One teacher's story of moving towards inquiry-based learning and peer collaboration in the math classroom.

Embracing rich contexts, complex tasks and experiments in Algebra 1 and 2

What my math class looks like

Teacher Cred

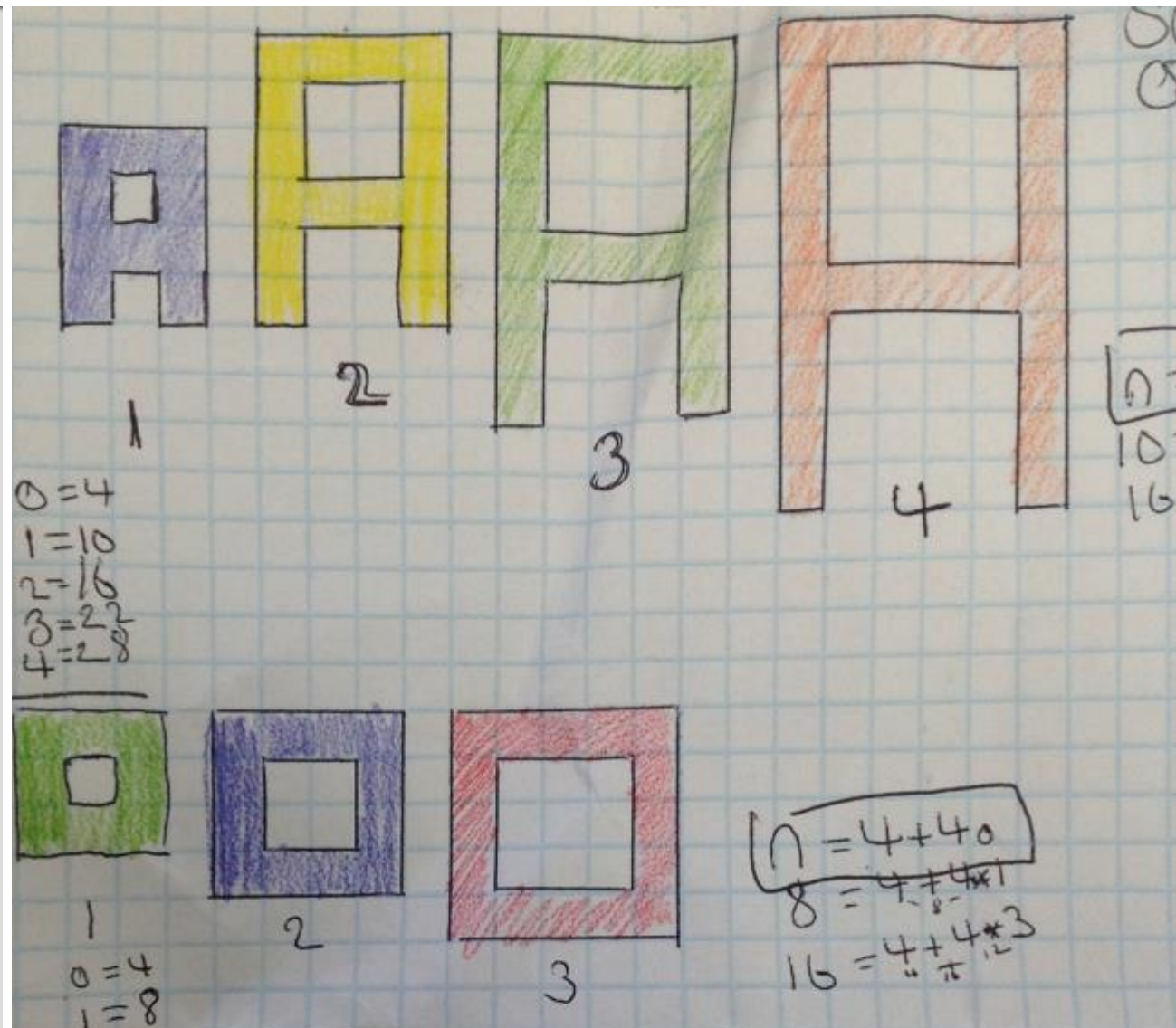# Proportions / Similar Figures

Proportions / Similar Figures

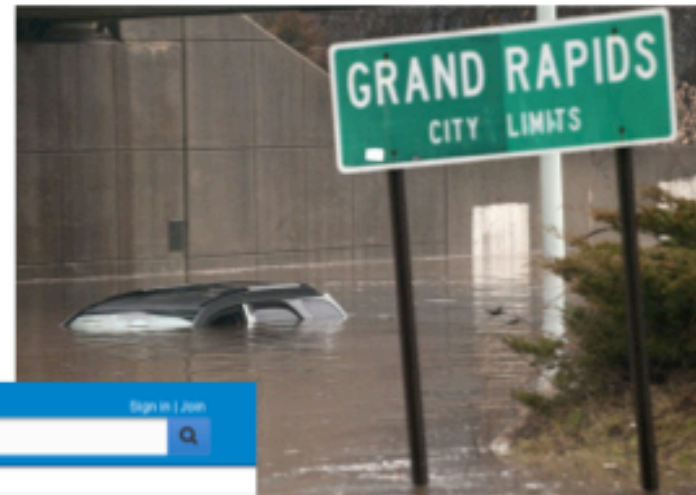# Rates

Linear Relationships

Creating Equations from Patterns

Modeling local events

Grand Rapids Flooding 2013

On Sunday, April 21ˢᵗ, 2013 at about 10pm the Grand River, which runs through downtown Grand Rapids, crested at 21.85 feet and started to recede. Flood stage for the river is 18 feet.

Lowell flooding update: With crest past, Grand River receding by 1 inch every 2 hours

Based on this information, when will the river be below flood stage?

Linear/Exponential Modeling
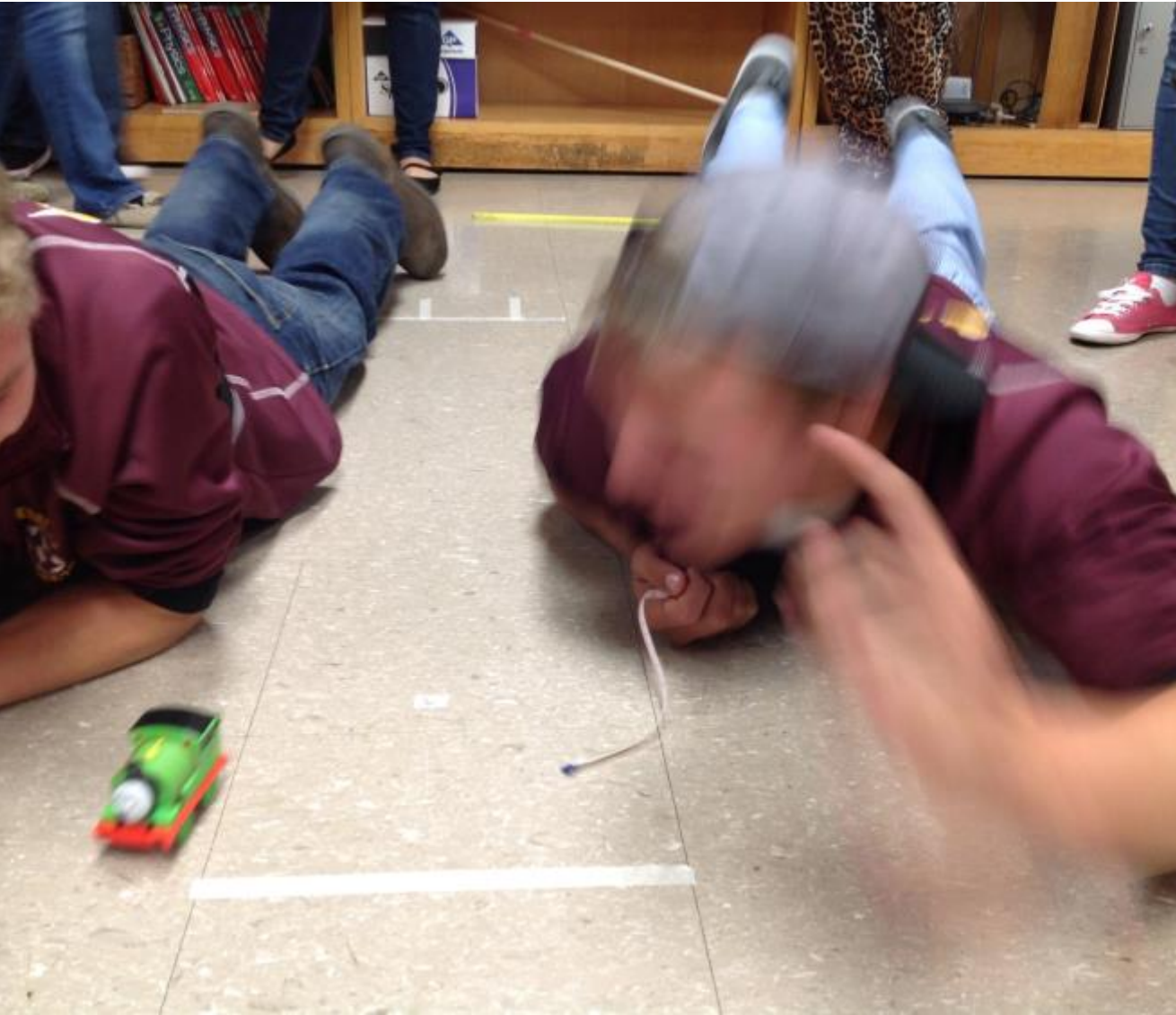
Graphing

Variation Functions
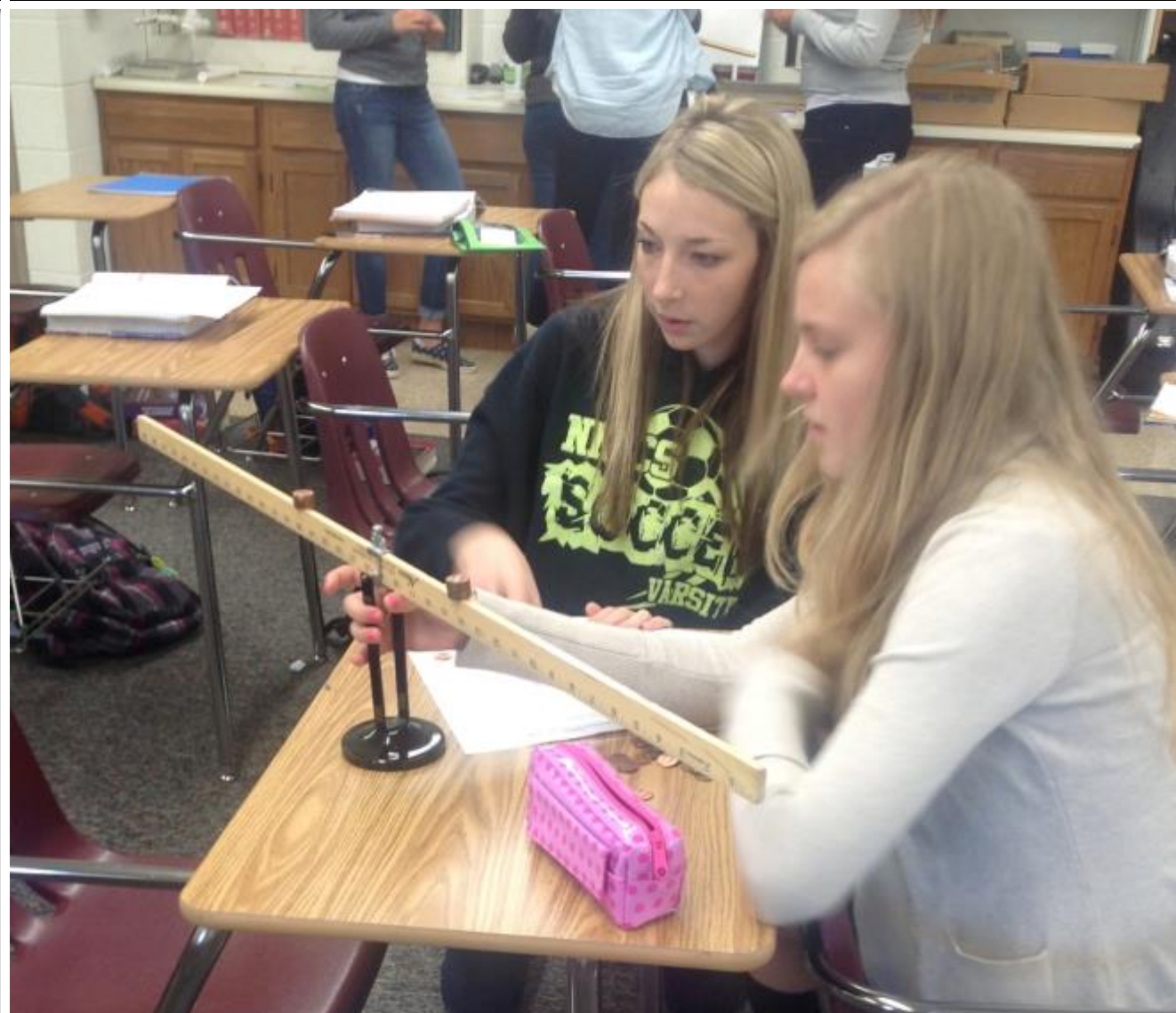
Combined Variation

Inverse Square Variation

Quadratics and Linearity
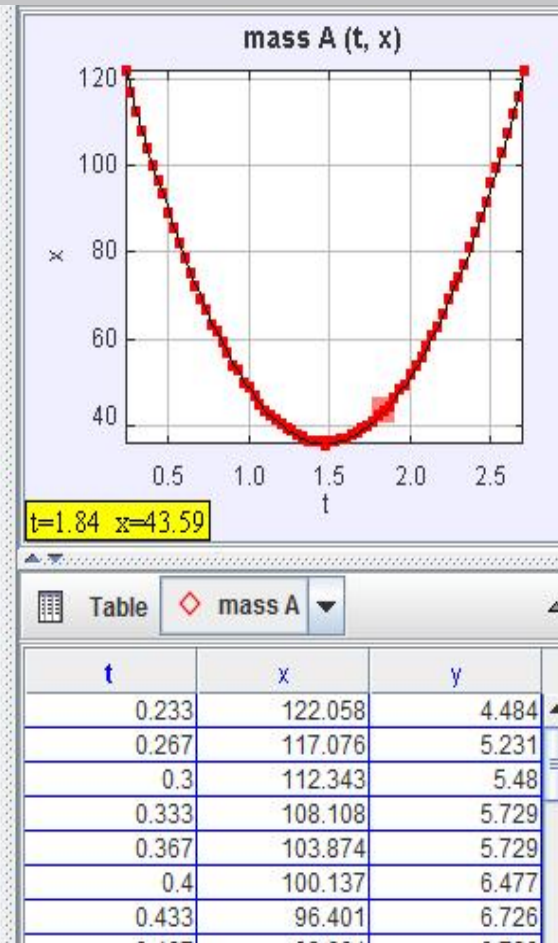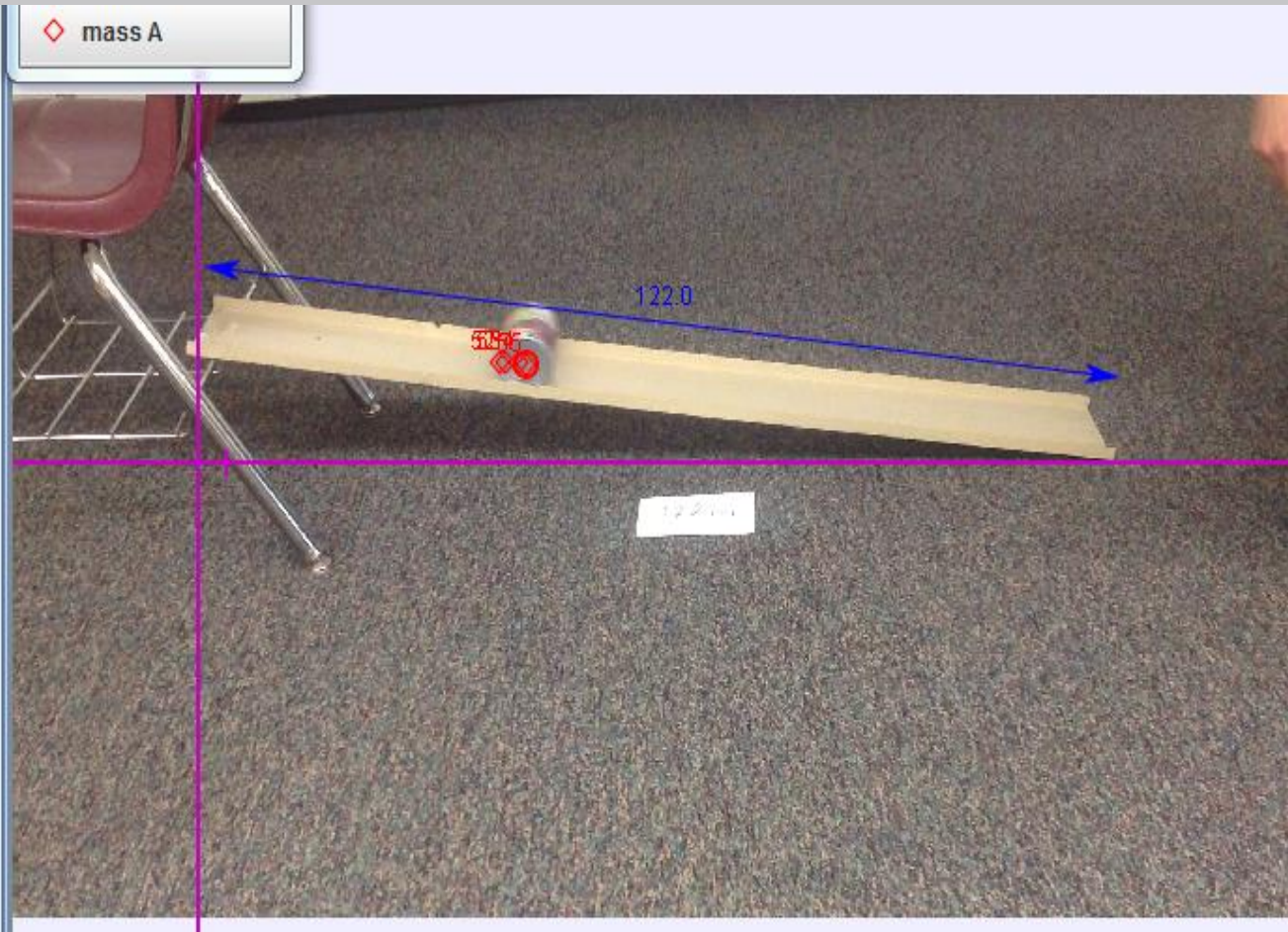
Quadratic Transformations

Quadratic Transformations and Projectiles

Enter witty yet inspirational saying here.

Starting the Process

Math Blogs

- Dan Meyer – blog.mrmeyer.com

- Fawn Nguyen – fawnnguyen.com

- Geoff Krall – EmergentMath.com
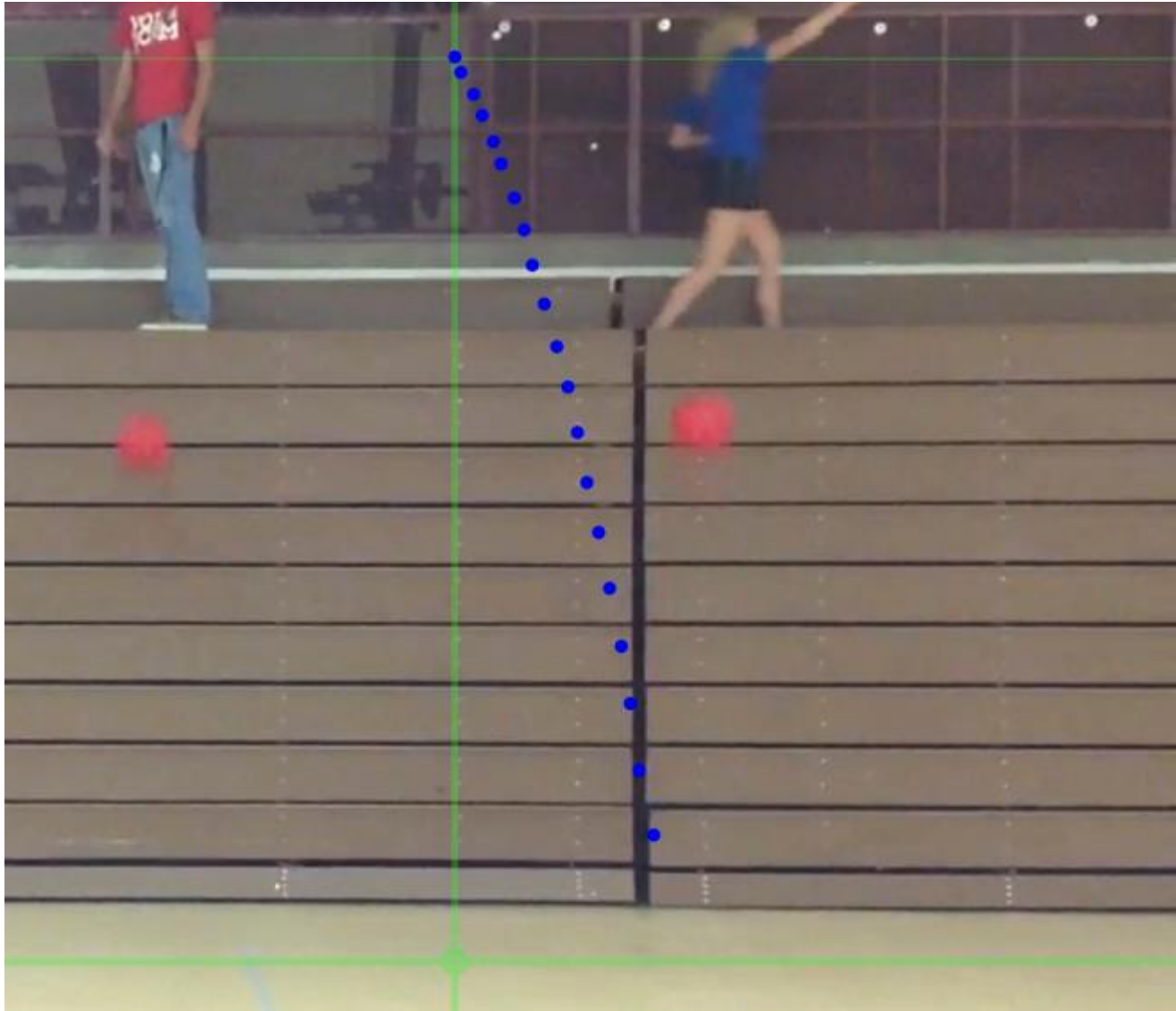 This is THE place to start.

Grade 9: Algebra One
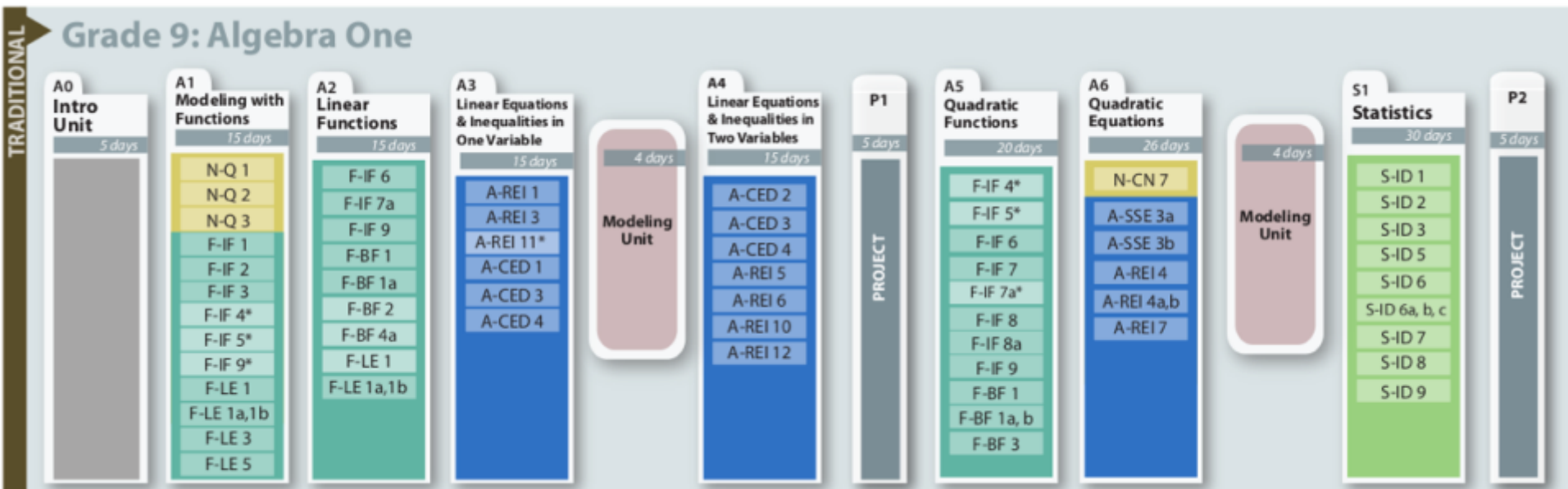
UNIT: Linear Equations in One Variable	A-REI 1,3,11*; A-CED 1,3,4	15
KD vs. Lebron (Dane)	A-REI.1,3, A-CED.1	½
Pepsi Points (Timon)	A-REI.1, 3,A-CED.1	2
Gas Pump (Dane)	A-REI.1, 3, A-CED.1	1
Bottomless Coffee Mug (Andrew)	A-REI.1, 3,A-CED.1	1
The Perfect Chocolate Milk Mix (Yummymath)	A-CED.1, 8.EE.7	1
Styrofoam Cups (Andrew)	A-CED.1,2,3,4, A-REI.3	2
M&M's (Dane)	A-CED.1,2, A-REI.1	1

Twitter – No, Really.

- #MTBoS (Math Twitter Blog-o-Sphere)

- #Alg1Chat – Sundays at 9pm

- #Alg2Chat – Mondays at 9pm

- #MichED – Wednesdays at 8pm

Best Math Ed Book… EVER

5 Practices for Orchestrating Productive Mathematics Discussions

-Margaret S. Smith and Mark K. Stein
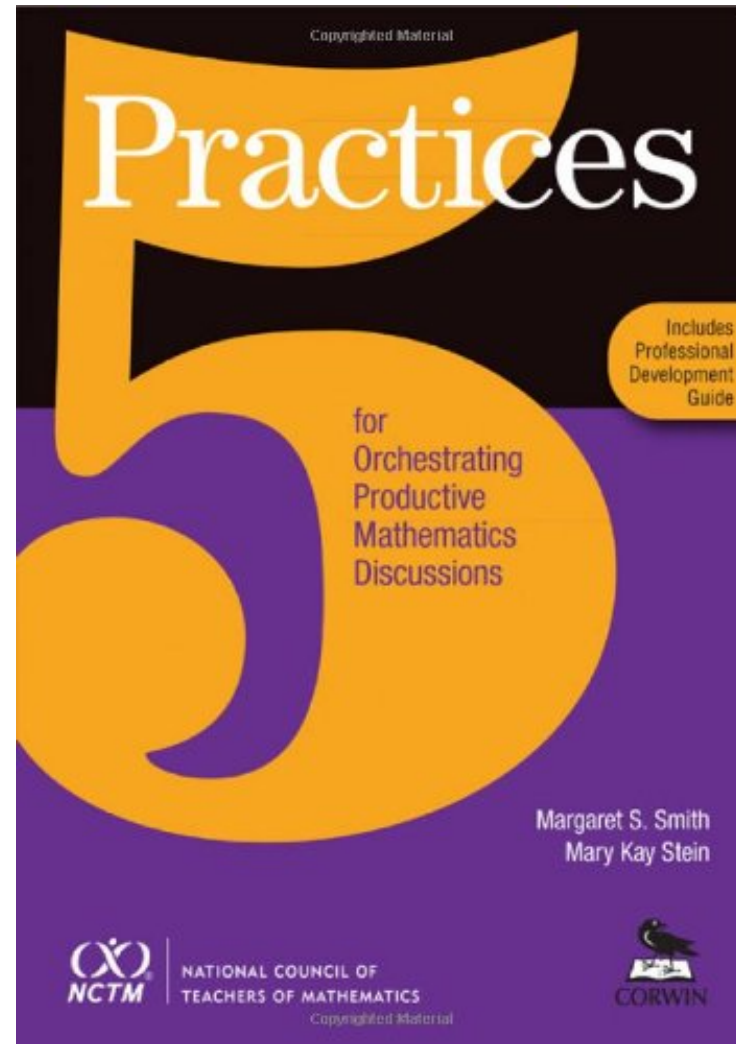
What to do with and where to put all your brilliant ideas.

Organization

Evernote

For gathering all the stuff you find, the notes you make and almost anything else you can think of...

and syncing them across multiple devices

Text Doc

Outline course concepts and how you plan to teach them.

6. Quadratic Functions

      Absolute-value functions

      Translations of quadratics

      Vertex Form

      Standard Form

      Completing the Square

      Modeling based on differences

      Quadratic Formula

      Imaginary and Complex Numbers

      Discriminant on Quadratic Formula

      *6.3 Activity 11 Modeling a Quadratic with a flashlight

      *6.6 Toothpicks

      *6.3 Using Desmos and Geogebra to transform quadratics to fit data:

      free throw, rolling can, tossed ball. (DONE)

      *6.6 Act 3 Toothpicks

      *Quadratic - Angry Birds

      *CBR Rolling Ball Experiment with ramp

   *M&M Catapult lesson (students build catapults at home) (DONE)

Ch6 #1 Projectile Motion, #2 Sum and Products of Roots, #4 Quadratic Models pg 408

Your Textbook

Look at the project section at the end of the chapters.

3 Overhead Projectors as Size Changers

Overhead projectors are used because they project images of figures under a size change. A light source passes through a transparency (preimage), reflects off the mirror and projects a picture onto the screen (image). As you move the projector away from

screen

mirror

transparency

light source
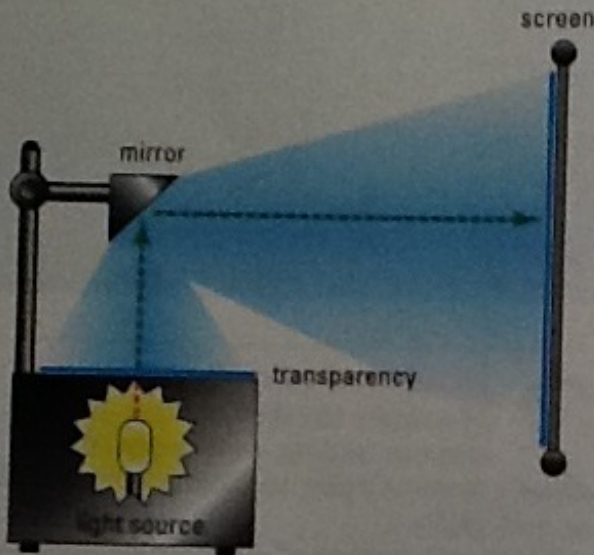
Overhead Projector

the screen, the image gets larger, and as you move the projector closer to the screen, the image gets smaller. Investigate whether the following is true.

4 Translations using Matrix Multiplication

The translations in this chapter are done using matrix addition. All other transformations of points here are performed using matrix multiplication and a 2×2 matrix particularly chosen for that transformation. A translation cannot be done using multiplication of 2×2 matrices. However, to translate a point using matrix multiplication, first write the point $\begin{bmatrix} x \\ y \end{bmatrix}$ in *homogeneous form* as $\begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$. In homogeneous form, the translation

$$T_{h,k}: \begin{bmatrix} x \\ y \end{bmatrix} \rightarrow \begin{bmatrix} x + h \\ y + k \end{bmatrix}$$

becomes $T_{h,k}: \begin{bmatrix} x \\ y \\ 1 \end{bmatrix} \rightarrow \begin{bmatrix} x + h \\ y + k \\ 1 \end{bmatrix}$.

a. Multiply $\begin{bmatrix} 1 & 0 & h \\ 0 & 1 & k \\ 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$ to see how matrix multiplication can be used for translations.

b. When a point is written in homogeneous form, the 2×2 matrices for transformations for size changes, scale changes, reflections, and rotations need to be written as 3×3 matrices in this form. For example,
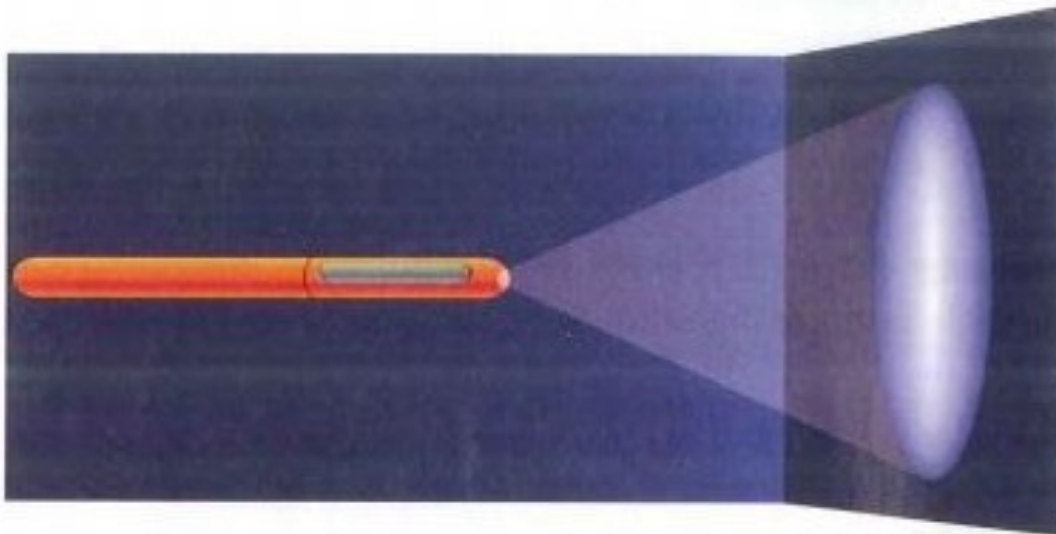
Size Change Matrices

Book problems often need to be reworked but at least it's a place to start.

Taking a promising task and making it better -ish

Re-Working a Task

2 You could test your ideas about the (*distance, intensity*) relationship by collecting data from an experiment. But you can also get good ideas by mathematical reasoning alone. Consider what would happen if you were to enter a dark room and shine a small flashlight directly at a flat surface like a wall. The flashlight will create a circle of light on the wall.

a. Complete entries in the following table that contains measurements of light circle diameter for one flashlight that has been held at several distances from a wall. Distance and diameter measurements are in feet. Express the area in terms of π.

Light Circle Measurements

Distance from Light Source, x	1	2	3	4	5	6
Diameter of Light Circle, d	2	4	6	8	10	12
Radius of Light Circle, r						
Area of Light Circle, A						

b. Write rules that show:

   i. diameter of light circle as a function of distance from the light source.

   ii. radius of light circle as a function of distance from the light source.

   iii. area of light circle as a function of distance from the light source.

c. Describe the relationships of the geometric variables diameter, radius, and area by completing sentences like this: "The variable _____ is _____ proportional to _____, with constant of proportionality _____."

d. Light energy is measured in a unit called *lumens*. The intensity of light is measured in lumens per unit of area. As the light circle of a flashlight or lamp increases in size, the intensity of light decreases.

To explore how that decrease in light intensity is related to distance from source to target, suppose that the flashlight that gave (*distance, diameter*) values in Part a produces 160 lumens of light energy. Use the area data from Part a to complete this table relating light intensity I to distance x.

Light Intensity Measurements

Distance from Light, x	1	2	3	4	5
Area of Light Circle, A	π	4π			
Light Intensity, I	$\dfrac{160}{\pi}$	$\dfrac{160}{4\pi}$			

a. Complete entries in the following table that contains measurements of light circle diameter for one flashlight that has been held at several distances from a wall. Distance and diameter measurements are in feet. Express the area in terms of π.

Light Circle Measurements

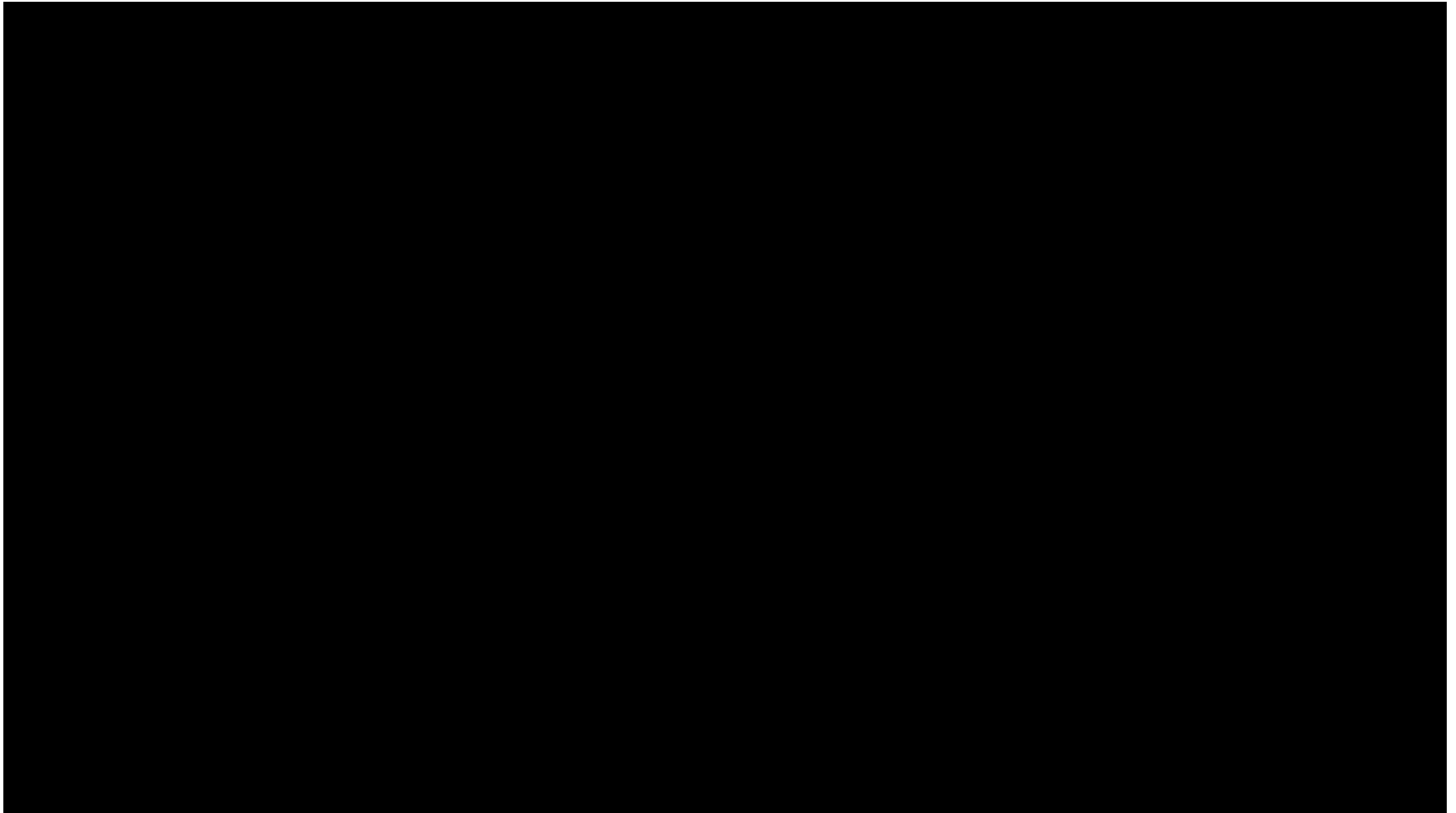| Distance from Light Source, x	1	2	3	4	5	6
Diameter of Light Circle, d	2	4	6	8	10	12
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  iii. area of light circle as a function of distance from the light source.

c. Describe the relationships of the geometric variables diameter, radius, and area by completing sentences like this: "The variable _____ is _____ proportional to _____,

Making the task more accessible

- Can we delay the abstraction until later on?

- Can we reduce the literacy demand?

- Can we create an intellectual need?
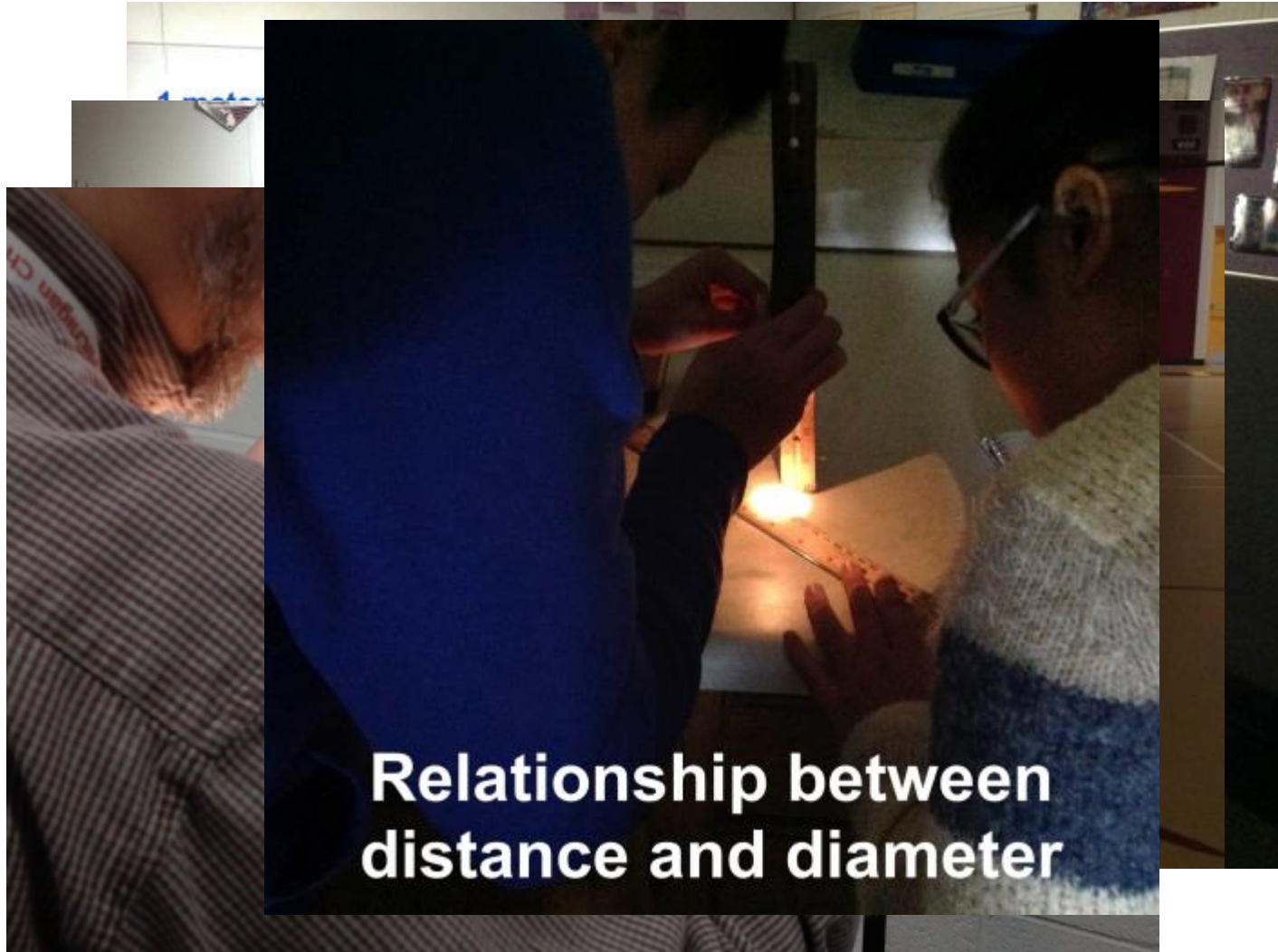
My stab at a 3 Act
version of this task...

Q: What is the diameter of the light circle at the far end of the gym?

Class discussion:

What information do you need to solve the problem?

Relationship between distance and diameter

3 Act Version: Spotlight – Act 3

The reveal…

andrewbusch.us

HOME | MATH TASKS | BLE | MATH CLASS | CHAPELS | PRAYER CLASS | VISITORS | MORE...

ALGEBRA 1 AND 2 - PRBL TASKS

This tab and all the pages under it are works in progress. I thought about 'hiding' them until they were finished but then thought none of you would actually mind.

I know the CCSS are searchable but when I think of covering a topic, I think "Exponential Functions" and not "HSA-REI.D.11". So, I'm organizing based on topic covered on not the CCSS. That means the overarching "Functions" theme has been parsed into each of the categories. If you think I missed something, please let me know.

As I create tasks this year, I'll file them under one of the headings below. If the heading is a hyperlink, then something's in there. If not, then not. For now, I feel I need this summary page to help me organize the tasks.

Don't be shy.

Questions?