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Coaching Teachers to Increase Student Engagement

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Howard County Public Schools

Session O

As a result of this professional learning experience, we will:

- Engage in a thinking task with a collaborative group
- Discuss various benefits of engaging your students in thinking tasks
- Explore additional resources for engagement

Cubes of Paint

A recipe for maroon paint says, "Mix 5 ml of red paint with 3 ml of blue paint."

1. Use snap cubes to represent the amounts of red and blue paint in the recipe. Then, draw a sketch of your snap-cube representation of the maroon paint.
   a. What amount does each cube represent?
   b. How many milliliters of maroon paint will there be?

2. A. Suppose each cube represents 2 ml. How much of each color paint is there?

Red: _______ ml Blue: _______ ml Maroon: _______ ml

B. Suppose each cube represents 5 ml. How much of each color paint is there?

Red: _______ ml Blue: _______ ml Maroon: _______ ml

3. A. Suppose you need 80 ml of maroon paint. How much red and blue paint would you mix? Be prepared to explain your reasoning.

Red: _______ ml Blue: _______ ml Maroon: _______ ml

B. If the original recipe is for one batch of maroon paint, how many batches in 80 ml of maroon paint?

Let's get up to the Vertical Whiteboards!

When working at vertical whiteboards, we...

- Use only one marker per group
- The person talking does not have the marker
- You are allowed to talk! (If you have the marker, you must pass it to someone else.)
- You can move around to check others' thinking/strategy
- Have fun!

Fruit Juice Task

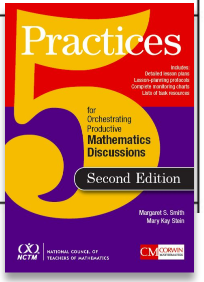
Elena makes fruit punch by mixing 4 parts cranberry juice to 3 parts apple juice to 2 parts grape juice. If one batch of fruit punch includes 30 cups of apple juice, how large is this batch of fruit punch?

MS Word download: https://tinyurl.com/5practicesv2

5 Practices Observation/Interview Tool

Task ____________________ **Class/Period** ____________ **Date** ___________

Representation/Strategies	**Posing Questions to Move the Math Thinking Forward**		**Who and What?**	**Sequence/Order**
Anticipate likely responses to a challenging task/problem. List them here. Then *monitor* and add any unanticipated ones.	**Assessing Questions** - Intended to assess what a student knows and is able to do; helps make thinking visible.	**Advancing Questions** – Intended to help move a student's thinking forward or to explore the underlying concept(s) more deeply.	Names of students w/ corresponding strategies/representations observed or monitored during task work.	*Select* students to present their work during whole group discussions. *Sequence* the order of student presentations.



Adapted from *5 Practices for Orchestrating Productive Mathematics Discussions* by M. Smith & M. Stein, 2018

Sample Assessing & Advancing Questions

Assessing Questions

- How did you find your [solution]?
- Why do you think your answer is correct? Can you show me evidence?
- How are these [*ideas, arguments, quantities, etc.*] related?
- Describe the *approach, method or strategy* you are trying.
- Can you give an example (or non-example)?
- How can you prove that?
- How does this information represent ________?
- What does your solution represent?
- Can you describe the meaning of [insert] in the context of the problem?
- Describe what you have learned or accomplished.

Advancing Questions

- Where do you think you are stuck?
- What information are you given? What do you need to find?
- Have you used all of the important information you are given?
- How can you organize the work you have completed thus far?
- Can you [*draw a picture*] to show what you told me?
- Why are you trying that strategy? Is there a more efficient way to do what you are trying? Explain.
- Can you explain your work to another student/group?
- Do you see a pattern? Can you describe the pattern? Can you extend the pattern?
- Is this like a problem you have seen before? Explain.

Purposeful Questioning in Mathematics

Assessing Questions

Focus closely on the instructional content the students have explored

Clarify what the students understand about what they have learned

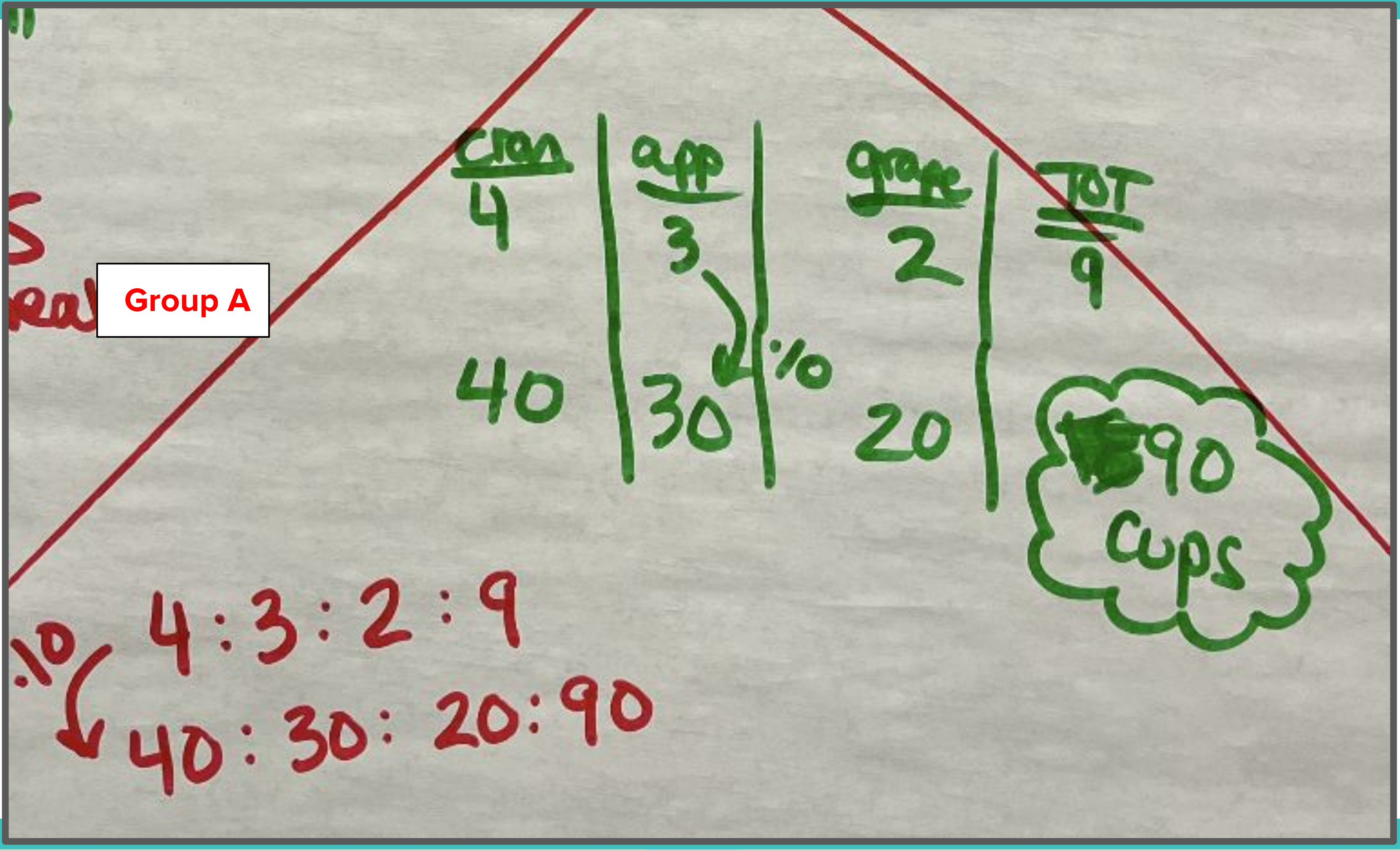
Provide information to the teacher about what students understand and/or still need to learn

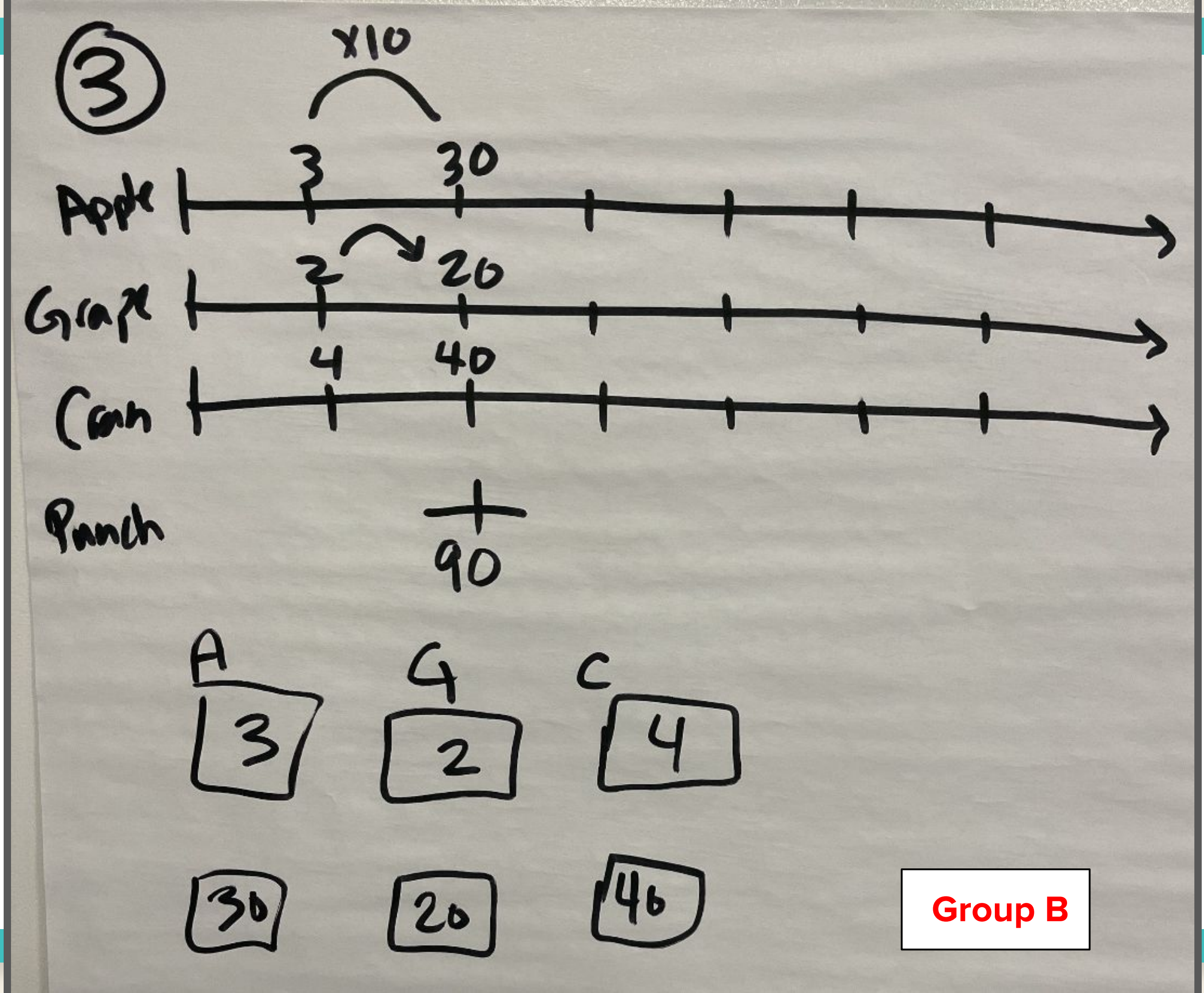
Advancing Questions

Use what students learned as a basis for making progress towards mastery of the clear target

Move students beyond their current thinking by pressing students to extend what they know to a new situation

Press students to think about something they are not currently thinking about

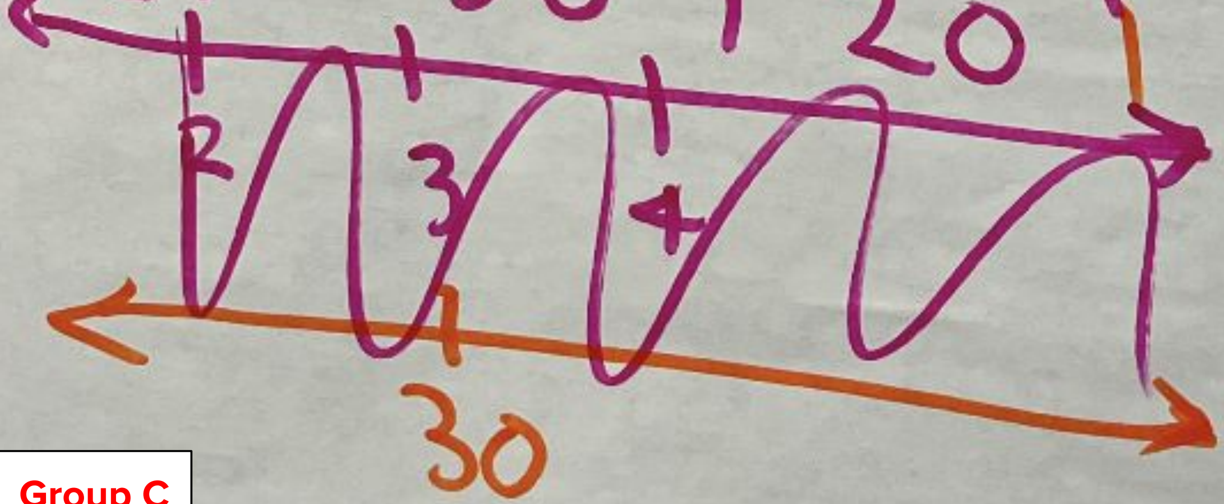

Group A
cran
4
app
3
grape
2
TOT
9
40
30
·10
20
90
cups
4 : 3 : 2 : 9
·10
40 : 30 : 20 : 90



Group B

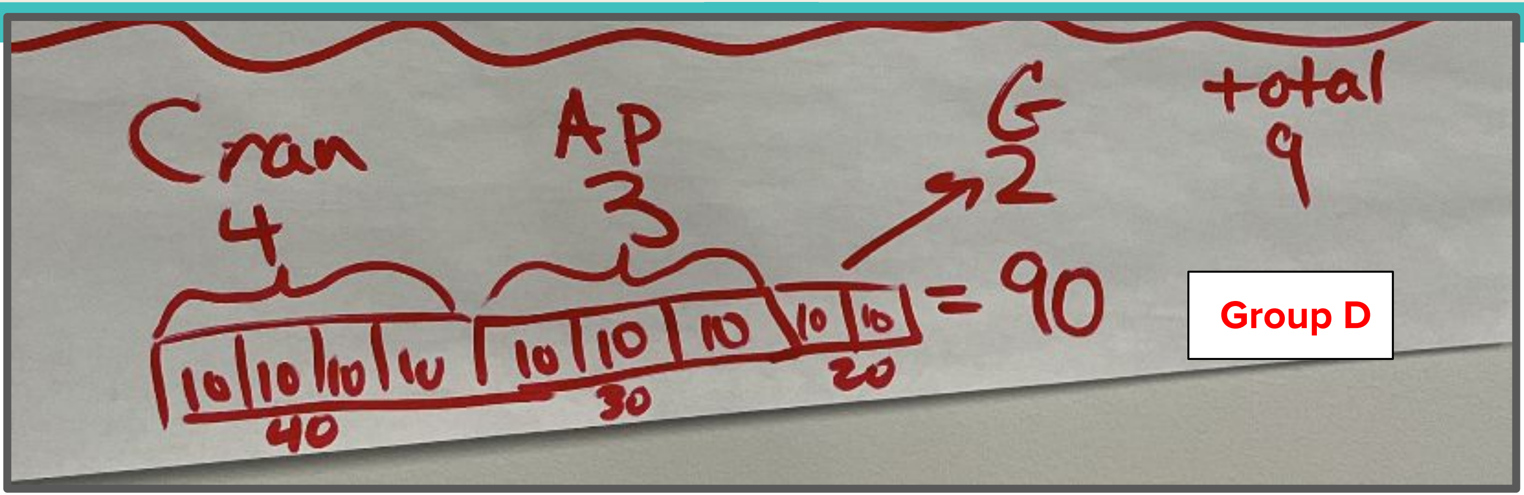
1 parts orange juice

C	A	G	Total
4	3	2	9
×10	×10	×10	×10
40	30	20	90

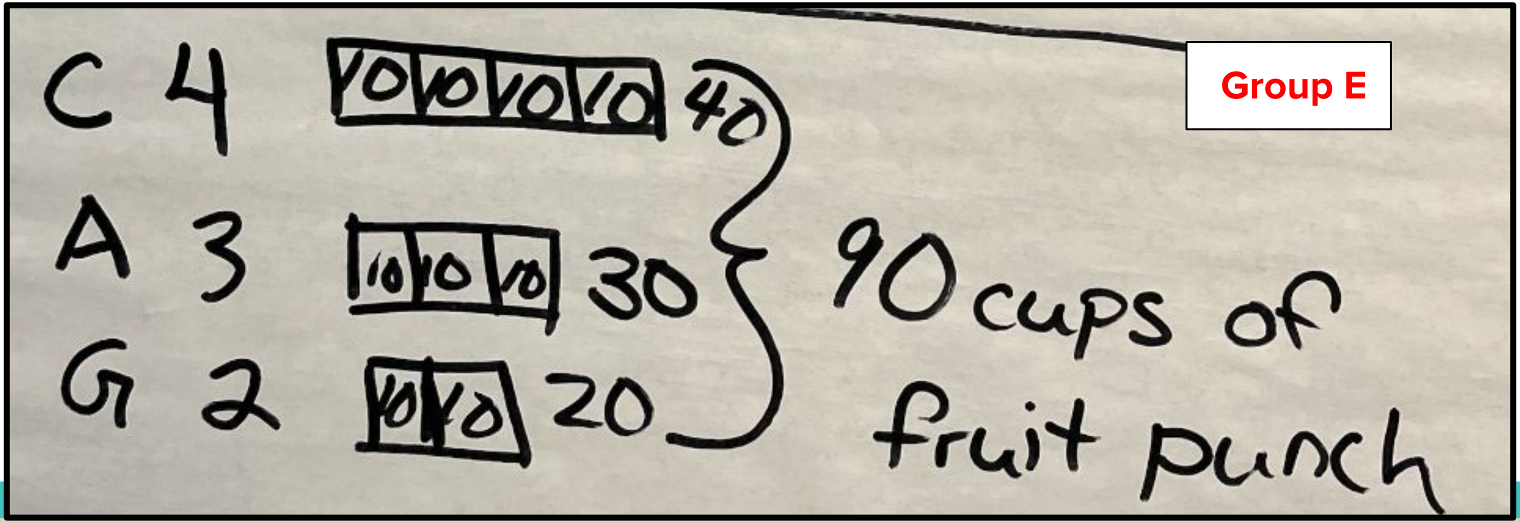


90 cups of fruit punch

Group C



Cran
4
Ap
3
G
2
total
9
10 10 10 10
10 10 10
10 10
= 90
40
30
20
Group D



C 4
10 10 10 10
40
A 3
10 10 10
30
G 2
10 10
20
90 cups of fruit punch
Group E

Back to the Boards!

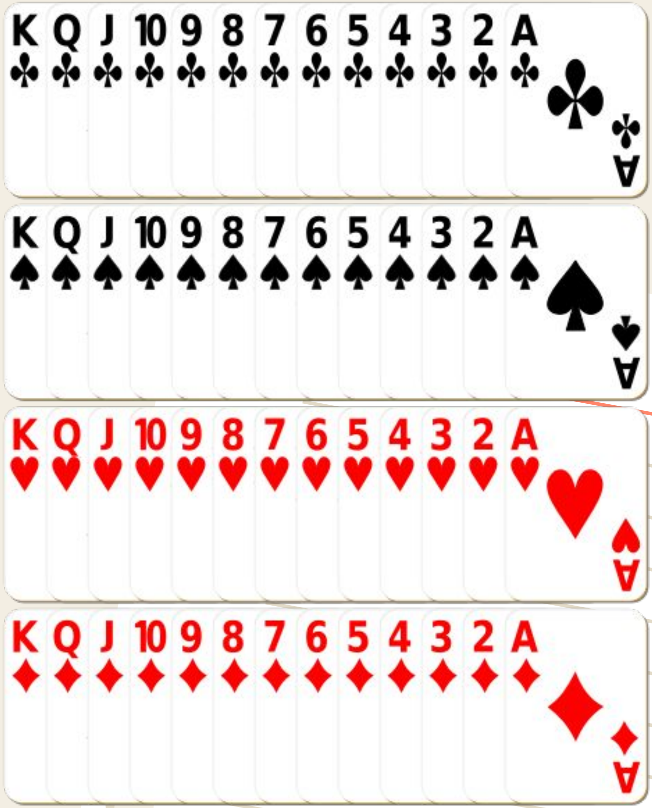
- How was the cube activity experience different for you from the fruit juice activity experience?

Back to the Boards!

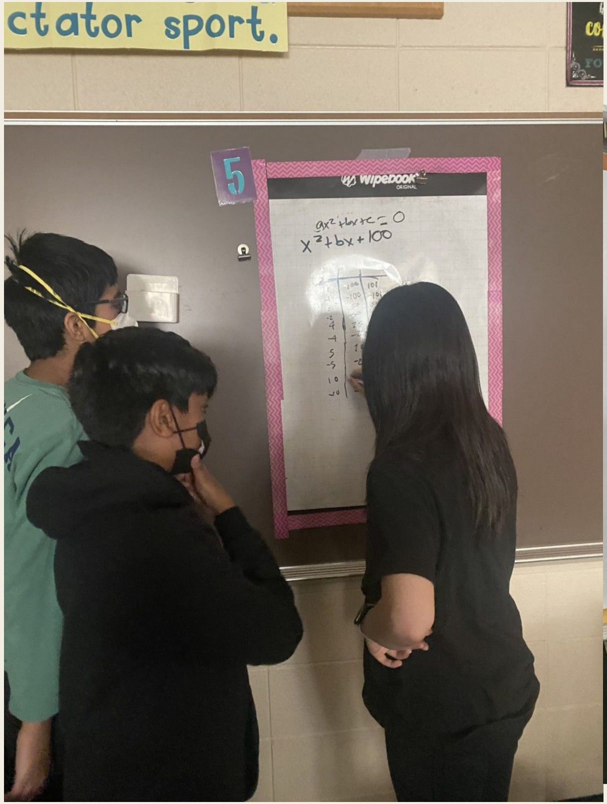
- **What is the likelihood you would use this approach...**
  - Next week?
  - Next Unit?
  - Next year?
- **What's holding you back from trying it?**

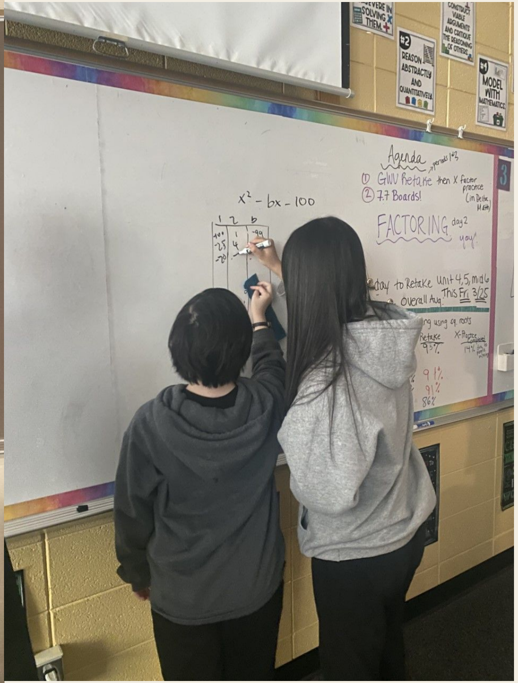
Tools for Random Grouping

- Playing Cards
- Flippity.net
- Popsicle Sticks
- Spreadsheet Tool
- Other manipulatives

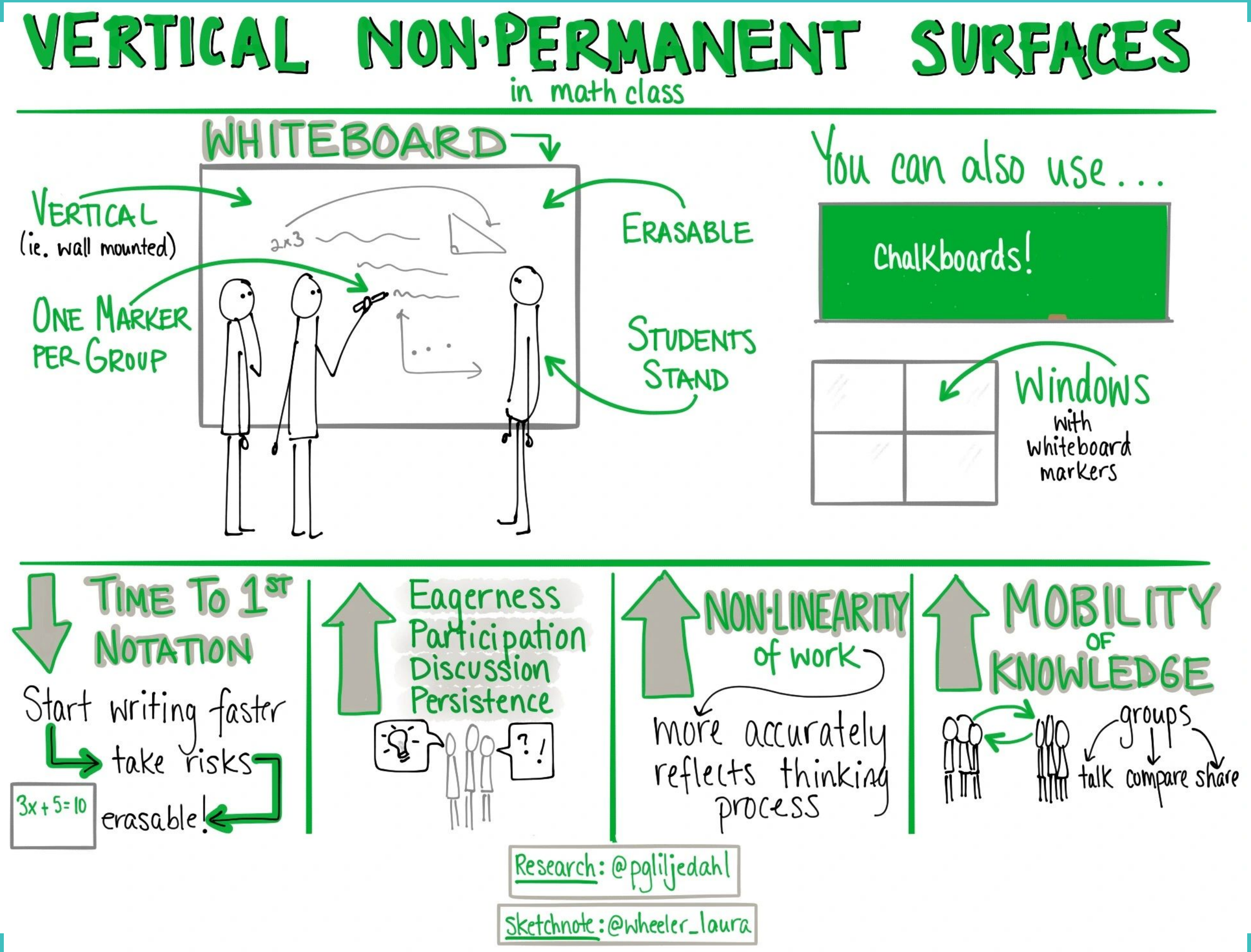



MINDSET


ctator sport.
5
wipebook
$ax^2+bx+c=0$
$x^2+bx+100$

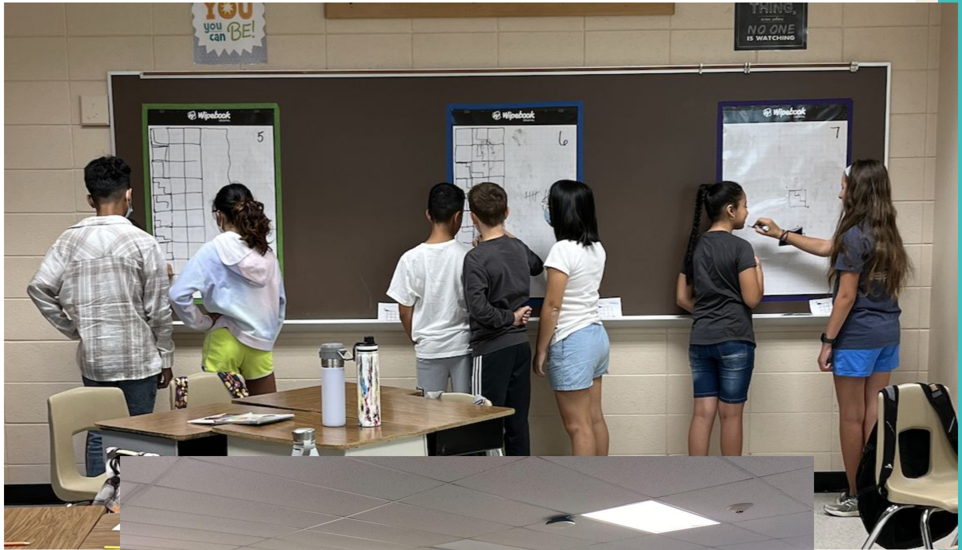

$x^2-bx-100$
Agenda
GWU Retake
7.7 Boards!
FACTORING
3


THINK BIG
NEVER give UP
10


VERTICAL NON-PERMANENT SURFACES
in math class
WHITEBOARD
VERTICAL
(ie. wall mounted)
ONE MARKER PER GROUP
ERASABLE
STUDENTS STAND
2x3
You can also use...
Chalkboards!
Windows
with whiteboard markers
TIME TO 1ST NOTATION
Start writing faster
take risks
3x + 5 = 10
erasable!
Eagerness
Participation
Discussion
Persistence
?!
NON-LINEARITY of work
more accurately reflects thinking process
MOBILITY OF KNOWLEDGE
groups
talk
compare
share
Research: @pgliljedahl
Sketchnote: @wheeler_laura

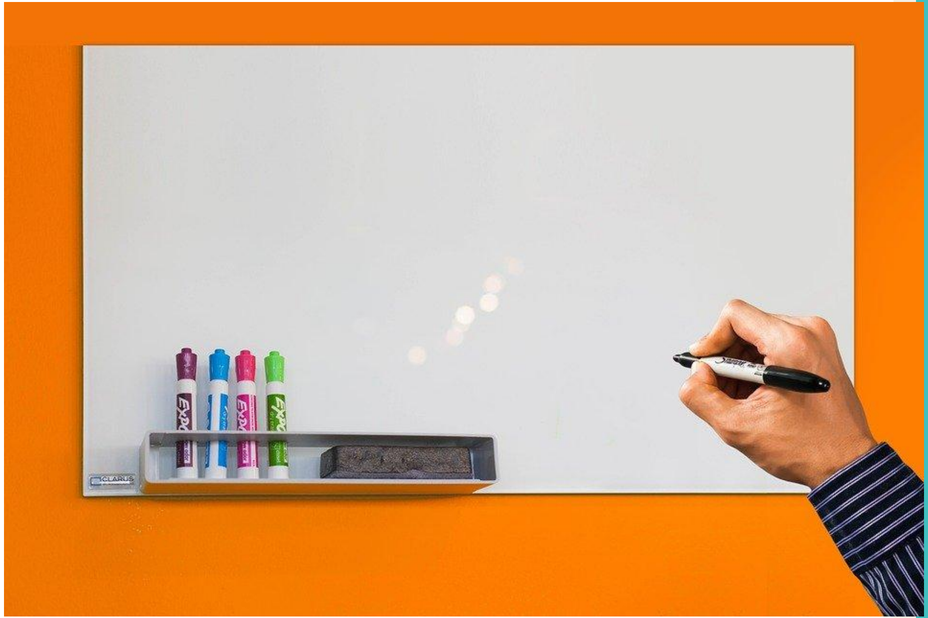
Where students work

- In groups
- At Vertical Non-Permanent Surfaces
- Standing up
- With shared materials (markers, manipulatives)
- In close proximity to one another



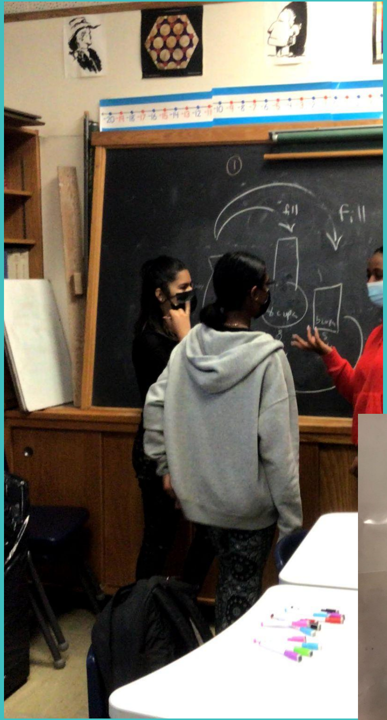
Possible How To's:

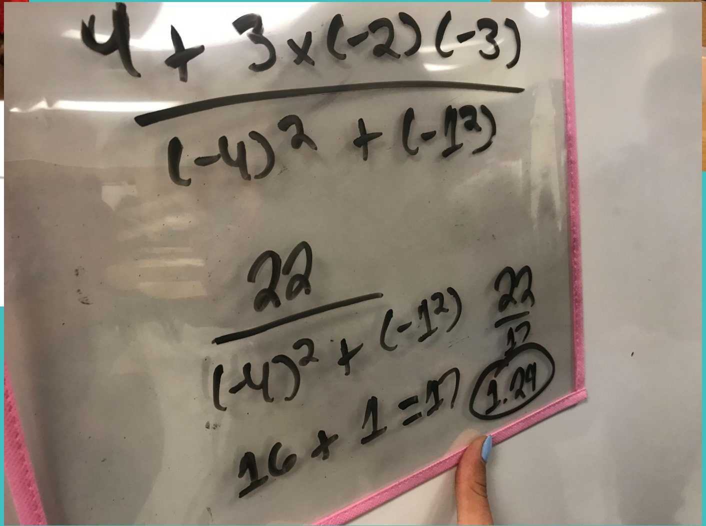
- Have only one marker per group
- Move the marker around within the group
- If necessary, have the rule that the person writing cannot write any of their own ideas
- Have groups in close proximity to each other
- Talk to the students about the valuing wrong ideas and not erasing other's work
- Possibly, let students talk & visit other groups

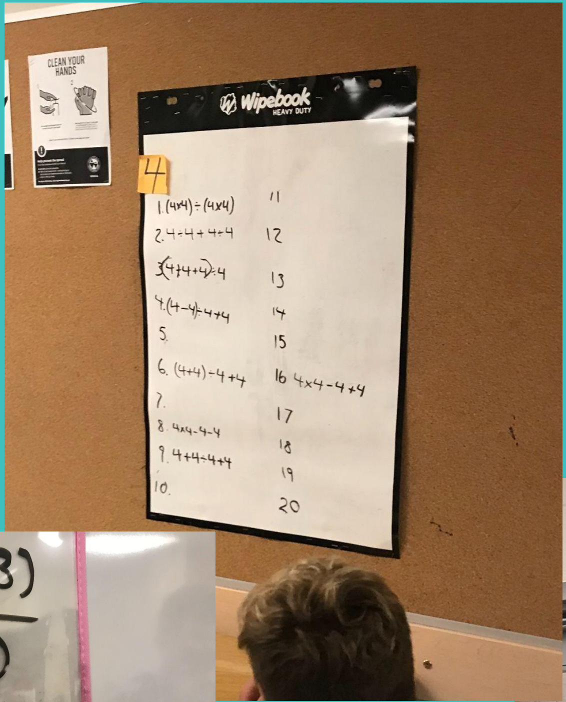


Links for printable versions [here]() and [here]()

Alternatives to Whiteboards





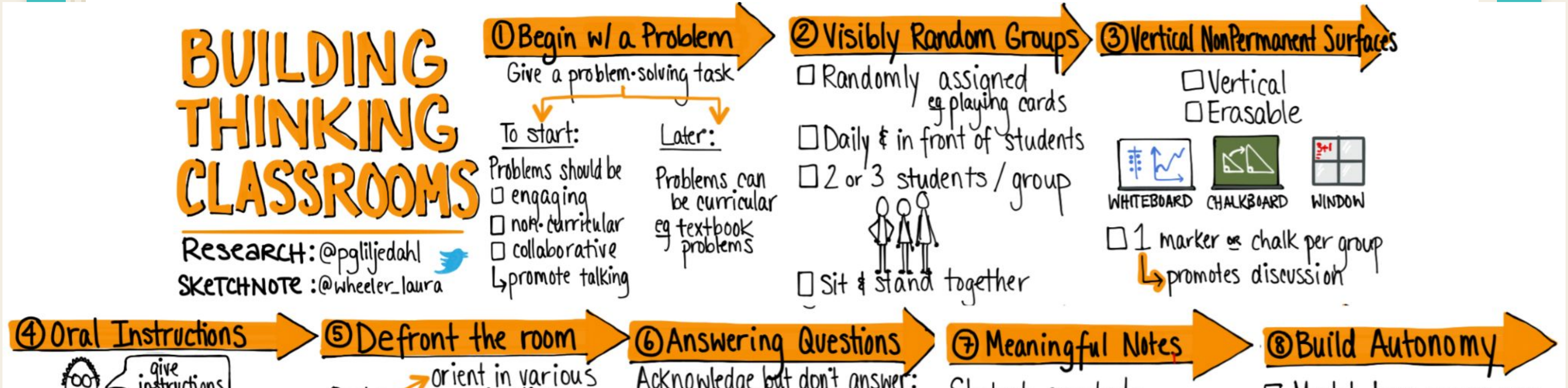


Okay, so how does this actually work?

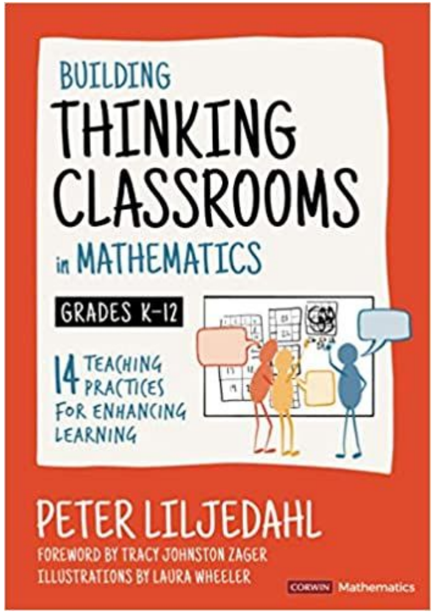
- What about copying?
- What about the kids who don't participate?
- What about kids with specific student needs?
- My class is too big...
- Can you think of any other concerns you might have?

Building Thinking Classroom Starters

- What Types of Tasks We Use
- Thinking Tasks
- How We Form Collaborative Groups
- Visible Random Grouping
- Where Students Work
- Vertical Non-Permanent Surfaces



Resources:



- WipeBooks
- Clipboards with embedded rulers
- Dry Erase paper
- Facebook Group - Building Thinking Classrooms
  *many subject specific groups for BTC too

https://tinyurl.com/MCTMCoachingEngagement

Thank you for coming!