Supporting Struggle & Discourse with H.O.T. Tasks
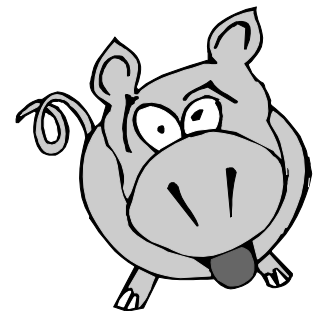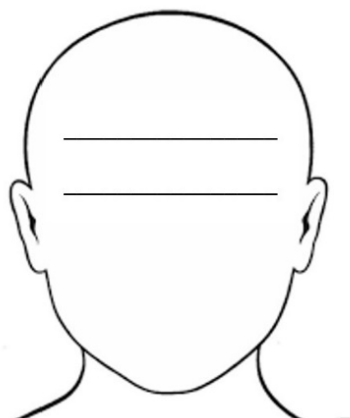
Chris Shore

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TASM 2025

Mindset

Student must believe in…   Teacher must believe in…
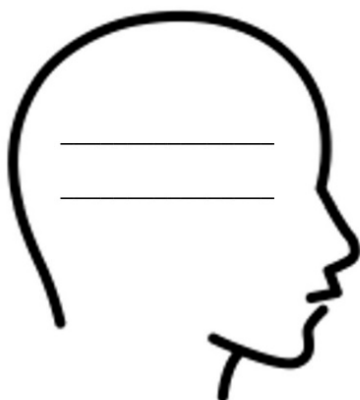
_____
_____

#1 Effect Size is _____

Our 3 Principles

For Students =

For Teachers =

For Your Systems =

Problems and Tasks

Exercise =

Problem =

Crisis =

Tasks =

The Facebook Warm-Up
10 Album Covers

Day 1 of 10. In no particular order, share 10 of your all-time favorite albums that really made an impact and are still on your rotation list, even if only now and then. Post the cover, no need to explain, and nominate a person to do the same (a different person everyday). I nominate ....
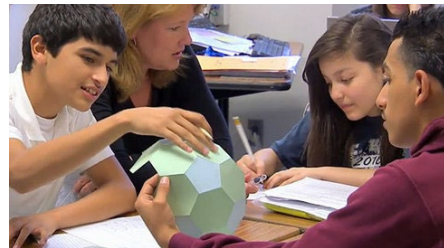

Hey Kelly, If you ask 10 people, who then ask 10 people etc... how many rounds will it take before the whole world (8 Billion People) is posting album covers on Facebook?
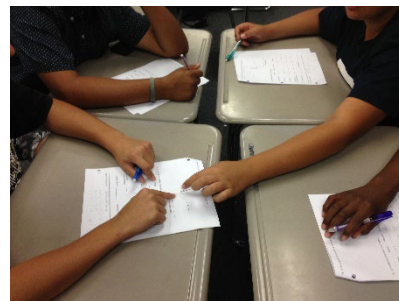
Making Group Work
Work with Less Work

Why Group? _____ & _____

Which Groups? _____, _____, _____

Managing Groups? _____, _____, _____

When to Group? _____,
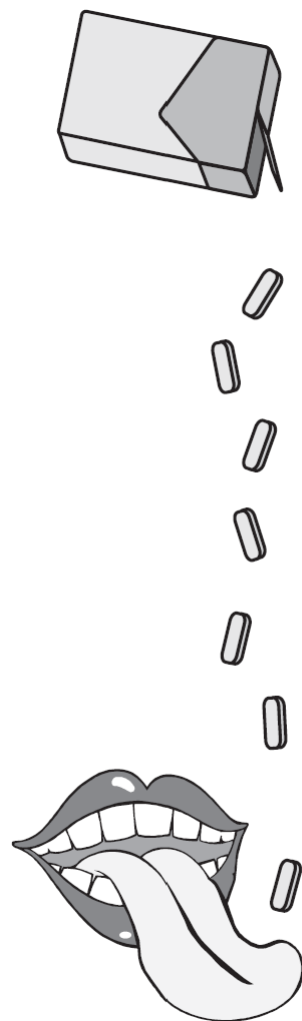
The Breath Mint Equation

The equation below represents the relationship between the number of breath mints, M, you eat before a date, and the number of kisses, K, you get at the end of the date.

$$K = 2M + 1$$

In the equation above, how many quantities do you see? List each quantity and explain it in the context of kisses and breath mints.

Five Practices for Orchestrating Mathematical Discussions

Practice	Description
Anticipating	Predicting and considering students' potential responses.
Monitoring	Carefully observing and listening to students as they work on the task to gather information about their thinking, strategies, and understanding.
Selecting	Choosing specific students' responses to share during the whole-class discussion, guided by the lesson goals and anticipated responses.
Sequencing	Planning the order in which selected responses are shared to build on students' understanding, gradually introducing more complex strategies.
Connecting	Linking students' responses to each other and overarching concepts by asking probing questions, highlighting similarities and differences, and emphasizing principles.

The 4-Digit Problem

8 + 8 + 8 + 8 = 32

$8^2/8 + 88 = 96$

Arrange four 8's to produce 19.

MATHEMATICAL PROCESS STANDARDS (TEKS)

The student uses mathematical processes to **ACQUIRE** and **DEMONSTRATE** mathematical understanding. The student is expected to:

A

APPLY mathematics to problems arising in everyday life, society, and the workplace

B

USE a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution

C

SELECT tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems

D

COMMUNICATE mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate

E

CREATE and **USE** representations to organize, record, and communicate mathematical ideas

F

ANALYZE mathematical relationships to connect and communicate mathematical ideas

G

DISPLAY, EXPLAIN, and **JUSTIFY** mathematical ideas and arguments using precise mathematical language in written or oral communication.

Math Process Standards

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.
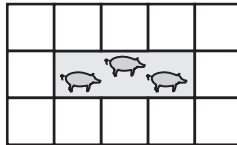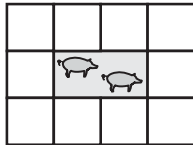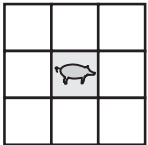
1. How would you move the existing bales to make room for another pig?

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?
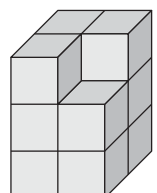
7. Write an equation that represents the number of bales B needed to pen P number of pigs.
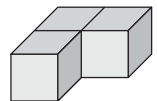
8. Show how to use your new equation to find how many bales are needed for 100 pigs.
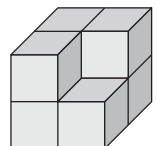
9. How many pigs could be penned by 96 bales of hay?

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.

CANDY BARS: ADDING FRACTIONS

Your friend shares a candy bar equally with you. Another friend shares the same kind of candy bar among three of you.
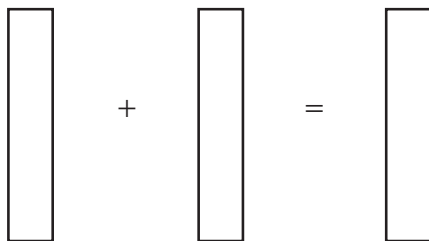
1. a) Show in the first bar below your portion of the first candy bar.
   b) Show in the second bar your portion.
   c) Show in the third bar, how much you have total.
   d) How much more do you need in order to eat a whole candy bar?
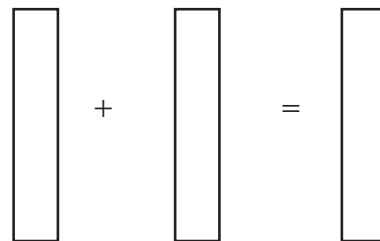
   +   =
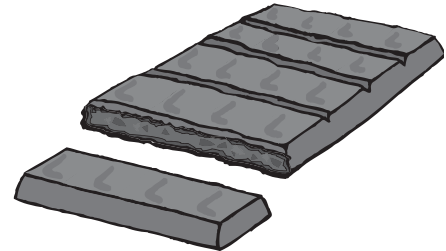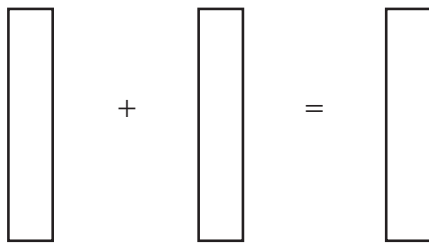
   e) Is there an easier way to figure this out, without drawing the diagrams? Show it.

2. Show how both methods above can be used to solve the following problems.

   a) $\frac{2}{3}$ + $\frac{1}{6}$ =
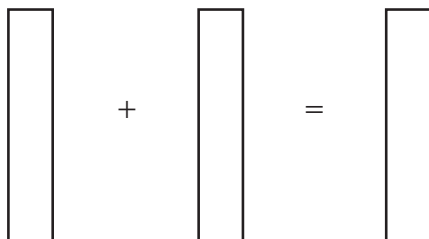
   +   =

   b) $\frac{3}{5}$ + $\frac{1}{2}$ =

   +   =

   c) $1\frac{1}{4}$ + $1\frac{1}{2}$ =

   +   =

   3. Practice:
   a) $\frac{2}{3}$ + $\frac{1}{2}$ =

   b) $\frac{3}{2}$ + $\frac{1}{4}$ =

   c) $2\frac{1}{4}$ + $1\frac{1}{3}$ =

   4. Generalization:
   $\frac{a}{b}$ + $\frac{c}{d}$ =

Recap of the Day

Mindset

Students must believe in…

Teachers must believe in…

The 3 Principles of School Improvement

Students don't improve until…

Teachers don't improve until…

Your Systems are getting the exact results that …

Definitions of Problems & Tasks

Unlike exercise or crisis, students have the _____ to solve a
problem, but _____.

Tasks are problems that teach both _____ & _____.

Group Work

Why should teachers use group work?

Which common group structures are available for teachers to use?

What 3 techniques will help teachers to manage groups?

How often should teachers use group work?

The 5 Practices of Orchestrating Mathematical Discussion are:

_____   _____

_____   _____

_____

The Process Standards

List the Process Standards.

Ap _____   Co _____

U _____   Cr_____

S _____   D _____

An _____

Leading Your Teachers

Where should you encourage teachers to find H.O.T. tasks?

Challenge teachers to start with ____ task per unit.

Ask your teachers to try _____.

Improving Your Systems

What should your teachers be teaching each day besides content standards?

What are two ways you can increase the need for H.O.T. Tasks that will develop productive struggle and mathematical discourse?

Your Reflection

Your Big Take-Aways from this session are:

Your Next Step

When you get back to your school, within the next 2 weeks, your next step will be: