

**GIRLS EMPOWERED BY MATH
& STEM FOR HER**

GEM HUNT

*Discover hidden figures in unconventional
math-related careers*

#GEMHUNT2019



Politics and Gerrymandering

Meet Abbe Herzig:

Dr. Abbe Herzig is the Director of Education for the American Mathematical Society (AMS). She has a Ph.D. and M.S. in Mathematics Education, an M.A. in Mathematics, M.Phil in Statistics, and an M.S. and B.S. in Applied Mathematics and Statistics.

Her Math Story:

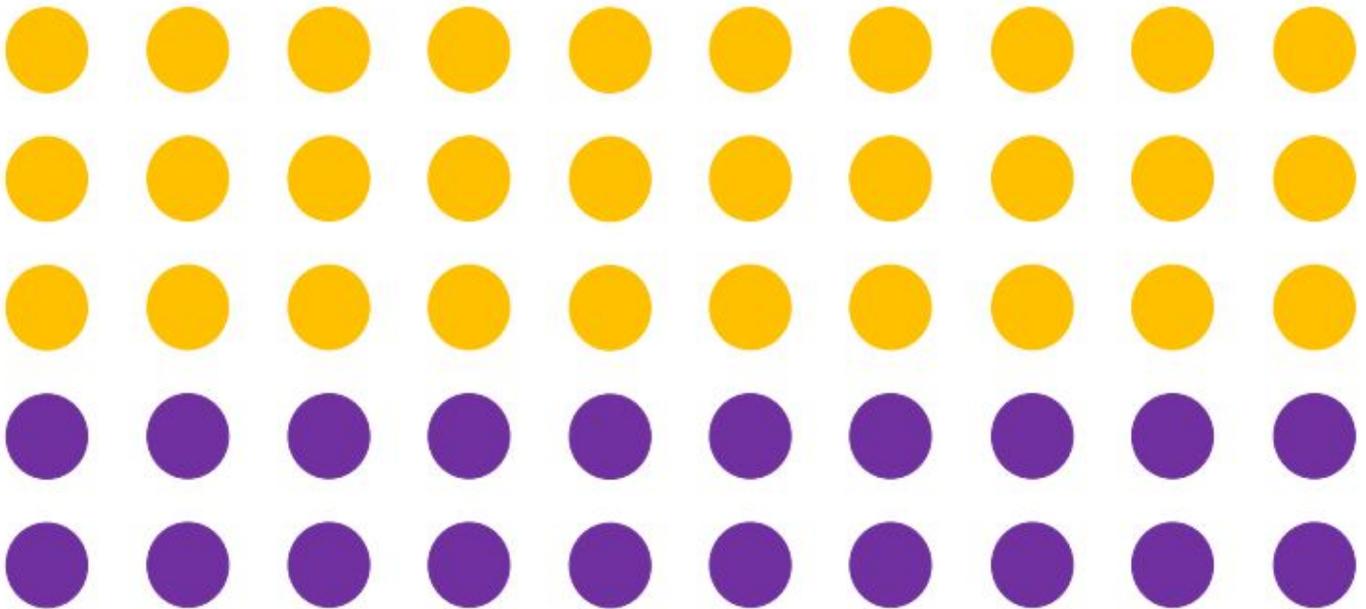
“I have loved mathematics for as long as I can remember! When I was 10 years old, I spent endless hours reading a book on Mathematics that my parents bought me. I was captivated by a photo of the spiral cowlick on the back of a boy’s head, with a caption that said it’s impossible to comb the hair on the surface of a sphere without a spiral. I spent a lot of time, picturing brushing the fuzz on a tennis ball to understand the idea, and from then on I was hooked.

As a mathematician, I have tested consumer products to help consumers make decisions about quality, safety, and price of the things they buy, created ways to measure healthcare quality, advised the United Nations on presenting data about how women fare around the world, analyzed data for a discrimination lawsuit, conducted research about diversity in mathematics education, and a taught math in high school, college, and graduate school.”

Activity:

This “map” shows where 50 voters live. There are two parties: **Yellow** and **Purple**. We need to identify 5 equal-sized districts.

1. How many districts should have a **Yellow** majority, and how many should be **Purple**, in order to be fair?
2. Create a districting plan that meets that requirement.
3. Create a districting plan in which *all* districts have a **Yellow** majority.
4. Can you create a districting plan in which there are more **Purple** districts than **Yellow**?
5. Can you create a districting plan in which *all* districts have a **Purple** majority?



Accounting and Finance

Meet Maram Alamsi:

Maram Alamsi is a budget officer for the International Monetary Fund (IMF) and is also a chartered financial analyst. She has a Bachelor of Commerce, M.S. in International Business, and an M.B.A.

Her Math Story:

“Finance, accounting, and math, in general, have opened countless doors and empowered me to work in everything from investment management, to budgeting (currently manage \$100M+), to consulting in many sectors, to supporting a family business. Math also gave me a passport to use my knowledge working around the world including in the United Arab Emirates, Jordan, Canada, the United States, the United Kingdom. I've also had the privilege to help women-owned businesses in Haiti, Afghanistan, and Malaysia. I'm really looking forward to sharing my journey with you and hearing about what your dreams are and how STEM can help you achieve them.”

Meet Angel Wang:

Angel Wang is an auditor for the National Institutes of Health (NIH). She has a Masters in Accounting and a Bachelor's in Finance.

Her Math Story:

“I discovered my interest in the auditing profession during my first internship and have enjoyed doing it for the past 18 years. It has helped me in many skills, not only the technical and accounting knowledge but also the interpersonal communication skills. My job involves working with many people from many different companies to review their financial information and internal processes, discuss my findings and make recommendations for corrective actions. As a mother of three teens and pre-teens, my goal is to balance my family life and my professional career.”

The Activity:

GEM's Jewelry produces three flavors of necklaces: silver, gold, and diamond. Price and costs of the three are as follows:

	Silver	Gold	Diamond
Selling Price	\$ 20	\$ 30	\$ 60
Variable Costs	\$ 12	\$ 20	\$ 25

Fixed costs are \$600,000

The sales mix is Silver 60%, Gold 10% and Diamond 30%

What is the break-even in sales dollars?

- A) \$ 1,875,580
- B) \$ 1,338,290
- C) \$ 1,500,000
- D) \$ 2,075,653
- E) Some other number

Health Sciences

Meet Sindy John:

Sindy John is a manager in Bioinformatics for MilliporeSigma. She has a Bachelor's in Mathematics and a Masters in Computer Applications.

Her Math Story:

“I have over 15 years of experience in various fields of software development in computational sciences. I started my career with a brief stint as a high school computer science teacher before joining Infosys Technologies in Bangalore, India as a software developer, and then working to support neuroscience research at Carnegie Mellon University's Center for the Neural Basis of Cognition and the Stanford Center for Mind Brain and Cognition (MBC) of Stanford University where I was developing neural network applications for modeling cognitive behavior and learning (e.g. how does a child's brain learn the past-tense of words?).

I then moved to Boston to work in a research programming position for Massachusetts General Hospital (MGH). I currently lead a full-fledged bioinformatics team that supports the next generation sequencing group in providing technical support and software solutions. My role primarily involves managing the design, architecture, and development of software applications that implement bioinformatics algorithms and bringing these algorithms to a validated state for compliance with client and global regulatory requirements. I am actively involved in identifying new technology trends of scientific computation and keeping my group and the company ahead in cutting edge software solutions. I still enjoy

teaching immensely, so I try to spend some off-hours tutoring a few elementary-age kids in Math and Python coding.”

Meet Cara Peters:

Cara Peters is a Ph.D. Candidate at the University of Maryland (UMD). She also works for the Johns Hopkins Applied Physics Lab. She has a B.S. in Applied Math, M.S. in Applied Math, and about to receive her Ph.D. in Applied Math. She also has minors in Computer Science and Italian.

Her Math Story:

“I’m currently finishing my Ph.D. in Applied Math at UMD. My research is on mathematical models of chronic myeloid leukemia. We are trying to understand what role the immune system plays in the success of treatment. I am looking to finish my dissertation this semester and will begin work at Johns Hopkins Applied Physics Lab at the end of October. For the last year and a half, I have also been co-coordinator for Girls Talk Math summer program at UMD.”

The Activity:

Z-64 is a highly contagious super virus associated with severe flu-like symptoms. For each contact an infected person has with a susceptible person, there is a 72% chance that the susceptible person will become infected. Luckily a cure is available. The Center for Disease Control (CDC) recommends that treatment for Z-64 be administered immediately upon diagnosis. It will take an average of 8 days for the infected person to be relieved of all symptoms and become immune from becoming infected again. You receive a report from the CDC that the first case of super Virus Z-64 found in DC is a male flying from LAX to DCA on October 1st. A quarantine has been established in DC, no people are entering or exiting the district. Health officials need to know how its residents will be affected:

- How many people have been infected?
- How many susceptible residents are there?
- How long until the virus is no longer a concern and the quarantine can be lifted?

Using the Model:

1. How many Susceptible, Infected and Recovered on Day 2? Day 3?
2. Use the computer to simulate the model and determine when virus Z-64 will no longer be a threat.
3. How does the simulation change if the number of contacts a day increases? If the duration of the infection changes? If the percentage of infection changes?

Engineering

Meet Trudy Padmore:

Dr. Trudy Padmore is a Lab Supervisor at MilliporeSigma. She has a Chemical Engineering BSc from Howard University and a Chemical and Biomolecular Engineering PhD from Georgia Institute of Technology.

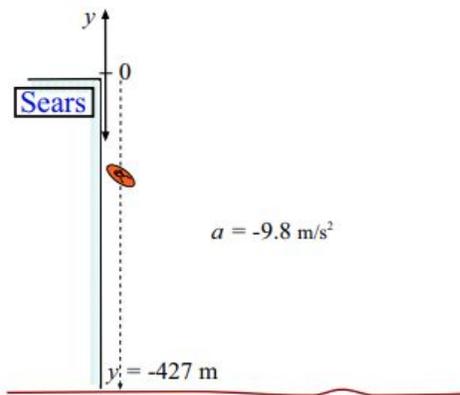
Her Math Story:

“A Caribbean native, my interest in biotechnology stems from a long standing personal aspiration to improve patient health outcomes. As an engineer and scientist, I approach research and development with efficient processes and scalability in mind. I have a passion for mentoring and helping underserved children.”

The Activity:

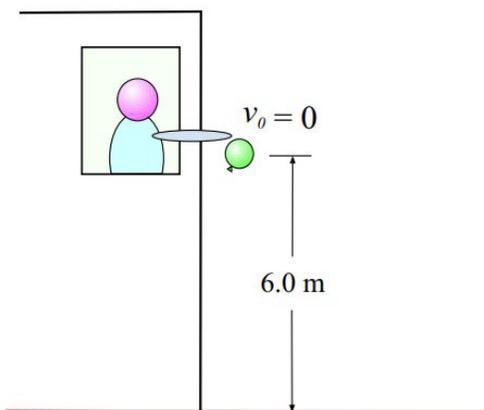
1) A penny is dropped from the top of the Sears Tower in Chicago. Considering that the height of the building is 427 m and ignoring air resistance, find the speed with which the penny strikes the ground.

Hint: Use the equation $v^2 = v_0^2 + 2ax$



2) From her bedroom window a girl drops a water-filled balloon to the ground, 6.0 m below. If the balloon is released from rest, how long is it in the air?

Hint: Use the equation $x = v_0t + \frac{1}{2}at^2$



Scratch Paper

Scratch Paper

SURVEY

Your High School Grade

- € Freshman
- € Sophomore
- € Junior
- € Senior

Are you involved in STEM activities besides this program?

- € A lot
- € A little
- € Not at all

What STEM classes you are taking this year? Please specify which Science and Math classes

- € Science
- € Technology
- € Engineering
- € Math

Do you have a favorite STEM area (circle up to two)?

- € Science
- € Technology
- € Engineering
- € Math

Overall, I enjoyed participating in the program

- € A lot`
- € A little
- € Not at all

Do you plan to pursue studies (now or after high school) in STEM?

- € Yes
- € Not Sure
- € No

Did today's programming influence your decision to pursue future studies in STEM?

- € A lot
- € A little
- € Not at all

Did GEM Hunt increase your awareness of math-related careers?

- € A lot
- € A little
- € Not at all

Did GEM Hunt increase your interest in pursuing a math-related career?

- € A lot
- € A little
- € Not at all

Any comments?

What did you like best about today's program?

What should we do differently if we did this program next year:

If you would like to receive occasional updates regarding *STEM for Her* and how we are working to support girls and young women in the DC-metro area to engage in STEM-related careers, check the box below and provide your email address. Note that we will not sell, transfer, or share your contact information, and you can remove your name at any time.

Yes – Please send me periodic updates regarding *STEM for Her*

Email address (please print clearly):

Under 18 years old: _____ Yes _____ No