Reaching and Teaching "Those Kids"

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MPJ

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Paradigm Shift

- Shift from Absolution Mindset to a Coach's Mindset.
- Emotional Investment.
- Single-Digit failure rates possible.
- We are to teach ALL kids.
- Teachers need growth mindset also.

No-Options Engagement

- No-Options: Make failure more painful than success.
- Engagement: No Quiet Deals, No Gravity Storms.
- It's not an issue of knowledge; it's a matter of will.
- Education by Mandate = Work & Participation

Boot Camp

- Refresh, Refine & Accelerate.
- Focus on Prerequisite Skills.
- Numeracy is the #1 indicator of math success.
- Students don't flunk current content; they flunk prior content.
- Use your textbook pre-assessments.

HOTS

- Explicit Teaching of the Math Practices
- Tasks = Problems that teach both Content & Critical Thinking. (Dual Targets)
- Be Task-Oriented.
- Group most of the time.
- Collaborative Learning is Superior.
- Vary grouping strategies.
- Norms, Vigilance and Accountability
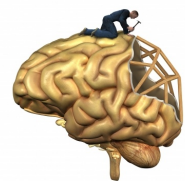
Access

- Courses, content and activities should be available to all students.
- Be aware of *your* Gap between genders, ethnicities, EL, SPED, incomes and behaviors.
- Remedial classes don't work.
- Equity means fairness.

Resources

Online Boot Camp Numeracy Activities
The Math Projects Journal. Chris Shore, mathprojects.com

Clothesline Math. Chris Shore, clotheslinemath.com

Number Tricks. Chris Shore, numbertricks.net

Estimation 180, Andrew Stadel, estimation180.com

Pure Number, purenumbers.tumblr.com

Todos, todos-math.org

Would You Rather, John Stevens, wyrmath.wordpress.com

Online Tasks
The Math Projects Journal. Chris Shore, mathprojects.com

101 Questions, Dan Meyer, 101qs.com

Glenrock Publishing, Robert Kaplinsky, robertkaplinsky.com

Graphing Stories, Dan Meyer & Buzz Math, graphingstories.com

Graph of the Week, Kelly Turner, turnersgraphoftheweek.webs.com

Illuminations, NCTM, illuminations.nctm.org

Illustrative Math, www.illustrativemathematics.org/

Mathalicious, Karim Kai Ani, mathalicious.com

Teacher to Teacher Press, Brad Fulton, www.tttpress.com

Visual Patterns, Fawn Nguyen, visualpatterns.org

Yummy Math, Brian Marks, yummymath.com

21st Century Classroom Resources
Achieve the Core, http://achievethecore.org/

Agile Mind, ccsstoolbox.agilemind.com/resources_samples.html

Common Core State Standards Initiative, www.corestandards.org/

Engage NY, engageNY.org

Ed Leader 21, www.edleader21.com

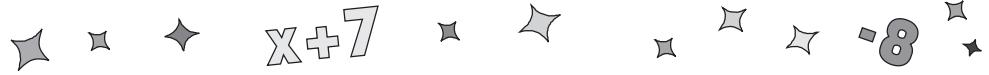*The Math Forum,* mathforum.org

The Mathematics Vision Project, mathematicsvisionproject.org/

PARCC, www.parcconline.org/parcc-assessment

Smarter Balance (SBAC), sampleitems.smarterbalanced.org

NUMBER TRICKS
x+7   ·8

In the column titled *"Your number,"* write the results of each step of the number trick listed on the left. Once other solutions are shown by your classmates, you may copy down two of the solutions in the two columns titled *"Another Number."* Analyze these three solutions, and make a conjecture to what you think the final result of the number trick will always be. Finally, in the fourth column, write the algebraic expression that represents the cumulative steps of the number trick. On the second to last line of this column should be the complete expression; then write the simplified version.

		Your Number	Another Number	Another Number	Algebraic Expression
TRICK #1	Pick a number	_____	_____	_____	_____
	Multiply by 2	_____	_____	_____	_____
	Add 3	_____	_____	_____	_____
	Subtract twice the original number	_____	_____	_____	_____

Common Result: _____ **Simplified Expression**: _____

		Your Number	Another Number	Another Number	Algebraic Expression
TRICK #2	Pick a number	_____	_____	_____	_____
	Add 4	_____	_____	_____	_____
	Multiply by 2	_____	_____	_____	_____
	Subtract 7	_____	_____	_____	_____
	Subtract twice the original number	_____	_____	_____	_____

Common Result: _____ **Simplified Expression**: _____

		Your Number	Another Number	Another Number	Algebraic Expression
TRICK #3	Pick a number	_____	_____	_____	_____
	Add 2	_____	_____	_____	_____
	Multiply by 3	_____	_____	_____	_____
	Subtract 6	_____	_____	_____	_____
	Subtract twice the original number	_____	_____	_____	_____

Common Result: _____ **Simplified Expression**: _____

		Your Number	Another Number	Another Number	Algebraic Expression
TRICK #4	Pick a number	_____	_____	_____	_____
	Add 5	_____	_____	_____	_____
	Multiply by 2	_____	_____	_____	_____
	Subtract 9	_____	_____	_____	_____
	Subtract the original number	_____	_____	_____	_____

Common Result: _____ **Simplified Expression**: _____

ASSIGNMENT

Create a number trick similar to those shown above. The trick must be unique. Demonstrate the solution with three different numbers, and then show the algebraic expression that represents each step of the number trick. Finally, write the simplified expression that represents the result of each trick. The higher the degree of difficulty, the higher the grade.

The Clothesline

Name: _____

Date: _____

For each set, record the given values, expressions or drawings. After the discussion of their placement on the clothesline, record them on the number line.

1. _____ , _____ , _____

$\longleftrightarrow$

2. _____ , _____ , _____
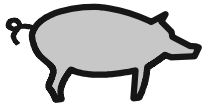
$\longleftrightarrow$

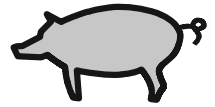**3.** _____ , _____ , _____

$\longleftrightarrow$

The 4-Digit Problem

$8 + 8 + 8 + 8 = 32$

$8^2/8 + 88 = 96$

Arrange four 8's to produce 19.

Pig Pen Algebra

Farmer John is making a pig pen. He is short on materials so he is making the pen out of bales of hay. These bales are shaped as cubes. Farmer John likes to keep things simple, so whenever he gets another pig, he just extends the pen as shown below. Your job is to help Farmer John write a formula to tell him how many bales of hay he will need for a given number of pigs.
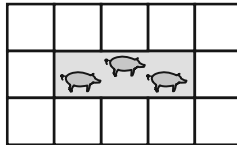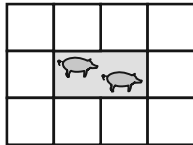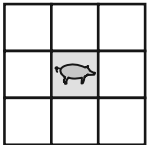
1. How would you move the existing bales to make room for another pig?

2. In the space above, draw pens that would hold 4 and 5 pigs respectively.

3. How many bales of hay must be added to an existing pen, to make room for the next pig?

4. Without anymore drawings, complete the chart below for P number of pigs and B number of bales.

P (pigs)	1	2	3	4	5	6	7	8	9	10	20	50
B (bales)	8	10	12									

5. How did you figure out your answers for 20 and 50 pigs?

6. According to the pattern in the chart, how many bales would you predict are needed for no pigs?
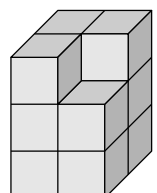
7. Write an equation that represents the number of bales B needed to pen P number of pigs.
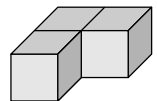
8. Show how to use your new equation to find how many bales are needed for 100 pigs.
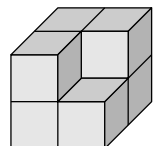
9. How many pigs could be penned by 96 bales of hay?

ASSIGNMENT
A tower is built up as shown on the right. Write an equation that represents the number of blocks T needed to build a tower S stories tall.

Zip Line Activity

The Indoor Zip Line Company uses a room that is 30 meters long and 38 meters high to set up their zip line. The zip line industry has many safety regulations. Regulation #1 is that the platform from which you launch from must be a minimum of 3 meters long. Regulation #2 is that the platform that you land on must be a minimum of 6 meters long. Regulation #3 is that the zip line must be 2 meters above the edge of both the launching and landing platforms. There are other regulations that deal with the steepness, distance, and the sag (slack) of the zip line as well. The Indoor Zip Line Company starts by building one zip line with the maximum steepness allowed. Here is a graph of their first zip line.

Height (Meters)

A(0,22)

Platform #1
18 meters high

B(27,4)

Landing Platform #1
4 meters high

(0,0)

Length (meters)
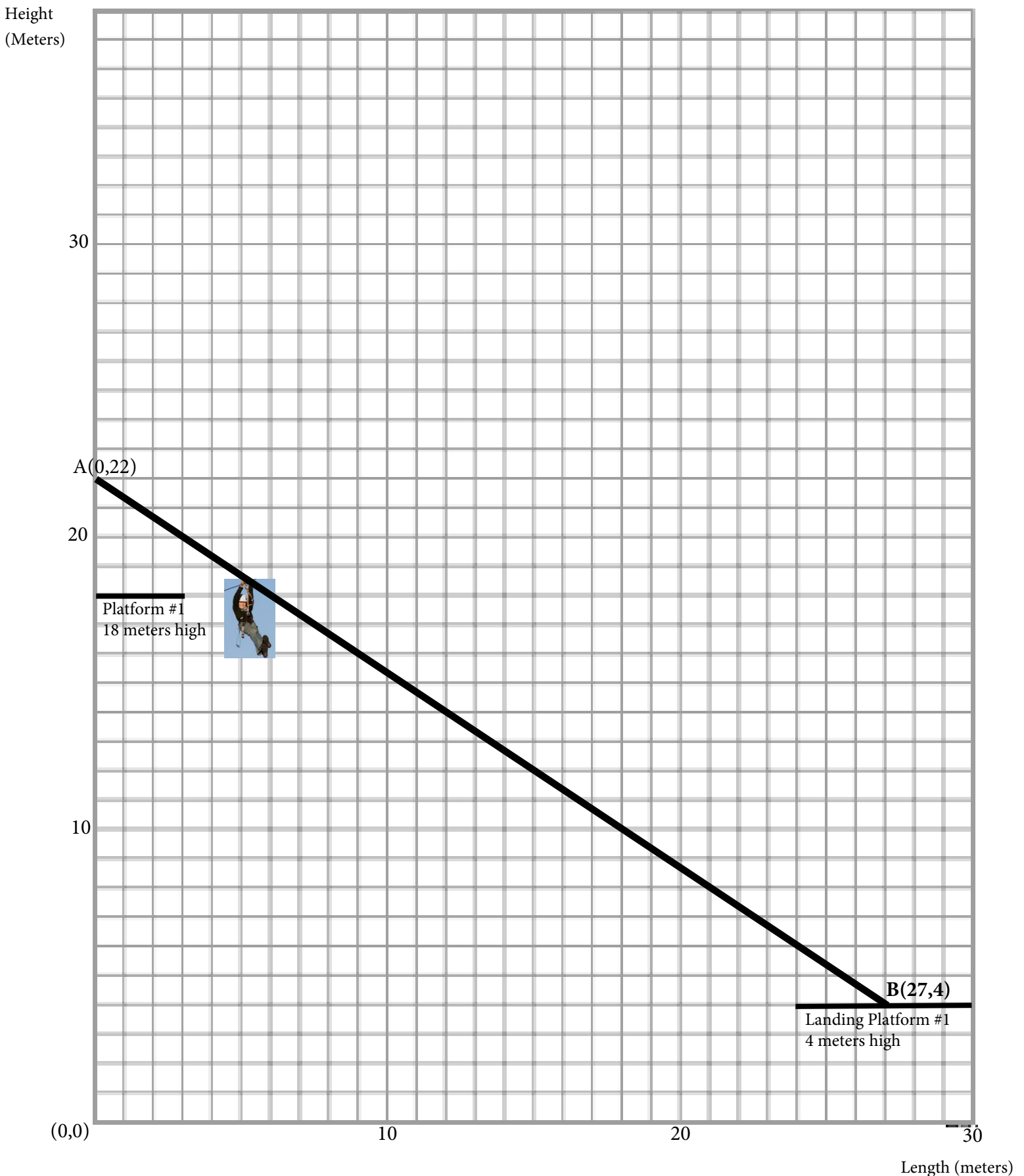
Zip Line Activity

1. The Indoor Zip Line Company built their zip line to be the steepest allowed by regulations. Complete the following safety regulation about steepness.

   Regulation #4 is ...

2. a) What is the distance from point A to point B?

   b) Regulation #5 deals with the distance of the zip line ride and how much sag there must be in the cable. According to the regulation, the sag in the cable must have at least 5% of the distance from point A to point B. What does the minimum length of the cable have to be to meet this regulation?

3. a) Assuming there is no sag in the cable, write the equation of the zip line in slope intercept form.

   b) Assuming there is no sag in the cable, write the equation of the zip line in standard form.

4. a) The Indoor Zip Line Company has been getting request to build a second zip line that is more exciting, but safety regulations won't allow them to build one that is steeper. So instead of going steeper they decide to build one that is higher off the ground. Their second 3 meter launching platform will be 29 meters off the ground. If the distance and the steepness stay the same as the first zip line, and they follow all of the regulations, how high must the second 6 meter landing platform be off the ground?

   b) Assuming there is no sag in the cable, write the equation of the second zip line in slope-intercept form.

5. a) To maximize their space the Indoor Zip Line Company decides to build a third zip line using the second landing platform as their third launching platform. This is still within regulation since the minimum launching platform is 3 meters long and this platform is 6 meters long. The third zip line will have the same steepness and distance as the first two zip lines. Knowing that the zip line must be 2 meters above the edge of the platforms and the third landing platform must be 6 meters long, what is the equation of the third zip line in slope-intercept form assuming no sag?

   b) What the domain and range of the 3rd zip line?

6. At what height do the first and third zip lines intercept?