

## **#STEMexperiences for Teachers:** **Building Mathematical Knowledge and Enhancing Curriculum**

\*\*Handout found at <https://tinyurl.com/2019-STEM-Experiences>

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**Objective:** To provide teachers with ideas, strategies, and resources for engaging in various STEM experiences that build teacher knowledge and enhance curriculum through examples of problems, activities, projects, and career connections.

### Ideas/Strategies:

- 1) Do something crazy like Skydiving ...if you really want to ☺
  - Skydiving
    - ✓ D=RT, Graphing, Slope, and Writing the equation of a line
    - ✓ Video & Handout = <https://youtu.be/pr-fQLL6RIE>
- 2) Learn and make connections through travel experiences
  - Find and apply for a FREE educational sponsored program
    - Fulbright Memorial Fund (<https://www.iie.org/Programs/JFMF>)
      - Architecture, Flag Math, & Origami  
[https://www.papercrane.org/articles/abcTV/jumping\\_frog.pdf](https://www.papercrane.org/articles/abcTV/jumping_frog.pdf)
    - Other Opportunities
      - National Endowment for the Humanities ([www.neh.gov/](http://www.neh.gov/))
      - Illinois Humanities Council ([www.ilhumanities.org](http://www.ilhumanities.org))
    - Search for other programs (<https://exchanges.state.gov/us/find-programs>)
  - On your own
    - Vacation (Projects) or Staycation (Field Trips/Projects)
      - ✓ An Evening in Italy
        - Architecture, currency (proportions & art=embossing), & music!
      - ✓ Beyond the World's Fair: The Art & Architecture of Forest Park
      - ✓ The Geometry & Art of St. Louis: From Downtown to Midtown
        - Geometric Figures, Measuring, Scale, Perspective
- 3) Look for & attend STEM workshops
  - Missouri Botanical Garden
    - Tree Circumference, Using a Clinometer & trig, Volume, Carbon Storage, etc.
  - Ranken Technical College, Summer STEM Academy for Teachers
    - Robotics & Control Systems
      - ✓ Order of Operations, Adding and Subtracting Integers
      - ✓ Robot Racers and Linear Functions
      - ✓ **ARTICLE** = [www.nctm.org/Publications/Mathematics-Teacher](http://www.nctm.org/Publications/Mathematics-Teacher)  
Remijan, K.W. (Jan/Feb 2019). "STEAMing Up Linear Functions". **Mathematics Teacher**. 251-256.
  - \*ASM Materials Camp for Teachers...hosted around the nation\*
    - <https://www.asminternational.org/en/about/foundation/teachers/teacher-camps>

- 4) Collaborate with professionals from various fields to create real projects or problems
  - City Planner, Engineer, Architect, Builder, Habitat for Humanity Director
  - Materials Engineering, Sustainability, & Design (planning)
    - i. Project DESTINE
    - ii. OTHS for Habitat
 

**ARTICLE** = <http://docs.lib.purdue.edu/ijpbl/vol11/iss1/1/>  
 Remijan, K.W. (2017). *Project-Based Learning and Design-Focused Projects to Motivate Secondary Mathematics Students*. **Interdisciplinary Journal of Problem-Based Learning**.
- 5) Ask your CTE director to put you on the list for CTE events/workshops
  - Workshops (3D Printers and Animation)
    1. Axes, volume, GEOMETRY
    2. Pixar in a Box (<https://www.pixar.com/pixar-in-a-box>)
  - Construction Career Expo - Southern Illinois Home Builders Association
  - Manufacturing Day – Southwestern Illinois College
    - Precision Machining Technology (Computer Numerical Control)
      - Plotting points, programming a Machine to make something
      - **EXAMPLE (handout)**  
**ARTICLE** = <https://tinyurl.com/math-machining>  
 Remijan, K.W. (September 2018). "Cultivating the Machining Field by Planting Seeds in the Math Class". **The Record**. 24-27.
- 6) Take a non-math class at a junior college
  - \*Surveying, Materials and Methods, Construction Estimating
  - Aviation Meteorology, Precision Machining Intro
- 7) Observe or participate in a non-math class within your school or community
  - 9<sup>th</sup> grade Technical Drawing
    - Technology, orthographic drawings, area, perimeter, radius, etc.
    - Reference: [www.youtube.com/watch?v=HXK3ALZKCV8&noredirect=1](http://www.youtube.com/watch?v=HXK3ALZKCV8&noredirect=1)
  - 7<sup>th</sup> grade Science
    - Polymers (Bouncing balls, Circumference, Bounce Height, Venn diagrams)
  - Pre-school Science at the Science Center
    - UV Beads (Fractions, Percent, Probability, Displaying & Analyzing Data)
- 8) Network with professionals/businesses/organizations outside of education
  - Metro East STEM Society
 

Michael Pedersen, Junior Code Academy

    - i. Using SCRATCH to program the equation of a line
    - ii. Modeling path of a ball from the game PONG (writing an equation of a line)
    - iii. VIDEOS = <https://youtu.be/PEw7FS71cCw> AND <https://youtu.be/4Tu3LaKiuZw>
    - iv. **ARTICLE** = <http://journal.ictm.org/index.php/imt/article/view/112>  
 Remijan, K.W. & Pedersen, M. (2018). *Scratching the Surface of Pong: Enriching Linear Equations with Computer Programming*. **Illinois Mathematics Teacher Journal**.

## 9) Request a Professional Development Day for Shadowing a STEM Career

- Establish Goals
  - a. Learn about STEM careers and establish classroom to career connections
  - b. Discover procedures, tech, training required, and math concepts utilized
  - c. Develop STEM-related problems and activities.
- Consider Additional STEM Fields and Do Preliminary Research
  - a. Crash Reconstruction (measuring, equations involving radicals, chords, etc.)
    - **ARTICLE:** <http://www.ascd.org/ascd-express/vol13/1306-remijan.aspx>  
Remijan, K.W. (November 22, 2017). *Building Mathematical Skills and Community Relationships Through Crash Reconstruction*. **ASCD Express**.
  - b. Drone/UAV Pilot (plotting points, proportions, distance formula, area, etc.)
    - [knowbeforeyoufly.org/education-use/](http://knowbeforeyoufly.org/education-use/)
  - c. Logistics Readiness (cargo, fuel, etc.)
    - Weight of Fuel (proportions) - [www.youtube.com/watch?v=KH4UD4OlBAQ](http://www.youtube.com/watch?v=KH4UD4OlBAQ)
    - Center of Gravity (measuring & formulas) - [www.ustranscom.mil/dtr/part-iii/dtr\\_part\\_iii\\_app\\_p.pdf](http://www.ustranscom.mil/dtr/part-iii/dtr_part_iii_app_p.pdf)
  - d. Pilot (Tailwind/Headwind & Integers, Aviation Alphabet = Groups, Triangles)
    - [http://www.classbrain.com/artteensb/uploads/mathinflight\\_student.pdf](http://www.classbrain.com/artteensb/uploads/mathinflight_student.pdf)
    - <https://bit.ly/2QYdCzd>
    - <https://bit.ly/2GLcQ3H>
    - [https://www.nasa.gov/sites/default/files/atoms/files/axes\\_control\\_surfaces\\_k-4.pdf](https://www.nasa.gov/sites/default/files/atoms/files/axes_control_surfaces_k-4.pdf)
  - e. Air Traffic Control (Compass Rose, Parallel Lines, GPS = Intersecting Circles)  
Airline Operations, and Aviation Maintenance
    - <http://science.howstuffworks.com/transport/flight/modern/air-traffic-control1.htm>
    - <https://science.howstuffworks.com/transport/flight/modern/air-traffic-control2.htm>
    - <https://gisgeography.com/trilateration-triangulation-gps/>
    - <https://bit.ly/2QZHtHy>
    - <https://atcsim.nasa.gov/>
    - [www.airnav.com/airport/KCPS](http://www.airnav.com/airport/KCPS)
  - f. Meteorology (Forecasting, Probability, Graphs of Trig Functions)
    - NOTE: Meteorologists also use math to predict flood levels)
    - [www.cocorahs.org/media/docs/radar\\_basics.pdf](http://www.cocorahs.org/media/docs/radar_basics.pdf)
    - [http://ww2010.atmos.uiuc.edu/\(Gh\)/guides/mtr/home.rxml](http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/home.rxml)
- Contact various organizations
  - a. Your local Police Department or your State Police Forensic Crime Lab
  - b. State Police Air Operations (ex. [www.isp.state.il.us/services/airops.cfm](http://www.isp.state.il.us/services/airops.cfm))
  - c. A Local Air Force Base (ex. Scott AFB, 375th Air Mobility Wing Public Affairs)
  - d. The aviation department at a local college, EAA ([www.eaa.org/aea/aea-chapters/find-an-aea-chapter](http://www.eaa.org/aea/aea-chapters/find-an-aea-chapter)), or Civil Air Patrol ([www.gocivilairpatrol.com/programs/aerospace-education](http://www.gocivilairpatrol.com/programs/aerospace-education))
  - e. The aviation department at your local college
  - f. Your local National Weather Service Office ([www.weather.gov](http://www.weather.gov)) to request a visit (example for people near St. Louis, MO = [www.weather.gov/lx/tour\\_form](http://www.weather.gov/lx/tour_form))

10) Write a Grant

SPECIAL THANKS TO:

1. Scott AFB STEAM Advisory Council (STEM Career Initiatives Grant)
2. Math and Science Partnership (Math and Science Connections Grant)
3. OTHS Endowment (Project Fire RESCUE Grant)
4. Toyota TIME (Project MELTT Grant)

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**@Teachers4STEAM**