

**Meaningful Math:**  
**Activities, Applications, & Career Connections for the Teaching & Learning of Math Concepts**

<https://tinyurl.com/Making-Math-Meaningful>

Created and Presented By:

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\*\*After the presentation, I would greatly appreciate your feedback by completing a 2-minute survey. ☺

[www.tinyurl.com/IMSASurvey22](http://www.tinyurl.com/IMSASurvey22)

Objective: 5<sup>th</sup>-12<sup>th</sup> grade teachers will 1) Discover career connections & tech tools that can be integrated into the math curriculum & 2) Gain ideas, activities, & LOTS of resources which can enhance the teaching/learning of math concepts

- 1) Machinist
  - a. Plot Points on an x-y coordinate plane
    - i. **CNC EXAMPLE** = <https://docs.google.com/presentation/d/1uEdelF3JXdUzmvTEiboAMIT7u7Vf61L5FnUMX1yqge0/copy>
    - ii. **ARTICLE** = Remijan, K.W. (September 2018). "Cultivating the Machining Field by Planting Seeds in the Math Classroom". **The Record**. 24-27. Retrieved from <https://ntma.org/wp-content/uploads/2019/02/Sept18-Record-web-compressed.pdf>
  - b. Utilize a CNC Machine and Write a Computer Program to Make a Design
    - i. Partner with a CTE teacher at a high school or college to access equipment
    - ii. Utilize an Online Simulator – <https://ncviewer.com/> (How to Video - [https://youtu.be/Z4V\\_qKuoMMk](https://youtu.be/Z4V_qKuoMMk) )
  - c. **SUGGESTION** = Ask your CTE director or principal about attending CTE events or webinars
    - i. Workshops (3D Printers and Animation)
    - ii. Construction Career Expo and/or Manufacturing Day
    - iii. ASM Materials Camp for Teachers...hosted around the nation\*  
<https://www.asminternational.org/en/about/foundation/teachers/teacher-camps>
- 2) Police Work - Crime Scene Investigator
  - a. Take Photos of Crime Scene & Evidence (Angles, Perspective, Measurement, Scale)
    - i. **RESOURCES** = <http://www.forensicsciencesimplified.org/photo/Photography.pdf>
    - ii. **IDEAS**
      - Measure various pieces of evidence or compare length to height
      - Pick up shoe/footprints or tire prints with Adhesive or Dental Casting
      - Create a Crime Scene (Library Room, Stage, or Barbie miniature)  
[https://ncssm.instructure.com/courses/1673/pages/option-3-mock-crime-scene?module\\_item\\_id=92152](https://ncssm.instructure.com/courses/1673/pages/option-3-mock-crime-scene?module_item_id=92152)
    - iii. **OTHER PHOTOGRAPHY TOPICS** = Shutter Speed & Aperture Ratios
  - b. Conduct a Crime Scene Sketch (Measurement & Scale Drawings)
    - i. **RESOURCES**
      - <http://www.forensicsciencesimplified.org/photo/why.html>
      - [http://www.evidencemagazine.com/index.php?option=com\\_content&task=view&id=184](http://www.evidencemagazine.com/index.php?option=com_content&task=view&id=184)
      - Use <https://incompetech.com/graphpaper/> for graph paper
    - ii. Provide alternatives for creating scale drawings such as Google Sketchup
  - c. Determine Bullet Trajectory (Measure Angles Horizontally & Vertically (w/ zero-base protractor)
    - i. Utilize trajectory rods and a laser to follow the path of a bullet
    - ii. **VIDEO** = <https://www.wired.com/video/watch/technique-tutorial-bullet-trajectory>
  - d. **SUGGESTION**
    - i. **TALK** to and/or **TEAM** up with a science teacher from your school/District
    - ii. **CONTACT** your nearest State Police Forensic Crime Lab for a Guest Speaker  
<https://www.isp.state.il.us/Forensics/html/Laboratories.html>

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- 3) Police Work - Crash Reconstructionist
- a. Understand Friction, Measure Skid Marks, and Use Formulas to Determine Speed
    - i. **ARTICLE** = Remijan, K.W. (November 22, 2017). *Building Mathematical Skills and Community Relationships Through Crash Reconstruction*. **ASCD Express**.  
<http://www.ascd.org/ascd-express/vol13/1306-remijan.aspx>
    - ii. **VIDEO** = <https://youtu.be/fGtfjcd8MEM>
  - b. Use a CBR to reinterpret a crash in the classroom (Systems of Linear Equations)
    - i. **TECH OPTIONS** = TI CBR 2 or TI CBR (I purchased my TI CBR via E-bay for \$20)
    - ii. **ARTICLE** = Remijan, K.W. (Under Development). When Turtle Met Mickey.
  - c. Retrieve Data from an Air Bag Module (Analyze Graphs)  
**RESOURCE** = <http://www.crashforensics.com/automobiledatarecorders.cfm>
  - d. Utilize a Drone (Calculate Viewing Area and Landing Pad Area, Understand Inequalities)  
**RESOURCE** = <https://knowbeforeyoufly.org/>
  - e. **IDEAS**
    - i. Discuss how a private accident reconstructionist can also be hired
    - ii. Contact a crash reconstructionist to be a guest speaker - <https://actar.org/directory>
    - iii. If you live in Illinois and would like to connect with a Crash Reconstructionist from the Illinois State Police within your area, please contact me, Kelly, at: [kremian@imsa.edu](mailto:kremian@imsa.edu)
- 4) Surveyor
- a. Use a Clinometer and Apply the Concept of an Isosceles Triangle or Trigonometry
    - i. Smart Phone App to find tree height & help NASA - <https://bit.ly/3ocOLV0>
    - ii. Clinometer – [http://www.globe.ee/TeacherGuide/landcover/appendix/land\\_app.pdf](http://www.globe.ee/TeacherGuide/landcover/appendix/land_app.pdf)
    - iii. Finding tree height connects to Cell Tower Surveys
      - <http://www.georgialandsurveying.com/commercial-surveys/telecommunications-cell-tower-surveys/>
      - <https://bit.ly/35f5DD7>
      - <https://millmanland.com/telecommunication-cell-tower-surveys/>
  - b. Utilize a Total Station and Conduct an Impervious Land Survey
    - **RESOURCE:** [https://digitalcommons.imsa.edu/pfs\\_tr/24](https://digitalcommons.imsa.edu/pfs_tr/24)
  - c. **SUGGESTION:** Teachers should take a non-math class at a junior college or shadow
    - i. Examples: Surveying, Materials and Methods, Construction Estimating, CAD, Drafting
    - ii. Other Ideas: Aviation Meteorology, Precision Machining Intro
  - d. **RECOMMENDATION:** Teachers should attend STEM workshops outside of “Mathematics”
    - Ex: Botanical Garden - Tree Circumference, Volume, Carbon Storage, etc.

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- 5) Electrician
- a. Math Concepts
    - i. Read Blueprints to Determine # of Lights/Switches/Outlets Needed in Building a House
    - ii. Measure and Bend Conduit
      - References:
        - <https://www.mathscinotes.com/2018/01/electrical-conduit-math/>, <https://bit.ly/3szoR0e>
        - <https://www.kleintools.com/sites/kleintools/files/instructions/Conduit%20Bender%20Guide.pdf>
      - 5 Part Video: <https://youtu.be/G2uEOMwDEJ0>
    - iii. Calculate Area, Determine Lumens Needed for a Room
      - <https://www.alconlighting.com/blog/residential-led-lighting/how-do-i-determine-how-many-led-lumens-i-need-for-a-space/>
    - iv. Utilize a Multimeter, Measure Voltage, Graph Data
      - Additional File located at [https://digitalcommons.imsa.edu/pfs\\_tr/5/](https://digitalcommons.imsa.edu/pfs_tr/5/)
    - v. Solve Equations involving Ohm's Law
      - [https://www.electronics-tutorials.ws/dccircuits/dcp\\_2.html](https://www.electronics-tutorials.ws/dccircuits/dcp_2.html)
    - vi. Calculate Area to Determine Number of Solar Panels
      - <https://www.youtube.com/watch?v=cEWxkZYroZk>
      - <https://www.wholesalesolar.com/blog/solar-panel-size-guide/>
  - b. **IDEA** = Collaborate with organizations or professionals to design meaningful projects
    - i. IBEW Labor Union, City Planner, Engineer, Architect, Builder, & Habitat for Humanity
    - ii. **ARTICLE** = Remijan, K.W. (2017). *Project-Based Learning and Design-Focused Projects to Motivate Secondary Mathematics Students*. **Interdisciplinary Journal of Problem-Based Learning**. <http://docs.lib.purdue.edu/ijpbl/vol11/iss1/1/>
- 6) Aviation
- a. Aviation Mechanic
    - i. Pose Sheet Metal Problems (Fractions, Scale, Angles)
      - **ARTICLE** = Remijan, K.W. (Under Development). Connecting Middle School Math to Aviation Mechanics
    - ii. Demonstrate Propellers (Distance vs Time, Diameter, Collecting & Graphing Data)
      - I purchased a kit and made a propeller car for \$19 from <https://tinyurl.com/tqlpgyo>
      - Utilize FREE Tracker Software - <https://physlets.org/tracker/>
    - iii. **RESOURCE** = <https://www.achieve.org/files/MathAtWork-Aerospace.pdf>
  - b. Air Traffic Controller or Pilot
    - i. Visualize Air Traffic Control Tower Airspace (Cylinders)
      - <https://science.howstuffworks.com/transport/flight/modern/air-traffic-control.html>
      - [www.youtube.com/watch?v=rl6jmmM98lg&list=PLBJ4Geff0T5iYy5Q8u2WVaX50Zoz3qbgYe](http://www.youtube.com/watch?v=rl6jmmM98lg&list=PLBJ4Geff0T5iYy5Q8u2WVaX50Zoz3qbgYe)
    - ii. Utilize <https://skyvector.com/> for Navigation Charts (Circles & Compass Rose)
      - i. Use Google Earth or [www.airnav.com/](http://www.airnav.com/) for Airports/Runways (Headings & Parallel Lines)
      - ii. Connect Flight Profile to Graphing (Increasing, Constant, and Decreasing Functions)
        - <https://science.howstuffworks.com/transport/flight/modern/air-traffic-control.htm#pt2>
    - iii. Apply the idea of Satellites/GPS (Intersecting Circles)
      - Where Am I Activity? - <http://www.gps-stem.com/earth/>
      - GPS Tech Activity - [https://digitalcommons.imsa.edu/pfs\\_tr/25](https://digitalcommons.imsa.edu/pfs_tr/25)

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  - a) To learn about math concepts and technology involved in various careers
  - b) To establish career to classroom connections and to enhance mathematics curriculum and improve workforce development
2. Southwestern Illinois College
  - Machining - Mark Bosworth, Jerry Bonifield, & David Berry
  - Aviation – Keith Mueller & Matt Harter
  - Prior Surveying Class
3. Illinois State Police
  - Crash Reconstruction – Sgt Brad Brachear
  - Crime Science Investigation – Investigator Josh Easton
4. IBEW 309
  - Electrical Work - Dave Kokotovich
5. Parkland College
  - Kory Allred – Collaborative surveying project with the Illinois Dept. of Innovation & Technology

**Thank you for attending!**

- ✓ Please feel free to contact me at [kremijan@imsa.edu](mailto:kremijan@imsa.edu) if you have questions, if your school/district would like professional development, or if your organization is looking for a presenter for a conference/event.
- ✓ Check out [www.IMSA.edu/Educator](http://www.IMSA.edu/Educator) for outreach/PD from IMSA – Center for Teaching & Learning.
- ✓ I would greatly appreciate your feedback via 2-minute survey: [www.tinyurl.com/IMSAsurvey22](https://tinyurl.com/IMSAsurvey22)