Math, Science, and Engineering Resources for Adults

This list includes books that should prove useful to adults working with girls on Operation SMART activities. Some of these titles are biographies of prominent, inspirational women in math and science fields. Many of the books provide ideas for fun, educational activities. While no one would be expected to own all these titles, this list will provide a useful starting point in building your collection. These books can be purchased online or in bookstores, and many of them should be available to borrow from your local public library.

Arviso, Lori, & Van Pelt, Elizabeth. (2000). *The scalpel and the silver bear: The first Navajo woman surgeon combines western medicine and traditional healing.* New York: Bantam. ISBN: 0553378007. $14.95

Suitable for staff and older girls, this personal narrative reads like a good novel. From the beginnning you will want to know what happens in the life of a young woman who was born into a Navajo reservation family and grows up to be a surgeon, and then becomes the Associate Dean of Students at the Dartmouth College medical school. Dr. Arviso practices medicine with great sensitivity to the culture of her people through a unique combination of old ways and new technology.

Bernstein, Leonard, Winkler, Alan, & Zierdt-Warshaw, Linda. (1998). *African and African American women of science: Biographies, experiments and hands-on activities.* Maywood, NJ: Peoples Publishing. ISBN: 1562567047. $21.00

Each chapter contains a two-page biographical sketch of a notable woman of science, followed by suggested activities for the girls to do. For example, after reading about physician Jewel Cobb's life, the girls may make a list of questions that they would like to ask their own doctor and then are encouraged to discuss the questions with each other. Suggestions for further reading are listed. Contains a glossary and brief notes on additional scientists.

Teacher's edition. ISBN: 1562567292. $7.99

The teacher's edition provides helpful tips for carrying out activities with the girls. It's well worth the added expense.

Bernstein, Leonard, Winkler, Alan, & Zierdt-Warshaw, Linda. (1998). *Latino women of science: Biographies, experiments, and hands-on activities.* Maywood, NJ: Peoples Publishing. ISBN:1562567055. $21.99
Teacher's edition. ISBN: 1562567306. $7.99

Fifteen women scientists are each profiled in a two-page biography. There is an activity related to each career and questions to answer. There are follow-up suggestions for further activities, such as journal writing, interviewing a woman in your field of interest, and writing to a college to find out academic requirements. The careers range from astronomy to medicine.

National Headquarters
120 Wall Street
New York, NY 10005
(212) 509-2000 • Fax: (212) 509-8708
www.girls-inc.org

National Resource Center
441 West Michigan Street
Indianapolis, IN 46202-3233
(317) 634-7546 • Fax: (317) 634-3024
E-mail: distribution@girls-inc.org

Washington Office
1001 Connecticut Avenue
Suite 412
Washington, DC 20036-5514
(202) 463-1881 • Fax: (202) 463-8994

Bernstein, Leonard, Winkler, Alan, & Zierdt-Warshaw, Linda. (1996). *Multicultural women of science: Three centuries of contributions with hands-on experiments and activities for 37 weeks.* Maywood, NJ: Peoples Publishing. ISBN: 1562567020. $24.50 *Teacher's edition.* ISBN: 1562567276. $7.99

This volume is packed with information and it repeats only four women from the separate Latina and African American books by the same authors. There is no duplication of facts, except the essential ones. I would recommend buying all the books in the series. The publisher offers a better price ($54.78) if you are ordering this book as well as the other two titles.

Bock, Louise, Guengerich, Susan, & Martin, Hope. (1997). *Multicultural math fun: Holidays around the year.* Portland, ME: J. Weston Walch. Available from the publisher at (800) 341-6094. ISBN: 0825129052. $23.95

Activities are planned for each month of the year with explanations, supply lists, and step-by-step instructions for the teacher/program staff to follow The National Council of Teachers of Mathematics standards. The guide follows the first four standards: Mathematics as Problem Solving, Mathematics as Communications, Mathematics as Reasoning, and Mathematical Connections. Close attention is paid to gender equity.

Braxton, Beverly, et al. (1999). *Math around the world: Teacher's guide.* Berkeley, CA: GEMS, Lawrence Hall of Science. ISBN: 0924886439. Available from the publisher at (510) 642-7771. $25.50

Based on activities done by families in stations set up at "math festivals" held in outof-school-sessions, this collection of eight games from four continents goes beyond the activities to make explorations into geography and history, in order to develop awareness of other cultures. The guide includes very concrete step-by-step instructions. Appropriate to use with girls of middle school age (grades 5-8). There are recommended assessment activities, suggested resources, and a list of books to make connections to literature.

Coates, Grace Dávila, Thompson, Virginia, & Williams, Ann Humphrey (Ill.). (2003). *Family Math II: Achieving success in mathematics, K-6.* Berkeley, CA: Lawrence Hall of Science, University of California at Berkeley. ISBN: 0912511303. $22.95

The *Family Math* series presents engaging activities, puzzles, and experiments in a well-organized manner. These activities are fun and accessible for elementary students of varying ages and skill levels. The inviting illustrations and clear explanations help to pull in even those who are reluctant to play with math.

Ebenezer, Jazline V., & Lau, Eddy. (2002). *Science on the Internet: A resource for K-12 teachers.* Upper Saddle River, NJ: Prentice Hall. ISBN: 0130607959. $19.00

The first chapter introduces search engines to surf the Internet, for general sites as well as those for science. There is a list of fourteen ways of using the Internet, including: testing personal ideas, conducting Internet labs, taking a virtual trip, participating in group projects, finding an expert opinion, collaborating with scientists, creating an electronic portfolio, using time efficiently, simulating dangerous and costly experiments, motivating the girls (an alternative to a boring textbook), and learning in a relaxed environment (girls can progress at their own pace). For all of the categories there are suggested Web sites to explore. Includes criteria for evaluating materials, and the activities are rated against the National Science Standards.

Flannery, Sarah, & Flannery, David. (2003). *In code: A mathematical journey.* New York: Algonquin. ISBN: 1565123778. $13.95

This autobiography of Sarah Flannery is inspiring. Although Ms. Flannery exhibited a talent for math from a young age, she would not have achieved her amazing accomplishments without hard work and dedication. Her work in cryptography has won both Ireland's Young Scientist of the Year and the European Young Scientist of the Year awards. She emphasizes the fact that she's not "brilliant" or a "genius", but rather a girl who enjoys mathematical puzzles.

Gardner, Martin. (1997). *New mathematical diversions* (Rev. ed.). Washington, DC: Mathematical Association of America. ISBN: 0883855178. $19.95

Gardner writes columns sharing the fun of mathematical games for the magazine *Scientific American.* This collection of some of his columns includes challenging activities such as paper cutting, board games, puzzles, etc. Gardner updates the exercises from ancient times to make them more contemporary. Answers are included. Suitable for staff with a strong interest in mathematics.

Herbert, Don, & McKie, Roy (Ill.). (1980). *Mr. Wizard's supermarket science.* New York: Random House. ISBN: 0394838009. $10.99

Despite the 1980 copyright date and the fact that few of your girls or staff members will have heard of Mr. Wizard, this book is still in print and worth purchasing. It's full of simple but interesting experiments using readily available supplies. Most of the activities are quite safe, although they should still be carried out under adult supervision. Go to the Mr. Wizard Studios Web site at http://66.113.205.203/contents.htm for free activities and further information.

Kaplan, Andrew, et al. (2003). *Math on call: A mathematics handbook.* Boston: Great Source Education Group. ISBN: 0669508195. Available from the publisher at (800) 289-4490. $19.67

A color-coded handbook divided by topics, accessible through the table of contents showing the match ing color, such as numeration (blue), number theory (hot pink), computation (lime green), algebra (red), graphs and statistics (violet), geometry (green) ratios, proportion and percentage (teal), probability and odds (purple), plus a glossary with prefixes, suffixes, problem solving, study tips, using a computer for math, and much more. In spite of its serious content, the format of this resource is very reader-friendly.

Lambert, Stephen, & DeCotis, Ruth J. (1999). *Great jobs for math majors.* Chicago: VGM Career Horizons. ISBN: 0844264229. $11.95

A practical guide for those who choose a focus on math in college. It helps the reader to answer the question of how to use what has been learned to have "a productive and happy life." The chapters include important topics such as: self assessment, cover letters, resumes, "researching careers", interviewing, networking and follow-up, and finally whether to go on to graduate school. Directed to young women and staff.

Martin, Hope, & Guengerich, Susan. (1999). *Integrating math in the real world: The math of food.* Portland, ME: J. Weston Walch. ISBN: 0825138612. $13.95

The publisher markets this as a "reproducible book," which means you may photocopy the activities to work with groups of girls. A nice way to integrate nutrition information with fitness, and burning calories with calculating the cost of food. A writing exercise about vegetables and the number of lines required for haiku make poetry connections. Practical applications for math in everyday life.

Matyas, Marsha Lakes, & Haley-Oliphant, Ann E. (Eds.). (1997). *Women life scientists: Past, present, and future: Connecting role models to the classroom curriculum.* Bethesda, MD: American Physiological Society. ISBN: 1890251003. $17.50

Here is a good five pounds of resources in one volume of recommended activities that comply with the National Science Education Standards (see Appendix A). Attention is paid to equity programming, for those doing Operation Smart in a coed setting (see Appendix B). Contains suggested resources and organizations to tap for additional material (see Appendix C). Among the subjects covered in the modules: genetics, DNA fingerprinting, AIDS, cancer research, and more. For each topic there is an accompanying biographical sketch of a woman scientist who has worked in the field and the training that she completed in order to become a professional. The usual women scientists are here, but look for a surprise person—Beatrix Potter!

Murphy, Pat, Klages, Ellen, & Shore, Linda. (2003). *The math explorer: Games and activities for middle school youth groups.* San Francisco: Exploratorium. ISBN: 1559535407. $12.95

The Exploratorium is an exciting science museum in San Francisco. Since many of us cannot visit, they publish books full of activities to bring their fun, educational experiences to us. After publishing the *Science Explorer* series (see below), they created *The Math Explorer*. This book is full of games, puzzles, and experiments that can be used even by adults who think they don't like math or that they don't know enough to teach it. All of the activities have been tested by families and youth groups.

Murphy, Pat, Klages, Ellen, & Shore, Linda. (1996). *The science explorer: Family science experiments from the world's favorite hands-on museum.* New York: Henry Holt. ISBN: 0805045368. $12.95

The authors wrote these activities with the staff of the Exploratorium in San Francisco. The emphasis is on family participation, which makes it a useful resource for involving parents. Each experiment is explained along with the recommended amount of time, a list of supplies (nothing unusual) and whether the girls could do it alone. Many illustrations. There is a good list of suggested readings for further exploration and the phone number for the Exploratorium to place orders for them: (415)561-0393.

Muschla, Gary Robert, & Muschla, Judith A. (2002). *Hands-on math projects with real-life applications: Ready-to-use lessons and materials for grades 6-12.* West Nyack, NY: Center for Applied Research in Education. ISBN: 0130320153. $28.50

Over 300 pages devoted to an overview of how to incorporate math projects in the class, along with management techniques and suggestions. Also included are a variety of evaluation methods for the projects. Each chapter has several reproducible worksheets. Games and activities are included throughout. Although designed for schools, this handbook would be useful for affiliate staff trying to integrate math with literacy, sports, and science. The text is clear, the words are in large print, and there is a lot of white space.

National Research Council. (1996). *National Science Education Standards.* Washington, DC: National Academy Press. ISBN: 0309053269. $19.95

The goal of the standards is to offer a coherent vision of what it means to be scientifically literate, describing what all students, regardless of background or circumstance, should understand, and be able to do at different grade levels in various science categories. Affiliates that need to meet the requirements of the standards in your in-school and after-school programming, these are your guidelines. The text highlights the changes in emphasis in the content of science courses: for example, less emphasis on providing answers to questions about science content to more emphasis on communicating science explanations, and less emphasis on management of materials and equipment to more emphasis on the management of ideas and information.

O'Brien-Palmer, Michelle. (2002). *How the Earth works: 60 fun activities for exploring volcanoes, fossils, earthquakes, and more.* Chicago: Chicago Review Press. ISBN: 1556524420. $14.95

Through games, activities, models, and experiments, students with many different learning styles will have fun exploring many facets of Earth. This book includes a useful "Chapter-by-Chapter Content and Skills Guide", and the activities reach across the school curriculum.

Parker, Marla (Ed.). (1995). *She does math! Real-life problems from women on the job.* Washington, DC: Mathematical Association of America. ISBN: 0883857027. $24.00

The career fields in which these women work range from computer science and software engineering to real estate and archaelogy. By including a challenging project from their jobs, the women convey to the reader the importance of math knowledge to everyday problem-solving in their lives. This connection is often missing in classroom mathematics. Black and white photos are included, as well as graphics to enhance the projects.

Reid, Constance. (1996). *Julia: A life in mathematics.* Washington, DC: Mathematics Association of America. ISBN: 0883855208. $31.95

Don't be fooled by the cover of this book. It is not for children, but oldest girls who are getting serious about math. They will find inspiration in this biography written by the sister of Julia Robinson, the first woman mathematician to be elected to the National Academy of Sciences (1976) and the first woman president of the American Mathematical Society (1983). In addition to the facts collected about her life, the book contains chapters written by her scholarly colleagues Martin Davis and Yuri Matijasevich. Contains reproduced samples of written work, plus black and white photographs.

Singer, Margie, Konold, Cliff, & Rubin, Andee. (1996). *Between never and always: Probability.* Palo Alto, CA: Dale Seymour. ISBN: 0866519920. $25.25

After an Operation SMART staff discussion, the idea was raised that there were definitely possibilities with probability as a programming concept. The group decided that this could be expanded to many aspects of the girls' lives. These activities are part of the series Investigations in Number, Data, and Space™. The difficulty level is designed with 5th and 6th graders in mind, but as always, staff should use what is appropriate for their own girls. The approach to math here is to encourage them to explore a problem, expect that there is more than one way to solve it, and motivate them to invent their own strategies and to report on their findings in a meaningful way. A resource for those who are impatient with memorization.

Sterrett, Andrew (Ed.). (2003). *101 Careers in mathematics.* Washington, DC: Mathematical Association of America. ISBN: 0883857286. $34.95

This book is the answer to "why study math?" All of the people profiled here use mathematics in their everyday lives at work. Their academic degrees range from a Bachelor's level to a Ph. D., and they have worked for companies with recognizable names such as L.L. Bean, IBM, AT&T, and American Airlines. Nearly half of the mathematicians are women, including our own Research Associate, Faedra Lazar Weiss.

Venters, Diana, & Ellison, Elaine. (1999). *Mathematical quilts: No sewing required.* Emeryville, CA: Key Curriculum Press. ISBN: 155953317X. $14.95. Phone (510) 595-7000 or online: http://www.keypress.com

Written by two math teachers who are also quilters, this guide is divided into thematic sections to group quilts by design, such as golden ratio, spiral, right triangle and tiling quilts. After a short introduction to each section, the hands-on activities are explained. Includes research and technology activities, including some to be done on the Internet. Through the engaging projects, girls can find the connections between mathematical concepts and design elements. There is also a set of four colorful posters for $19.95, but when purchased together with the guide the total price is $27.95.

Note: The following three resources are published by the AIMS Education Foundation. For those of you who are unfamiliar with AIMS, the acronym stands for "Activities Integrating Mathematics and Science." Since its inception in 1981, AIMS has published hands-on instructional materials that have been expanded from just these two disciplines of math and science to include language arts, social studies and others. The goal is to integrate the learning of these subjects because that is the way girls will use them in the real world. Field-testing was done for two years in cooperation with 80 elementary classroom teachers. It is not necessary to attend any trainings. The handbooks are stand-alone resources. Generous copyright permissions are granted.

Wiebe, Arthur J. (1998). *Actions with fractions*. Fresno, CA: AIMS Education Foundation. ISBN: 1881431711. $16.95. Available from the Foundation, P.O. Box 8120, Fresno, CA 93747-8120. Phone (888)733-2467.

These activities are designed to teach the following concepts: recognizing fractional parts and expressing them in symbolic notation, recognizing and naming equivalent parts, and using pie charts and graphs. This resource guide relates fractions to sports activities for example, giving kids a whole new meaning to getting their fair share.

Wiebe, Arthur J. (1997). *Spatial visualization.* Fresno, CA: AIMS Education Foundation. ISBN: 1881431738. $16.95. Available from the Foundation, P.O. Box 8120, Fresno, CA 93747-8120. Phone (888)733-2467.

This guide utilizes the properties of solids to explore the three-dimensional aspects of geometry. Researchers tell us that mastering geometry is an important indicator of academic performance in college. Here is an opportunity to give your girls an advantage. A selection of topics includes: building solids from four-view and isometric drawings, creating "exploded" views of solids, studying maximum and minimum surface area and volumes, and determining surface areas and perimeters.

Wiebe, Arthur J., & Wilson, Jim (1997). *The amazing circle*. Fresno, CA: AIMS Education Foundation. ISBN: 188143172X. $16.95. Available from the Foundation, P.O. Box 8120, Fresno, CA 93747-8120. Phone (888)733-2467.

This activity guide engages children in a hands-on way to help them learn geometric concepts. The authors make connections between abstract concepts and their physical models using circles, squares and triangles. Staff have permission from AIMS to reproduce the exercises in affiliates.