STEM RESOURCE GUIDE

Compiled by Catalyst at Swarthmore College

Local Summer Camps, Programs, and Organizations

- Girls in Engineering Math and Science Camp, Innoworks Academy at UPenn
  http://www.seas.upenn.edu/education/summer-programs.php

- SMARTgirls workshops at Penn State's College of Technology
  http://www.pct.edu/smartGirls

- Girls' Programs at the Carnegie Science Center in Pittsburgh
  http://www.carnegiesciencecenter.org/programs/girl-programs/

- Alice Workshop at Carnegie Mellon on computer science, for middle school girls
  http://www.pathwaystoscience.org/programhub.aspx?sort=HSC-CarnegieMellon-AliceWorkshpGirls

- PathwaysToScience.org is generally a good website for searching summer programs and camps
  www.pathwaystoscience.org

- TechGirlz offers a summer camp at Drexel, as well as one-day workshops throughout the year in everything from game design to digital knitting
  http://www.techgirlz.org/

- [For High Schoolers] Girls Who Code is a summer immersion program for high school students focusing on instruction in computer science, exposure to female engineers and entrepreneurs, and mentorship
  https://girlswhocode.com/programs/

Local Places to Go

- The Franklin Institute
  Located in the heart of Philadelphia, The Franklin Institute is one of America's most celebrated museums—a renowned leader in science and technology. It features a giant heart you can walk through, a hands-on mechanical technology section, and more!

- Academy of Natural Sciences Drexel University
  Come see live animal presentations, fossil exhibitions, and animal collections on display at this natural history museum in Philadelphia. Lots of activities and displays for kids and adults.

- Swarthmore College's Crum Woods

Woods on Swarthmore's campus with free entry, with plenty of opportunities for watching birds and exploring the creek.

- Longwood Gardens
  One of the premier botanical gardens in the United States, open to visitors year-round to enjoy exotic plants and horticulture (both indoor and outdoor), events and performances, seasonal and themed attractions, as well as take part in educational lectures, courses, and workshops.

- Please Touch Museum
  A museum that aims to encourage learning through play by providing interactive experiences for young children and families [at Memorial Hall in Fairmount Park]

- Delco Institute of Science
  FREE lectures on science, technology, and nature, as well as animal and plant exhibits for all ages in Media, PA

- Wagner Free Institute of Science
  "The Wagner Institute's nineteenth century exhibit hall houses an extraordinary collection of natural history specimens including mounted birds and mammals, fossils, rocks and minerals, insects, shells, dinosaur bones, and the first American saber-toothed tiger." [Philadelphia, PA]

- The DaVinci Science Center
  A science center open all days of the week for kids of all ages in Allentown, PA

- Lancaster Science Factory
  A hands-on, interactive technology and science center in Lancaster, Pennsylvania with exciting exhibits relating to the physical sciences, engineering, technology and mathematics

- North Museum of Natural History and Science
  "The North Museum of Nature and Science inspires curiosity, discovery, and a lifelong appreciation of nature, science, and cultures through educational exhibits, collections, and programs" [Lancaster, PA]

- Carnegie Science Center in Pittsburgh
  As the most visited museum in Pittsburgh, the Carnegie Science Center contains a planetarium, a robotics exhibit, a surgery simulator, and much, much more.

Reading List

- Fiction

A Wrinkle in Time by Madeleine L'Engle
Fever 1793 by Laurie Halse Anderson
Counting by 7s by Holly Sloan
The Evolution of Calpurnia Tate by Jacqueline Kelly
The Martian by Andy Weir (advanced)

- Non-Fiction

Letters to a Young Scientist, E. O. Wilson
The Magic of Reality by Richard Dawkins
Unweaving the Rainbow by Richard Dawkins
The Immortal Life of Henrietta Lacks by Rebecca Skloot
Math Doesn't Suck by Danica McKellar
Why We Get Sick by Randolph M. Nesse
Genome by Matt Ridley
My Life with the Chimpanzees by Jane Goodall
Cosmos by Carl Sagan
The Number Devil by Hans Magnus Enzensberger
Your Inner Fish by Neil Shubin
The Selfish Gene by Richard Dawkins
A Brief History in Time by Stephen Hawking
Rosalind Franklin: The Dark Lady of DNA by Brenda Maddox

- Magazines

BBC Knowledge
Discover
National Geographic
Science News
Scientific American
Mental Floss
Muse Magazine
Awesome Math (free online at https://www.awesomemath.org/mathematical-reflections/archives/)
Girl Works (online at http://girlworks.ca)

TV Shows & Movies
- Wonders of the Solar System
- Life (Sir David Attenborough)
- Planet Earth
- Interstellar (sci fi)
- Cosmos
- Star Trek

Facebook Pages

- Science Is Awesome
  https://www.facebook.com/ScienceIsSeriouslyAwesome
- The Scientist
  https://www.facebook.com/TheScientistMagazine
- National Geographic
  https://www.facebook.com/natgeo?fref=ts
- National
  https://www.facebook.com/NOAA/timeline
- Amy Poehler's Smart Girls
  https://www.facebook.com/amypoehlersmartgirls?fref=ts
- A Girls Guide to Taking Over the World
  https://www.facebook.com/agirlsguidetotakingovertheworld?fref=ts
- I Freaking Love Science
  https://www.facebook.com/IFeakingLoveScience?fref=ts
- From Quarks to Quasars
  https://www.facebook.com/fromquarkstoquasars?fref=ts
- National Aeronautic and Space Administration
  https://www.facebook.com/NASA?fref=ts
- Scientific American
  https://www.facebook.com/ScientificAmerican?fref=ts
- Science
  https://www.facebook.com/ScienceMagazine?fref=ts
- Hubble Space Telescope
  https://www.facebook.com/hubbleESA
- NASA's Curiosity Mars Rovers
  https://www.facebook.com/MarsCuriosity

Youtube Channels

- Vihart
- Veritasium
- Vsauce
- Minute Physics
- MinuteEarth
- SciShow
- SciShow Space
- The Periodic Table of Videos
- Bill Nye the Science Guy
- Sick Science
- DeepSkyVideos
- Numberphile
- Sixty Symbols
- The Brain Scoop

Note: The Brain Scoop has compiled a list of science channels made by women! Find it here: https://www.youtube.com/watch?v=yRNt7ZLY0Kc

Online Resources and Activities

- Kahn Academy: https://www.khanacademy.org/
- Code Academy: http://www.codecademy.com/
- Ted.com: http://www.ted.com/
- Games:
  - games.noaa.gov
  - brainpop.com/science
  - edheads.org
  - stevespanglerscience.com/lab/experiments/category/chemistry
- Engineer Girl: engineergirl.org
- Canteen Girl: canteengirl.org
- The Adventures of Josie True: josietrue.com
- 197 Educational YouTube Channels You Should Know About: opencolleges.edu.au/informed/features/197-educational-youtube-channels/
- Tips for Encouraging Girls in STEM: pbs.org/parents/scigirls/stemsantional-resources/tips-for-encouraging-girls-in-stem/
- 15+ Ways to Teach a Student to Code (Even Without a Computer) edutopia.org/blog/15-ways-teaching-students-coding-vicki-davis
- Exploratorium: http://www.exploratorium.edu/explore/activities

Swarthmore Alumni in STEM
Advice or Personal Anecdote

- The biggest advice I have: doing things that are really hard is worthwhile and a little addicting. There will be times when it seems like understanding or being able to do something feels beyond your reach. But after you break through a barrier like that - and you will, if you divide it into less-scary pieces, approach it in a few different ways, and ask for lots of help - then you know it really deeply. And you can also remember the transition from not getting it at all to being a boss at it the next time something really hard comes up. Another option is just to play Flawless by Beyonce over and over again. **Amandine Lee '13, Software Engineer at Dropbox**

- Find women in STEM who you look up to. Learn about what it has taken for women to be successful in STEM. I read books and books on female scientists growing up. I was, and still am, so inspired by those women who broke through the field. Read, read, read! And don't be afraid to send an email to a couple of women you read about or women who you listen to interviews with. You might be surprised at who returns your emails and what amazing advice/thoughts they have to offer. My sister and I have both done this (she is a Physics major at Wash U interested in Astro and quantum physics) and we have been

given incredible advice and read amazing reflections from various women working in our field of study. In a nutshell, find women who you admire and look up to, and appreciate the history of what it means to be a woman in STEM. **Rose Pitkin '14, Neuroscience Research Assistant at UPenn**

- Girls and women are often expected to be passive, agreeable, "nice", etc. There are many times in my job where I have learned I am correct about something when a (male, more experienced) co-worker is not. If I am afraid of contradicting him because it will make me look catty, or that no one will believe me because I'm a young female engineer, then it's worse for the team, worse for our codebase, and worse for our users. I also think girls are raised with an expectation to be perfect--usually this applies to physical appearance, but it extends successful at school, too--and this can lead to an overwhelming fear of being wrong. I think that men tend to speak up more, and with more confidence, because they are less often socialized with this fear of being wrong. So, don't be afraid to be wrong, and don't be afraid to be powerful. **Jackie Kay '14, Software Engineer at Open Source Robotics Foundation**

- I obtained my B.S. in chemistry at Penn State Behrend and from there went on to obtain my Ph.D. from the University of Pittsburgh. My thesis focused on using magnetic resonance spectroscopy to probe the structure and dynamics of various biological molecules, in particular a protein-DNA complex formed by the enzyme EcoRI. After my Ph.D. I then took a postdoctoral position at the University of Virginia where I continued to use magnetic resonance to study biosystems. To this day I still use magnetic resonance to answer questions about the behavior of interesting biomolecules that are either involved in disease states or play a specific role in the normal function in the cell. Throughout my studies I have met women who have inspired me to continue in the field of science and to become a better teacher of science. These women were inspirational to me because they showed through hard work and commitment you cannot only advance your own career in the sciences but hopefully inspire other women to do the same! **Jessica Sarver, Visiting Assistant Professor, Department of Chemistry & Biochemistry, Swarthmore College**

- I always liked math, but I didn't always know much about it. I did logic puzzles as a kid, but I wouldn't have called that math back then. Now, my area of math is mathematical logic, and logic puzzles are an example of mathematical logic. Like most kids, I thought math was about things like long division, and solving for x. In high school, I started to learn more about what math can be. I was lucky that there was a really great math club at my school. One of my fellow students had parents who were really into recreational mathematics, like puzzles, origami, and games. They helped introduce the math club to these topics, and that's when I first started to learn about how math was more than just equations. In the summer before my senior year of high school, I had the opportunity to go to MathCamp (http://www.mathcamp.org/). It's a summer camp for high school students who love math. At MathCamp, I learned about the kind of math people do in college and beyond, and I learned what it means to be a research mathematician. After

that, my path was pretty straightforward. I went to a liberal arts college and got a degree in math. Math in college is really quite different from math in high school and before. In my many years of teaching, I have heard a lot of students say that they never liked math until they got to college. During college, I led a group of middle school girls in an after school math and science program, which was my first introduction to teaching math. I wanted to become a math professor, and I was happy to learn that getting a PhD in math is typically free, and the school will actually pay you, so I went on to get my PhD in mathematics from the University of Chicago. In addition to learning a lot of math there, and picking a research field, I taught a variety of courses. I then spent three years at Harvard as a postdoc, which is a temporary position for people who have recently received their PhDs. Now I am at Swarthmore as a Visiting Assistant Professor, teaching and doing mathematical research. I think math can be really fun, and I love introducing people to new ideas in math. **Rachel Epstein, Visiting Assistant Professor, Department of Mathematics and Statistics, Swarthmore College**