STEAMing Up Algebra:
Connecting Concepts & Engaging Students with Activities that Utilize Technology

https://tinyurl.com/STEAMING-UP-ALGEBRA

Created and Presented By:
Kelly Remijan, PhD
LinkedIn - www.linkedin.com/in/kellyremijan/
Twitter - @Teachers4STEAM

Objective:
8-12th grade teachers will discover and experience tech-based activities for enhancing the teaching and learning of algebra concepts: create designs w/ ordered pairs (ncviewer.com & CNC Machine), replicate flags w/ equations/inequalities (Desmos/GeoGebra), solve a system of linear equations to reinterpret a crash with toys (CBR), simulate a parabolic action (Phet.Colorado.Edu), model a quadratic regression (Graphing Calculators and/or and Desmos), and capture video to collect/graph/analyze data (Physlets.org/Tracker).

#1 Ordered Pairs – Machining designs using Computer Numerical Control (CNC) Machines

- ✓ Article
  - Remijan, K.W. (September 2018). "Cultivating the Machining Field by Planting Seeds in the Math Classroom". **The Record**. 24-27. https://ntma.org/wp-content/uploads/2019/02/Sept18-Record-web-compressed.pdf
  - Remote Option -https://docs.google.com/presentation/d/1uEdelF3JXdUzmvtEiboAMIT7u7Vf61L5FnUMX1yqge0/copy
- ✓ Free CNC Simulator Technology
  - https://ncviewer.com/
  - How to use ncviewer.com - https://youtu.be/Z4V_qKuoMMk
- ✓ Special Thanks
  - Mark Bosworth, Jerry Bonifield, and Mark Berry (Southwestern Illinois College) https://www.swic.edu/academics/career-degrees/precision-machining-technology/

#2 Linear Equations/Inequalities - Creating Flags Using Desmos & GeoGebra

- ✓ Explore (www.Desmos.com and www.GeoGebra.org)
  - How do you change colors, represent inequality symbols, and restrict domain/range?
- ✓ Research Flags (Aspect Ratio, Design, Colors, etc.)
  - Identify equations or Inequalities to replicate (or re-create) flags
  - Have students find the meaning behind the colors, design, etc.
  - Connect flag design to history, geography, culture, etc.
- ✓ Resources
  - Remijan, K. (2021). Flag Designs of African Countries: Enriching the Graphing of Linear Equations and Inequalities in Algebra. **The Lighthouse Almanac**. 12-19. http://bbamath.org/wp-content/uploads/2021/03/Lighthouse-Almanac_Vol4_Issue1.pdf
  - Remijan, K. (2020). Day 11 - Travel the World Through Flags: Desmos, Equations, and Inequalities. 19-19-19 COVIDeos 19 E-Learning Webinars. 11. https://digitalcommons.imsa.edu/covideos_19_webinars/11/
  - Remijan, K. (2020). Day 02 - Friday Night Fun with Flags: GeoGebra for Geometry and Graphing. 19-19-19 COVIDeos 19 E-Learning Webinars. 2. https://digitalcommons.imsa.edu/covideos_19_webinars/2
  - Remijan, K. (To be published 2023). Flags of Latin America: Culturally Relevant Learning Experiences with Technology to Enhance Algebra & Geometry Concepts.

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#3 Systems of Linear Equations - Modeling Movement Using a CBR Motion Detector

- ✓ Technology Options: TI CBR 2 or TI CBR (NOTE: I purchased my TI CBR via E-bay for $20)
- ✓ References
  - Remijan, K.W. (2022). Playing with Push Toys and Technology: Solving a System of Linear Equations. Journal for Mathematics Education at Teachers College. 13(1), 31–33. Retrieved from https://digitalcommons.imsa.edu/pfs_pr/57/
  - Additional Resources:
    - https://education.ti.com/en/activity/search/advanced
    - Remijan, K.W. (Jan/Feb 2019). "STEAMing Up Linear Functions". **Mathematics Teacher**. 250-256. https://pubs.nctm.org/view/journals/mt/112/4/article-p250.xml

#4 Quadratic Functions & Regressions – Simulating Projectile Motion w/ Phet.Colorado.EDU & Desmos

- ✓ Resources
  - Projectile Motion Simulator (HTML5) found at https://phet.colorado.edu/
  - Remijan, K. (2020). American Football, Quarterbacks, and Parabolas. Teacher Resources. 8. https://digitalcommons.imsa.edu/pfs_tr/8
  - Using Desmos to Create a Quadratic Regression - https://youtu.be/tBvrq5lOwl8
  - Further Inspiration/Additional Teacher Resource
    - Top Gear: Car Darts! https://youtu.be/-i-op1aceUg?t=115
    - Remijan, K.W. (2020). Car Darts and Parabolas. Teacher Resources. 12. https://digitalcommons.imsa.edu/pfs_tr/12

#5 Data Collecting & Parabolic Graphs – Modeling Math w/ Tracker Software & Graphing Calculators

- ✓ Technology
  - Tracker Video Tool Software
    - FREE Video Analysis Tool Available for Download - https://physlets.org/tracker/
    - Directions via video on how to use Tracker Software – https://youtu.be/mWZhZKvU9us
  - Graphing Calculators
    - Suggestion: TI-Smartview or TI Emulator via Wabbit Emu
      - Directions on how to acquire a TI Emulator - https://youtu.be/q_xm605bjQs
    - ScreenCast-O-Matic to Screen Record - https://screencast-o-matic.com/screen-recorder
    - How to Create a Regression on a TI Graphing Calc - https://youtu.be/D-XRIh2-hKQ
- ✓ Inspiration/Resources
  - Hot Wheel Stunts Video Using GoPro Hero 5 by 5Mad Movie Makers - https://youtu.be/vKs5H9FHD7Q
  - Remijan, Kelly W. (2020). “Tracker Software and Matchbox Car Jumps" *Teacher Resources*. 14. https://digitalcommons.imsa.edu/pfs_tr/14