1993, *Science*

"Creative Solutions: Electronic Mentoring," March 13, 1993, *Science*

Current publications list of the University of Wisconsin Women's Studies Library

Publication list from EQUALS

Association for Women in Science brochure

Math/Science Network Membership form

For Presenters:

Tips for Teaching Girls

What are Girls Thinking About?

A PARENT'S MATH & SCIENCE RESOURCE

Minority Women in Science (MWIS), a national network of chapters involved in projects to facilitate the entrance of minority women in science careers. They publish a quarterly newsletter, *Reporter*, and a quarterly journal, *The Bulletin of Science, Technology, and Society*. Contact: American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC., The Directorate for Education and Human Resources, (202) 326-6670.

Sourcebook for Science, Mathematics, & Technology Education, provides information about the people, programs, and organizations involved in the nation's current efforts to improve the quality of science, mathematics, and technology education. It contains a resource a list of programs targeting under-represented groups. Contact: American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC., The Directorate for Education and Human Resources, (202) 326-6670.

The Hispanic Mother–Daughter Project, 100 teams of eighth–grade girls and their mothers participate annually in this project, which builds on the strong mother–daughter relationships intrinsic to Latino families. Concentrating on career development and college preparation, program staff encourage participants to pursue professional training. Contact: Joanne O'Donnnell, Associate Dean of Students, Arizona State University, Temple, AZ 85287-0512, (602) 965-6547.

The Women's Equity in Education Act Publishing Center, offers a free catalog of books that have inexpensive and gender fair resources for the classroom, workplace, community and home. Contact: WEAA Publishing Center, Inc., 55 Chapel St., Suite 200, Newton, MA 02160, (800) 225-3088.

Science Books & Films, a review of journals of science materials for younger students and general audiences, publishes some 1,500 critical reviews of books, films, video, filmstrips, and software in all the sciences for all ages. American Association for the Advancement of Science, 1333 H Street, NW, Washington, DC., The Directorate for Education and Human Resources, (202) 326-6670.

Science Education News, is an interdisciplinary tool to inform readers of science, mathematics, and technology education activities. The newsletter is published ten times each year. It informs the science education community about activities related to school and community-based science, mathematics, and technology education carried out by AAAS, its affiliates, and other organizations. The newsletter is sent at no charge. Contact: same as above.

Science–By–Mail ™, is designed to encourage children to explore the process of science. Elementary and junior high school students are paired with professional scientist, who serve as pen pals, in a process of solving science challenge packets. Three time each year participating children receive a *Science–By–Mail* ™ packet, which consists of series of activities, a science challenge, and some tools to solve the challenge. Contact: Program Manager, Museum of Science, Science Park, Boston, MA 02114, (617) 589-0437.

1994 EYH Adult Packet produced, in part, by a grant from the **Intel Corporation**

Women's Association Listing

Association for Women Geoscientists
Macalester College Geology Department
1600 Grand Avenue
St Paul, MN 55105-1899
(612) 696-6448
FAX (612) 696-6122

The Association of Women Soil Scientists is a small one, about 150 members at this point. Most members work on the professional level (i.e. have B.S. or M.S. degrees) with the federal government (USDA -Soil Conservation Service or the USDA - Forestry Service) Those with Ph.D.'s tend to be employed by either research universities or the USDA Agricultural Research Service. The Chair of the executive committee is:

Mary West
USDA Soil Conservation Service
600 FCS Building
375 Jackson Street
St. Paul, MN 55101-1854

We do not have a speaker's bureau (not big enough), but Mary could point people in the right direction to find a speaker locally or within a given region.

Diane E. Stott
USDA-ARS-MWA
1196 Soil Building
National Soil Erosion Research Lab
West Lafayette, IN 47907-1196
Internet: stottd@ecn.purdue.edu
FTS2000: A03destott
Phone: (317) 494-6657
FAX: 494-5948

American Association of University Women (AAUW)
Educational Foundation
1111– 16 St NW
Washington, DC
(800) 225-9998

American Chemical Society of Women Chemists
1155–16th St., NW
Washington, D.C. 20036
(202)872-4600

Association for Women in Computing
41 Sutter St., Suite 1044
San Francisco, CA, 94104
Phone (415) 979-8450.

1994 EYH Adult Packet produced, in part, by a grant from the **Intel Corporation**

Association for Women in Science (AWIS)
President Ellen Weaver
1522 K St. NW, Suite 820
Washington DC 20005.
(202) 408-0742, (800) 886-AWIS
Fax: (202) 408-8321

Dues are on a sliding scale, depending on your salary, with a maximum of $55. you get a very good bi-monthly newsletter with articles pertaining to women in science, plus grant and job listings. AWIS is affiliated with AAAS so you can go to AAAS meetings at the member rate, and get special mailings of issues of Science, such as last year's women in science issue. For more information call AWIS at 202-408-0742, or write: Association for Women in Science Suite 820, 1522 K Street NW, Washington, DC 20005.

Association for Women Geoscientists
Macalester College Geology Department
Dr. Jeanette Leete, President
1600 Grand Avenue
St Paul, MN 55105-1899
(612) 696-6448
FAX (612) 696-6122

AWG is quite active, with a national conference each year, good representation at a number of the professional meetings, a speakers bureau of women scientists who speak on quite a variety of topics, and quite a few local chapters.

Center for Women Policy Studies
2000 P St., NW
Washington, DC 20036

Colloquium Speakers List of Women in Physics
APS
335 East 45th Street
New York, NY 10017

Committee on Women in Science and Engineering
National Academy of Sciences, Harris Building
2001 Wisconsin Ave., NW
Washington, D.C. 20007
(202) 334-2000

1994 EYH Adult Packet produced, in part, by a grant from the **Intel Corporation**

International Network of Women in Technology (WITI)
4641 Burnet Avenue
Sherman Oaks, CA 91403
or Carolyn Leighton, WITI@cup.portal.com, (818) 990-1987

Mid Life Women Workplace Hearings:
The Department of Labor has requested that all women interested in influencing policy on the issues of mid life women in the workplace attend (and/or speak) the following hearings: December 2, 1992, Denver, CO, December 4 Los Angeles (California State Office Bldg., 107 So Broadway Auditorium, Room 1138. Madeline Mixer, Regional Administrator for the Department of Labor 415 744-6711.

Minority and Women Doctoral Directory
4104 Los Arabis Dr.
Lafayette, CA 94549
(510) 283-2220

National Coalition of Girls Schools
228 Main St
Concord, MA 01742
(508) 369-1484.

National Science Foundation (NSF)
1800 G St., NW
Washington, D.C. 20550
Faculty Awards for Women: (202) 357-9639 or (202) 357-7461
Research Initiation Considerations, Research Planning Grants, and Career Advancement Awards: (202) 357-7456
Visiting Professorships for Women: (202)357-7734

Sigma Delta Epsilon/Graduate Women In Science (SDE/GWIS)
Box 4748
Ithaca, NY 14852

Society of Women Engineers (SWE)
National Headquarters
President Anna Salguero
345 E 47 St
New York, NY 10017
(212) 705-7855

Women's Committee Council of Graduate Schools in the U.S.
Dean of Graduate Studies and Research
Appalachian State University
Boone, NC 28608
(704) 262-2130

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WEPAN (Women in Engineering Programs Advocates Network)
Member Services Office
Civil Engineering Bldg. G-293
Purdue University
West Lafayette, IN 47907
(317) 494-5387

WEPAN has compiled a Catalogue of Resource Materials for Women in Engineering Programs which includes: Program Funding, Program Offerings, Professional Networks, Publications Available, and Prevalent Issues. There is a cost involved with receiving the catalog and it is available on disc (MAC or DOS format) and hard copy.

Materials
teaching mathematics effectively and equitably to females
available for $5 from ERIC Clearinghouse on Education, Box 40, Teachers College, Columbia University., NY 10027 (212)-678-3433

Women in Astronomy Slide Set
$39.45 from Astronomical Society of the Pacific, women's slide orders, 390 Ashton Ave, San Francisco, CA 94112. California residents add sales tax.

1994 EYH Adult Packet produced, in part, by a grant from the **Intel Corporation**

An overview of the changing definition of the 'problem of girls and mathematics'

Over one hundred years ago there were arguments about the inclusion of mathematics in the curriculum for girls. Even amongst those most committed to girls learning mathematics, however, many believed that girls were physically, emotionally and intellectually ill-equipped for the serious study of mathematics. For example, Dorothea Beale, a leader in the higher education for girls movement, stated in 1868:

> . . . I do not think that the mathematical powers of women enable them generally – (their physical strength, I dare say, has a great deal to do with it) to go so far in the higher branches, and I think we should be straining the mind (which is the thing of all things to be most deprecated) if we were to try to force them to take up such examinations . . . (quoted in Clements 1979, p. 317)

In Australia twenty years ago, it was still widely and complacently believed that girls are mathematically less able than boys. While most of us had grown past the view expressed by Dorothea Beale, on the whole we regarded the existence of gender differences in mathematics achievement unproblematically since it provided yet another confirming instance of our deep-rooted belief that women were the weaker sex – physically and intellectually. Indeed, the commonsense notion of the 1960s was that girls could not, need not and would not want to do advanced mathematics – or at least not to the same extent as boys.

During the 1960s researchers began to 'explain' girls' low achievement in mathematics. ('Why *can't* girls do as well as boys in mathematics?' they asked.) In 1964, Smith, a Scottish psychologist, published a book in which he argued that sex differences in mathematical *ability* could be explained by genetically determined differences in spatial ability. At the time of publication, the book and the issue were of little interest outside the particular academic field of psychology. Within a decade, however, the climate had changed both in Australia and internationally. In educational circles most people now talked of mathematical *achievement* rather than of mathematical ability (although talk of the male mathematical gene continues to appear in the media with disconcerting regularity). Mathematical and spatial achievement were at the centre of a nature/nurture debate on gender differences, fuelled in part by competing psychological theories of intelligence, but also by the various political movements of the 1960s and 1970s which exposed as flawed the biological determinism used to justify class, race and gender differences in educational and occupational experiences.

By the early 1970s, the reputed lower achievement and participation of girls in mathematics was regarded as a problem – especially for the girls! Many people had come to consider it appropriate that girls be prepared for a wider range of employment opportunities than they were previously. It was still understood, of course, that girls achieve less well than boys in mathematics, but there had been a subtle, although significant, shift; less often did we ask, 'Why *can't* girls do as well as boys in mathematics?' and more often, 'Why *don't* girls do as well as boys in mathematics?'

A considerable research literature which focused upon 'affective influences' on girls' achievement in mathematics developed during the 1970s. For primary and secondary school levels, and contrary to some common beliefs, little evidence was found to show that mathematics was enjoyed by girls any less than by boys, and attempts to relate mathematics achievement to liking or disliking the subject, on the whole, failed (see reviews by Atweh 1980 and Schofield 1982). Similarly, explanations of difference were sought in studies of 'achievement motivation' which were, in turn, related to differential societal expectations of girls and boys with regard to assertiveness, independence, competitiveness, 'success avoidance' and so on. In Australia, Leder (1977, 1980a, 1982), following Horner (1972), studied the relevance of the 'fear of success' construct to 'mathematically able' girls. The effect of task variables, such as the context in which problems are set, on the relative success of girls and boys (Leder 1974, 1976) and the effect of the sex stereotyping of textbooks (Carss 1982; Grimison 1982) were also explored. The belief that girls do not do well at mathematics remained largely unchallenged until the late 1970s when researchers began to express doubts even about that.

It is perhaps only a slight oversimplification to suggest that the commonsense conception of girls and mathematics thirty years ago was that there was no problem, it was 'only natural' that girls could not, did not and would not want to do mathematics. Twenty years ago, however, that girls *could not* do as well as boys in mathematics had come to be regarded as a problem worthy of the attention of psychologists and educators. Ten years later, fuelled in part by the increasing popularity of 'social' explanations of educational achievement, but also by the re-emergence of feminism amidst social, political and economic change, the problem had also changed. We no longer asked why girls could not but rather why they *did not* do as well as boys at mathematics. Now, in the late 1980s, the problem has become why girls *will not* do as well as boys, why they choose to participate less. For many who are concerned with equal opportunity, today's problem is that girls limit their post-school options by choosing not to study certain mathematics courses; for others, it is the waste of talent implied when girls, as a group, 'underparticipate' in mathematics. In either case, the solution is seen to be to require that more girls be encouraged to undertake more mathematics.

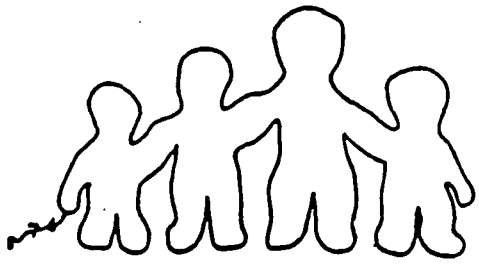
Reprinted from *Real Girls Don't Do Maths'*,
Sue Willis, Deakin University Press, 1989.

WHAT IS FAMILY MATH?

FAMILY MATH is a way for the adults and children in a family to enjoy doing mathematics together. Many parents would like to help their children with math but don't know how to begin or what to do.

FAMILY MATH classes:

- usually are offered as a series meeting from four to six weeks
- are offered by teachers, parents, retired persons, or community workers in a school, church, community center, or home
- usually are taught by grade levels (K-2; 3-4; 5-6; 7-9), although many different combinations are used
- usually meet for an hour-and-a-half to two hours
- include the topics of logical thinking, number, geometry, probability and statistics, measurement, estimation—concepts covered throughout the K-8 mathematics curriculum
- give parents an overview of the mathematics topics covered at various grade levels and explanations of how the FAMILY MATH activities fit in
- give parents and children opportunities to develop problem-solving skills and to build an understanding of math concepts with "hands-on" materials



PROBLEM SOLVING

By problem-solving skills we mean ways in which people think about how to solve a problem using such strategies as looking for patterns, drawing a picture, working with a partner, or eliminating possibilities, etc.

Having a supply of strategies helps eliminate the frustration of not knowing how or where to begin solving a problem. Having more strategies increases confidence, improving willingness to tackle new problems, and resulting in better problem solvers.

HANDS ON

By "hands-on" materials, we mean concrete objects, such as blocks, beans, toothpicks, etc.,—household items—which are used to help learners picture and conceptualize problems.

RESOURCES AVAILABLE

The FAMILY MATH book (available in English, Spanish, and Swedish) provides full instructions and activities for families to do at home or in class as well as information on how to set up a FAMILY MATH course. A 17-minute film, showing scenes from several FAMILY MATH classes is available for purchase. For more information about the FAMILY MATH/MATEMATICA PARA LA FAMILIA Projects, please contact either Virginia Thompson, Mary Jo Cittadino, José Franco, Bob Whitlow, Karen Mayfield, Grace Dávila Coates, or Helen Raymond at:

FAMILY MATH
Lawrence Hall of Science
University of California
Berkeley, CA, 94720
Office: (510) 642-1823
Mary Jo Cittadino/Network:
(510) 528-0560

¿QUE ES MATEMATICA PARA LA FAMILIA?

MATEMATICA PARA LA FAMILIA es una manera de gozar juntos el estudio de las matemáticas entre los adultos y los niños en una familia. A muchos padres de la familia les gustaría ayudar a sus niños con las matemáticas pero no saben cómo empezar o qué deben hacer.

Las clases de MATEMATICA PARA LA FAMILIA:

- por lo general se ofrecen como una serie de cuatro ó seis semanas de clases
- se ofrecen por los maestros, padres de la familia, los jubilados, o trabajadores comunitarios en una escuela, iglesia, centro comunitario, o en casa
- por lo general se pueden presentar por niveles agrupados de grados (K-2; 3-4; 5-6; 7-9), aunque ocurren muchas variaciones
- por lo general se reunen por una hora y media ó dos horas
- se incluyen los temas de pensamiento lógico, aritmética, geometría, probabilidad y estadística, medición, estimación—los conceptos que se introducen a través de todo el programa de estudios matemáticos de kinder a octavo grados
- provee a los padres una sobrevista de los temas matemáticos para los grados correspondientes y explicaciones de como los materiales de MATEMATICA PARA LA FAMILIA sirven para reforzar estos conceptos
- provee a las familias oportunidades de desarrollar destrezas útiles en la resolución de problemas y ganar un entendimiento de las matemáticas a través de actividades que envuelven la manipulación de objetos concretos.

LA RESOLUCION DE LOS PROBLEMAS

Por destrezas para la resolución de problemas entendemos las formas en que se aprende cómo pensar sobre un problema, utilizando estrategias tales como buscando patrones, dibujando figuras, trabajando con un compañero, o eliminando posibilidades, etc.

El tener una fuente de estrategias alivia así la frustración que se siente cuando no se sabe cómo ni dónde comenzar. Mientras más estrategias se tengan, más confianza se gana y más se mejora la habilidad para resolver problemas.

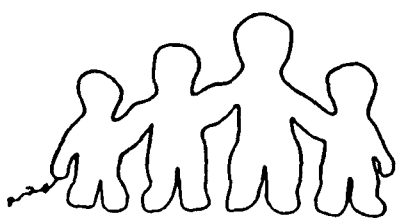
OBJETOS CONCRETOS

Por "la manipulación de objetos concretos" nos referimos al manejo de materiales concretos y comunes, tales como bloques, frijoles, palillos de dientes, etc., los cuales se utilizan para ayudarnos a todos a entender y a resolver los problemas.

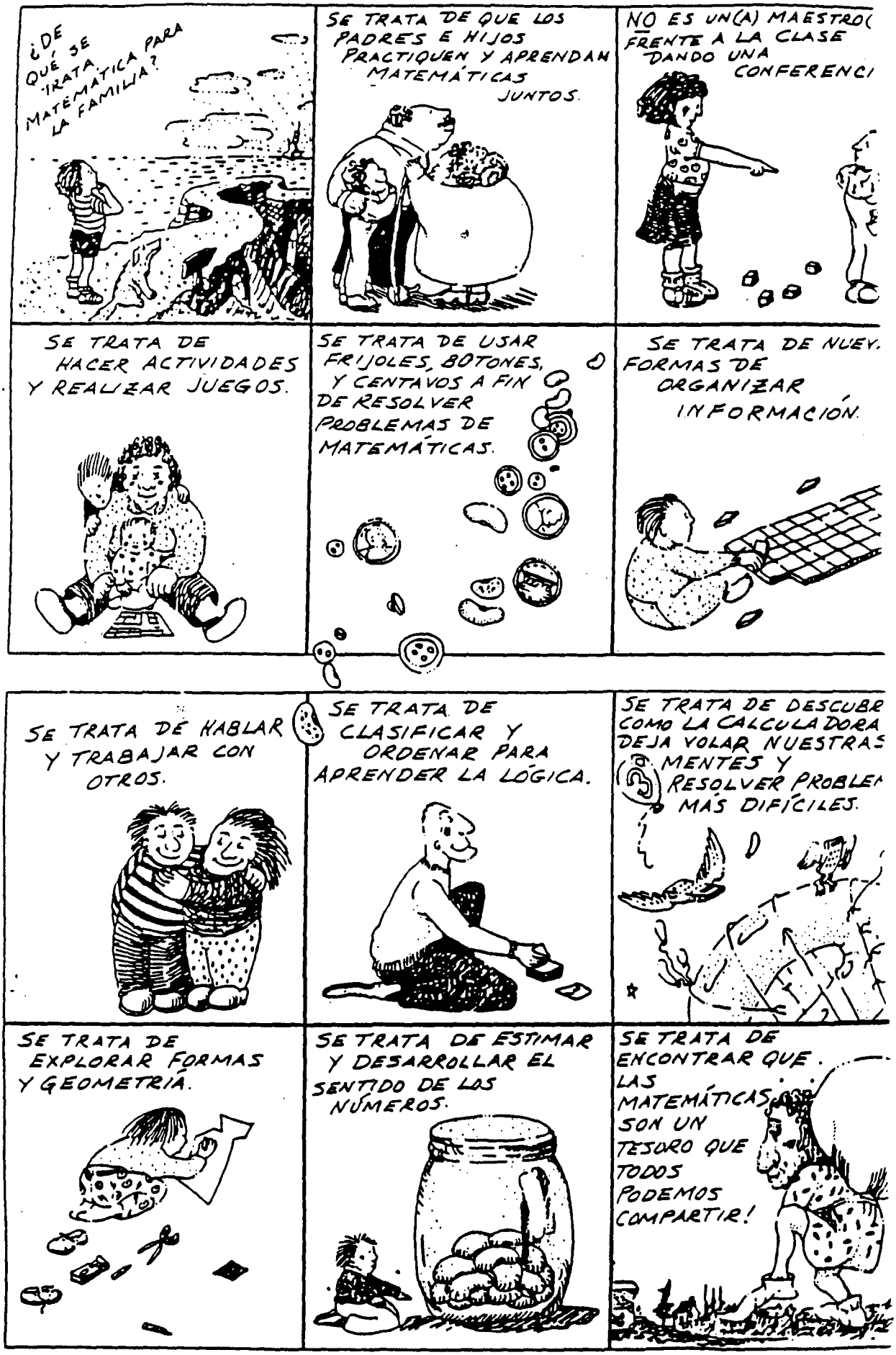
RECURSOS DISPONIBLES

El libro, MATEMATICA PARA LA FAMILIA (en español, inglés y sueco), provee instrucciones completas y actividades para las familias para hacer en casa o en una clase y además, información sobre cómo organizar un curso de MATEMATICA PARA LA FAMILIA. Una película de diez y siete minutos se vende y incluye escenas de algunos cursos de MATEMATICA PARA LA FAMILIA. Para más información de MATEMATICA PARA LA FAMILIA/FAMILY MATH, diríjase a José Franco, Grace Dávila Coates, María José Cittadino o a Virginia Thompson.

MATEMATICA PARA LA FAMILIA
Lawrence Hall of Science
University of California
Berkeley, CA 94720
La Oficinia: (510) 642-1823
María José Cittadino/La Red:
(510) 528-0560



WHAT IS FAMILY MATH?



WHAT IS FAMILY MATH?

FAMILY MATH SITE LIST

For further information about the FAMILY MATH program and inservices for those who wish to prepare themselves to teach FAMILY MATH classes to parents and children in their own schools and communities contact:

Virginia Thompson, Director
FAMILY MATH
Lawrence Hall of Science
University of California
Berkeley, CA 94720
510-642-1823

Mary Jo Cittadino, Coordinator
FAMILY MATH/MATEMATICA PARA LA FAMILIA Network
Lawrence Hall of Science
University of California
Berkeley, CA 94720
510-528-0560

Or for regional information:

CALIFORNIA

Fresno
Elizabeth Sullivan
Fresno County Office of Education
2314 Mariposa
Fresno, CA 93721
209-488-3332

Los Angeles
Geri Clark
Los Angeles County Office of Ed.
9300 East Imperial Highway
Downey, CA 90242-2890
310-922-6817

Orange County
Ed Rodevich
Orange County Office of Ed.
200 Kalmus Drive, Building B
Costa Mesa, CA 92626-9050
714-966-4320

Riverside County
Judy Anderson
Riverside County Office of Ed.
P.O. Box 868
Riverside, CA 92502
714-369-6408

San Diego
Leigh Childs/Dinorah Whitehead
San Diego County Office of Ed.
6401 Linda Vista Road
San Diego, CA 92111-7399
619-292-3806/Leigh
619-569-5398/Dinorah

ARIZONA

Virginia Sterling
Valle del Sol
1209 South First Avenue
Phoenix, AZ 85040
602-258-6797

COLORADO

Martye Pollard-Cole
Department of Education
201 E. Colfax
Denver, CO 80203
303-866-6763

CONNECTICUT

Mj Terry
Hartford Public Schools
Curriculum Office
1240 Albany Ave.
Hartford, CT 06033
203-722-8938

IDAHO

Barbara Eisenbarth
Idaho Department of Education
Len B. Jordan Building
650 W. State St.
Boise, ID 83720
208-334-2186

ILLINOIS

Steve Jordan
Office of Math & Computer Ed.
M/C 249
University of Illinois at Chicago
Box 4348
Chicago, IL 60680
312-996-2439

INDIANA

Charles Payne
Department of Secondary Ed.
Ball State University
2000 University Avenue
Muncie, IN 47306
317-285-5466

MAINE

Jackie Mitchell
DECS
State House Station #23
Augusta, ME 04333
207-289-5925

MARYLAND

Rhett Lewis
National Urban Coalition
Lee Plaza, Suite 500
8601 Georgia Ave.
Silver Spring, MD 20910
301-495-4999

MASSACHUSETTS

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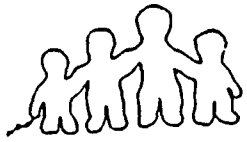

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STARTLING STATEMENTS

1. Latina/o Americans constitute approximately 9% of the U.S. population. What percent of the U.S. teachers are Latina/o American?

2. The National Council of Teachers of Mathematics (1989) *Curriculum and Evaluation Standards for School Mathematics* state, "all students will have a calculator." What percent of grade 8 students reported having unrestricted use of calculators in their math classes?

3. About 1% of construction workers are women. What percent of secretaries and typists are women?

4. The median annual earnings of full-time male workers with a professional degree is $70,284. What do full-time female workers with a professional degree earn?

5. The National Council of Teachers of Mathematics (1989) *Curriculum and Evaluation Standards for School Mathematics*. state, "A computer will be available at all times in every classroom." What percent of grade 12 students had at least one computer in their mathematics classrooms?

6. How many of the 2054 living members of the National Academy of Sciences are women?

7. What percent of 1992 African American high school graduates enrolled in college the following fall?

8. What percent of high school mathematics teachers majored in mathematics?

9. What percent of Native Americans in urban high schools drop out before graduating?

10. What percent of states mandate that schools adopt written policies that prohibit sexual harassment?

11. The United States has one Asian American senator. How many Asian Americans are members of the House of Representatives?

12. What percent of the 50 state school superintendents are women?

13. What percent of the 24 members of the National Science Board are women?

14. What percent of U.S. residents speak a language other than English at home?

1993 Startling Statements Answers

1. Less than 3%	Planchon, P. *Highlights of Minority Data from the Schools and Staffing Survey, 1987-88.* U.S. Department of Education, Office of Educational Research and Improvement.
2. 19%	Council of Chief State School Officers. *State Indicators of Science and Mathematics Education, 1993.* Washington, D.C. (p. 4).
3. About 99%	U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings.* January 1992.
4. $42,604	U.S. Department of Commerce, Bureau of the Census, *Money Income of Households, Families and Persons in the United States: 1991.* August 1992.
5. 20%	National Center for Education Statistics, U.S. Department of Education, *NAEPfacts.* Office of Educational Research and Improvement, March 1992.
6. 76	National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. (personal communication).
7. 49%	Vetter, B. *Scientific, Engineering, Technical Manpower Comments*, vol. 30, no. 4, June 1993.
8. 42%	Blank, R. and Engler, P. *Has Science and Mathematics Education Improved Since A Nation at Risk?* Science and Mathematics Indicators Project, Council of Chief State School Officers, State Education Assessment Center, January 1992.
9. 85%	Equity Coalition for Race, Gender, and National Origin, *Programs for Equal Opportunity.* School of Education, University of Michigan, Autumn 1992.
10. 4%	Linn, E. *Programs for Educational Opportunity.* School of Education, University of Michigan, February 1993.
11. 3	United States Department of Labor, *Women & Work.* Office of Information and Public Affairs, Washington, D.C., May 1993.
12. 18%	AAUW Educational Foundation, *The AAUW Report: How Schools Shortchange Girls.* Washington, D.C., 1992.
13. 4%	Vetter, B. *Scientific, Engineering, Technical Manpower Comments*, vol. 29, no. 3, April-May 1992.
14. 14%	U.S. Department of Commerce, Bureau of the Census, *Language Spoken at Home and Ability to Speak English for United States, Regions and States, 1990.* Report CPH-L-133, May 1993.

Comments on the 1993 Startling Statements

1. Latino/Latina Americans constitute approximately 36% of the U.S. minority population. They are the second largest minority group in the United States, with a mainland population of 22.35 million in the 1990 Census. (Where we have used Latino/Latina, the term "Hispanic" is used by the US Bureau of the Census to refer to Americans of Mexican, Puerto Rican, Cuban, Central and South American, and Spanish descent.)

2. The percent of students with unrestricted calculator use was positively associated with each state's average in mathematics proficiency. Only 3% of fourth graders were permitted free and open use of calculators in class. When taking tests, 2% of fourth graders and 34% of eighth graders were permitted to use calculators. Although there are some exceptions, more proficient students appear to have more opportunities to use calculators than their less proficient peers.

3. Weekly earnings of secretaries and typists average $357, while those of construction workers are about $483, a full $126 more every week.

4. These figures include full-time workers who are 25 years old or older. The figures do not include unemployed professional persons or those who work part-time. Some examples of professional degrees include medicine, dentistry, chiropractic, optometry, pharmacy, podiatry, law, and theology. The median annual earnings of all full-time working U.S. males, regardless of position or education, are $29,421. The median annual earnings of similar full-time working females are $20,433. The median annual earnings of other full time workers include:

European American males	$30,366
African American males	$22,075
European American females	$20,794
Latino American males	$19,771
African American females	$18,720
Latina American females	$16,244

5. About one-third of fourth-grade students had at least one computer in their mathematics classrooms, while one-fifth of eighth and twelfth grade students had at least one computer in their mathematics classrooms. Computer labs existed in the schools of 56% of students in grade 4, 61% of students in grade eight, and 79% in grade 12. These labs were not necessarily available for mathematics instruction.

6. Since its founding in 1863, the National Academy of Sciences has elected a total of 92 women and 3691 men. The first woman was elected in 1925, 62 years after the Academy was founded. The second woman was elected in 1931, and the third in 1944. This year, 75 new members were elected, 6 of whom were women. No figures are kept regarding race or ethnicity. The National Academy advises the government on science matters of national and international importance.

7. Women (65%) were more likely to enroll than men (60%). Fifty-seven percent of Latino/Latina Americans enrolled in the fall, while 64% of European Americans did so.

8. Of all science teachers, 54% majored in a science field. The percent of teachers with majors in mathematics varies by state from 20% in Louisiana to 62% in Kentucky. It varies in science from 31% in Louisiana to 73% in Minnesota and Missouri.

9. Native Americans have the highest drop-out rate from high school of any racial or ethnic group. Native Americans are 0.8% of the total U.S. population. About 770 Native American scientists and engineers are in the doctoral workforce, up from 200 in 1977. Wilma P. Mankiller, Principal Chief, Cherokee Nation of Oklahoma, heads the U.S. National Institutes of Health.

10. Two states, Minnesota and California, mandate that schools have sexual harassment policies. Of the 40 student-to-student sexual harassment cases currently before the U.S. Department of Education Office of Civil Rights, 19 involve K-12 students.

11. There is one African American senator and 20 African Americans in the House of Representatives. There are no Latina/o senators; there are 11 Latina/o representatives in the House. The Senate has one Native American and there are no Native Americans in the House. In the November 1992 elections, four newly elected women gained seats in the Senate, and 24 in the House of Representatives. This brings the total to 6 senators and 47 representatives—the highest representation of women in the history of the Congress.

12. Eighteen states elect their state school superintendents by popular vote; in 32 they are appointed. Of the nine women, eight were elected and one was appointed.

13. The National Science Board is the policy arm of the National Science Foundation. The only woman member is Marye Anne Fox. There is one woman on the President's Council of Advisors on Science and Technology, the top committee in the federal science hierarchy, Mary L. Good.

14. One in seven U.S. residents speaks a language other than English at home. The fastest-growing language is Mon-Khmer, spoken by Cambodians. Spanish is the most common second language, spoken by 17.3 million people. According to the Equity Coalition for Race, Gender, and National Origin, Programs for Equal Opportunity, University of Michigan School of Education, only 33% of students aged 5 to 14 who have limited proficiency receive any form of special programming responsive to their linguistic needs. Students who have limited proficiency in English represent a wide variety of ethnic/linguistic/cultural groups. They may be Navajo, Chinese, Hmong, Chaldean, Mexican, Russian, or members of another of the several hundred ethnic groups in the United States.

Women Scientists, Engineers Seek More Equitable Industrial Environment

California conference offers ways to effect change in workplace where 'old boys' network' leaves women feeling isolated, underutilized

Mairin B. Brennan, C&EN Washington

Women scientists and engineers who go to work in industry commonly encounter a less-than-friendly environment. Achieving executive-level status is rare. Taking time off to have a child is frequently perceived as a lack of commitment to the organization. Women feel isolated, cut off by the "old boys' network." These were the sentiments of speakers and participants at the second annual conference of the National Research Council's (NRC's) Committee on Women in Science & Engineering (CWSE), held last month at the Arnold & Mabel Beckman Center in Irvine, Calif.

But the two-day conference—"Women Scientists and Engineers Employed in Industry: Why So Few?"—was far from a platform for airing gripes. Instead, the 133 women and 14 men attending set about informing one another what must be done to help improve the industrial environment. Help, they agreed, comes at the price of individual responsibility, and the burden will fall largely on women to implement change. They must learn how to sensitize their male peers and managers to women's needs.

C&EN staff photos

Five CWSE committee members—from left, Charlotte V. Kuh, executive director, Graduate Records Examination Program, Educational Testing Service; Carola Eisenberg, lecturer in psychiatry, Harvard Medical School; Esther M. Conwell, research fellow, Xerox Corp.; Mildred S. Dresselhaus, Institute Professor of Electrical Engineering & Physics at Massachusetts Institute of Technology (committee chairman); and Betsy Ancker-Johnson, chairman of the World Environment Center—get together after panel discussion

The conference also looked at ways of attracting more women into science and engineering. Speakers included sociologists, psychologists, economists, engineers, physicists, chemists, mathematicians, computer scientists, and human resources specialists. Some women at the conference didn't want their managers to know they were attending. And others were hesitant to speak candidly.

White men no longer make up the absolute majority in the industrial workplace, but they are still the single largest group there, and they will remain so for years to come. In 2000, for instance, white males will make up 41% of the industrial work force in the U.S., down from 47% in 1985, according to Betty M. Vetter, executive director of the Commission on Professionals in Science & Technology. Among all scientists and engineers, 23% are women, according to the National Science Foundation's most recent data, which were collected in 1988. In industry, however, women make up only 16% of all scientists and engineers.

The atmosphere of exclusion that women often sense in industry was not seen as intentional, but as the heritage of a culture once overwhelmingly white male. The consensus at the conference was that many chief executive officers are unaware that bias toward women exists in their firms. Many also are unaware that all too often there is active resistance to dealing with women's issues. Gender diversity in industry has created a dilemma for both men and women. Men, even those who believe they think objectively, often don't have a clue as to what women want. Women, for their part, don't know how to go about getting what they want. "The problem," says Linda S. Wilson, chairman of NRC's Office of Scientific & Engineering Personnel and president of Radcliffe College, "is not for women to make their way, but for men and women to engage in mutual adaptation."

Attrition for women scientists and engineers in industry is high, except for women with Ph.D. degrees, Wilson says. Many leave within one to five years. "The chemical industry is feeling this acutely," she notes. Women with bachelor's and master's degrees more commonly leave after they have children, when inflexible work schedules conflict with the needs of child care, according to Anne E. Preston, associate professor of economics at the State University of New York, Stony Brook. Women leave industry at much higher rates than they leave academia, government, or nonprofit organizations, she says, and family matters, mentoring relationships, and mismatches of interests and career are among factors in their decision to leave.

Mentoring, co-op, and minority programs pay off

Being both a woman and a member of an ethnic minority could seem a double barrier to a successful scientific career in industry. But three such women were among the speakers at the National Research Council's conference, "Women Scientists and Engineers Employed in Industry: Why So Few?" In describing their own experiences, the three illustrated the importance of role models, early mentoring, and cooperative and minority programs in drawing more women into science and engineering.

Maria Quintana is an auto design engineer with the Pontiac design staff of General Motors in Warren, Mich. Her sister, Eugenia Kunzman, is an assistant scientist in molecular toxicology at Parke-Davis Pharmaceuticals. In 1976, when both were in their late teens, they were uprooted from Mexico when their father, an American citizen, moved his family of nine to Michigan. Neither spoke English, but Quintana had finished high school in Mexico. Kunzman, whose high school years in Mexico coincided with the family's move to a rural area when her father took up farming, had missed four years of school because, as she put it, "it wasn't considered proper for girls to ride a bus to school." Instead she helped her father with the farm.

Once in the U.S., Quintana elected to repeat high school. She enrolled in 10th grade and Kunzman in ninth. When Quintana graduated she wanted to study engineering or architecture, remembering her fascination as a child with an older brother's passion for architectural drawing. But her father discouraged her from choosing either career, so she spent four years in nursing school before deciding that being a nurse "would not be good either for me or the patient." She made up her mind to realize her dream and started over in Michigan's Macomb Community College, which had a cooperative program with General Motors.

Quintana, who is taking classes toward a B.S. degree in engineering, applauds GM for having several educational programs available to both women and men. She credits her success to determination and supportive coworkers, who often share child care responsibilities in the evenings so parents can attend night school. She believes one should "never turn down an opportunity."

Kunzman attributes her success to a "guardian angel" mentor—her high school English teacher who fortuitously was fluent in Spanish. This teacher encouraged Kunzman on all fronts, told her what women could achieve, even pushed her to take driver's education. When Kunzman passed this course, her father assured her she "didn't need a license, that he and her brothers would drive her." (She eventually got her license—at age 24, when she bought her own car.) Her English teacher persuaded Kunzman's family to allow her to participate in the Upward Bound program at Oakland University, Rochester, Mich. Upward Bound is a nationwide high school program for college-bound, predominantly low-income, minority students. Kunzman graduated from high school, placing seventh in her class of 400. She obtained a B.S. degree in biology in 1987.

Maria Quintana

One mistake she believes she made in college was not telling her professors how she had to struggle with English. Many times they thought she should be doing better than she was, given her high school achievement. She believes they would have been more under-

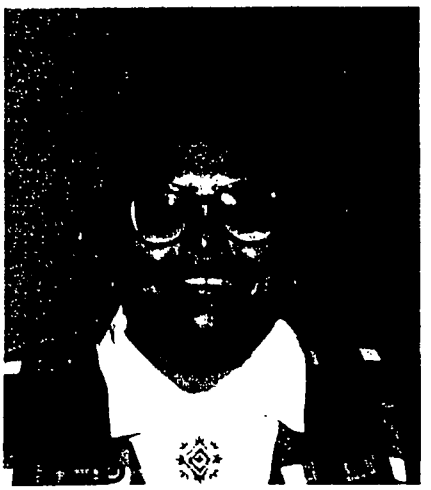
Human resources personnel and women's advocacy groups can be instrumental in achieving change—in getting a company to implement flexible hours, part-time work, or job sharing, for example. Naomi Behrman, coordinator of employee counseling services at AT&T Bell Laboratories, told the conference how she helped Bell Labs set up workshops on balancing work and family. Shirley C. McCarty, general manager of human resources for Aerospace Corp., recounted how a women's committee at Aerospace helped develop a maternity leave policy and bring benefits of nonexempt employees in line with those of the professional staff. But "advocacy groups can be ineffective unless they reflect the company's business bottom line," cautioned chemical engineer Deborah L. Grubbe, manager of Du Pont's regional engineering office, Linwood, Pa. The bottom line is that any change must benefit the company.

Sometimes the organization has taken the initiative. One arm of Xerox, Xerox Corporate Research & Technology organization, initiated a women's council to provide recommendations on how to make Xerox the employer of choice for women in science and engineering. Argonne National Laboratory has a two-year rotating position in which a woman scientist, as part of her job, devotes a percentage of her time to women's issues. A number of companies sent men to the conference to learn more about the issues women scientists believe to be hampering their careers. Clearly, many companies are moving toward change.

Employee turnover is costly to companies, and many have implemented child care, family leave, and other programs to help cope with a work force increasingly populated by dual-career and single parents. These policies make good business sense—when parents are relieved of anxiety about child care, they can be much more productive workers. Among the more innovative efforts brought to light at the conference were Alcoa Technical Center's policy to pay incremental child care costs when a single parent is on business travel; Bell Labs' lactation facilities for nursing mothers; and Dow Chemical's eldercare program.

Many companies, however, still practice blatant discrimination, according to Arlene A. Johnson, vice president of the Families & Work Institute in New York City. Some go so far as to break the law in an employment interview, asking whether a woman is married, has children, or is planning to have children. Several women at the conference believed that enforcing antidiscrimination laws would go a long way toward helping women. However, women who experience discrimination have the added burden of reporting it. Moreover, commented one speaker, "the enforcement agencies have been gutted." Johnson believes the key to discouraging discrimination "is to learn how to develop women as a minority group." As she explains it, women scientists and engineers in industry will be in a minority for many years, so targeted efforts should be made to advance their cause.

Eugenia Kunzman



Cynthia Martine

standing, and she too would have benefited, if they had known how much time she spent with her dictionary trying to translate biology textbooks.

Now fluent in English, Kunzman enjoys her work and finds the challenges rewarding. A new mother, she praises her company's prenatal counseling program. She likes the compressed workweek Parke-Davis offers in summer—longer workdays from Monday through Thursday but only four hours on Friday—because it gives her more family time on the weekend.

The third minority woman, Cynthia A. Martine, is a chemical engineer at Eastman Kodak in Rochester, N.Y. A Native American, she grew up in New Mexico thinking "an engineer was someone who drove a train" until the summer she participated in the Indian Resource Development Program at New Mexico State University, Las Cruces. That program sparked her interest in chemical engineering, and she subsequently graduated from New Mexico State.

Martine's parents are graduates of two-year colleges, her mother in nursing, her father in architecture. Her working mother was her role model; her older sister, who changed majors rather than quit while in college, gave Martine the tenacity to continue even though being a minority in her field made the going tough. Then Martine discovered the American Indian Science & Engineering Society and, for the first time, a sense of professional belonging.

When Martine was recruited by Kodak, leaving her family and the Southwest was difficult; nevertheless, she took the risk. "The first year at Rochester was rough," she says. Not only did she miss New Mexico, but she also was the only woman in a group of 26 engineers. She has worked hard to establish a rapport with her male colleagues and to increase her company's sensitivity to women's issues. She likes her job as a manufacturing engineer, and, as a new mother, is determined to combine family and career and "make things work."

Quintana and Kunzman speak eloquently on the obstacles faced by Hispanic women who go against family tradition in choosing a career. Both emphasize the importance of mentors or other facilitators who can intercede with parents and persuade them that having a daughter in a technical career is not so bad.

Differences among cultures present complex dilemmas. But they shouldn't hinder either a woman or a man from a rewarding industrial career, says James W. Mitchell, who is head of AT&T Bell Laboratories' analytical chemistry research department, a 25-year veteran in industry, and black. Mitchell presented the conference with a set of "genderless, transcultural" rules for successful longevity in industry. Among them: Measure your success by your own yardstick, and balance your professional and personal lives.

Resources are available for companies looking to change their policies or implement new ones. For example, the Families & Work Institute will consult with companies on work-family issues and recommend appropriate policies. Catalyst, a New York City-based not-for-profit organization that works with businesses to effect change for women, will review corporate policies and suggest modifications to provide optimum benefit. "We work with corporate task forces and human resources professionals, organize educational conferences, and advise corporate women's groups," notes Marion Yuen, vice president of research at Catalyst.

Myra H. Strober, a professor of education and economics at Stanford University, and her husband, Jay M. Jackman, a psychiatrist, sometimes act as mediators for companies seeking to break out of the traditional mold. Strober gives feedback on what's sabotaging women in the company; Jackman helps to communicate this to male executives. "Changing a business to accommodate women and minorities isn't easy," notes Strober, but she is hopeful that the Clinton Administration may help ease the way.

Mentoring and role models are crucial elements in bringing more women into science and engineering. A strong message echoed repeatedly at the conference was the importance of early mentoring, starting, if possible, in grade school. Guidance counselors and teachers frequently send subtle messages that channel women out of science and engineering, notes George Campbell Jr., president of the National Action Council for Minorities in Engineering and a member of the NRC committee that sponsored the conference. A family's cultural bias against women in nontraditional careers can also destroy a daughter's aspirations. Here a mentor could intercede with the family on the daughter's behalf. Women need mentors throughout their career, but they also must learn to be mentors—to both men and women. As women climb the career ladder, more mentoring will be needed of them and less will be available to them. A successful career in industry requires more than technical expertise, so women are advised to find "political" mentors as well as technical ones—people who know where power and opportunity exist in a company.

Responding to the need for mentoring know-how, the Association for Women in Science (AWIS) has compiled a self-help book that can be used both by women scientists and engineers who want to be mentors and women undergraduate and graduate students looking for mentors. "A Hand Up: Women Mentoring Women in Science" is scheduled for publication this month, according to Catherine J. Didion, executive director of AWIS. The association also has some funds available for mentoring.

Women were urged to learn how to build networks of communication and advice with other women and with men. Developing a network gives women more visibility and opens the door to lateral moves, promotions, or even moves to another

firm. Professional organizations are good networking grounds. So are electronic bulletin boards such as WISENET, established last year by the Center for Research on Women & Gender, at the University of Illinois, Chicago. Developed specifically for women in science and engineering, WISENET lists job opportunities, conference announcements, and calls for papers, and keeps up with women's issues. Systers, which is an electronic mailing list for women in computer science, could be replicated by other disciplines, points out Barbara Simons, a computer scientist and researcher at IBM. Systers was developed by Anita Borg, a consulting engineer at Digital Equipment Corp.

Professor of sociology Henry Etzkowitz of State University of New York, Purchase (left), with Dow's Davis

Full participation of women in industrial science and engineering careers, however, is unlikely until top executives become more "women friendly." One obvious solution is to get more women into top corporate positions. That's not so easy, however. Citing statistics from a report published last March in *Management Review*, Mary L. Good, senior vice president for technology at Allied-Signal Inc., points out that in 1990, 5384 men, but only 254 women, were directors at Fortune 500 companies, and only 175 women, compared with 6502 men, were officers. Corporations target specific profiles when filling such positions—for example, they may want the person to be a senior executive well versed in the international aspects of business or a prestigious member of the industrial or academic research community with recognized professional stature. Nobel laureates are among those who would fit the latter category, Good says.

Few women are high enough up in the corporate ranks to be considered for executive-level positions. "What drives these positions are the [high-ranking] officers," says Good. She stresses the importance of power in cracking the corporate network. "Power exists in corporate office staffs and corporate boards," she says, and women must be able to access it.

Executive women's networks can help—someone will know when a position is open and someone will know who's qualified to fill it. Good cites as resources both Catalyst and the International Network of Women in Technology (WITI). Founded by Carolyn Leighton, president of Criterion Research, Sherman Oaks, Calif., WITI's mission is to increase the number of women in key leadership positions. Another successful network she cited is a Chicago group that started a network by seeking out the 100 most influential women in the Chicago area, regardless of their line of work, because these women know where the power is. Good, a former president of the American Chemical Society, is disappointed that ACS's Women Chemists Committee has not addressed issues that face women executives in the chemical industry. A 25-year veteran of academia before moving to industry, she deplores academia's lack of understanding of how the corporate world works and its myopic view of corporate professionals as "second-class citizens," which discourages graduates from working in industry.

Women who aspire to posts as corporate executives must pay their dues by climbing the management ladder. One good omen for women may be that "many companies are moving away from hierarchical to team management," according to Aerospace's McCarty. Hierarchical, or vertical, management is highly structured, placing people into pigeonholes. Team, or matrix, management breaks down these barriers, because people from several areas of the company are involved in decision-making, and employees may have more than one manager. Being flexible and adaptable are key ingredients for achieving success in a matrix-managed firm. Women often have both of these traits. "The patchwork quilt of women's careers attests to their ability to adapt," notes Radcliffe's Wilson.

Rhetta Q. Davis, laboratory director of applied organics and functional polymers research at Dow Chemical, has firsthand experience of what it's like to work in team management. Davis manages about 90 employees, while also interacting with R&D, manufacturing, marketing, and sales. She believes matrix management offers a highly creative environment, where each individual is respected, and employees and managers can communicate with ease both within and across organizational lines. Employees are encouraged to express their ideas, identify problems, and be part of the solution. Their horizons are broadened by being exposed to multiple facets of the company so they often can target positions they would like to explore or that might better utilize their talents.

To function well in a matrix environment, one must have "excellent technical and interpersonal skills," cautions Davis. Dow offers a tremendous amount of training in these areas, including workshops on sensitivity and dealing with diversity in the workplace, she notes. And all employees are expected to spend part of their time in training.

Among other issues the conference addressed were the conflict between the timing of career development and a woman's "biological clock"; federal legislation to combat sexual discrimination and harassment of professional women in the workplace, such as a bill (H.R. 467) reintroduced last month by Rep. Constance A. Morella (R.-Md.); and the ingredients needed for success as a woman entrepreneur.

The conference radiated hope and a sense of community. The timing couldn't have been more auspicious, at the heels of the Year of the Woman and the dawn of an Administration that advocates change. Having a President who so openly values diversity can benefit women in all work settings. Having chief executive officers with daughters now joining the work force may go even further in benefiting women in industry. Their daughters and granddaughters are beginning to sensitize chief executive officers to women's issues, says Allied-Signal's Good. □

Key Issue: Mentoring

Women have trouble finding senior scientists to guide them toward career success.

by Ann Gibbons

By any measure, Sheila Widnall is a scientific success story. At 53, she is associate provost of the Massachusetts Institute of Technology (MIT) and the Abbey Rockefeller Mauzé professor of aeronautics and astronautics. One of the first women to win tenure and full professorship at MIT—in the early 1970s—she went on to win prestigious research and career achievement awards and fellowships in major engineering and science societies, including serving as president of the American Association for the Advancement of Science.

None of this would ever have happened, says Widnall, without a touch of mentoring at a crucial moment. "It didn't occur to me to go to graduate school until my mentor—a faculty member in our department—for some reason took a special interest in my career development," says Widnall. "He pushed me and pushed me and urged me to go to graduate school." And that pushing from Professor Holt Ashley (now at Stanford University) made the difference: Widnall was the only woman of the 12 in the MIT class of 1960 to go directly to graduate school.

Mentoring is a crucial part of the maturation of any young scientist into a senior researcher. Through a mentor a young scientist makes all-important contacts with meeting organizers, journal editors, and other researchers that lead to career advancement. The mentor can also help a young scientist develop his or her own scientific "style," choosing from among the welter of possible problems whose solution will lead to the greatest intellectual reward and career advancement. And finally, as in the case of Widnall, the mentor offers a precious commodity in a harshly competitive scientific world—encouragement.

Unlike Sheila Widnall, most women have a tough time getting this important guidance. At the top levels of science there are few women, and because of what Bernice Sandler, a psychologist and an expert on mentoring who works at the Center for Women Policy Studies in Washington, calls the "clone factor," men feel more comfortable mentoring other men. A recent study of female scientists by sociologists Kathryn B. Ward of Southern Illinois University and Linda Grant of the University of Georgia shows that many women lack mentors and that those who do have guides find them later in life than men do.

Mentor/mentee. Holt Ashley, Sheila Widnall

The price female researchers pay for lack of mentoring is often exacted at the beginning of their careers. "One of the things I'm finding is that some of these women seem to be coming out into the field less well prepared and socialized," says Ward, who examined 600 questionnaires from university physicists, chemists, and sociologists, which included detailed answers from more than 50 scientists about mentoring experiences. Those with no mentoring or negative experiences "seem to be floundering the first few years, in terms of grants and getting published. They often seem to get into jobs that are not a good fit, or are of marginal status."

But the fact that the traditional route to mentoring—working closely with a senior colleague—is often not available to women doesn't mean women get no mentoring. Indeed, female scientists report reaching out to find mentoring in unorthodox ways, beginning early on. "When I was in fifth grade, my father gave me his high school physics book," says Joyce Freiwald, a mathematician who is director of operations for General Atomic's Distributed Computing Solutions division. "When I was in seventh grade, he started teaching me nuclear and atomic physics. A lot of the women I know usually had a father who was very important in it all." Other women married scientists who supported their career choices at key times.

In addition, sociologist Ward notes that many early female scientists came from women's colleges, where they were mentored well by both male and female faculty and formed long-lasting alliances. A similar networking model is now being applied in electronic form by computer scientists who look to their female peers for support, encouragement, and inside tips (*see box on facing page*).

Although these strategies are innovative, the ultimate solution is likely to be increasing the number of senior women in science who can serve as mentors for younger female colleagues. As women like Widnall and Freiwald reach the highest ranks, they are raising consciousness by their example. In addition to mentoring their own students and younger colleagues, women like Susan Brainard, director of the Women in Engineering Initiative at the University of Washington, are actively lobbying and convincing universities to start programs to help keep women in engineering and science. The University of Washington's program now connects some 700 female engineering students with faculty mentors or senior students every year.

Surveying the field. Kathryn Ward's data show women have more difficulty finding mentors than men do.

These women are also spreading the word about the importance of mentoring—hoping to change male attitudes. "I always point out to my male colleagues that it is absolutely crucial to urge women to go to graduate school," says Widnall. "If that doesn't happen," she adds, "the chances of women getting graduate degrees are greatly reduced." It seems possible that from this patchwork of solutions—changed attitudes among male scientists, more females in senior positions, and innovative networks—the "mentoring deficit" for young women may soon be filled. ●

Creative Electronic Mentoring

A persistent problem for women scientists is a lack of the crucial contacts in the research community that young male scientists develop through mentoring and networking. In 1987 at an Austin, Texas, computer science conference, an innovative solution emerged in an unusual place: the ladies' room. Out of 400 conference attendees, only about 30 were women, recalls Anita Borg, a computer scientist at Digital Equipment Corp.'s Western Research Laboratory in Palo Alto, California. "We didn't run into each other except in the ladies' room," she says. "A few of us started talking about women's issues in there, and every time someone came in, they stayed. Pretty soon, we ended up with 10 women deep in conversation."

Soon there was the Systers network for female computer scientists—named from wordplay on "sisters" and "systems." The network has 900 members ranging from undergraduates to senior faculty. Their communications cover a broad spectrum: pleas for career advice, questions about who is doing research on a particular topic, requests for guidance on writing papers, even on what to wear when they present them at conferences (the answer: leave cocktail dresses at home and wear sensible clothes with a place to attach a microphone).

Systers, which Borg runs from her computer terminal at Digital (and which Digital underwrites), has made a real difference in the lives of some of the women who use it, including Ursula Wolz. In 1988 Wolz was a 32-year-old graduate student, wrapping up her Ph.D. in computer science at Columbia University, who was on the verge of abandoning her career in academics. She had always wanted to teach—she had a master's degree in education—but she had become discouraged by the atmosphere at Columbia, where she "watched the junior faculty go crazy" trying to juggle the demands of teaching, doing research, and having children.

Before bailing out of academia, Wolz, in a last-ditch effort, sent out a message on Systers—and the answers changed her mind. The one that had the greatest effect was from Nancy Leveson, a highly regarded professor of computer science at the University of California, Irvine, whom Wolz had never met. "She said, 'Don't give up on teaching,'" recalls Wolz. "She told me there are less conventional ways of having an academic career, and, as a result, I applied to all different levels of colleges and universities."

Today, Wolz is an assistant professor in computer science at Trenton State College in New Jersey. "I'm ecstatic," she says. "I like the department. I like the collegial atmosphere. I adore teaching." Without the electronic interaction—which amounted to a kind of mentoring—Wolz says she might not have been able to see that there was more than one way for a woman to have an academic career in computer science. "The women at Columbia are very committed to being research scientists in an academic setting," says Wolz. "If they had been my only role models, it would have been a tough decision."

Borg says: "There is something very useful about being able to get together with other women whom you have so much in common with....As a result of Systers, there are women's get-togethers, lunches, or dinners at almost every computer science department....Someone will send out a message saying they're going to a conference and can we organize a lunch? Sometimes it is depressing when you realize there are only 10 women at a conference. But sometimes, it is quite wonderful." **A.G.**

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Sister of invention. Anita Borg.

Speaking Out

PRINCETON

Princeton University molecular biologist Shirley Tilghman says she didn't encounter gender discrimination in her highly successful route to being a senior scientist. Her parents and teachers were so supportive that she says, "In a way, I've lived a Mary Poppins sort of existence." Indeed, until recently she believed women face few obstacles in becoming scientists. But recent experiences, including some at conferences, changed her mind.

"My conviction is that the unconscious biases against women are the last frontier that we face. But these are so subtle, so unintentional, and culturally bound that we must be ever-vigilant. Here is a serious example: In 1988, I ran a Gordon Conference on molecular genetics which was funded by the NIH. About 33% of the speakers and 45% of the attendees were women. Two years later, another conference on the same topic was arranged by some of my male colleagues. And only two of the speakers were women. I don't think you can attribute this to anything but an unconscious bias. In the biological sciences, there's been a tendency to think that we are doing so well that the problem is over. And most women would like to believe this. I believed it. But that is nonsense." **Virginia Morell**

Virginia Morell is a free-lance writer based in Ashland, Oregon.

Creative Solutions: Foundations Lend a Hand

Applied mathematician Anna Nagurney of the University of Massachusetts at Amherst is a Renaissance woman who holds degrees in applied math and Russian studies. She is also an expert in computers, which she uses to model complex business, transportation, and engineering problems. It's no surprise, then, that Nagurney won tenure in a record 4 years and was recently promoted to full professor. Even a rising female star like Nagurney, however, is grateful for the boost she got from two National Science Foundation (NSF) fellowships designed to help women advance their careers: the Visiting Professorships for Women and the Faculty Awards for Women. She calls the awards a "phenomenal" help. After getting them, she says, she could hire her own graduate students and get access to "computers that the males were dominating" without having to "bow down to the academic hierarchy." Programs aimed at keeping women on the track to tenure are a godsend in Nagurney's opinion, because although "there's a lot of pressure to hire female faculty...schools aren't very good at developing these resources once they get them."

The NSF fellowships are two of a handful of new programs that are trying to help women get over the tenure hump and help them gain "visibility" outside their own departments, says Margrete S. Klein of the NSF—visibility that women, sometimes isolated in their fields, have trouble obtaining. The Visiting Professorships for Women, begun in 1982, annually give 25 women funding to spend a year at a major university other than their own pursuing research. The Faculty Awards for Women free recipients from some teaching responsibilities, giving them more time to pursue research—with the help of $50,000 a year for 5 years. Little wonder that the program attracted more than 600 applications for 100 slots last year.

These NSF programs have been supplemented by private initiatives. One approach is to fund named professorships that give junior faculty prestige and the confidence to persist in academia—along with a healthy dose of funding. When Clare Booth Luce died in 1987, she left funds to provide support for women in tenure-track positions. So far, 30 women at 22 institutions have been awarded a total of $18 million as Clare Booth Luce professors. The awards range from $200,000 to $500,000 for 5 years, depending on the position and salary of the applicant.

Not everything is coming from the foundations: Women scientists themselves are banding together to give each other grass-roots support. At the Massachusetts Institute of Technology, an informal collaboration among female faculty, dating back to 1972, has helped many of the 50 or so women who have won tenure at MIT (out of a faculty of 936). The MIT women's network is now preparing a proposal aimed at setting up a special mentoring program for junior faculty women.

U. OF MASSACHUSETTS

Renaissance woman. Anna Nagurney.

These programs will succeed, say experts on the subject, only if individual institutions help them. "There is absolutely no substitute for commitment on the part of the university administration to equal opportunity," says MIT associate provost Sheila Widnall. "You have to have that at every stage in the process... in the search process, in hiring, promotion, mentoring, and in seed money for setting up labs." How well the universities heed this message will be crucial for the next generation of female scientists. **A.G.**

With reporting by Constance Holden.

Speaking Out

Susan Solomon

Solomon is an atmospheric chemist at the National Oceanic and Atmospheric Administration in Boulder, Colorado. In 1986, she was the first to propose a mechanism for how chlorofluorocarbons (CFCs) could cause a hole in the ozone layer—a theory she confirmed a year later with experiments in Antarctica. Her discovery led to international bans on the use of CFCs and numerous awards, including the Department of Commerce's gold medal for "impeccable science in the cause of humankind." In Antarctica, where Solomon led a team of 18 men, she got two distinctly different impressions of how men view women in science.

"We were flown down to the Antarctic on Navy aircraft, and our pilot came swaggering in in his flight suit. He looked at us and said, 'Who's in charge here?' And I said, 'I am.' He was taken aback for a second, but then he said, 'Good for you.' And more often than not, I've found men to be like that pilot—they actually enjoy the difference of working with women, or they just frankly like women."

"In Antarctica, we were the first new people that the over-winter team had seen in about 6 months. I was assigned a dorm room, which didn't have curtains, so I tacked up some cardboard and began to get undressed when I heard this squeak in the snow right outside my window. And sure enough, there was a Peeping Tom—welcoming me to Antarctica. So there I was in my bra and long underwear thinking, 'I bet this didn't happen to anybody else in my group.' **V.M.**

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WOMEN, RACE, & ETHNICITY: A BIBLIOGRAPHY (1991; project directors Susan Searing and Linda Shult). An annotated bibliography of print and nonprint listings on American women of various ethnicities.

Numerous topical bibliographies are part of the series ***Wisconsin Bibliographies in Women's Studies.*** Among recent titles: "Women and Science: Issues and Resources," by Susan E. Searing, update by Phyllis Holman Weisbard; "Brave, Active and Resourceful Females in Picture Books," sel. and annotated by Claudia Morrow"; "Finding Funding: Grant-Getting Tips for Women," by Phyllis Holman Weisbard; "Issues Related to Women and Management: A Selected Bibliography," by Marge Karsten; "Annotated Bibliography of Feminist Aesthetics in the Literary, Performing and Visual Arts, 1970-1990," by Linda Krumholz and Estella Lauter; and "New Reference Works in Women's Studies 1990/1-1992," by Phyllis Holman Weisbard. Forthcoming: "Feminist Perspectives on the Ethic of Care," by Virginia Dudley.

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National Coordinators of Expanding Your Horizons in Science and Mathematics Conferences

Tips for Teaching Girls

More boys than girls choose to pursue careers in math, science, and technology. Evidence suggests that boys get more encouragement to pursue these fields, and more encouragement to believe in their own academic skills in general. What can teachers do to change those odds?

Evidence shows that teachers give more classroom attention to boys than to girls. Examine your own teaching habits. Do you unconsciously do this? You can probably train yourself not to. Evidence also shows that the attention girls do get is more vague and less helpful and insightful. Try to give the girls in your classes specific, thoughtful responses that really help them learn and grow and challenge themselves.

Other evidence suggests that girls may learn better in cooperative settings, not competitive settings. You might try organizing your students into cooperative study groups. But evidence also suggests that mixed-sex work groups may be harmful to girls' progress and confidence because of the way boys and girls tend to interact. Same-sex work groups seem to work better for girls, although there is too little evidence to say for sure. According to the AAUW Report on How Schools Shortchange Girls, "Providing a structure in which all students answer questions, pose questions, and receive answers, rather than one that emphasizes target students or those who call out answers loudest, increases girls' opportunities and interest."

In general, any hands-on experience a girl can get before a topic is covered in class tends to give her more familiarity with the topic. This seems to be one of the advantages boys have in these fields: boys have encountered the ideas before, so it's easier to learn more about them. Anything you can do to increase a girl's exposure to scientific ideas before she encounters them in class is likely to improve her performance.

According to the AAUW Report, "Having students read and try out math and science problems before they are covered in class appears to narrow the 'experience' gap between boys and girls."

As a rule, try *expecting* more from girls. Developing their confidence in their own abilities is crucial.

Encouragement is also important. Those girls who *do* pursue scientific fields after high school "report that the encouragement provided by their teachers is very important."

Give it a little thought. You can make a difference in the statistics!

This information is taken from the AAUW Report, How Schools Shortchange Girls.

1994 EYH Adult Packet produced, in part, by a grant from the **Intel Corporation**

What Are Teenage Girls Really Thinking About?

To help you prepare your presentation, we want to remind you what it was like to be a teenage girl. The girls attending your workshop will bebetween 12 and 17; a member of your Planning Committee can tell you which specific ages you can expect.

What a teenage girl is thinking about:

- She wonders who she is.
- She's curious about the changes in her body.
- She wants a "better" body.
- She's thinking about boys.
- She's thinking about how to act with boys.
- She is rebelling, challenging, and questioning.
- She is becoming more independent.
- She's deciding what she believes in and what is important to her.

What she is like:

- She's egocentric (she focuses on herself).
- She feels she is special or different—that no one understands how she feels.
- She feels that nothing bad can happen to her.
- She believes everyone else is watching her and passing judgment on her appearance and behavior.
- She seeks the company of adults (besides her parents) who can be role models and give her support and guidance.

Girls vary a great deal at this stage. A girl's age isn't the best clue to her level of development, mentally or emotionally. Some adolescent girls can already think conceptually and hypothetically; some are still developing these skills.

How Girls Are Different From Boys

- Adolescent girls experience more serious drops in self-esteem than boys.

- Girls report *much less enthusiasm for math and science,* and less confidence in their academic abilities.

- Girls report less interest in professional careers than boys.

- Girls are more likely than boys to be concerned about how they look.

- Girls are less assertive and less aggressive than boys.

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- As girls learn that aggression and dominance are not considered " feminine," they develop sex-typed ways of being powerful: manipulating, flattering, excluding others from cliques, gossiping, competing with other girls for boys' attention.
- Girls rely more on others for approval and support.
- Girls at this age care more about conforming to sex roles than younger girls do.
- Girls are less likely than boys to develop expertise at logical persuasion, argumentation, task persistence, or power management—the crucial qualities for leadership.
- Girls are less likely than boys to have access to computers and other forms of advanced technology.
- Girls develop more competence in sophisticated social skills than boys (such as empathy, self-disclosure, and the ability to make friends).
- Girls often learn best (and gain more self-confidence) when they work *with* other students, instead of *competing* with them.
- When girls find new concepts difficult, they need to learn to work harder to understand the new material (instead of falling back on their strengths and avoiding the new material).

Some of our information comes from Girls Incorporated and a 1991 study from the AAUW concerning the self-esteem of young women. Some comes from Carol Gilligan's study of adolescent girls at the Emma Willard School (published by Harvard University Press 1990).

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Expanding Your Horizons in Science and Mathematics

Student Packet
1994

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Oakland, CA 94613

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Tips for Studying

Become an expert on how you study best.

- Do you prefer to work in study groups?
- Do you prefer to work alone?
- Do you prefer to work in study groups *with certain people only?*

Try asking your teacher to arrange things the way *you* like them! Or try organizing a study group after school.

- Do you learn best from lectures?
- Do you learn best from classroom discussions?
- Do you learn best from your textbooks?
- Are you more comfortable in classroom discussions if you've already read about the topic?

It might be worth reading ahead in your textbooks if it makes you feel more comfortable discussing things in class. Even trying a math or science problem in advance may help.

- If a problem seems especially difficult, do you give up on it?
- Are you happier working on things you already know, or tackling difficult new topics?

An especially difficult problem might need extra time and attention. Don't give up on it!

These ideas derived from the AAUW Report, How Schools Shortchange Girls.

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How to Design Your Own Future:

Step #1: Take yourself seriously and plan your own future. What would you *really* like to do? Picture yourself doing it. Do you like what you see?

Step #2: Become an expert on yourself. Have you thought about what you like and don't like? Are you trying new activities to find out what you like? Have you talked to your school counselor? Have you taken interest tests? The SAT? The ACT? If you haven't, why not?

Step #3: Become an expert on careers. Have you read career booklets? Have you considered *all* the possibilities? Have you talked to women in careers that used to be considered unusual? How about visiting the library? You may discover an exciting career you never dreamed of.

Step #4: Begin now to prepare for your career. What kinds of education and training are needed? Will you need technical training? Or a two-year or four-year program in college? Will you need to go to graduate school? What are the admissions requirements for the schooling you need? What high-school courses are required? Are there part-time jobs and summer employment to help you explore the world of work? Are these jobs related to your career choice?

Step #5: Take charge of making decisions for your own life and career. Form your own ideas about what is the best career for you. You know best what your abilities and interests are. Others can help you explore your options, but *don't let anyone else decide for you.*

Step #6: Set your own goals and learn how to work for them. Keep a strong image in your mind of what these goals are. Work toward your goals with the idea of success in your mind. Many women are successful and happy in challenging and interesting careers. You can be too!

Think about it . . . because only you can design your future!

EYH 12/93 rewrite of the pamphlet called "THINK ABOUT IT . . . and you can design your own future." The pamphlet says it was produced with a grant from Intel Corporation and "most text from Think About It . . . ,' prepared by Oregon Institute of Technology in Klamath Falls, the only polytechnic institute in the Pacific Northwest. Booklets available by calling (800) 422-2017 in Oregon and (800) 343-6653 out of Oregon, or writing Admissions Office, Oregon Institute of Technology, Klamath Falls, OR 97601."

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You Can Design Your Own Future!

Have you thought about what you would like to do? Choosing a career can be tremendously exciting when you realize that . . .

Yesterday career options for women were limited. When your grandmother was growing up, women who even considered careers usually only thought about becoming a nurse, a secretary, or a teacher.

Today a young woman can choose to become just about anything: an accountant, pilot, lab technician, architect, astronomer, biochemist, cartoonist, computer programmer, symphony conductor, hotel manager, mason, mathematician, engineer, meteorologist, newscaster, plumber, physicist, nurse, oceanographer . . . the list goes on and on. A young woman graduating from high school now has choices that are limited only by her imagination!

But are young women taking advantage of the possibilities? Many young women still shy away from science, math, engineering, and technology. Even when they have *all* of the ability, intelligence, and interest they could need, young women do not even consider many of the new and exciting careers available to them.

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Why Haven't More Young Women Considered Careers in Science and Technology?

Six reasons stand out.

Reason #1: Your ideas about yourself keep you from dreaming big. Movies and TV show boys as strong, brave, competitive, clever *leaders*. Girls are shown as passive, dependent, clumsy, inadequate *followers*. And many girls have learned to think of themselves this way. **But the fact is,** you are in charge of your life. And you can be as strong, brave, and smart as anyone.

Reason #2: We are taught that men do certain things and women do other things. Even schoolbooks give us ideas about male roles and female roles.

Look at these arithmetic problems:

Mr. Smith is an auto mechanic. If he repairs three trucks a day, at the end of five days how many trucks will he have repaired?

Mrs. Smith bakes two cherry pies each morning. At the end of six days, how many pies will she have baked?

Besides arithmetic, what does a girl learn from these questions?

But the fact is, female auto mechanics do quite well. (And they get a lot of dates.)

Reason #3: Maybe you haven't been encouraged to combine family and career. Many young women want a family, and they don't want to give that up for a career. **But the fact is,** nine out of ten women will work at some time in their lives. Most of these women will work because they need the money to help provide a better life for their families. So why not choose a career that can make you more money and give you more options?

Reason #4: Parents, teachers, and counselors often expect different things from boys and girls. Boys are encouraged to study and excel in "male" subjects like mathematics and science. Girls are not. **But the fact is,** you are still the one in charge of your life. And you have a lot more options than you might think.

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NOTES FROM A TECHNICAL WRITER

You don't need a degree in science to work as a technical writer. There are four technical writers where I work. Two of us have degrees in English, and two have degrees in biology. And it works out well. We have different strengths and weaknesses, and the department is better off because of this.

I never thought I'd end up working at a biotechnology company. I was looking for an editing job at a publishing house when I stumbled into a temporary position at a biotech company—and I fell in love with the science. Biotech companies are doing some really exciting things! I also fell in love with the paycheck. Technical writing pays *much* better than literary editing. And much to my delight, I found that I didn't need a background in science. The biotech company I work for gave me a break, and I proved myself. I'm a very good writer and editor. I do a good job, and people here have come to respect my work and my opinions.

But I do wish I'd taken a few basic science courses in college.

I don't regret majoring in English: I bring important editing skills to this job, and my talents are appreciated. But I could have taken just a *couple* of basic science courses. College-level biology. College-level chemistry. It wouldn't have killed me. And it would really help me out today.

For one thing, even a basic understanding of biology and chemistry would really help me understand the cutting-edge science I write about every day. There are times when people are surprised to discover that I don't know the simplest things about common chemical compounds. And sometimes I need to stop editing and go find someone to answer my questions before I can continue. If I knew just a *little* more about science, it would really improve the quality of my work. And it would improve my credibility and make me more likely to get promoted.

There's another reason I wish I'd taken a few science courses. I'm really interested in biotechnology now, and I'd like to learn more about it. And I am *very* lucky: Most biotech companies will pay for their employees to study biotechnology. *They* will pay for *me* to take classes that qualify me for a *better-paying job!* You can't get a much better deal than that. If I had taken even a few basic courses in college, I'd be ready to take classes in the really exciting stuff: cell biology, genetics, pharmacology, recombinant DNA technology . . . But as it is, I'd have to take two or three basic courses before I could start on the really exciting—and really

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impressive—stuff. I'm dying to study genetics—and put it on my resume! More people would be interested in hiring a technical writer who had a degree in English *and* some advanced science courses under her belt. But basic chemistry isn't impressive enough to put on my resume. It would have been so easy to fit these classes into my schedule in college!

Math courses would have been really helpful, too. Whenever I ask someone in my field what single course would do me the most good, they surprise me by saying "Statistics." Who would have thought that?

So I recommend taking courses in math and science even if you aren't planning a career in math or science. They will turn out to be helpful.

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Reason #5: There's a myth that women can't handle science and technology jobs. But the fact is, women have proven that they *can* handle jobs in science and technology. For many years women have been handling jobs at all levels in math, science, and technology. Physical strength is not important in most jobs today. What *is* important for careers in math, science, and technology? Mental ability, creativity, curiosity, interest in problem-solving, and perseverance. **Both women and men have all these traits.**

Reason #6: Even though women are at the cutting edge of science, mathematics, engineering, and technology, their careers have been given too little attention. Expanding Your Horizons in Science and Mathematics™ hopes to introduce you to some new role models.

Remember: Years ago, women who became scientists or mathematicians had to overcome major obstacles. They had to be extremely persistent. But now these odds are changing. Young women can look forward to exciting careers in all areas of math, science, and technology.

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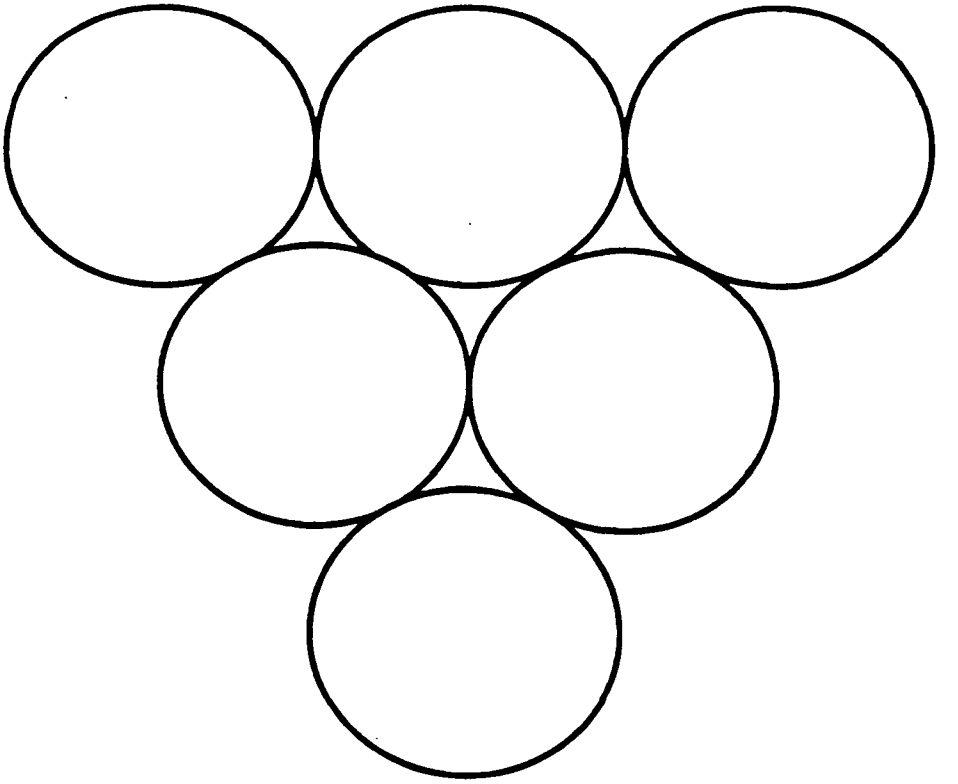
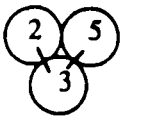
POOL PATTERNS - A



Arrange the numbers 1 through 6 so that each circle shows the difference between the two touching numbers above it.

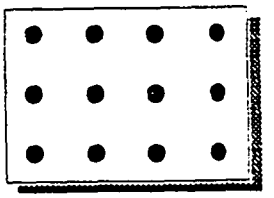
For example: 

3 is the difference between 5 and 2.

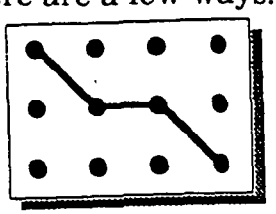
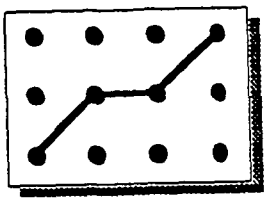
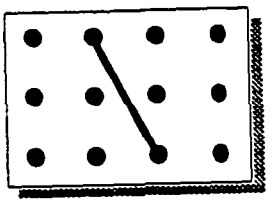
(Don't forget to mix up the numbers before you leave.)

GEOBOARD RECTANGLE

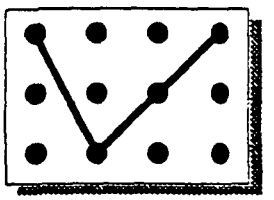
This a geoboard rectangle.



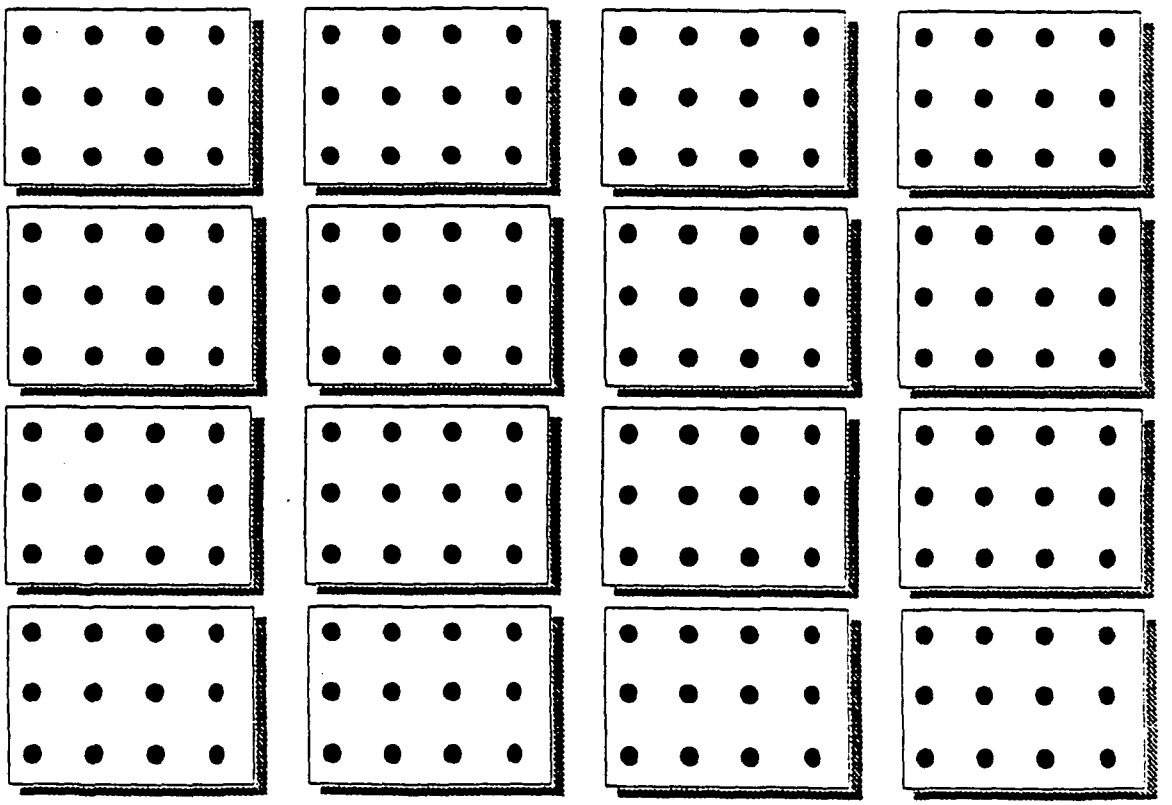
There are 19 know ways to cut it in two congruent pieces with a rubber band on the geoboard. Here are a few ways.

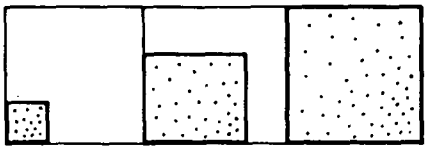
Note: this is **not** a legal way: (you get 3 pieces)



Find the remaining 16 ways



Pico, Fermi, Bagels



Grade Level

TOOLS

Pencil
Paper

Why

To practice making deductions by the process of elimination and to reinforce the concept of place value

How

- ☐ The goal is to guess the leader's secret three-digit number.
- ☐ The digits in the secret number must be all different; that is, 121, 442, and 777 are not allowed.
- ☐ The leader will give clue responses to each guess as follows:

  BAGELS means **none** of the digits is correct
  PICO means **one** of the digits is correct, but it is in the wrong place
  FERMI means **one** of the digits is correct and in the correct place.

- ☐ This sample game will illustrate how the clues are given. *(The secret number is 427.)*

Guess	Response	Comments
109	Bagels	1, 0, and 9 are eliminated from all places
123	Fermi	Only one digit is correct and in the correct place
145	Pico	One of the digits is correct but in the wrong place
265	Pico	Same
353	Bagels	3 and 5 are now eliminated from all the places
426	Fermi Fermi	Two numbers are correct and in the correct spot
427	Fermi Fermi Fermi	All correct!!

- ☐ Players should keep a record of the guesses and leader's responses.
- ☐ If you are the leader, write your number on a slip of paper to refer to as you give the clues.

More Ideas

- ☐ Allow repeated digits.
- ☐ Play with more than three digits.
- ☐ Play with letters that form three-, four-, or five-letter words.

► ***Pico*** *is a metric prefix meaning one trillionth or* 10^{-12}.
Fermi *was a famous nuclear physicist.*
Bagel *is a hard roll with a center hole, like a zero.* ◄

The 1993 Game

Use each of the digits 1, 9, 9, and 3, in order, along with any of the following operations, to form each of the numbers 1 to 100.

You may use any of the following:

- The operations of +, −, ×, ÷
- Exponents: $19 = 1$, so $1^9 + 9 + 3 = 13$
- Radicals: $\sqrt{9} = 3$, so $1 + \sqrt{9} + 9 + 3 = 16$
- Factorial: $(\sqrt{9})! = 3! = 3 \times 2 \times 1 = 6$, so $1 + (\sqrt{9})! + 9 + 3 = 19$
- Absolute value: $|-9| = 9$ and $|9| = 9$ so $1 + |-9| + 9 + 3 = 22$
- The digits may be juxtaposed to form a number such as 19 and 93: $-19 - (-93) = 74$
- Parentheses and brackets: $(1 + 9) \times 9 + 3 = 93$
- Order of operations exists: × and ÷ take precedence over + and −: $1 + 9 \times 9 + 3 = 85$

List in order:

$1 = -1 - 9 \div 9 + 3$
$2 = -1 + (9 - 9) + 3$
$3 = 1 - 9 \div 9 + 3$
$4 = 1 + 9 - 9 + 3$
$5 =$ ...

.

.

.

.Extensions:

- To make the activity easier, allow the digits to be used in any order, so that $93 - (9 + 1) = 83$, for example. Or, form each of the numbers from 1 to 35 only.
- Make manipulatives and move the numbers around.

- Find as many solutions as you can for each number.
- To make the activity harder, require that the solutions be found in numerical order.

TOOTHPICK PUZZLES

(ditto sheet)

1. Use 17 toothpicks to construct this figure 

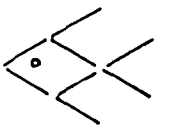
   a. Remove 5 toothpicks and leave 3 squares.
   b. Remove 6 toothpicks and leave 2 squares.

2. Make this figure with 12 toothpicks. 

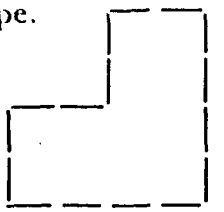
   a. Remove 4 toothpicks and leave 3 triangles.
   b. Move 4 toothpicks and form 3 triangles.

3. With 9 toothpicks, make this figure. 

   a. Remove 2 toothpicks and leave 3 triangles.
   b. Remove 3 toothpicks and leave 1 triangle.
   c. Remove 6 toothpicks and get 1 triangle.
   d. Remove 4 toothpicks and get 2 triangles.
   e. Remove 2 toothpicks and get 2 triangles.

4. Use 8 toothpicks and 1 button to form a fish. 

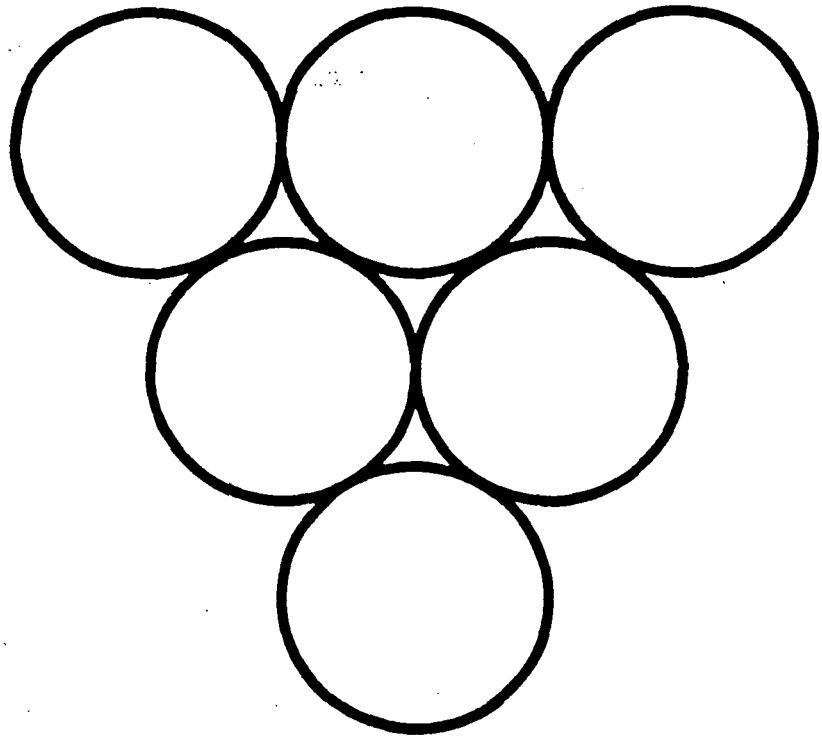
   Move 3 toothpicks and button to make this fish swim the opposite direction.

5. Two farmers have land this shape. 

   a. The first farmer wants to divide her land evenly among her three daughters. Add 4 toothpicks to form three parcels of equal size and identical shape.
   b. The second farmer wants to divide her land evenly among her 4 daughters. Use 8 toothpicks to form four parcels of equal size and identical shape.

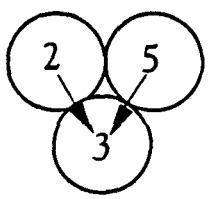
6. Use 6 toothpicks to form 4 equilateral triangles.

PATRONES DE BILLAR - A



Disponga los números del 1 al 6 de manera que cada círculo muestre la diferencia entre los dos números contiguos sobre él.

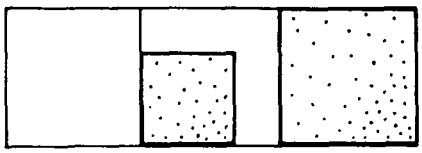
Por ejemplo:



3 es la diferencia entre 5 y 2.

(No se olvide de mezclar los números antes de irse.)

Save Twenty



Grade Level

TOOLS

5 dice for each pair, or spinners (see page 154)

Scratch paper

A game for 2 players

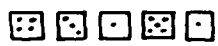
Why

To build understanding of probability and to provide practice with strategy development, averaging, and addition

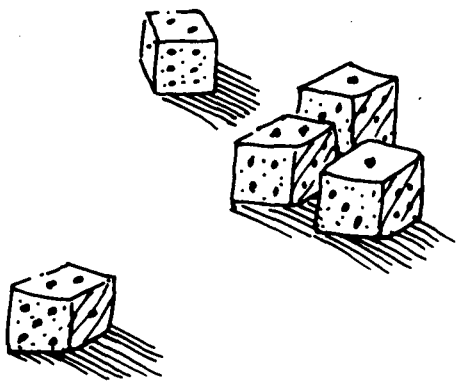
How

- In each game, five dice are rolled to try to create a sum close to, but not greater than, 20.
  - A sum larger than 20 gives the player a score of zero.
  - Players try to achieve the highest total score for ten games.
- Each game has **four** rounds.
  - A player rolls all four rounds before giving the dice to another player.
  - On the first round, five dice are rolled. For example:

  - The player may "save" from none to all of the dice to make up her or his game score.
  - Any dice not saved on the first round must be rolled again for round two. Again, none or all of the newly rolled dice may be saved.
  - Continue this way through round four.
  - On the fourth roll, all dice that are left must be used to make the final score.
  - Note: Any dice saved cannot be rolled again in that game.
  - Here is a sample game:

ROUND	ROLLED	SAVED	TOTAL
1			12
2		NONE	0
3			5
4			1
			TOTAL SCORE 18

- After both players have played a game, they record their scores. After ten games, average the scores. The player with the highest average is the lucky winner.

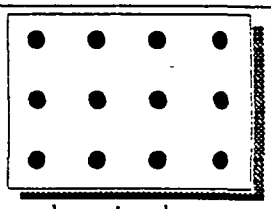


More Ideas

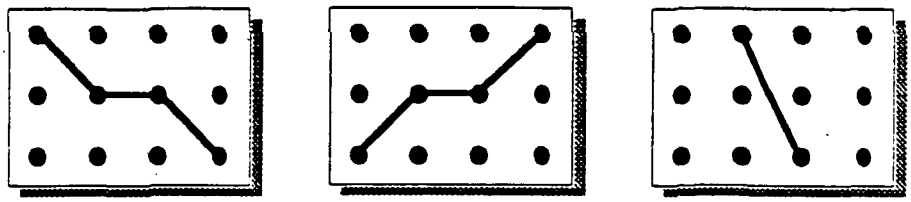
Instead of pairs, play with teams. Talk to each other about your reasons for saving dice. Try to keep improving your team scores.

RECTANGULO GEOBOARD

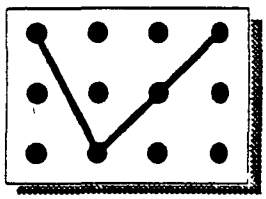
Este es un rectángulo geoboard.



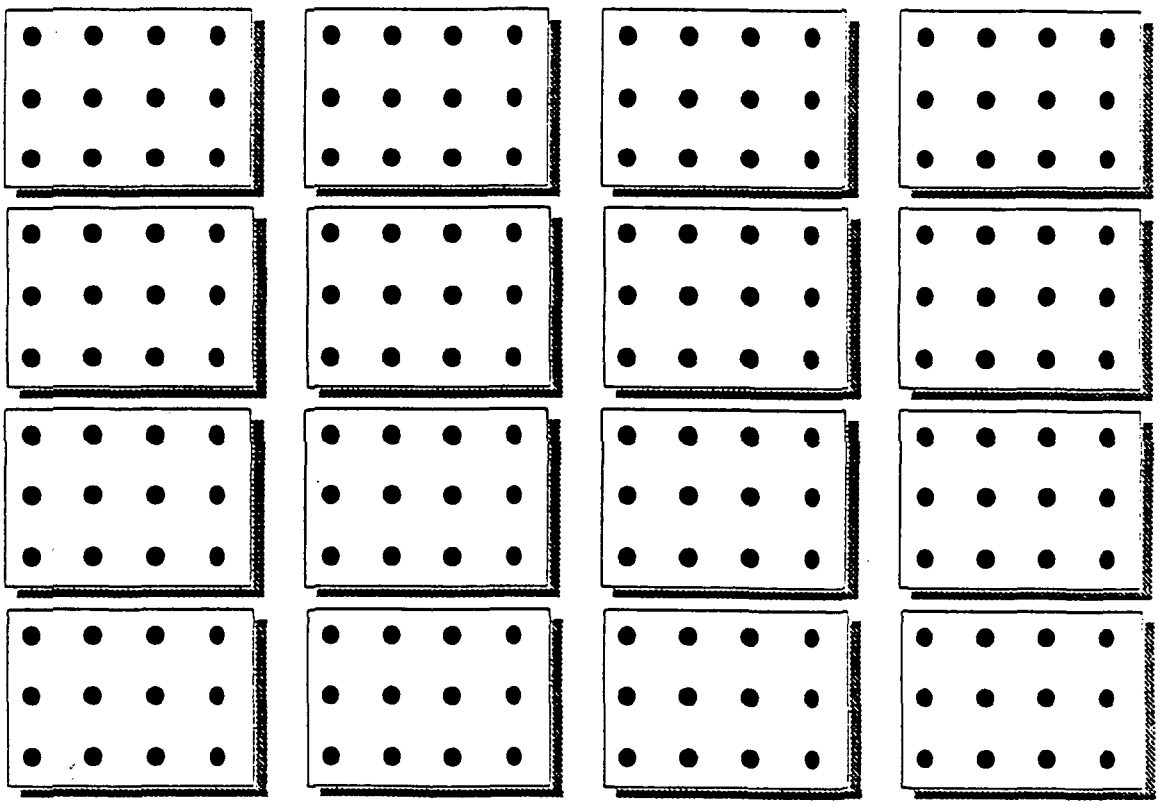
Hay 19 maneras conocidas de dividir por la mitad con una liga de goma un rectángulo geoboard.
Aquí hay algunas de esas maneras.



Nota: Esta no es una manera aceptable: (obtiene 3 pedazos)



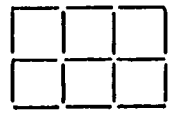
Encuentre las 16 maneras restantes.



ROMPECABEZAS DE PALILLOS

(hoja duplicada)

1. Use 17 palillos para construir esta figura.

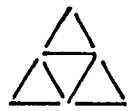


   a. Quite 5 palillos para construir 3 cuadros.
   b. Quite 6 palillos para construir 2 cuadros.

2. Construya esta figura con 12 palillos.

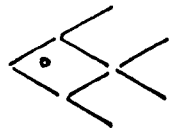
   a. Quite 4 palillos para construir 3 triángulos.
   b. Mueva 4 palillos para formar 3 triángulos.

3. Con 9 palillos, construya esta figura.



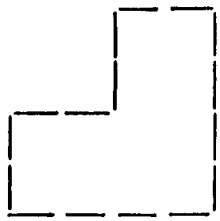
   a. Quite 2 palillos para construir 3 triángulos.
   b. Quite 3 palillos para construir 1 triángulo.
   c. Quite 6 palillos para construir 1 triángulo.
   d. Quite 4 palillos para construir 2 triángulos
   e. Quite 2 palillos para construir 2 triángulos.

4. Use 8 palillos y 1 botón para formar un pescado.



   Mueva 3 palillos y el botón para hacer el pescado nadar en la dirección opuesta.

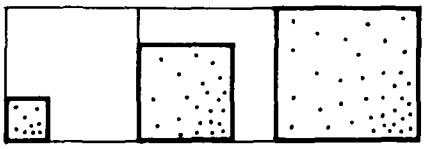
5. Dos granjeras tienen su parcela de terreno con esta figura.



   a. La primera granjera decide dividir su terreno igualmente entre sus tres hijas. Añada 4 palillos para formar 3 parcelas de dimensiones uniformes y figuras identicas.
   b. La segunda granjera quiere dividir su terreno igulamente entre sus cuatro hijas. Utilize 8 palillos para construir 4 parcelas de dimensiones uniformes y figuras identicas.

6. Use 6 palillos para construir 4 triángulos equiláteros

Pico, Fermi, Dona



Nivel

Materiales

Lápiz

Papel

Porqué

Para practicar las deducciones lógicas mediante el proceso de eliminación y para reforzar el concepto de valor relativo.

Cómo

- El propósito del juego consiste en adivinar los dígitos secretos del director del juego.
- Los dígitos del número secreto deben ser **diferentes.** Por ejemplo 121, 442 y 777 no se permiten como números secretos.
- El director responde a las preguntas del siguiente modo:

  Dona Si *ninguno de los dígitos es correcto.*

  Pico Por cada dígito correcto que aparece en la posición incorrecta.

  Fermi Por cada dígito que aparece en la posición correcta.

- El siguiente ejemplo muestra como se ofrecen las claves. *(El número secreto es el 427.)*

Número Adivinado	Respuesta del Director	Comentarios
109	Dona	1, 0 y 9 se eliminan como posibilidades en todas las posiciones.
123	Fermi	Hay un dígito correcto y en la posición correcta.
145	Pico	Hay un dígito correcto en la posición incorrecta.
265	Pico	Ver comentario anterior.
353	Dona	3 y 5 se eliminan de todos los lugares.
426	Fermi, Fermi	Hay dos dígitos correctos en las posiciones correctas.
427	Fermi, Fermi, Fermi	¡ Todos los dígitos son correctos !

- Los participantes deben mantener una lista de los números adivinados y las respuestas correspondientes

- Si diriges el juego, escribe los números en un pedazo de papel para referirte a ellos cuando presentes las claves.

Ideas Adicionales

- Permite la repetición de dígitos.
- Juega con más de tres dígitos.
- Juega con letras que forman palabras de tres, cuatro o cinco letras.

Pico *es un prefijo métrico que significa un* ***trillon*** *o* 10^{-12}

Fermi *es el apellido de un famoso físico nuclear italiano.*

Dona *es una masa de harina en forma de anillo.*

El Juego de 1993

Use cada uno de los dígitos 1, 9, 9, y 3, en ese orden, junto con cualquiera de las operaciones siguientes, para formar cada número del 1 al 100.

Puede usar cualquiera de las operaciones siguientes:

- Las operaciones de +, −, ×, ÷
- Exponentes: $1^9 = 1$, so $1^9 + 9 + 3 = 13$
- Radicales: $\sqrt{9} = 3$, so $1 + \sqrt{9} + 9 + 3 = 16$
- Factoriales: $(\sqrt{9})! = 3! = 3 \times 2 \times 1 = 6$, so $1 + (\sqrt{9})! + 9 + 3 = 19$
- Valores absolutos: $|-9| = 9$ and $|9| = 9$ so $1 + |-9| + 9 + 3 = 22$
- Puede yuxtaponer los dígitos para formar un número como 19 y 93: $-19 - (-93) = 74$
- Paréntesis y corchetes: $(1 + 9) \times 9 + 3 = 93$
- Existe un orden por el cual se ejecutan las operaciones: × y ÷ toman precedencia sobre + and −: $1 + 9 \times 9 + 3 = 85$

Aliste en orden:

$1 = -1 - 9 \div 9 + 3$
$2 = -1 + (9 - 9) + 3$
$3 = 1 - 9 \div 9 + 3$
$4 = 1 + 9 - 9 + 3$
$5 =$ ...
.
.
.

Extensiones:

- Para facilitar esta actividad, permita que los dígito sean usados en cualquier orden, de tal manera que $93 - (9 + 1) = 83$, por ejemplo. O forme los números del 1 al 35 unicamente.
- Ejecute manipuleos y intercambie los números.

[9] [+] [1] [3] [9]

- Encuentre cuanta solución pueda para cada número.
- Para dificultar esta actividad, requiera que las soluciones sean encontradas en orden numérico.

BOOKS FOR OLDER CHILDREN AND YOUNG ADULTS

Most of the titles listed are collective or individual biographies of women scientists and physicians. Some include classroom activities to help students understand the scientific contributions of these women.

Bachrach, Deborah. MARGARET SANGER. San Diego, CA: Lucent Books, 1993.

Baker, Rachel. AMERICA'S FIRST TRAINED NURSE: LINDA RICHARDS. New York: Messner, 1962. Nursing history and biography from the late nineteenth and early twentieth centuries.

Billings, Charlene W. GRACE HOPPER: NAVY ADMIRAL & COMPUTER PIONEER. Hillside, NJ: Enslow Publishers, 1989.

Bowman, Kathleen. NEW WOMEN IN MEDICINE. Mankato, MN: Creative Education, 1976. Includes biographies of sex educator Mary Calderone, pediatrician Kathryn Nichol, neurologist Anna Elington, medical researcher Mary Louise Robbins, endocrinologist Estelle Ramey, nurse-midwife Margaret Hewitt, and psychiatrist Elisabeth Kubler-Ross.

Brandt, Keith. MARIE CURIE, BRAVE SCIENTIST. Mahwah, NJ: Troll Assoc., 1983.

Brown, Jordan. ELIZABETH BLACKWELL: PHYSICIAN. New York: Chelsea House, 1989.

Brown, Marion Marsh. HOMEWARD THE ARROW'S FLIGHT. Nashville, PTN: Abingdon, 1980. On Omaha Indian physician Susan LaFlesche Picotte.

Brown, Pam. FLORENCE NIGHTINGALE: THE DETERMINED ENGLISHWOMAN WHO FOUNDED MODERN NURSING AND REFORMED MILITARY MEDICINE. Milwaukee, WI: Gareth Stevens, 1989.

Bryan, Jenny. HEALTH AND SCIENCE. New York: Hampstead Press, 1988. Examines the participation of women in medical and scientific discoveries and the growth of health care in France, Great Britain, and the U.S. through the lives of Marie Curie, Cicely Saunders, and Clara Barton.

Carson, Rachel. THE SENSE OF WONDER. New York: Harper & Row, 1956.

Clapp, Patricia. DR. ELIZABETH, THE STORY OF THE FIRST WOMAN DOCTOR. New York: Lothrop, 1974.

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Clark, Eugenie. LADY AND THE SHARKS. Sarasota, NY: Mote Marine Lab, 1991. Autobiography of an ichthyologist, reprinted from a 1969 edition.

Crawford, Deborah. LISE MEITNER, ATOMIC PIONEER. New York: Crown, 1969.

Dash, Joan. THE TRIUMPH OF DISCOVERY: WOMEN SCIENTISTS WHO WON THE NOBEL PRIZE. New York: Messner, 1991.

DeLeeuw, Adele. MARIE CURIE, WOMAN OF GENIUS. Champaign, IL: Garrard, 1970.

Douty, Esther M. AMERICA'S FIRST WOMAN CHEMIST: ELLEN RICHARDS. New York: Messner, 1961.

Dubowski, Cathy East. CLARA BARTON: HEALING THE WOUNDS. Englewood Cliffs, NJ: Silver Burdett Press, 1991.

Dunn, Andrew. MARIE CURIE. New York: Franklin Watts, 1991.

Emberlin, Diane. CONTRIBUTIONS OF WOMEN: SCIENCE. Minneapolis: Dillon Press, 1977.

Facklam, Margery. WILD ANIMALS, GENTLE WOMEN. NewYork: Harcourt Brace Jovanovich, 1978. Includes zoologists and animal behaviorists.

Ferris, Jeri. NATIVE AMERICAN DOCTOR: THE STORY OF SUSAN LAFLESCHE PICOTTE. Minneapolis, MN: Carolrhoda Books, 1991. Biography of the first Native American woman to graduate from medical school.

Fromer, Julie. JANE GOODALL: LIVING WITH THE CHIMPS. Frederick, MD: Twenty-First Century Books, 1992. For grades 3-6.

Gallardo, Evelyn. AMONG THE ORANGUTANS: THE BIRUTE GALDIKAS STORY. San Francisco: Chronicle Books, 1993. Primatologist.

Gleasner, Diana C. BREAKTHROUGH: WOMEN IN SCIENCE. New York: Walker, 1983.

Goldberg, Jake. RACHEL CARSON. New York: Chelsea Juniors, 1992.

Goodfield, June. AN IMAGINED WORLD: A STORY OF SCIENTIFIC DISCOVERY. New York: Harper & Row, 1981. An intimate portrait of five years in the life of a cancer researcher.

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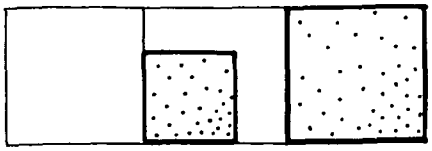
Acumulando Veinte



Nivel

Materiales

5 dados para cada par de jugadores o una aguja giratoria

(Ver la página 154.)

Papel para hacer cálculos

Un juego para dos jugadores

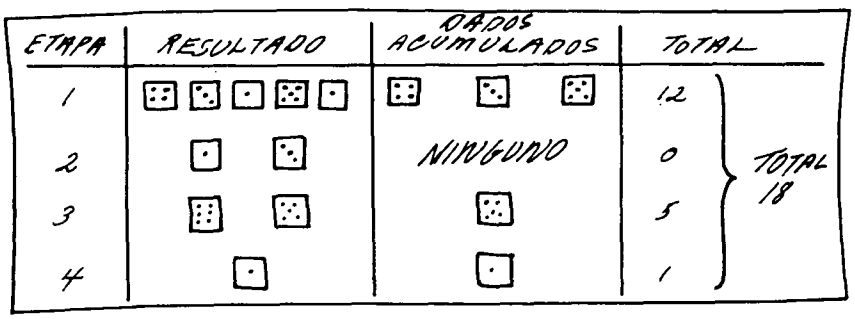
Porqué

- Para entender mejor las ideas de la probabilidad y practicar planificando estrategias, sumando y hallando promedios

Cómo

- En cada juego se tiran cinco dados intentando obtener una suma tan cercana a 20 como sea posible, pero sin ser mayor.
  - Si un jugador obtiene una suma mayor que 20, el mismo no acumula ningún punto.
  - Los jugadores aspiran a obtener la puntuación más alta posible en un total de 10 juegos.
- Cada juego consiste de 4 etapas.
  - Cada jugador deberá completar las cuatro etapas antes de pasar los dados a otro jugador.
  - En la primera etapa de un juego se lanzan los cinco dados. Por ejemplo:

- El jugador puede acumular desde ninguno hasta un máximo de 5 dados al calcular sus puntos.
- Todos los dados que no se hayan acumulado en el primer turno se deberán tirar en el segundo turno. De éstos el jugador de turno podrá acumular desde ninguno hasta el total de los dados lanzados en esa etapa.
- Se continúa de esta manera hasta que se haya completado un máximo de cuatro etapas.
- En la cuarta etapa los puntos obtenidos se tienen que utilizar para calcular el total de puntos.
- **Nota**: Todo dado utilizado para acumular puntos no se podrá tirar nuevamente durante el juego en curso.
- He aquí un ejemplo:



- Luego de que cada jugador haya completado un juego, se anotan los puntos obtenidos. Luego de diez juegos se calculan los promedios de los puntos por juego. El jugador con el promedio más alto gana el juego.

Haber, Louis. WOMEN PIONEERS OF SCIENCE. New York: Harcourt Brace Jovanovich, 1979.

Hume, Ruth. GREAT WOMEN OF MEDICINE. New York: Random House, 1974. Includes biographies of physicians, nurses, and researchers.

Jezer, Marty. RACHEL CARSON: BIOLOGIST AND AUTHOR. New York: Chelsea House, 1988.

Kaye, Judith. THE LIFE OF FLORENCE SABIN. New York: Twenty-First Century Books, 1993. For grades 4-8.

Keller, Mollie. MARIE CURIE. New York: Watts, 1982.

Kevles, Bettyann. WATCHING THE WILD APES: THE PRIMATE STUDIES OF GOODALL, FOSSEY, AND GALDIKAS. New York: Dutton,1976.

Kittredge, Mary. BARBARA MCCLINTOCK. New York: Chelsea House, 1991. Biography of Nobel Prize winning geneticist.

Kronstadt, Janet. FLORENCE SABIN. New York: Chelsea House, 1990. Immunologist.

Kudlinski, Kathleen V. RACHEL CARSON: PIONEER OF ECOLOGY. New York: Viking Kestrel, 1988.

Latham, Jean Lee. ELIZABETH BLACKWELL: PIONEER WOMAN DOCTOR. Champaign, IL: Garrard, 1975.

Lutzker, Edythe. WOMEN GAIN A PLACE IN MEDICINE. New York: McGraw-Hill, 1969. Both a history of medical treatment of women and biographies of the first British women doctors.

McCoy, Joseph J. THE CANCER LADY: MAUD SLYE AND HER HEREDITARY STUDIES. Nashville: Nelson, 1977.

McFerran, Anna. ELIZABETH BLACKWELL: FIRST WOMAN DOCTOR. New York: Grossett & Dunlap, 1966.

McKown, Robin. SHE LIVED FOR SCIENCE: IRENE JOLIOT-CURIE. New York: Messner, 1961.

McLenighan, Valjean. WOMEN AND SCIENCE. Milwaukee, WI: Raintree, 1980. Careers of six women scientists.

McPherson, Stephanie Sammartino. ROOFTOP ASTRONOMER: A STORY ABOUT MARIA MITCHELL. Minneapolis, MN: Carolrhoda Books, 1990.

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SALUTE TO BLACK WOMEN INVENTORS: LEARNING ACTIVITIES. Chicago, IL: Chandler/White, 1990. Inventions patented by Black women from 1884 to 1975 with a learning activity for each invention.

Stanford, Barbara. WOMEN IN SCIENCE. Portland, ME: J.Weston Walch, 1975.

Steinkamp, Marjorie W., and Maehr, Martin L., eds. WOMEN IN SCIENCE. Greenwich, CT: JAI Press, 1984.

Stopes-Roe, Harry Verdon with Ian Scott. MARIE STOPES AND BIRTH CONTROL. London: Priory Press, 1974.

Stott, Carole. INTO THE UNKNOWN. New York: Hampstead Press, 1989. Astronomer Caroline Herschel, aviator Amy Johnson, and astronaut Sally Ride.

Stwertka, Eve. RACHEL CARSON. New York: Franklin Watts, 1991.

Tames, Richard. MARIE CURIE. New York: Franklin Watts, 1990.

Topalian, Elyse. MARGARET SANGER. New York: F. Watts, 1984.

Vare, Ethlie Ann. ADVENTUROUS SPIRIT: A STORY ABOUT ELLEN SWALLOW RICHARDS. Minneapolis, MN: Carolrhoda Books, 1992. Grades 3-6.

Veglahn, Nancy. THE MYSTERIOUS RAYS: MARIE CURIE'S WORLD. Coward, McCann & Geoghegan, 1977.

Veglahn, Nancy. WOMEN SCIENTISTS. New York: Facts on File, 1992.

Verheyden-Hilliard, Mary Ellen. AMERICAN WOMEN IN SCIENCE BIOGRAPHIES. Bethesda, MD: Equity Institute, 1988. A series of 15 biographies for children (grades 1-4) about women scientists and mathematicians from diverse ethnic groups. Includes mathematicians Shirley Mathis McBay and Caryn Navy, engineer Nancy Wallace, and scientists Antoinette Rodez Schiesler, Rue Chih Cheo Huang, Constance Tom Noguchi, Maria Cordero Hardy, Agnes Naranjo Stroud-Lee, Elma Gonzalez, Phyllis Stearner, Judith Pachciarz, June Rooks, and Anne Barrett Swanson.

Wadsworth, Ginger. RACHEL CARSON: VOICE FOR THE EARTH. Minneapolis, MN: Lerner, 1992.

Weaver, Rebecca, and Dale, Rodney. MACHINES IN THE HOME. New York: Oxford University Press, 1992.

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Steinkamp, Marjorie W., and Maehr, Martin L., eds. WOMEN IN SCIENCE. Greenwich, CT: JAI Press, 1984.

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Stott, Carole. INTO THE UNKNOWN. New York: Hampstead Press, 1989. Astronomer Caroline Herschel, aviator Amy Johnson, and astronaut Sally Ride.

Stwertka, Eve. RACHEL CARSON. New York: Franklin Watts, 1991.

Tames, Richard. MARIE CURIE. New York: Franklin Watts, 1990.

Topalian, Elyse. MARGARET SANGER. New York: F. Watts, 1984.

Vare, Ethlie Ann. ADVENTUROUS SPIRIT: A STORY ABOUT ELLEN SWALLOW RICHARDS. Minneapolis, MN: Carolrhoda Books, 1992. Grades 3-6.

Veglahn, Nancy. THE MYSTERIOUS RAYS: MARIE CURIE'S WORLD. Coward, McCann & Geoghegan, 1977.

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Verheyden-Hilliard, Mary Ellen. AMERICAN WOMEN IN SCIENCE BIOGRAPHIES. Bethesda, MD: Equity Institute, 1988. A series of 15 biographies for children (grades 1-4) about women scientists and mathematicians from diverse ethnic groups. Includes mathematicians Shirley Mathis McBay and Caryn Navy, engineer Nancy Wallace, and scientists Antoinette Rodez Schiesler, Rue Chih Cheo Huang, Constance Tom Noguchi, Maria Cordero Hardy, Agnes Naranjo Stroud-Lee, Elma Gonzalez, Phyllis Stearner, Judith Pachciarz, June Rooks, and Anne Barrett Swanson.

Wadsworth, Ginger. RACHEL CARSON: VOICE FOR THE EARTH. Minneapolis, MN: Lerner, 1992.

Weaver, Rebecca, and Dale, Rodney. MACHINES IN THE HOME. New York: Oxford University Press, 1992.

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Wilkie, Katherine E. MARIA MITCHELL: STAR GAZER. Champaign, IL: Garrard, 1966.

"Women Heroes of Science: A Bibliography, a Selection of Titles About the History of Women in Science." SCIENCE BOOKS & FILMS 27, no.2, March 1, 1991: 33-34.

Yost, Edna. AMERICAN WOMEN OF SCIENCE. Philadelphia, PA: Frederick A. Stokes Co., 1943; Philadelphia, PA: Lippincott, 1955. Rev. ed. Biographies of Ellen H. Richards (home economist), Annie Jump Cannon (astronomer), Alice Hamilton (industrial toxicologist), Florence Rena Sabin (medical researcher), Mary Engle Pennington (refrigeration expert), Lillian Moller Gilbreth (management engineer), Libbie Henrietta Hyman (zoologist), Wanda K. Farr (botanist), Hazel K.Stiebeling (nutritionist), Florence B. Seibert (chemist), Katharine Burr Blodgett (physicist), and Margaret Mead (anthropologist).

Yost, Edna. WOMEN OF MODERN SCIENCE. New York: Dodd, Mead, 1959: repr. Westport, CT: Greenwood, 1984. Biographies of Gerty Theresa Cori (biochemist), Lise Meitner (physicist), Helen Sawyer Hogg (astronomer), Elizabeth Shull Russell (geneticist), Rachel Fuller Brown (biochemist), Chien Shiung Wu (nuclear physicist), Edith Hinkley Quimby (physicist), Jocelyn Crane (zoologist), Florence van Straten (meteorologist), Gladys Anderson Emerson (biochemist), and Dorothea Rudnick (embryologist).

Taken from The History of Women and Science, Health, and Technology: A bibliographic guide to the professions and the disciplines, second edition, by Phyllis Holman Weisbard and Rima D. Apple (Madison, WI: University of Wisconsin System Women's Studies Librarian, 1993). For information about obtaining the complete bibliography and other publications of the Women's Studies Librarian, contact her at 430 Memorial Library, 728 State Street, Madison, WI 53706; 608-263-5754; email:wiswsl@macc.wisc.edu.

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Organizational Packet

1993-1994
Expanding Your Horizons in Science and Mathematics™
Conferences

List of Enclosed Materials for Chairs (for Distribution)

Conference Planning Chair

- Conference Planning Packet
- Report of 1992 Network Activities (including site evaluation responses)
- EYH Summary Data Sheet
- Planning Committee Guide
- Preventing Volunteer Burn-Out
- Suggestions from Past Sites

Finance Chair

- Finance Packet
- Notes to Finance Chair
- Past and Present EYH Sponsors
- Souvenirs order forms (buttons, stickers, posters, tangrams, newsletter)

Program Chair

- Presenter Information Packet
- Sample of Hands-on Workshop
- Tips for a Successful Career discussion or Workshop
- Possible Workshop Titles
- Adult Workshop Titles

Publicity Chair

- Public Relations and Outreach Kit
- Generic Fill-in Posters (two)
- Generic Letterhead
- EYH Logo

Other Materials

- Notes to Facilities Committee Chair
- Guidelines for Evaluating Your Conference
- Sample Evaluation Forms
- Inexpensive or Free Materials
- Membership Form

I. CONFERENCE PLANNING PACKET

CONFERENCE GOALS

Every year, the Math/Science Network issues a report on the Network's main project: Expanding Your Horizons in Science and Mathematics. The purpose of Expanding Your Horizons (EYH) is to interest young women in grades six through twelve in a variety of careers where mathematics and science are important. Our goals for EYH are to:

* *Increase young women's interest in mathematics and science through positive, hands-on experiences.*

* *Foster awareness of career opportunities for women in math and science related careers.*

* *Provide young women with positive role models who are active in math and science related careers.*

* *Involve young women who have fewer opportunities to meet successful young women of similar backgrounds or circumstances and limited access to positive math/science experiences for any reasons including:*

    - Communities that do not value staying in school.

    - Schools that lack facilities or staffing.

    - Poverty, chronic illness, race or ethnicity, pregnancy or childcare issues, homelessness, physical or mental or emotional disability, lack of transportation, language barriers, or some other circumstances.

One of the goals of the EYH program is to find the young women in these limiting circumstances and offer them the EYH experience along with girls who have more opportunities.

RESULTS FROM 1993 CONFERENCE SITE EVALUATIONS

Of the conferences with available data at the time of this summary, over 40% returned statistics on their conferences. We assume that the remainder of the conferences have similar statistics. Here is a summary from the evaluations and conversations between the Network and local site coordinators.

Conference Size

During the 1992-1993 Expanding Your Horizons cycle (September 1992 through June 1993), 141 organizations registered with the Math/Science Network to receive EYH planning materials; of those, **140** sites organized an EYH conference. *This is an increase of 30% over 1991-1992.* Nationwide, approximately *41,000 students attended Expanding Your Horizons conferences in 1993.* This brings to approximately 280,000 the total number of students who have benefited from our program since 1976. Approximately *78% of the students attending the conferences continue to be in grades six through eight and 22% in grades nine through twelve.* Statistics show that the earlier young women receive positive images of themselves with respect to science and mathematics, the more likely they are to continue in these fields. For this reason, we are pleased to be reaching such a large number of girls in grades six through nine.

St. Louis Community College had the largest conference, with 1250 students attending from all over the state. Many sites hosted over 500 students. *The average attendance was 293 students and 42 adults per site.*

A Special Request

For the 1994 EYH conference we ask the sites to **aggressively** record the participation of young women of color. Additionally, the Math/Science Network plans to start tracking all the participants. This tracking will provide valuable information for measuring the effectiveness of the EYH conferences. Therefore, we would like each site to develop a list of their participants. As of yet we do not have software available but anything as simple as a spreadsheet (Excel, Quattro or Lotus for example) is an excellent way to start. Since most of our sites have held many EYH conferences it would be fairly easy for you to begin and maintain a tracking system. The information extrapolated from the tracking can be used in your fund raising efforts, especially, when you can show an increase of girls from year to year.

Conference Planners and Role Models

Expanding Your Horizons conferences could not be the success that they are without volunteers. Approximately *830 people worked on planning committees and approximately 3,000 women worked as role models.* These numbers show the tremendous grassroots support that Expanding Your Horizons conferences have throughout the country.

Budgets for the conferences averaged approximately *$5,044.* The average 1993 conference fee was *$6* which included several sites that charged $10 and gave each student a complimentary T-shirt. The fee is nominal considering it generally includes the cost of conference materials, buttons, puzzles, snacks, and lunch. The conference fee has been suggested by the Math/Science Network not only to supply funding, but also to commit students who pre-register. Though volunteers performed the majority of the work, certain costs are always difficult to avoid. The major means of defraying such costs as brochure printing, conference lunches, mailing, reproducing conference materials, etc. is through funds provided directly by a college, university, school district, or equity organization sponsoring a conference. Corporate and group donations made up the next largest source of funds.

Conference Materials

The Math/Science Network, in the past, has provided each site with at least three packets of information. This year we have consolidated the packets. You now will receive only two packets. The first packet contains the organizational materials. These materials include suggestions for the conference planners on everything from locating role models and speakers, to preparing the brochure and press releases. The second packet, Adult and Student packet, contain the information that you give out to the conference participants, parents, and teachers.

The Network also provides the sites with posters which should be filled in to indicate the time and location of their conferences. Although we are unable to provide each site with the colorful *Women in Mathematics and Science* poster they can be purchased from the Math/Science Network at a discount of $5.25. We also coordinate orders of buttons, stickers, tangrams and the *Women in Science* newsletter (see enclosed material).

EYH 1992-1993
*Evaluation Summary Data**

Subject	Count	Percentage (%)	Conference Average
140 Conferences	in 30 States		
Middle school	31,980	78	
High school	9,020	22	
Total students*	**41,000**	**100**	**293**
Minority student	10,080	24% of total attendees	
Adults attended	5,740	15% of total attendees	
Role models	6,560	14% of total attendees	
Conference Budget			$5,044.00
Conference Fee			$6.00

*projected estimates based on evaluation respondents as of 9/30/93

- EYH had a 33% growth rate in 1993 with over 140 sites throughout the nation!
- The largest Conference in 1993 was St. Louis Community College, St. Louis, Missouri with **1250** students participating!
- California, with 17 EYH conferences, was the state with the most sites. Texas came in second with 15 EYH conferences.
- EYH sites rated the Math/Science Network Student & Adult Packets as:
  40% rating **Very Important**
  42% **Important**
  16% **Somewhat Important**

Your completion of the EYH evaluation sheet is essential feedback. Each year we work to improve the information disseminated to the young women attending the conferences. Your input is extremely valuable!

PLANNING COMMITTEE GUIDE

These suggestions will help the Planning Committee understand its roles and responsibilities as well as those of the suggested ten major committees. For new sites, it will help you organize. For experienced sites, it will remind you of the planning tasks necessary for a successful EYH conference and, perhaps, provide some new ideas. We recommend that the Planning Committee be comprised of the following committee chairs:

Conference Planning Chair(s)

- Develop a timeline and deadlines.
- Determine tasks for committee chairs and **delegate**.
- Keep committee chairs on task and on time.
- Review all planning by Coordinating Committee chairs.

Finance Chair

- Develop expense budget.
- Secure funding for the conference.
- Obtain donations of in-kind services, contributions for door prizes, gifts, materials, etc. **with the help of a committee**.

Program Chair

- With a committee, organize your program for the **entire** day of the conference.
- Coordinate opening and closing sessions and lunch time activities.
- Seek out and find role models for hands-on workshops and career panels.
- Provide each role model with a Presenter's Packet.
- Prepare role models to conduct workshops via training session prior to the conference.

Evaluation Chair

- Work with a committee to design an evaluation procedure and forms for your local conference.
- Provide for evaluation forms to be filled out by **students, role models, adults** and **Planning Committee members** to determine what does and does not work for you.
- Collect data and fill out the evaluation **form from the Math/Science Network** that evaluates the EYH program from a national perspective and helps us evaluate how we can improve our services.

Facilities Chair

- Work with a committee to secure a site for the conference.
- Work with the site to arrange logistics, including such things as direction, parking, and registration signs.
- Provide for guides to direct conference participants.
- Coordinate lunch and coffee for role models as well as conference attendees; arrange refreshments for the reception following the conference.
- Work with the Program Committee to ensure that role models have equipment necessary for workshops, i.e., lab equipment, microphones, easels, video equipment, etc.

Public Relations Chair

The following tasks are critical to the success of all other tasks. A committee chairperson should be assigned to each task.

Publicity Committee

The main goals are to let the community know about the conference beforehand and obtain news coverage on the day of the conference:

- Prepare newspaper, radio, and TV coverage, as well as pre-conference publicity.
- Coordinate publication and distribution of conference brochures and posters.
- Distribute registration materials to places where potential conference participants are located.

Brochure Committee

Although a form of publicity, the brochure is important and crucial enough to warrant its own committee:

- Design brochure and meet with the Program Committee to ensure all pertinent program information is included in the brochure.
- Work with printer to facilitate reproduction, and ensure all production deadlines are met.
- List Math/Science Network on your brochure.

Student Recruitment Committee

- Develop and implement strategies for recruiting students to attend the conference.
- Go to schools and classrooms, making connections with teachers and counselors, submitting articles to student newspapers or hosting a publicity event for the conference.
- Include **student** representatives on this committee.

Adult Recruitment Committee

- Develop and implement strategies for recruiting.
- Go to schools, churches, community groups, and teacher organizations and make connections with parents and educators to attend the conference this target audience.
- Submit articles to teacher and parent newsletters, and work with the P.R. committee to target publicity to this audience.
- Include **educator** and **parent** representatives on this committee.

Registration Chair

- Work with a committee to design a process for conference registration.
- Develop registration forms for students and adults.
- Receive completed registration forms, compile registration information, and organize registration table at conference.

Materials Chair

- Work with a committee to collect materials for adult and student conference packets.
- Reproduce conference materials provided by the Math/Science Network.
- Organize conference packets.

PREVENTING EYH PLANNING COMMITTEE BURNOUT

Many sites indicated, on previous evaluation forms, that Planning Committee members frequently experience burnout. When that happens, members drop off the committee, which means the remaining members feel even more overworked. The worst result is that the site may stop offering an EYH conference.

Burn-out = Turnover and volunteer burn-out is expensive for any organizations in terms of time and energy spent recruiting, training, etc.

Gloria Cordova at the Los Alamos New Mexico EYH site offered these comments on avoiding burnout:

> *We don't really avoid burnout. We just bounce back every year despite it. We usually have a core group of people who come in and out. The best antidote to burnout is passion and commitment to the conferences, and a vision of what happens. Trusting the process helps. The goal is worthy and knowing it will happen relieves anxiety. One year our conference didn't occur, and it was missed. Los Alamos National Laboratory got behind it about three years ago and made the conference part of its affirmative action program, assigning people to work on it. Now we have PR people to handle logistics and publicity people who add their time and talents.*
>
> *It helps to rotate volunteers and to keep the communication open and flowing. Never assume that everyone knows about it. We had some volunteers who joined us because the Network got high visibility at a DOE Women's Program Review conference. They returned and wanted to know what they could do for the EYH conferences they had heard about.*

The best method to reducing volunteer burn-out is making sure the work load is reasonable. Volunteers will have different blocks of time they are willing to serve and at varying times. It's important for the volunteer to understand what is expected, how much time it will take, what "helps" are in place when the deadlines are due.

Pleasant surroundings promote job satisfaction. For volunteer meetings, go the extra mile and supply light snacks and beverages at all meetings.

The following are warning signs of burnout for individuals (adapted from *Fund Raising Management*):

- *You become detached*
- *You become impatient with others*
- *You project the blame for problems on others*
- *You perform your duties mechanically*

- *You stereotype others because it relieves the burden of having to think in depth about someone else*
- *You begin making poor judgments, therefore, poor decisions*
- *You feel no one appreciates you*
- *You develop a sense of omnipotence, e.g., no can do this job but me*
- *You become depressed*

We have come up with some **suggestions to alleviate EYH burnout:**

1. FINDING EYH CHAIR(s)

- Try new ways to identify someone for this leadership role.
- Many sites have **co-chairs** or **tri-chairs**, with each chair responsible for delegating categories of tasks, i.e., conference arrangements, public relations, finance, conference participants, etc.
- One site has a new co-chair as part of the team each year, so that one co-chair with a year's experience works with someone inexperienced each year.

2. DELEGATE TASKS

- Some people take on too much, burn themselves out and they deny others the opportunity for involvement.
- Chair or Planning Committee should identify tasks to be done and assign each task; develop a timeline for completion.

3. EACH ONE PULL ONE

- Have every member of the Planning Committee commit to finding at least one new person to join next year's committee. Look for these people in your offices, at professional meetings, in your neighborhood, etc.
- Invite these new people to the conference to assist with registration, hosting, or just to enjoy. New blood brings new ideas as well as new energy.

4. INVOLVE THE COMMUNITY

- Request that community groups, such as business and professional women associations such as AAUW, National Council of Negro Women, Society of Women Engineers, church education directors, school districts, teacher associations (especially those of middle and high schools), Girls Incorporated, Girl Scouts, science museums, etc. appoint a member to serve on the EYH Planning Committee for one year.

- Be creative about involving role models and workshop presenters in new ways. These people are a source of potential Planning Committee or subcommittee members.

5. HAVE A GOOD TIME !

- Make sure that your committee has fun with one another sometimes.
- Start the EYH cycle with some kind of social gathering and share funny anecdotes from years past.
- Show photos that were taken; list the successes from your last conference.
- Identify tasks that need to be done, and begin **REAL** planning at the second meeting.
- After the EYH conference is over, have the Planning Committee again meet to socialize, share the pride of a successful conference, and have fun.
- Promote recognition for Planning Committee members' hard work and express appreciation, e.g., a plaque or certificate for outstanding committee members.

SUGGESTIONS FROM PAST SITES

The following recommendations were suggestions made by EYH sites as part of their evaluation reports. As a way to share information between the EYH conference network, the Math/Science Network offers this list and encourages your EYH site to utilize these suggestions.

1. **Planning Do's:**

   DO . . .

   - Start planning early — choose a date you can live with and check for possible community event clashes.
   - Set a timetable and stick to it! Keep committee chairs reminded of deadlines.
   - Use one centrally located secretarial support — with computer access.
   - Keep minutes of each meeting.
   - Stay in contact with speakers.
   - Find a coordinator early.
   - Computers help in registration, mailing labels, and evaluation.
   - If possible, hire a coordinator for several months.
   - Carefully think through the registration process and provide adequate additional support if necessary prior to the week of the conference.
   - Start recruiting early for Planning Committee volunteers.
   - Encourage communication between committees.
   - Organize getting and keeping planning committee volunteers.
   - Go out of your way to recruit girl with fewer chances to participate in this kind of activity.
   - **Recruit women of color as role models.**

2. Conference Do's:

DO . . .

- Give workshops exciting attention-grabbing names.
- Have an adult program.
- Develop a computer label, like that below, for the front of the registration packet, so students know their sessions and where they are going.

Name
Time **Workshop (attention-grabbing names)**
Room 305
9:00 - 10:00 **Astronomy**

- Use door prizes for the closing session. Use the question and answer scavenger hunt to allow students to meet more Discussion Leaders.
- Utilize community groups for help and support. For example, have a women's service organization handle registration, workshop scheduling, and distribution of materials the day of the conference.
- Have a designated greeter for each keynote speaker.
- Simplify the food process.
- Be creative about conference scheduling. For example, one site scheduled the conference during the weekday and bussed their students from local schools. This helped get students within the **"high risk"** category to the conference.
- Allow adequate space for workshops.
- Organize registration by the first letter of the last name.
- Put someone in charge of getting equipment to correct rooms.
- Set up a table to handle late registration.
- Carefully think through the movement of people on the day of the conference.

3. Public Relations Do's:

DO . . .

- Not underestimate the recruitment strategies needed to reach young women, especially young women of color.
- Get conference support from local businesses and community organizations.
- Obtain support of school authorities, i.e. school board, superintendent, principals, PTA, early in the fall to secure commitment early. This gives you flexibility to do things the way you want, and as conveniently and efficiently as possible.
- Establish contacts at each school to promote the program among their students.
- Get brochures out early.

II. FINANCE COMMITTEE PACKET

NOTES FOR FINANCE COMMITTEE CHAIR

A list of donors and sponsors from past EYH conferences is included in this packet. We hope this list will stimulate new ideas about possible sources of support.

If your Planning Committee sends letters to potential funding sources, you may want to include the following information:

- Statistics from the 1993 Data Summary ("Report on the Math/Science Network's 1993 Activities").
- Similar statistics for your EYH site.
- Examples of quotations from student participants.
- Description of the ways EYH goals relate to the business receiving the request.
- Any EYH publicity from your local newspaper.
- Copy of 1993 brochure. Refer in letter to the 1993 list of sponsors and donors.

When your EYH site receives support from an organization or business, quickly send a thank you note and invite a representative to attend the EYH conference. If you want to be especially wonderful, invite the donors and sponsors to sit in front during the opening ceremonies or introduce them during a reception following the EYH conference for workshop presenters, role models, donors and sponsors and Planning Committee members. **Be sure to list all local and national donors and sponsors on the conference brochure.** After the conference is over, it is nice to send a certificate of appreciation to donors and sponsors.

PAST & PRESENT EXPANDING YOUR HORIZONS CONFERENCE SPONSORS

According to EYH conference site feedback, the following agencies and businesses supported conference expenses. We hope this list will help with ideas for fundraising at your site . . .

Alcoa Foundation
Amcore Bank
Amer. Assoc. for Artificial Intelligence
American Business Woman's Association
American Presidents Co.
ARA Catering
Arco
A T & T
BASF
Bausch & Lomb
Bay St. Louis Rotary Club
Bitteroot Motors
Blue Cross
Boeing Company
Bremer Foundation
Burger King
California Mathematics Council
Carbondale Memorial Hospital
Carl Perkins Funds
Clasters
Coca Cola
Consol Coal
D.C. Heath, Inc.
Dairy Queen
Daisy Marquis Foundation
Dakota EQUALS
Dennis Washington Foundation
Desert Research Institute
Elite Design
Equitrans
Exxon
First American Bank
Ford Motor Company
General Dynamics
General Motors
Golden Sunlight Mine
GTE Hawaiian Telephone
Hewlett Packard
Honeywell
I T Corporation
IBM
Immunex
Intel Foundation
International Paper Company
Jefferson Bank
Key Bank
Kiwanis
Kreb Motors
Legent Corporation
Lens & Camera
Los Almos National Bank & Laboratory
McDonald's
Marriot Hotels
MCI Foundation
Mellon Bank
Memphis Light, Gas & Water
Methodist Health Systems
Microsoft Corporation
Mid-America Marketing
Miles Foundation
Montana Power Co.
NASA-Ames Research Center
Pacific Bell
Peninsula Community Foundation
P G &E
Phoenix Press
Photometrics Ltd.
Professional Black Women's Association
Red Zone Robotics
Remco
Research Corporation
RGK Foundation
Robidoux Foundation
Ronan Telephone Company
Safeco
Salem Hospital
Sandia National Laboratory
Schering-Plough
Schlumberger Laboratory
See's Candies
Smead Corporation
Southern California Edison
Southwest Airlines
Southwestern Bell
St. Francis Medical Center
Tandy Corporation
TASSC
TCI Cablevision
Texas Instrument
Thorp, Reed & Armstrong
Tuscon Electric Power Company
U S West
University Mall
Wayne Printing
Westinghouse

BUTTON, BUTTON WHO'S GOT THE BUTTON?

Fall 1994 Sites use the form below to order your **Expanding Your Horizons buttons and stickers**. Enclose your check, made out to the Math Science Network, to cover the cost of the order, plus shipping and handling. Buttons and stickers will be sent directly to you from the button/sticker vendor.

*Site Name/Shipped To*_____

Shipping address _____

*City*_____ *State*_____*Zip*_____

Number of buttons:_____ Total Cost: _____
(23¢ per button)

Number of stickers: _____ Total Cost: _____
(9¢ per sticker)

(Sales Tax 8.25%, California only): _____

Plus shipping charge: $6.50
per 300 buttons

Total amount due: _____

Send order to:

Math/Science Network
Mills College
5000 MacArthur Blvd.
Oakland, CA 94613

510-430-2222

ORDERING YOUR EYH ANNOUNCEMENT POSTERS

Fall 1994 sites use the form below to order extra **EYH posters**. These posters are blank. You fill the date and place of your conference. Enclose your check to cover the cost of the order plus $2.90, **per 10 posters,** shipping and handling charge.

*Site Name/Shipped To*_____

Shipping address _____

*City*_____*State*_____*Zip*_____

Number of posters: _____Cost for posters (75¢ per poster): _____

(Sales Tax 8.25%, California only): _____

Plus shipping charge ($2.90 per 10 posters): _____

Total amount due: _____

Send order to:

Math/Science Network
Mills College
5000 MacArthur Blvd.
Oakland, CA 94613

510-430-2222

If your site needs Fortune Cookies, one source is:

Calvin Wong, Fortune Cookie Factory
261 12th Street
Oakland, CA 94607
(510) 832-5552 or (408) 738-1969

TANGRAM OFFER

After a long hiatus we are pleased to offer Tangrams as a gift idea for your EYH participants.

Prices are:

0-700	**50 cents each**
Over 700	**48 cents each**

They come in five colors (red, yellow, blue, green and orange) and stamped "Expanding Your Horizons."

*Site Name/Shipped to*_____

*Shipping address*_____

*City*_____ *State*_____ *Zip*_____

Quantity _____ Total Cost: _____

(Sales Tax 8.25%, California only): _____

Plus shipping charge: _____
$5.95 per 300 tangrams
$5.75 for less than 300 tangrams
Total amount due: _____

Send order to:

Math/Science Network
Mills College
5000 MacArthur Blvd.
Oakland, CA 94613

510-430-2222

Another new item for us is this 16 page ***Women in Science*** **newsletter.** It contains biographies of women in math and science related careers, games, statistics and exciting articles. Orginally produced by the Phildalephia Daily News it is now reprinted by the National Women's History Project. **We are able to bring this to you for only 72 cents a copy!**

*Site Name/Shipped to*_____

Shipping address _____

City _____ *State*_____ *Zip*_____

Quantity _____ Total Cost : _____

(Sales Tax 8.25%, California only): _____

Add 10% shipping charge:_____

Total amount due: _____

Send order to:

Math/Science Network
Mills College
5000 Mac Arthur Blvd.
Oakland, CA 94613

510-430-2222

III. PRESENTER INFORMATION PACKET

SAMPLE HANDS-ON WORKSHOP
for 60-minute workshop

We know that preparing a hands-on workshop for girls who attend EYH conferences can be a difficult task. It is made more difficult by not knowing what a "hands-on" activity really is, and not having experience teaching young women. This description of a sample hands-on workshop is designed to assist you with your preparation.

Workshop title: Something Fishy
Career: Marine Biology

Supplies: marking pens; 11" x 17" yellow and grey colored paper; masking tape; plastic probes; 1 whole fish per 2 people; worksheets; career information sheets and follow-up activity.

Time:	
2 minutes	I. **Introduction:** "Hello, 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."
5 minutes	II. **Defining career:** "First, I would like you to talk with the person sitting next to you about two things. Number one is a definition of a marine biologist that you both agree with. Please write your definition on the grey sheet of colored paper. Number two is to list three things you think a marine biologist does. Write these three things on the yellow sheet of paper. We will have five minutes for this discussion."
5 minutes	III. **Collecting information:** "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."
5 minutes	IV. **Using information:** "Let's look at these definitions of a 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].

25 minutes V. **Hands-on activity:** "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 kind 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.

Let's answer one question on the worksheet together. How many fins are on your fish? [Many girls call out an answer]. O. K. Write down this number in the appropriate space on the worksheet.

Are there any questions? [Waits at least 30 seconds.] If not, then 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.]

17 minutes VI. **Closing:** "Please stop working with your fish now. I would like to hear from the groups 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]. O. K., 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. As you leave the room, please pick up a hand-out that is on the back table. This includes more information about what marine biologists do, and some additional activities about body structure and functions that can be done with fish from the fish market. Thank you for your time."

TIPS FOR A SUCCESSFUL CAREER DISCUSSION OR WORKSHOP

As you develop your presentation for your Expanding Your Horizons conference, here are some things to consider:

What is equity? One purpose of Expanding Your Horizons in Science and Mathematics conferences is to promote educational opportunities, and, thus, career opportunities for girls. Many barriers still remain (gender stereotyping, teacher and parent expectations, peer pressure, media, etc.) that limit the participation of girls in science and mathematics. Expanding Your Horizons conferences are designed to help break down these barriers by presenting girls with encouragement, role models, and hands-on experiences to spark the interest and commitment necessary to prepare for careers that require prerequisite mathematics and science courses. We want to motivate girls to take all the mathematics and science courses that they can.

You are expected to help us with this task. Please be as encouraging as possible to the girls who attend your workshop session. Try to spark their curiosity about careers, mathematics, and science by being enthusiastic, challenging and interesting.

If boys also attend your workshop, monitor yourself so you are not teaching to the boys. If you use students for a demonstration, use girls. Watch who you call on during discussions to make sure that girls participate in workshop interactions.

Introducing Workshop Activities: At the beginning of your session, review the upcoming activities. For example, you might say that you intend to tell them a little about yourself, have them introduce themselves, and then you will answer questions they might have about you or your career. At 10:30, the girls will begin using the microscopes to view slides of plankton in pairs while filling in some observations on a worksheet. After 15 minutes, you will describe the importance of plankton in the food group. You will end the session by sharing with the group what you have observed. As an alternative, you might choose to write your session agenda on the chalkboard.

Icebreakers: Try to divide the time for your workshop into a variety of activities, including listening, talking, experimenting, acting, etc. Be friendly and personal. You might want to open your session with some information about yourself and you might want to have the girls introduce themselves. You can have them tell their names, grades, schools and favorite subjects. Or you might try something more imaginative: (1) ask the girls to pull an object from their backpacks and in two sentences describe the object and why it is important to them. The comments will reveal something about themselves, their interests, or their families and will help them to get a sense of each other. They may be shy at first, but there will usually be one or two girls who will be extroverts and get the

ball rolling. You can demonstrate with your own example. (2) Or you could ask them to take a few minutes to think about what they might like to be when they grow up. Encourage them to imagine what they will be doing in five or ten years. Tell them they are not to think about whether they will be able to do it, or how hard it might be to achieve. Ask them to tap into their wildest dreams. And then, perhaps they can share what they've thought about or made a few notes about. (3) You could ask the girls to make a timeline of their lives indicating the high and the low points. After they have had some minutes to do this a graph might be appropriate — they might then determine if they have learned anything about themselves and their interests. They could share their insights.

If you open yourself up to questions from the floor and we encourage you to do this be prepared to answer questions such as the following. These are typical questions that workshop leaders have been asked:

1. How much money do you earn?

2. Are you married? (What they really want to know is, do you have a personal life, what's it like, and how do you balance it all.)

3. How many years of school do I really need to be a _____?

4. Did you always know what you wanted to be? (Many young women at this age are uncertain about their futures. Help them see that our changing world may require flexibility and frequent career changes in the future.)

5. Do you ever make mistakes? What do you do when you make a mistake?

6. If you started over today, what would you do differently or the same?

7. Do you like what you do?

When answering, you might imagine that you are talking one-on-one with a young woman whom you know, e.g., your niece, daughter, next-door neighbor.

Learn by Doing: Then have the girls DO SOMETHING. Organize an activity that relates to your expertise. With youngsters, they will have questions and they will not perform the activity as rapidly as you might expect, so give them more time than you think they might need. It's important to get out of the way and let them fumble a little for themselves. Give them the opportunity to accomplish something on their own.

Discussion Techniques: You may have been asked to participate in a career discussion instead of a hands-on workshop. Be careful, you are trying to spark their interest — not lecture or educate. Tips for successful discussions include:

1. Ask open ended questions, not yes/no questions.

2. Phrase each question clearly and make sure the girls understand what it is that you want to know. Sometimes they may not understand terminology, which prevents them from discussing an issue.

3. Define terms that may be new to the girls. This promotes understanding of what you are talking about, and helps develop vocabulary.

4. After you ask a question, WAIT for an answer. This is called "wait time." Although silence is uncomfortable to most people, "wait time" allows girls to formulate answers to questions.

5. Some discussions are conducive to small groups. If your workshop group is over 12, break them into small groups of 3-4 girls. Each small group can discuss a different question, or the same one. Ask groups to take notes and report back to the large group at the end of the discussion.

Guided Activities: Some activities and discussions benefit from having a guide sheet that takes girls through the process. A good guide sheet makes goals clear and includes questions or steps to follow to reach the goals. Make guide sheets as interesting as possible.

Hints:

1. Be human.
2. Provide some information about your career beyond the hands-on activity.
3. Use active learning: small groups or pairs, that actually **do** something.
4. Keep students active: don't lecture or demonstrate. Let students **do** the activity.
5. Keep students engaged. When students are distracted it may be because they are stuck or don't understand what they are supposed to be doing. Move among the groups, listen and give them hints if they need them.
6. Be prepared for extra activities in case your group is small, or the first hands-on activity is completed quickly.
7. Move around the room. Interact with as many students as possible.
8. Make sure the learning environment is as comfortable as possible. Move furniture around if you need or want to.

WHAT ARE ADOLESCENT GIRLS REALLY THINKING ABOUT?

To help you prepare your presentation, we want to remind you what it was like to be a teen-age girl and to refresh your memory about her world. Some of our information comes from Girls Incorporated and a recent study from the AAUW concerning the self-esteem of young women.

The audience attending your workshop will be primarily girls aged 12 to 17. A member of the Planning Committee can give you more specific information about your expected audience.

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. Behavioral and thinking patterns, rather than age, indicate the developmental stage at which any particular girl is functioning. According to Piaget, adolescence is a time of transition from concrete to formal operation. "The capacity to think conceptually and hypothetically develops slowly over the next six or seven years and remains a potentiality attained only partially by most and fully by some" (Lidz, 1976). Therefore, some girls will demonstrate advanced capabilities, while others will need more time to develop cognitively.

The early adolescent is egocentric; she focuses on self. Early adolescents tend to think that they are special or different—that no one understands how they feel (personal fable); and that nothing bad can happen to them (magical thinking). They also believe that everyone else is watching them at all times and passing judgement on their appearance and behavior (imaginary audience).

The early adolescent seeks the company of adults other than parents who can serve as rôle models and provide support and guidance.

Developmental Differences from Boys

The AAUW study published in January, 1991 about the self-esteem of young women suggests that adolescent girls experience genuine, substantial drops in self-esteem that far outpace those reported by boys. Girls report *much less enthusiasm for math and science,* less confidence in their academic abilities, and fewer aspirations to professional careers.

Girls Incorporated reports that:

- Girls are more likely than boys to be concerned about their physical appearance.
- Girls are 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.
- As girls learn that aggression and dominance are not considered "feminine," they develop sex-typed ways of being powerful: manipulating, flattering, excluding others from cliques, gossiping, competing with other girls for boys' attention.
- Girls begin to become more accommodating to what they perceive as appropriate sex-role behavior.
- Girls are less likely than boys to develop expertise in logical persuasion, argumentation, task persistence, or power management the crucial qualities for leadership.
- Girls are significantly less likely than boys to have access to computers and other forms of advanced technology.
- Girls develop more competence in sophisticated social skills (empathy, self-disclosure, ability to make friends) than do boys.

Carol Gilligan, in her study of adolescent girls at the Emma Willard School (published by Harvard University Press 1990), asserts that girls often learn best and gain self-confidence through collaboration with other students and not through competition. In another study, it was suggested that girls need to learn that when finding new concepts difficult, they ought to redouble their efforts to understand the new material rather than falling back on their strengths in developed verbal skills.

POSSIBLE WORKSHOP TITLES

Many times the title of a workshop determines which sessions conference participants attend. In order to assist you in developing creative, catchy titles for Expanding Your Horizons™ workshops, the following list has been generated. These workshop titles come from 1986 and 1988 brochures of EYH conference sites. We hope this list will be helpful, although not all career categories or workshop titles have been included. Obviously, some titles can be used for a different career focus. The career categories are alphabetized.

Student Workshops

Accounting
Real Women Figure It Out
Accounting: Not Just Numbers
Checks and Balancing
Money Works 24 Hours a Day
How to Make a Million
A Head for Figures
Games You Can Play with other People's Money

Agriculture
A Wide Open Field

Archaeology
Can You Dig It?
Let's Dig In and Get Our Hands Dirty
Secrets of the Past
Solving History's Mysteries

Architecture
Spaced Out
Building Your Future

Astronomy
Are There Stars in Your Eyes?
Reach for the Stars
Look! Up in the Sky. It's a Plane. It's Our Universe
Finding Your Place in Space
Liftoff! Seeing Stars

Auto Mechanics
Ms. Goodwrench
What Mother Never Told You
You Can Fix It

Aviation:
Flying High

Biochemistry
In Search Of . . .

Biology
Dem Dry Bones
Spineless Critters
Notes on Newts
What Would Your Skin Say If It Could Talk?
Outside Our Winter Cocoon
Untying Tentacles
Going to the Boneyard
Snakes Alive
What Makes Us Tick?

Botany
Get A Blast From Protoplasts
How Does Your Garden Grow?
SEX in Plants
Close Encounters with Flowers
Apples, Grapes and Onions
Becoming Friends with a Mold

Chemistry
Petroleum Chemists Have the Refined Solution
Bubble, Bubble, Toil & Trouble
The Chemistry of Wine and Roses
Kitchen Chemistry
Chemistry: A Pigment of Your Imagination
How Acid Is Our Rain?
Chemists Have Solutions
Liquids You Can Cut
How Sweet It Is
Fantastic Reactions: Telling Time & Making Slime
Tidbits and Bytes
Chemistry Magic
Chemixtures and Chemysteries

Coast Guard
Ever Been to SEA Bill? . . . er Sue?

Computer Technology
Paint by Numbers (graphics)
Computer Capers
Talking To Your Home
More Than Just a Boring Game
A Bit of Basic Goes a Long Way
First Byte of the Apple
Fun with Turtles
We Have Designs on You
Ye CADS!
Bits and Pieces
Bytes and Pieces
Don't Eat These Chips!
A Byte Worth Taking
Let's Talk Turtles
Computers Don't Byte
A Byte of Basic
Are You With Me? (Computerized feedback)
Boys — The EST Way (Expert System with Intelligence)
Modeling: Not Just for the Tall and Slender

Construction
If I Had a Hammer
Have Lath Will Travel

Dentistry
Look Ma! No Cavities!
Preventing Dental Fallout
Open Wide: A Career In Dentistry
More Than Drill, Fill and Bill
What's Behind the Smile, Doctor?
Dental Hygienist: More Than a Cleaning Lady
Smiling Pretty

Drafting
You've Got to Draw the Line Somewhere!

Ecology
Rainforest on a Roof
Waste Not, Want Not
Bear Facts and Fish Stories
Pesticides — Are They Getting to You?

Engineering
Women Engineers (We Don't Drive Trains)
Testing Spaghetti Strength
Exploding Marshmallows
Material Magic
Good Vibrations

Engineering: Aerospace or Piloting
Up, Up & Away!
Beyond the Horizon
The Sky Is Not The Limit!
Tinkertoys and Airplanes
Becoming a Member of the Jet Set

Engineering: Civil
What Keeps A Building Up?
London Bridge is Falling Down?
You Gotta Know the Territory
Where Does All That Water Go When You Flush the Toilet?

Engineering: Electrical or Electricity
The Engineer Behind "The Force"
Shocking News
Shocks and Surprises
Megawatt to Kilowatt
Wire Up Your Circuits
Let Me Shock and Attract You
More Power to You!
Get a Charge Out of Life
Using Math and Science to "Wire Up" Your Future

Engineering: Mechanical
Sledge Hammer Through Metal in a Single Blow
Ms. Goodwrench: Space Age Mechanic
Springs and Swings
The Shape of Speed
Who's Not Mechanical?
Gasoline Ally
Are You on the Level?
Bridge Over the River Kwai
How Hot Do You Look?

Engineering: Petroleum
Let's Get Crude
Modern Day Prospecting

Entomology
Beauty and the Bugs
Insects: Art and Science

Firefighting
Smoke Gets In Your Eyes
You Light 'Em, We Fight 'Em (smoke jumper)

Fisheries
Wild Work

Forensics
How to Make Crime Pay

Forestry
Don't Miss the Trees for the Forest

Genetics
Designer "Genes"
The Blueprint of Life

Geology
Geologists Have Their Faults
Rock Videos
What's Underfoot
Romancing the Stone
An Earth Shaking Experience
When Continents Collide
Get to Know Your Faults
If Rocks Could Talk
How to Make an Earthquake
Shake It Up

Geophysics
How to Get Paid for Going on a Picnic

Horticulture
Growing Green

Hydrology
Walking On Water
Water, Water Everywhere, But is It Fit to Drink?

Insurance
How Do You Rate?

Law
Your Verdict Please
Mediating Your Beef
Member of the Jury

Mathematics
What Are The Chances?
Standard Deviates: A World that Varies
Maxima and Minima
The Magic of Mathematics
So You Have a Problem? Let's Solve It.
How to Lie with Statistics
Coloring Books: How Many Crayons Do You Need?
Pyramids, Prisms and Polyhedra
I Hate Math!
Mathematics Can Multiply Your Options
Toothpick Puzzles
The Right Stuff
Since Venn Have You Drawn in Math?
Can You Spriograph or Network?
Making and Breaking Secret Codes
Stick 'Em Up, Graph 'Em Up
Mathematical Art: String Along with Me
Two + Two = Ten?
It's Combinatorics That Count
Calculating Women
Fashion Fractions
Super Snooper Math Detectives

Media
Media Madness
SMART ART
Design Lines
Video Daze
Radio Days
The News Crews
All the News That is Fit to Print
Lights, Camera, Action

Medicine
What's Up Doc?
A Skeleton in the Closet
Is There A Doctor In the House?
We Don't Just Take Temperatures
What's In Her Bag?
Pediatrics Is Not Just For Kids
You Ate It — What Happens Next?
How To Get Plastered In Paris
Is Your Spine Out of Line?
Pills, Ills and Drills
AIDS: Get the Facts Before It Gets You
What Swims In Your Spit?
Let's Get Physical in Sports and
Medicine Save a Live with CPR
X-ray Vision
Breathe It all In
There's a "U" in Nursing
Nursing: Caring for the
Heartbeat of America

Meteorology
Is It Going To Rain?
Look! Up In the Sky

Microbiology
Bacteria: Your Constant Companion

Nutrition
Let's Hear It for Rutabagas
Promise Me Anything,
But Make Me Loose Weight

Oceanography
There's More in the Ocean Than Salt
More than Digging Clams

Optometry
For Your Eyes Only
Here's Looking At You

Pharmacy
Count, Pour, Lick & Stick
Prescription for Life
I Wanna Hold Your Hand

Physics
Where Did It Go &
How Did It Get There?
Mirror, Mirror on the Wall
The Sound of Music
Physics is Everything and
Everything is Physics

Plant Pathology
Smut — Not Just a Dirty Word

Plumbing
Stop That Leak!

Police Work
King County Blues
Life in the Fast Lane
This Lady Wears a Badge
An Arresting Profession
Gotcha!
Invisible Evidence
Whodunit?

Psychology or Psychiatry
Brian Storming
The Way We Were
Ordinary People
Time the Rat Race
Stress for All Seasons
The Deceiving Memory
Life On the High Wire
Now You See It, Now You Don't

Soil Conservation
Dirt Cheap

Taxidermy
Stuff It

Veterinary Medicine
All Creatures Great
All Creatures Small
Cat Guts
Bless the Beasts
Puppy Dog Tales
Aardvarks to Zebras: Taking Care of
Animals
Fur, Feathers, Fangs: Hoofprints on My
Fanny
All Creatures Feathered & Furry
Fido Fitness
The Inside Story — Fetal Anatomy
Meowers, Woofers, Tweeters and Lickers

Zoology
Tour the Wild Side

ADULT WORKSHOPS

The primary focus of Expanding Your Horizons™ conferences is young women. However, many of the young conference participants are accompanied by teachers, counselors and parents. By planning interesting and worthwhile activities, it is possible to influence these adults positively. Many sites currently offer adult workshops on a wide array of subjects. We've included some titles of teacher-parent-counselor sessions that you might like to try:

Parental Role in Math, Science and Computer Education

Your Role as Parent/Educator in Encouraging Young Women to Prepare and Participate in Math and Science Courses and Careers
Family Math: Developing Problem-Solving Skills
Fear of Math: Fact or Fantasy?
What Good Are Games?
You, Your Daughter, and Math Anxiety
Start Early: Get Involved

Career Options

Nothing But Options
Keeping Your Students' Options Open
Career Options for Women
Technology: Its Impact on Work
Long-term Employment Trends
Job Outlook for the 1990's
Women Pursuing Nontraditional Careers
Successful Steps to a Math/Science Career
Helping Your Daughter Design and Implement a Career Plan
Odds On You (EQUALS activity)
Women Working In Applied Sciences: Possibilities and Expectations

College

Preparing for the SAT
Is High School Math Really Preparing Your Daughter for College?
College Financing Options
Understanding Financial Aid
Making Ends Meet: Creatively Financing a College Education
Getting Through the College Financial Aid Maze
The Road to Higher Education

Gender Issues

You Did A Good Job . . . for a GIRL: A look at Gender Expectation and Student Achievement
Gender Expectations: What Can You Do?
Tips for Guiding Young Women

Building Your Daughter's Self Esteem

Math/Science/Technology

EQUALS: Ensuring Young Women's Involvement in Mathematics
Math and Technology in the Curriculum
Computers Don't Byte
Math and Science Education Outside the U.S.
Motivating Women in Math and Science
Computer Literacy
Math and Science: Stepping Stones to the Future

Miscellaneous

How Can I Help? Counselors Talk to Parents and Teachers
Should I Buy My Daughter a Computer?
Topics in Family Law
Great Expectations: Promoting Your Child's Academic and Career Development
Nutrition and Teenage Eating Habits
Mothers and Daughters — Issues of the 1990s
Parents in Harmony with Children
Teens, Sex, and Rock and Roll

Other Possible Workshops for Parents and Educators

Role Model Panel: Career Information

Student Panel: What Made Me Persist In Math and Science

College Admissions Panel

Videotapes and Films (Some conferences show media related to gender and mathematics, technology and science. Videotapes and films can be shown in a resource center all day in rotation, or single films or videotapes can be presented as workshops.)
The following have been shown:

> *Nothing But Options*: Five young women discuss math/science-related careers. (Available from the Math/Science Network.)
>
> *We All Count in Family Math:* Describes how problem-solving skills can be developed at home after Family Math workshops. (Available from EQUALS, Lawrence Hall of Science, Berkeley, CA.)
>
> *Rosie The Riveter:* A look at the women who worked in World War II defense plants and what happened to them when the war was over.

IV. PUBLICITY PACKET

PUBLIC RELATIONS and OUTREACH KIT

*(We hope this **Public Relations and Outreach Kit** will help you and your EYH site realize the public attention and success you deserve.)*

I. EYH GOALS

Every year the Math/Science Network issues a report on the Network's main project: Expanding Your Horizons in Science and Mathematics. The purpose of Expanding Your Horizons (EYH) is to interest young women in grades six through twelve in a variety of careers where mathematics and science are important. Our goals for EYH are to:

* Increase young women's interest in mathematics and science through positive, hands-on experiences.

* Foster awareness of career opportunities for women in math and science related fields.

* Provide young women with positive role models who are active in math and science related careers.

* Involve young women who have fewer opportunities to meet successful young women of similar backgrounds or circumstances and limited access to positive math/science experiences for any reasons including:

    - Their communities do not value staying in school;

    - Their schools lack adequate facilities or staffing;

    - Poverty, chronic illness, race or ethnicity, pregnancy or childcare issues, homelessness, physical, mental, or emotional disability, lack of transportation, language barriers, or some other circumstances.

One of the goals of the EYH program is to find the young women in these limiting circumstances and offer them the EYH experience along with girls who have more opportunities.

II. LIST OF SPONSORS

Sponsors to list on your brochure

When you design the EYH conference brochure for this year, please list the corporations and foundations below as contributors to or sponsors of your conference. Without their involvement, the national EYH network would not exist:

* The Math/Science Network
* The Coleman Charitable Foundation
* The Intel Foundation
* NASA-Ames Research Center
* American Association for Artificial Intelligence

This list of sponsors is as of November 11, 1993. We will send you additional names to add to this list when future contributors are known. Please include as many as possible up to the time of your brochure publication. **Please list the above supporters, along with your local donors.**

Please send us copies of your brochure.

The Math/Science Network requests that you **print 10 extra copies of your conference brochure and send them to us** (please note that we no longer require 100 brochures). We send these brochures to EYH sites, potential sites, and contributors. It is very helpful to sites to have a variety of brochures to stimulate new ideas. Please mail your brochures to us when you send us your conference evaluation. It's one of the best ways we know to communicate the fun, excitement, and real value of the conferences.

*Please be sure that you list your local sponsors **as well as the sponsors listed below including the Math/Science Network** on your conference publicity. These sponsors have donated to your conference at the national level. We suggest the following format:*

Presented by:

Your local group

The Math/Science Network

Sponsored by:

Local Funder

Local Funder

Local Funder

The sponsors listed above

Please express appreciation to these sponsors who make the EYH conferences possible. If we have additional names to add to the list, we'll send them along to you.

A. Outreach

"Outreach" means spreading information abut EYH to all corners of the area you wish to draw from. The goals of outreach are to:

- Fill your conference to capacity, and
- make EYH accessible to students who have fewer opportunities to meet successful women of similar circumstances and have limited access to positive math/science experiences.

First, figure out what geographical area you want to cover. A map and a list of the nearest EYH sites can help (the Math/Science Network can provide a current site list). Once you've determined the area, think about which young women in that area could use EYH the most.

- Are there communities that do not value staying in school?

- Are there schools that lack adequate facilities or staffing?

- Are there students whose access to a program like EYH is limited due to poverty, chronic illness, race or ethnicity, pregnancy or childcare issues, homelessness, physical, mental, or emotional disability, lack of transportation, language barriers, or some other circumstances?

One of the goals of the EYH program is to find the young women in these limiting circumstances and offer them the EYH experience along with girls who have more opportunities.

Where do you look for EYH participants? The list below will help you get started and also help you go beyond the local school system. You will increase your outreach success by finding individuals within each organization who can help distribute materials and be enthusiastic about EYH.

Here are places to reach young women, their parents, and people who work with young people.

Public and private school teachers and school newspapers
PTA (Parent Teacher Association)
Religious organizations
Sorority, fraternity and alumnae groups
YWCA/WHA
Girls Club
Girl Scouts
Campfire
Top 40 radio stations
Masons and Eastern Star
Homeless shelters

Senior citizen clubs
Yellow pages under "Social Services Organizations, "Women's Organizations," and "Community Services"

Gather a group of people, younger and older, EYH core committee members and not, and brainstorm where to go and what to ask for. Stores can put posters in windows. Organizations could find 20 needy students to sponsor. The most popular radio show could make an announcement or interview an EYH volunteer.

Before you begin calling and visiting, have a brief presentation prepared and materials ready to distribute.

Public Relations

B. Tips for Planning Effective Public Relations

The keys to an effective public relations campaign are planning and successful implementation. When planning a public relations campaign, there are **three** important tips to remember:

1. **Define clearly who you need to reach.**
2. **Accomplish only ONE objective per promotional message.**
3. **Choose the most effective method to reach a specific audience.**

The following covers each "tip" in detail:

1. Define clearly who you need to reach

A unique characteristic of the public relations for the Expanding Your Horizons program is that it is advantageous to reach a number of different audiences for different purposes. Therefore, this makes an effective public relations campaign very complex if all audiences are targeted. Possible audiences and purposes for reaching those audiences are:

Business community: Most EYH sites benefit from contributions from local businesses. It is important for the local business community to know about the goals and benefits of EYH, and that this conference is providing an important service to the community.

Junior high and high school girls: The participants at EYH conferences are junior high and high school girls. Therefore, it is important to attract their attention and convince them that attending a conference will benefit them.

Parents: Parents are important from two perspectives. First, parents are potential conference participants. Through their participation, parents become aware of how to help their daughters prepare for future careers and how to expand career options for their daughters. Second, many parents are instrumental in sending or taking their daughters to EYH

conferences. This is especially true for girls in grades 6 through 9. Parents must see the value of the conference in order to send their daughters to an EYH conference.

Educators: Educators are important from two perspectives. First, they too are potential conference participants. Through their participation, educators can become aware of the challenges related to girls in math and science education, career decision making, and potential nontraditional careers for their female students.

Second, they can influence the participation of their female students in EYH conferences. Educators can be the factor that determines whether a girl attends a conference or not. In order to promote attendance at EYH conferences, educators must see the value of the conference.

Presenters: The participation of workshop presenters and role models is crucially important to the success of EYH conferences. Ideally, current presenters should feel that they are contributing to an important community service. Potential presenters in the community should want to participate because the purpose of EYH conferences is seen as being important.

2. *Accomplish only ONE objective per promotional message*

Utilize separate promotional activities for each distinct target audience and message. Combining a number of target audiences and objectives diffuses the effectiveness and purpose of the public relations message. This makes the task of effective public relations complex, but specific targeting of audiences and messages makes this task effective. Therefore, follow these steps:

- **Define the specific group to reach.**
- **Define why the group needs to be reached.**
- **Clearly state the objective and method for each message to reach a specific group.**

3. *Choose the most effective method to reach a specific audience*

There are various methods for sending the message to reach each identified group. Choose the method that your planning committee or public relations subcommittee deems most effective for the target group. Methods for public relations include the following.

- Newsletters
- Brochures
- Audio visual presentations
- Speakers Bureaus
- Exhibits of photographs, clippings, and memorabilia

- Flyers and posters
- Events such as a coffee/dessert or open forum
- T-shirts, bumper stickers and decals
- Certificates

The trick is obviously to select the method(s) that will most effectively transmit the desired message to the target group. A Speakers Bureau may be an effective method for reaching potential EYH student participants when classroom presentations are given. Speakers can also carry a message to educators when a presentation is given at faculty meetings or local educational conferences. Speakers can also carry a message to potential presenters in presentations given at professional meetings and conferences. The crucial thing to remember is that each presentation must be geared to its target audience.

C. Rules for Developing Effective Public Relations

When developing newsletters, brochures, flyers, posters, audio visual presentations or preparing for EYH press coverage, follow these rules as suggested in *Profitable Public Relations for Non-Profit Organizations,* produced by Chevron U.S.A. Community Affairs:

Rule 1: Show your program and your people involved and in action. This gives your volunteers and sponsors a public "pat on the back" and is more appealing to the media.

Rule 2: Think dramatic. A colorful, splashy, eye-catching event will create interest in the community and the press. A famous keynoter can create a colorful event.

Rule 3: An event that involves people in fun or fantasy communicates a strong message to readers and the press. How about a gathering of former EYH conference participants to tell how the event changed their lives?

Rule 4: Keep the audience in mind. Plan and design each method of public relations to appeal to one targeted audience.

Rule 5: The best written description can not begin to convey what one obviously true-to-life photo can communicate about your program's value. Take black and white photos (close-ups of one to three persons: students, presenters and educators) at your conferences, file them, and use these photos for brochures, exhibits, newsletters, press releases, etc.

Rule 6: A new twist on the old is welcome in any newsroom. Be creative about presenting your message in a new way.

Rule 7: Everyone has a soft spot for kids. Capture touching moments involving EYH student participants on film and use them in public relations materials.

Rule 8: Sponsors often enjoy seeing where the company's money is going. When they come to visit, provide a natural opportunity for a photo you can use in your newsletter or with press releases. Invite representatives from sponsors and donors to attend your EYH conference and/or reception for presenters and planning committee and take photos. Use these photos for exhibits, newsletters and brochures designed to appeal to donors and sponsors, or to recruit presenters.

Rule 9: Increase your chances of getting media coverage by including an action photo with your press release. Again, be creative about capturing conference action – design photos to show the vitality and excitement experienced by the student and adult participants.

Rule 10: Sometimes a story is told better in a caption that accompanies a photo. Besides the photo, facts can be included in the photo caption.

Rule 11: Many words like exhibit, conference, workshop, etc. sound stodgy and uninteresting. Jazz up words used in public relations materials. An eye-catching photo can communicate fun and excitement.

Rule 12: Virtually all newspapers and magazines accept letters to the editor. Anyone can write one, either as part of a group or as a concerned citizen. They can be written in response to an article, to state an opinion, or to provide information on a subject. Letters to the editor are a great source of publicity!

D. Evaluating the Effectiveness of Your Public Relations Campaign

Since public relations takes time, effort and money, it is important to evaluate the effectiveness of the whole campaign, and to determine the effectiveness of each method for reaching targeted groups. In order to do this, it is necessary to compile data. When possible, ask members of a target group to identify how they found out about the Expanding Your Horizons program and your conference site.

For instance, ask student and adult participants to answer this question on conference evaluation forms: "How did you learn about this EYH conference?" Then list the methods you used to reach targeted groups. Request that students and adults check the method that reached them. If you have a Speakers Bureau, ask the following question when someone calls and makes a request for a speaker: "How did you find out about this Speakers Bureau?" Compile and file this data. When potential role models or workshop presenters contact someone from your site and express interest in participating in your EYH conference, ask the following question: "How did you find out about this EYH conference site or planning committee contact?" Compile and file this data.

By recording and filing answers to questions such as these, you will be able to determine what information methods are working effectively for you. You will also be able to identify methods to work on to improve and those to eliminate because they are a waste of time.

E. Hints for Working Effectively with the Press

There are numerous general hints for working effectively with the press in your community. By being sensitive to these hints, and listing and filing your own hints related to your community, your public relations committee will be more effective.

Hints for working effectively with the press include:

- Know people that are part of the local press. The best strategy is to get to know and invite someone from your local newspaper or television station to be on the EYH planning committee. If this is not possible, assign a planning committee member to spend time nurturing contacts with the local press. This may need to take place during the summer, or times when conference planning is not in full force. Personal contacts with the press are very effective ways to ensure coverage of the EYH event.

- Plan ahead. Send preliminary press releases of conference information to newspapers, radio and television stations two to three months in advance. Have a planning committee member (a "press

contact" person) make a follow-up phone call to "ask if they received the information and to answer questions." Include the name and phone number of the EYH press contact on press releases. Send another release to the press three to four weeks before the event.

- Consider all your media choices. Sometimes local weekly or school newspapers are more willing to do a feature article than are large daily newspapers.

- Don't nag the press. Telephone at least once to make contact, but then let them call the EYH publicity committee chair or press contact for further information, etc.

- Newspapers, television and radio stations are interested in NEWS. Think of ways to make your event newsworthy. A famous keynote speaker can draw the press . . . if you let them know about the keynoter and the speech. Another strategy is to stage a newsworthy event as a publicity gimmick prior to the EYH conference.

- Go all out for reporters who seek you out. Have an EYH press contact person be prepared with as much data as possible to answer questions and provide support information. If a reporter requests written information, get it mailed or delivered as quickly as possible. If a reporter calls to ask a question, but does not request additional information . . . offer it! S/he can always say no.

- Send thank you notes to members of the press who have been helpful to your site a few days after the coverage.

F. Sample Press Releases and Public Service Announcement

Following are two examples of press releases and one public service announcement that can be used for Expanding Your Horizons public relations purposes. These examples may be used as models for your site, or as they are with local information included.

• **NOTE:** Press releases and public service announcements should be on official letterhead, double-spaced with wide margins.

SOURCES OF INFORMATION for this Kit:

Oakland Artscape '86: Capture the Spirit!, Marketing Handbook Vol. 1; A Project of the Oakland Arts Council and the Oakland Redevelopment Agency.

Profitable Public Relations for Non-profit Organizations, Chevron U.S.A. — Community Affairs, P. O. Box 7753, San Francisco, CA 94120-7753.

SAMPLE PRESS RELEASE FOR COMMUNITY MEDIA
TARGET AUDIENCE: PARENTS
PURPOSE: INFLUENCE PARENTS TO SEND DAUGHTERS TO EYH CONFERENCE

For Immediate Release
(Date)

For details contact:
(Name of contact person)
(Phone number)

"Girls to Get Encouragement in Math and Science"
(Name of City) — On *(date of EYH conference)* the girls of *(city)* can attend a conference geared to increasing their interest in taking more math and science in order to prepare for expanded career options. The Expanding Your Horizons in Science and Mathematics conference will be held from *(hours of conference)* at *(conference site).*

(Information about keynoter, if relevant and newsworthy, and how her talk will address this issue.)

(Number of role models) women who work in math and science related careers will present workshops for conference participants. Workshops will include hands-on experiences of actual career activities, as well as discuss career preparation. Girls can attend workshops such as *(two or three jazzy workshop titles).*

Last year over 41,000 girls around the country attended Expanding Your Horizons in Science and Mathematics conferences. In *(site city), (number of last year's participants at your site) (grade level of girls who attended last year)* attended the EYH conference.

Typically, girls lose interest in or quit taking mathematics and science courses earlier than boys. The long-term result of this decision, is that these girls do not have as many career options available to them. Furthermore, the career options that are available are usually lower paying and less in demand. Expanding Your Horizons in Science and Mathematics conferences seek to expand career options for girls by encouraging them to prepare for the future.

SAMPLE PRESS RELEASE FOR STUDENT NEWSPAPER
TARGET AUDIENCE: STUDENTS
PURPOSE: ATTRACT STUDENT PARTICIPANTS TO EYH CONFERENCE

For Release *(when)*

For Information Contact
(Name of contact)
(Phone number)

"Explore A Touch of Science; A Fraction of Mathematics"

Nearly all women will work for wages during their lives and average 38 years in the labor market. Are you preparing yourself to have a satisfying, creative career for those years?

High school is a time for planning and preparing for the future. One important task is to consider future careers. On *(date)* an Expanding Your Horizons in Science and Mathematics conference will be held at *(site)* from *(hours of conference)*.

The purpose of Expanding Your Horizons conferences is to generate girls' interest in mathematics and science and to increase awareness of career opportunities for women in math and science related careers. At this day-long conference, girls from *(where)* will attend sessions such as *(examples of jazzy workshop titles)*. These workshops will provide hands-on experiences of things actually done by women in various careers. Girls will also hear about what it is like to be employed in math and science related careers, and hear the personal stories of many women.

Registration forms are available from *(who and where)*. The cost of the Expanding Your Horizons conference is *(fee)*, which includes *(what)*. For further information, contact *(who)*.

SAMPLE PUBLIC SERVICE ANNOUNCEMENT
TARGET AUDIENCE: STUDENTS
PURPOSE: ATTRACT STUDENT PARTICIPANTS TO EYH CONFERENCE

Start date: *(date)*

End date: *(date)*

Reading time: 30 secs.

Contact Person:
(Name of contact)

Contact Phone:
(Contact phone)

Organization:
Expanding Your Horizons
in Science and Mathematics

Conference Planned for Girls

Does a woman engineer drive trains? Girls in *(grade levels)* in *(city)* are invited to attend the 1993 day-long Expanding Your Horizons in Science and Mathematics conference at *(site location)* on *(date)* from *(hours)* to find out.

Girls will meet women in math and science related careers and attend workshops to find out about careers and how to prepare for future career options.

The registration fee of *(amount)* includes lunch and materials. Call *(phone number)* for more information or registration materials.

Send PSAs to broadcast stations' Public Service Director with brief cover letter. Contact within 5-7 days and attempt to secure a commitment to record or air it.

G. SAMPLE LETTER TO SCHOOL PERSONNEL

The Math/Science Network suggests the following letter might be useful in recruiting students to attend your Expanding Your Horizons™ conferences.

Contact person:_____

Phone:_____

Address:_____

To: Counselors and Teachers

From: Planning Committee or Name of Conference chairperson

Re: Expanding Your Horizons in Science and Mathematics™ conference

On ____, 1993 or 1994, *(location of site: college, university, school or other)* will be hosting an Expanding Your Horizons in Science and Mathematics™ conference for *(grades of participants)* girls. Many community individuals are volunteering their time and support to make this conference enjoyable to young girls. They hope to encourage them to persist in studying mathematics and science, thus expanding future career options for them.

The goals of the conference are:

- to increase young women's interest in mathematics and science,
- to foster awareness of career opportunities for women in mathematics and science related fields, and
- to provide students with an opportunity to meet and form personal contacts with women working in traditionally male occupations.

These goals are accomplished in two ways. First, girls attend workshops that give them a hands-on experience with some career-related activity. In this way, conference participants increase their awareness of career options. For instance, some of our workshops have been:

"Get A Blast from Protoplasts" (Botany)
"Are There Stars in Your Eyes?" (Astronomy)
"Ms. Goodwrench" (Auto Repair)
"Life in the Fast Lane" (Police work)
"You've Got to Draw the Line Somewhere" (Drafting)

Second, workshops and career panels are presented by women from the community. Participating girls meet adult role models who are employed in math or science or nontraditional careers. These role models provide career information and inspiration to students.

We are enclosing brochures and a poster that describe the conference. Please help us by sharing this information with people who might be interested in this conference girls, parents, teachers, counselors, etc. Please discuss this conference with your students, other staff, and parents. You may also want to place brochures at a front desk or other area where they will be available to the public. Please display the poster in an appropriate place. Similar brochures and posters are being sent to all schools in *(county, region or city)* which serve _____ graders.

If you need more brochures please call *(name)* at *(phone)*.

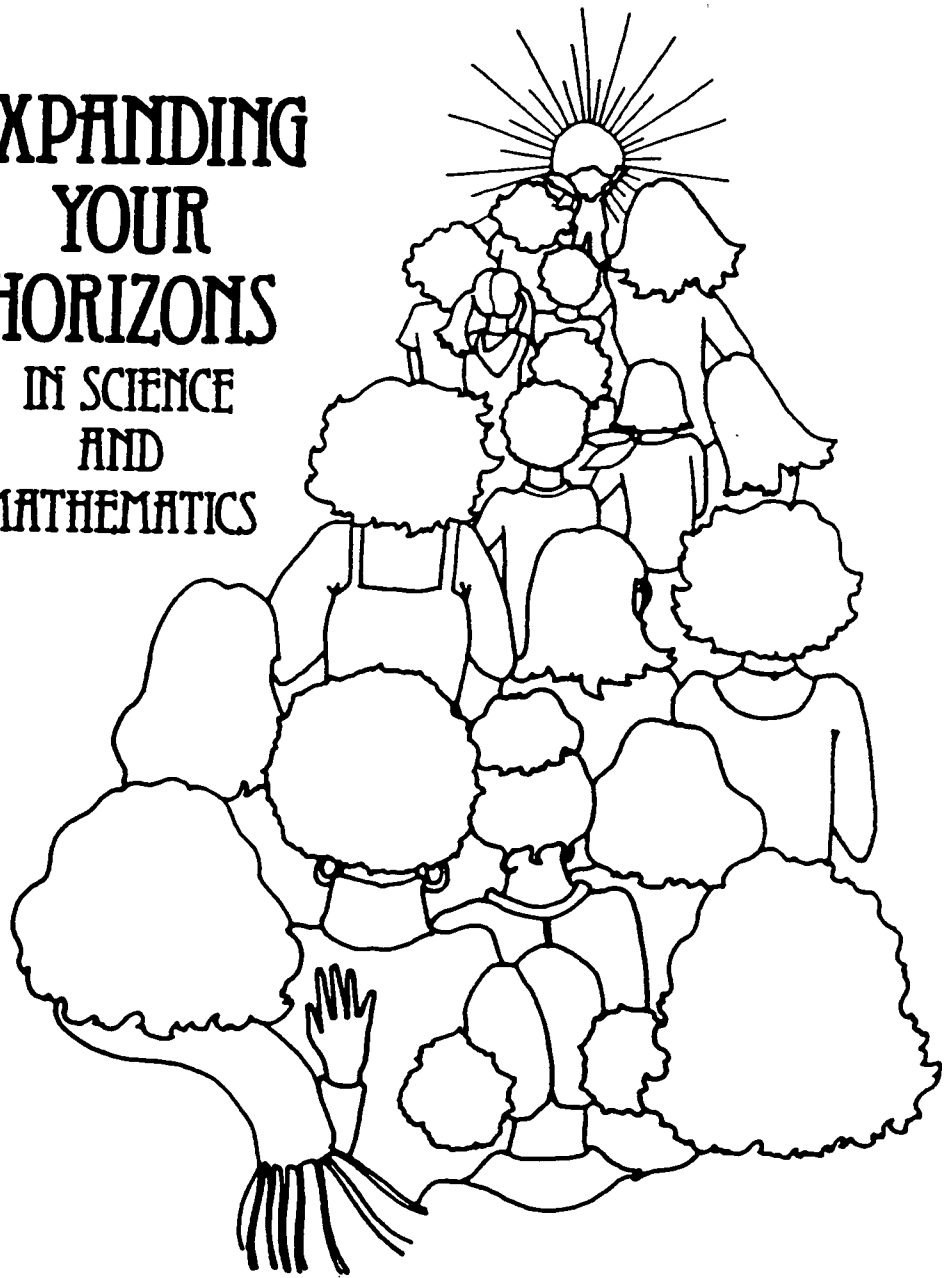
We encourage potential conference participants to request registration materials from us by *(date)*. All interested persons please contact (name *and phone number)*.

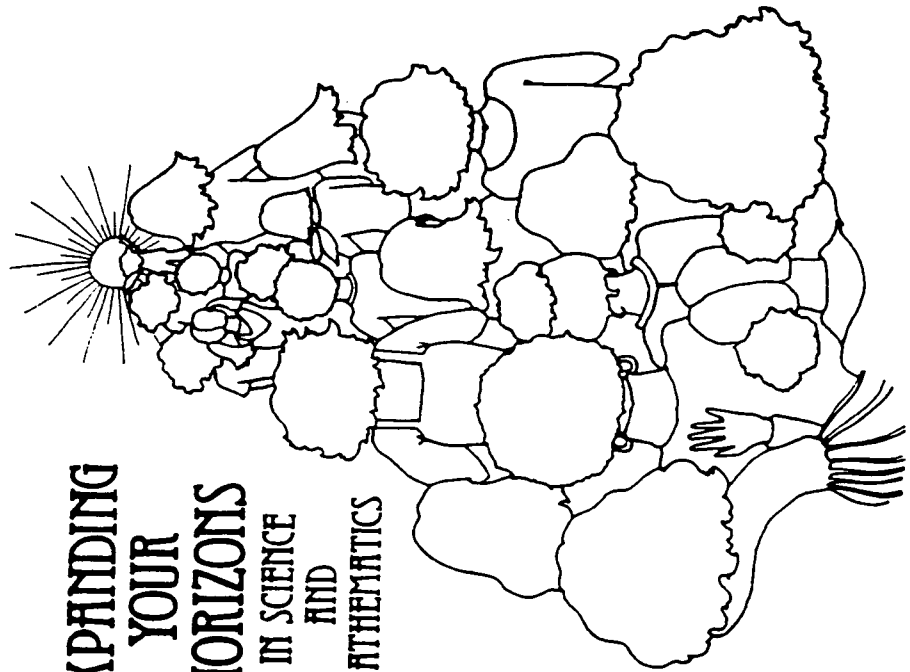
Thank you for your support and assistance.

Sincerely,

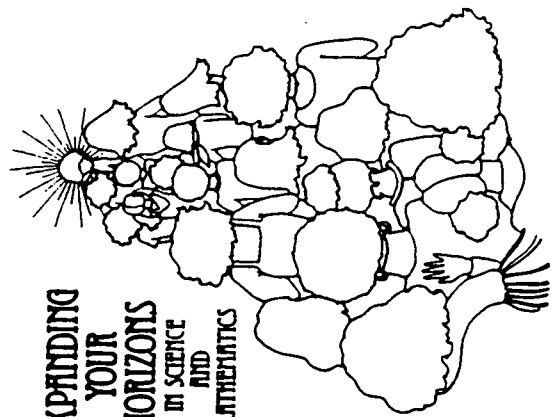
EXPANDING YOUR HORIZONS

IN SCIENCE AND MATHEMATICS





EXPANDING YOUR HORIZONS IN SCIENCE AND MATHEMATICS



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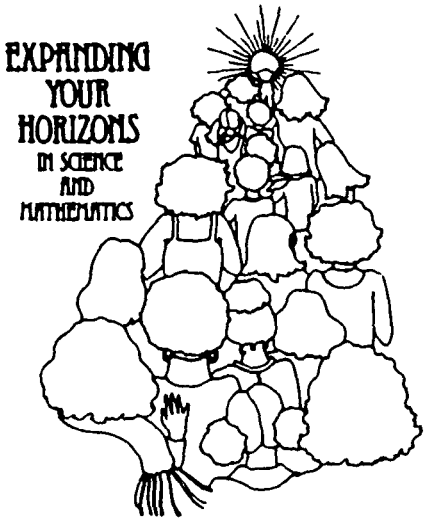
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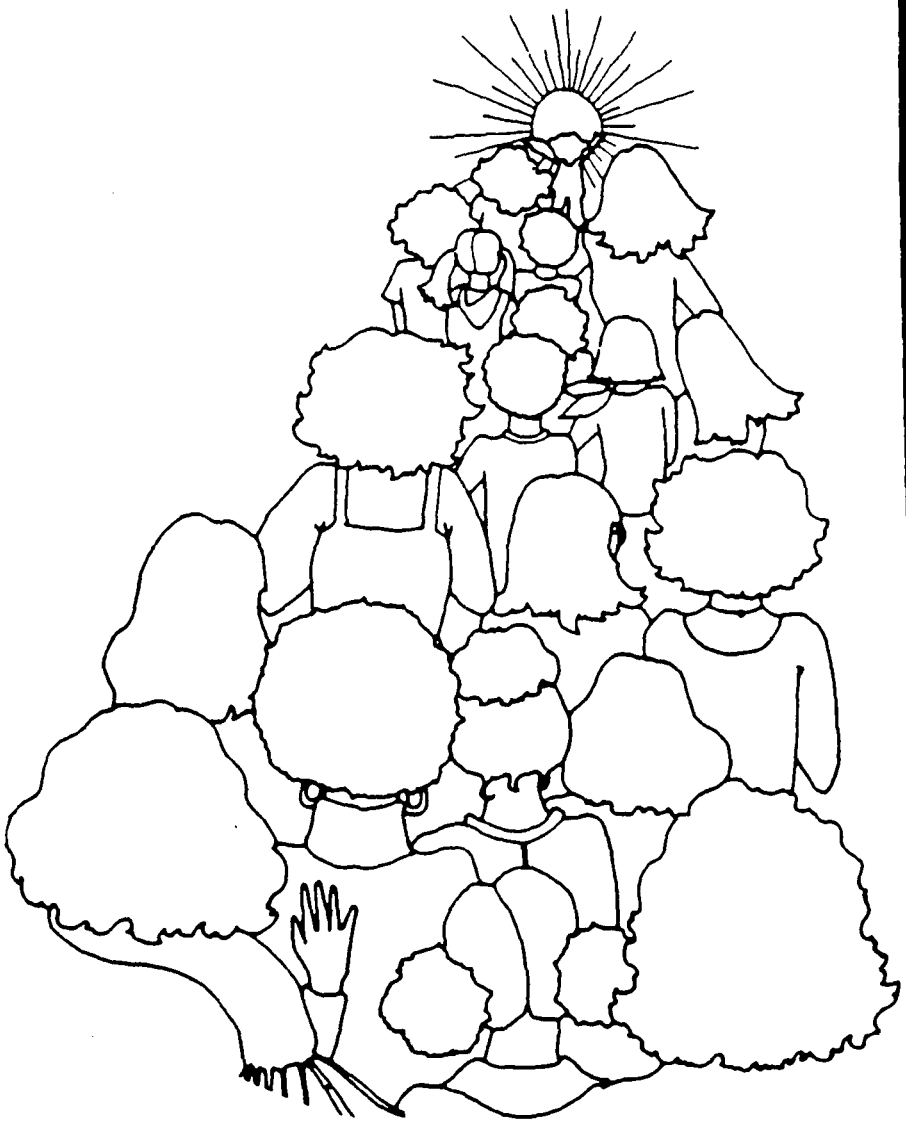
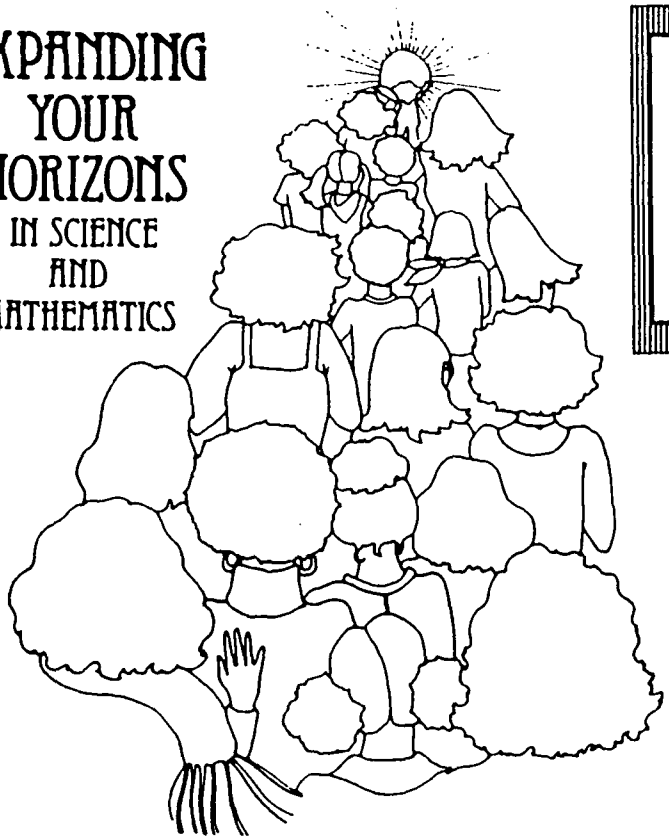


A CONFERENCE for Young Women to

- increase awareness of math and science careers
- meet and talk with women working in nontraditional careers
- increase confidence in math and science coursework

Supported by the Math/Science Network, Berkeley, CA.

EXPANDING YOUR HORIZONS IN SCIENCE AND MATHEMATICS



ANNOUNCING...

A Conference for girls that will:

1. Increase interest in mathematics and science.
2. Present information about career opportunities for women in math and science-related careers.
3. Provide women role models who are working in nontraditional careers.

Date:

Place:

Time:

Cosponsored by the Math/Science Network, Oakland, CA and

V. OTHER MATERIALS

NOTES FOR THE FACILITIES COMMITTEE CHAIR

LIABILITY INSURANCE:

Expanding Your Horizons conferences are generally covered by the liability insurance of the host institution. We encourage you to discuss liability coverage with a representative of your host institution.

SAFETY:

We suggest that at least one person be designated at your conference as a "Safety Officer." This person should have first aid training.

Identify the "Safety Officer" during the opening ceremonies of the conference and describe the location of a First Aid Station. Have the Safety Officer stay at this station in case of an emergency. Be sure to supply this station with a first aid kit or supplies.

We hope the Safety Officer will never be needed, but taking precautionary means to ensure the safety of the participants is a responsible action.

EVALUATING YOUR CONFERENCE
Guidelines for the Evaluation Committee

Evaluation is key to improving local EYH conferences and the EYH program nationally. By soliciting feedback from student and adult participants, role models and Planning Committee members we can determine what is working well for us and what we can improve. It is easy to overlook this important component of EYH, so this is a reminder to begin early to plan for the important tasks involved in evaluation. The Math/Science Network recommends that each EYH site delegate evaluation to a Planning Committee member who will act as chairperson of an Evaluation Committee.

Preconference Data Collection:

This is a great idea if you have time.

To determine how to structure your Expanding Your Horizons Conference to best meet the needs of your community we suggest that you interview a few students, one or two math and science teachers and parents. What are their concerns? What are they really interested in? What worries them? Will they help? Finding out girls' attitudes about women in nontraditional careers can influence role model selection; asking girls "who becomes a scientist? plumber? physicist? chemist? " can help explain the reluctance of some girls to attend EYH, and identify a challenge to overcome.

You can also collect valuable information using pre-conference questionnaires, but this is time-consuming and can be costly. But it can be an eye-opener and improve your EYH Conference

Postconference Evaluation:

Postconference evaluations are relatively simple to include in your process. The evaluation forms for students and adults can be included in packets. It's important to remember to allow time for them to be filled out, however, and to provide for them to be collected in a central place. Samples of student, adult, and role model evaluations, which can be adapted for your site, are included in this packet.

- **Student workshop evaluation** - The best way to determine the quality and impact of workshops is to ask students to rate them. Provide a questionnaire in the Student Packet that will identify the workshops attended and will ask the student to rate their success. Student participants know what role models held their attention and provided meaningful workshop experiences. *Be sure to give copies of the relevant evaluations to workshop leaders.*

- **Student EYH evaluation** - Collect comments that describe girls' reactions to the overall EYH experience. On the student *Evaluating Your Conference questionnaire,* ask the students to rate the keynote

address, workshops, and closing sessions. Also include open-ended questions such as "Comments about your experience at this Expanding Your Horizons conference" or "What new thing did you learn today?" or "What did you like most about this EYH conference?" These comments are useful for your site to determine the impact of your EYH conference (*sample enclosed).*

The Math/Science Network would like copies of the open-ended comments (or the best comments) to use for fund raising purposes and to tell others about the positive benefits of EYH conferences. Send your Student Comments to us with your Math/Science Network evaluation in June.

- **Role model evaluation** - Provide all workshop role models with evaluation forms that ask about their preparation, the support they received, and suggestions they have for workshop leaders (*sample enclosed).*

- **Planning Committee evaluation** - Collect information from Planning Committee members to identify what worked and didn't work vis a vis planning, communications, and the overall conference. This evaluation can be formal (using questionnaires) or informal (collecting information during a discussion). We recommend a written evaluation because it may elicit more information than might come out during a discussion. This will provide valuable data for future goals and improvements.

Math/Science Network evaluation - The Math/Science Network has enclosed an evaluation form to be filled out and mailed back to us **two** weeks after your conference. We are requesting data about the number and ethnicity of students, role models, adults, Planning Committee members; the usefulness of Network materials; total income and expenses as well as in-kind donations; major sponsor; and your major problem. Please keep on-going records for the evaluation. **We especially want any information you may have used to begin tracking the participants.**

The Math/Science Network really needs your evaluations - Please send them back. Thanks!!

To share information and ideas with other sites, we request **10 copies of your brochure** to be sent to us with your evaluation. We include these brochures in start-up packets requested by potential new sites and to many people who call and ask for information about the Network or EYH. We believe that the sample brochures, that show the exciting and interesting things that happen at an EYH conference are powerful sales pieces for EYH, and we include sample brochures in grant proposals, too.

EVALUATING YOUR EYH CONFERENCE
for the Math/Science Network

Site Name: _____

City: _____State: _____

Date of Conference: _____

Coordinator(s): _____

Conference Information

1. Total number of students attending _____

   % 8th grade or younger _____

   % 9th grade or older _____

   % minority students _____

   Any boys?_____ If yes, how many _____

2. Total number of adults attending _____ % minority _____

3. Total number of role models _____ % minority _____

4. Total number of people involved in your pre-Conference planning _____

   If any were paid, how many? _____

5. Which of the following were part of your EYH conference?

opening session	yes__	no__
career sessions	yes__	no__
hands-on workshop	yes__	no__
career fair	yes__	no__
closing session	yes__	no__

6. Describe the group that organizes your EYH Conference (e.g., Girls Club, AAUW, college/university, school district, workers for one or two companies, collection of volunteers).

7. Finances

   Total expenses $_____

   Total income $_____

8. List your major financial sponsors. Also please indicate any in-kind support, such as site, administrative personnel, lunches?

---

9. Do you charge a conference fee? If so, how much _____

10. Have you started to track your attendees? If so what method did you use?

---

11. Give us the high point of your conference.

---

12. Was there a major problem during your EYH Conference? If so, briefly explain.

---

13. Are you planning an EYH Conference next year? ____yes ____no
If no, why?

---

14. Are you aware that the Math/Science Network is the parent organization of all EYH conferences nationwide?
yes _____ no_____

15. Rank the importance of the materials you received from the Math/Science Network to your conference:

_____ very important _____ somewhat important

_____ important _____ not at all important

Briefly explain:

If you are not a member of the Math/Science Network, we would really like you to join. Just fill out the enclosed membership form, and sent it along with your membership fee. Please send this evaluation and ***10 copies of your brochure*** to: **Melanie DewBerry, Math/Science Network 678 13th Street, Suite 100, Oakland, CA 94612.**

EVALUATING YOUR EYH CONFERENCE

(SITE LOCATION)
(DATE OF CONFERENCE)

1. School _____

2. Grade _____

3. Ethnicity_____

4. How did you learn about this conference? (circle one)

teacher *counselor* *parent* *friend* *newspaper* *poster* *other*

5. Circle the math and science courses you have taken or are now taking:

algebra I *geometry* *algebra II* *advanced math* *other (what?)*

biology *chemistry* *physics* *computers* *other (what?)*

6. Who has most influenced your career plans? (circle one)

mother *father* *other relative* *teacher* *friend* *counselor*

7. Please rate your experiences today:

	Dull		*Average*		*Fantastic*
- Keynote speech	1	2	3	4	5
- Morning session: (Title:_____)	1	2	3	4	5
- Lunch	1	2	3	4	5
- Afternoon session: (Title: _____)	1	2	3	4	5
- Closing session	1	2	3	4	5

8. How helpful was this conference towards clarifying your future plans?.
(circle one) *Very* *Somewhat* *Not at all*

9. Did this conference influence your decisions concerning the number of math and science classes you plan to take in the future? (circle one)

Yes *No* *Don't know*

10. What future career(s) or occupation(s) are you considering?

11. Did you learn about any new careers at this conference? (circle one) *Yes* *No*
    If so, which ones?

12. Will you need (circle one) *more* *the same* *fewer* courses in math to pursue your chosen career?

13. Will you need (circle one) *more* *the same* *fewer* courses in science to pursue your chosen career?

14. What activities today provided you with new information about how mathematics and/or science are needed and used in various careers? (circle all that apply)

    keynote speech *a.m. session* *p.m. session* *closing session*

15. How many EYH conferences have you attended? (circle one)

    one *two* *three* *more than three*

16. Would you come to an EYH conference next year? *Yes* *No*

17. Have you attended an EYH before? If so, what year did you last attend? 19___

18. Would you encourage a friend to attend? *Yes* *No*

19. What topics would you be interested in for the future?

    1._____2._____3._____

20 Please make a comment about your experience today at this conference.

Please return this evaluation form to the designated place before your leave.

Thank you for participating in this conference.

EVALUATING YOUR EYH CONFERENCE

(SITE LOCATION)
(DATE OF CONFERENCE)

1. Relationship to student(s) attending workshop:_____

2. School student attends:_____

3. Is this your (circle one) *first second third* EYH conference?

4. How did you hear about this conference? (circle one)

teacher counselor student newspaper friend poster other

5. Please rate your experiences today:	*Dull*		*Average*		*Fantastic*
a. keynote address	1	2	3	4	5
b. morning session (title:_____)	1	2	3	4	5
c. lunch	1	2	3	4	5
d. afternoon session (title:_____)	1	2	3	4	5
e. closing session	1	2	3	4	5

6. Did the conference meet your expectations? (circle one) *very much somewhat not at all*

7. What would you like to see included in the adult program next year?

8. What type of follow up materials would you like?

9. Did you know your daughter can become a member of the Math/Science Network and receive quarterly information on women in math and science for only $5.00? If you would like a membership form please ask your conference coordinator or call us: Math/Science Network at (510) 893-6284, 678-13th St. Ste 100 Oakland, CA 94612

All conference organizers and role models are volunteers. If you would be interested in working on a future conference, please provide the information below:

Your name_____

Your address_____

City_____State_____Zip_____

Phone number_____

EVALUATING YOUR EYII CONFERENCE

(SITE LOCATION)
(DATE OF CONFERENCE)

1. Name (optional)_____

2. Please rate your experience:	*Poor*		*Average*		*Excellent*
a. preconference materials	1	2	3	4	5
b. training session	1	2	3	4	5
c. room arrangements	1	2	3	4	5
d. equipment in room	1	2	3	4	5
e. keynote speaker	1	2	3	4	5
f. Planning Committee support	1	2	3	4	5
g. your session	1	2	3	4	5
h. format of conference	1	2	3	4	5
i. overall rating	1	2	3	4	5

3. Do you have suggestions for improvement?

5. Would you be willing to participate in the conference next year? *Yes* *No*

6. Please suggest any women or occupations to be included next year.

Thank you for participating in the conference and for helping us to evaluate our performance.

INEXPENSIVE OR FREE MATERIALS RELATED TO MATH, SCIENCE, TECHNOLOGY, and CAREERS

The following materials are free or inexpensive. They can be used in the following ways:

- Distribute to conference participants (order now for the anticipated number of attendees or workshop leaders).
- Resource list can be included in adult and student packets or distributed to workshop leaders (revise, if appropriate, and reproduce).
- Resources can be displayed near the conference registration area (order one set of materials to display, and reproduce so that others may order).

Hands on/Minds on: Science Activities for Children: Ideas for a "hands–on" science activity for children. It has 36 activities in Physical Science, 31 activities in Life Science and 15 activities in Earth Science. Developed by Native American Students.

American Indian Science and Engineering Society
1630 30th Street, Ste. 301
Boulder, CO 80301-1014

CHOICES: tells about planning and setting career goals for girls. Sells for $16.95. Contact Advocacy Press for special discounts and quantity requirements for fund-raisers.

Deb Carstens
Advocacy Press
Santa Barbara, CA
(805) 962-2728

CAREERS THAT COUNT, OPPORTUNITIES IN THE MATHEMATICAL SCIENCES: *a 20-page booklet with photos and text that focus on particular women in such careers as oil recovery, robot motion, research and the world of nature (more than 10 copies, $1 each). Published 1991.*

Association for Women in Mathematics
4114 Computer & Space Science Bldg.
University of Maryland
College Park, MD 20742
(301) 405-7892

THE SOLID WASTE MANAGEMENT DILEMMA, Plastics, Part of the Problem, Part of the Cure:

The Council for Solid Waste Solutions
1275 King Street, N.W., Suite 400
Washington, DC 20005
(800) 243-5790

ENGINEERING AND YOU:

$15.00 per 100, 10% shipping and handling
Junior Engineering Technical Society (JETS)
1420 King Street, Suite 405
Alexandria, VA 22314-2715
(703) 548-5387

Other Material Resources

Math: Your Ticket to the Future: stickers, nine vinyl stickers per sheet. @40¢ per sheet

I Love Math: postcards, 11 stickers per postcard @ 40¢/postcard

Math is Functional: 8 stickers per sheet @ 40¢ per sheet or T-shirts @ $9.95 each

Also available are pencils, pens, mugs, memo pads, post-it notes, and a variety of brochures for parents and teachers. Add $2.00 handling charge to each order.

National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091
(703) 620-9840

Two *Career Posters:*

Middle School: **Seeing the Unseen.** High School **Microbiology: Challenge for the 21st Century** (single copies free; each additional copy, $4.00)

The American Society for Microbiology
Office of Education and Training
1324 Massachusetts, N.W.
Washington D.C. 20005
(202) 737-3600

MEMBERSHIP FORM

- ☐ **New Member**
- ☐ **Renewal**
- ☐ **Current Life Member**
- ☐ **Contribution**

Yes, I want to support the increased participation of girls and women in math, science, and technology. Please enroll me in the following membership category:

- ☐ Regular ($25)
- ☐ Supporting ($35)
- ☐ Sponsor ($50)
- ☐ Life Member ($250)
- ☐ Student - limited income ($5)
- ☐ Educational Institution ($50)
- ☐ Business or Industry ($250)

Name _____

Address _____

City/State/Zip _____

Day Phone ( ) _____ Evening Phone ( ) _____

Occupation _____

Employer _____ City _____

Please send gift membership in my name to:

Name _____

Address _____

City/State/Zip _____

___Regular ___Sponsor ___Student

___Regular Memberships @ $25	$_____
___Supporting Memberships @ $35	$_____
___Sponsors @ $50	$_____
___New Life Members @ $250	$_____
___Students @ $5	$_____
___Educational Institution @ $50	$_____
___Business or Industry @ $250	$_____
___Additional contribution	$_____
TOTAL ENCLOSED	$_____

Memberships and contributions are tax-deductible. Make checks payable to the Math/Science Network. Mail to: Math/Science Network, Mills College, 5000 MacArthur Blvd. Oakland, CA 94613

Members receive the *Broadcast* (the Network's quarterly newsletter), announcements of Network activities and projects, and a 10% discount on publications and videos sold by the Network. **New Life Members** also receive a free copy of *Evaluation Counts* by Network members Barbara Gross Davis and Sheila Humphreys.