Algebra and Geometry for All Students!

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All links are live on my Talks page: https://www.mathed.page/talks.html

Relevant Blog Posts

(https://blog.mathed.page)

For Algebra
In Defense of Algebra 2
What belongs in Algebra 2
In Defense of Geometry
Math as Literacy
NCTM on Data Science
Freakonomics Radio on Math Curriculum

Relevant Articles

(https://www.mathed.page/teaching)

Nothing Works
Big Picture Planning
Common Core: A Closer Look

Relevant Curriculum Materials

(https://www.mathed.page)

The Bicycle Trip | Follow-up

Algebra: Themes, Tools, Concepts
Making Sense in Algebra 2
Recognizing Functions

The Lab Gear
Completing the Square | Applet
Manipulatives

Geometry Labs
Geometric Puzzles
Pentominoes | Applet
Enrichment: Tiling | Symmetry

Relevant Commercial Products

Everything above is free on my website (https://www.mathed.page).
Possibly useful, in addition:

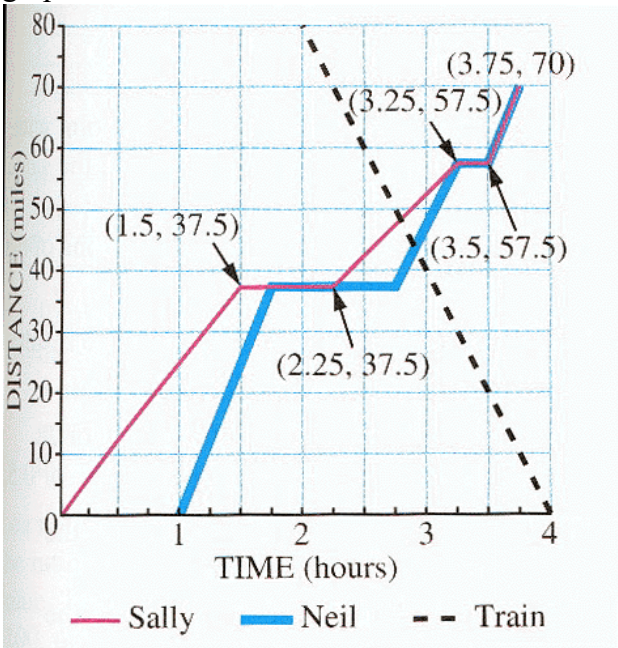
◊ Lab Gear (blocks and books — far better in my view than algebra tiles)

◊ *Working with Pentominoes* (more activities!)

◊ *There Is No One Way to Teach Math: Actionable Ideas for Grades 6-12*. A book on math pedagogy, co-authored with Robin Pemantle, featuring a philosophical framework and practical suggestions on just about every aspect of the job. (Table of Contents.) "Attends to all the right topics as it practically illuminates the importance of discussion, collaboration, variety, tools, and bridging the unhelpful either-ors with common-sense balance." —Steve Leinwand
20% off with this code until March 31: 25AFLY4 on the publisher's website.

The Bicycle Trip

Sally is riding her bike on a trip with her bicycle club. She left the staging area in Chapley at 10 am, and took a break at a rest area located about half way to the final destination of Berkhill, 70 miles away. Neil is driving the sweep vehicle, a van with food, water, first aid, and a bicycle rack. The distance-time graph below shows their progress. There are train tracks along the road. The progress of a train is also shown on the graph.



1. Compare Sally and Neil's progress. Who left first? Where did they stop? What happened at the end? What was the total distance covered?
2. Including the origin, the coordinates of six points on Sally's graph are given. Describe her ride between consecutive points.
   a. At what time did each leg of her trip start and end? How far did she ride each time? How long did it take? How long were her breaks?
   b. How fast was she going during each leg of the trip?
3. a. If you were to guess about which part of the trip was downhill or uphill, what would you guess? Why?
   b. How else might one account for the different speeds?
4. How fast did Neil drive in each leg of his trip?
5. Describe the train's progress. Which way was it going? Where and when did it pass Sally and Neil?
6. Where were Sally, Neil, and the train at 12:30pm?
7. At what time were Sally, Neil, and the train 20 miles from the staging area?
8. The equation of the train's motion is $D = 160 - 40t$.
   a. Choose three points on the train's graph, and check that their coordinates satisfy the equation.
   b. Do any points in Sally's and Neil's graphs satisfy the train's equation? Which ones?
9. **Summary.**
   a. In a distance-time graph like the one above, what does it mean if two points are on the same horizontal line? on the same vertical line?
   b. As you follow someone's progress from left to right on the graph, what is the meaning of a part of a graph that goes up? down? What is the meaning of a horizontal segment? Why is a vertical one impossible?
   c. What is the significance of a point that belongs to the motion graphs of two different people?