Implementing Thinking Classrooms

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https://tinyurl.com/mathinactionthinkingclassroom

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High School Math Teacher
Naperville Central High School

Married with 3 grown children + 3 grandchildren

Target

To implement the #thinkingclassroom

What is your name?

What is your location?

What is your favorite fruit?

WHEN ARE WE EVER GOING TO USE THIS?

Neil deGrasse

A question I constantly ask myself “Who is doing the thinking in the problem?”

- Jana Sebestik

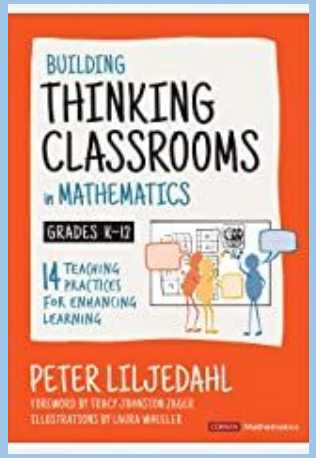
"People are naturally curious, but we are not naturally good thinkers; unless the cognitive conditions are right, we will avoid thinking."

- Daniel Willingham

How do we create these cognitive conditions ?

How I changed my practice

Building Thinking Classrooms in Mathematics, Grades K-12: 14 Teaching Practices for Enhancing Learning



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Problem Solving is what we do when we don't know what to do.

Peter Liljedahl

Practice #1 Tasks

Low Floor High Ceiling

Non-curricular

Scripted Curricular

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Non-curricular

You have a 4 minute and a 7 minute egg timer-the kind that you turn over and let the sand run through. How can you make a 9 minute egg using these timers?

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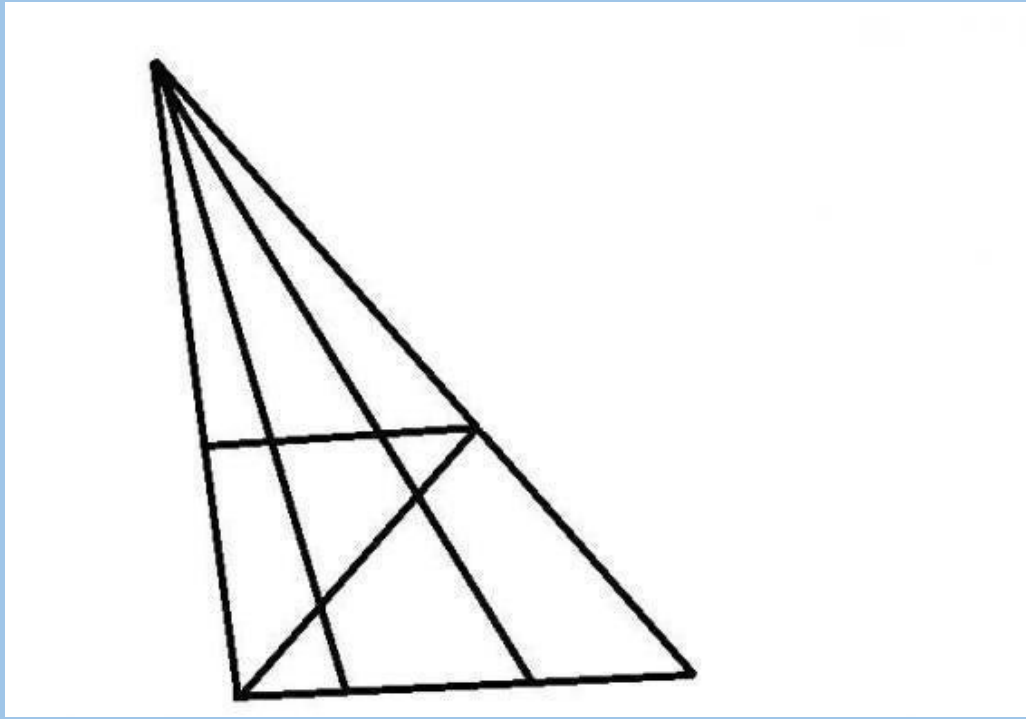
How many distinct triangles can you find?

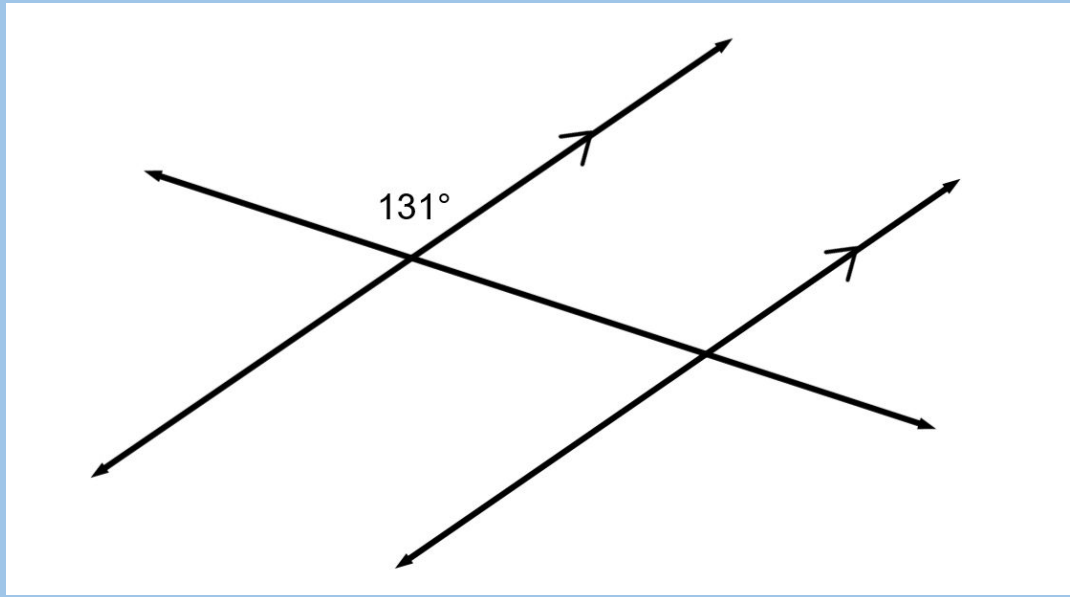


Curricular - Scripted

Draw the following.

What do you notice?

Find the missing angle measures.



Vertical Surface Problems

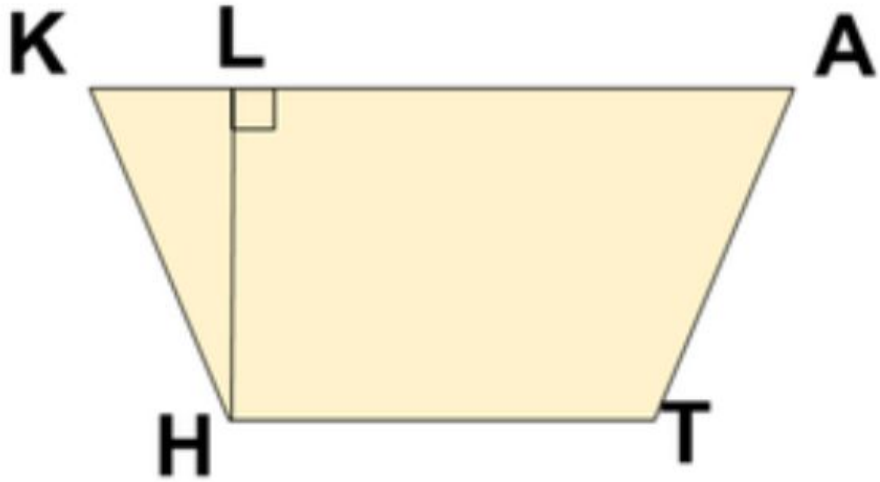
2. KATH is an isosceles trapezoid with bases segment KA and segment TH. Given segment HT=18 cm, segment HL=8 cm, and the m∠K=67∘.

Find:

a) the measure of segment AT

b) m∠A

c) m∠T



Vertical Surface Problems

- Vertical Surface Problems Quadrilaterals Target B
- Vertical Surface problems Right Triangles Target D
- Vertical Surface Problems Similarity Target C
- Vertical Surface Problems Polynomials Target E
- Vertical Surface Exponential Graphing problem

Practice #2 Grouping

Collaborative

Random

Size

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Groups of 3

When 2 is too little and 4 is too much

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Random Groups

- Groups of 4 with One High, One Low and Two Middle.
- Partners group of two.

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Random Groups

Chapter 2 Page 45

"Once we implemented frequent and visible random groupings, we saw an immediate uptick in the amount of students' engagement."

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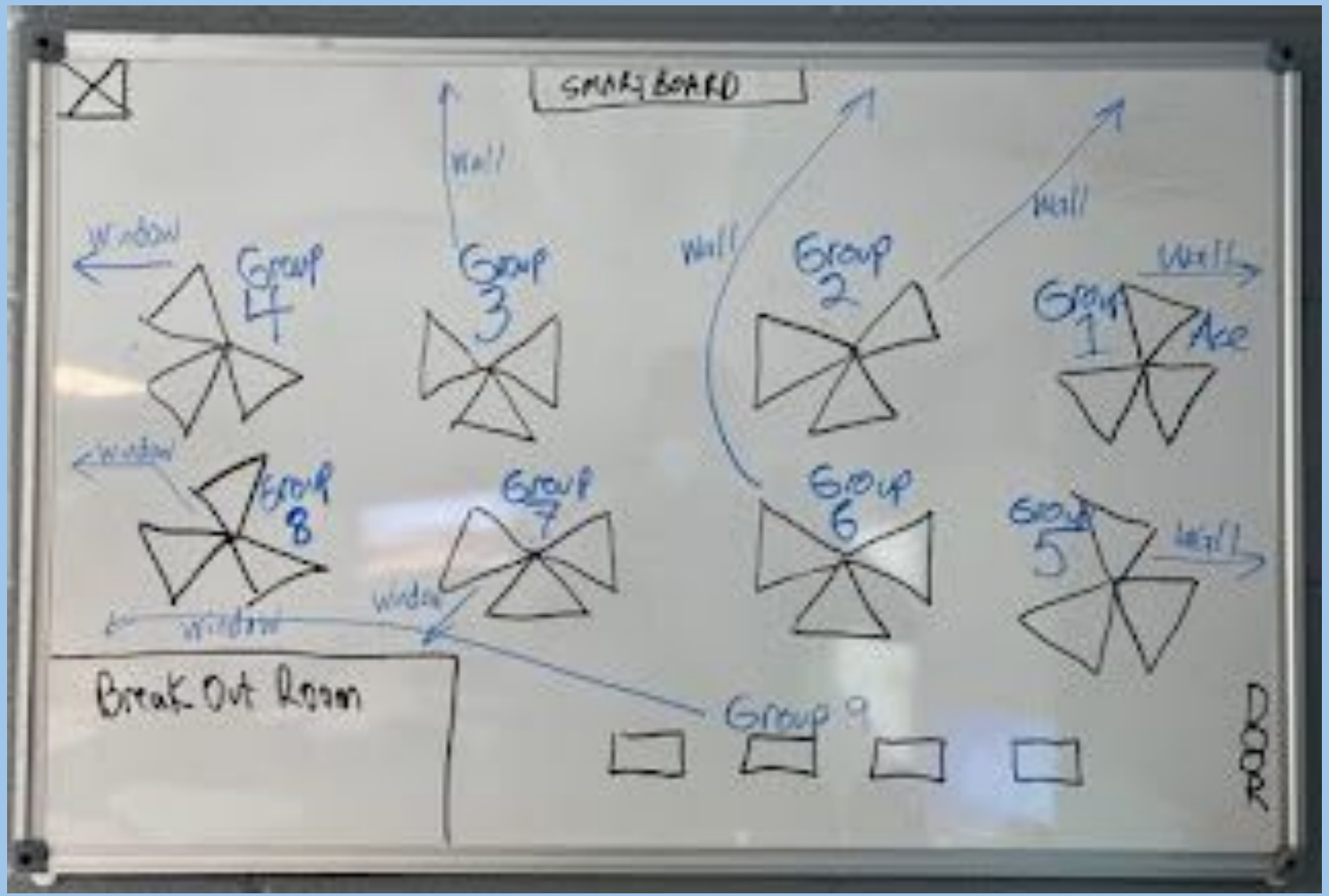
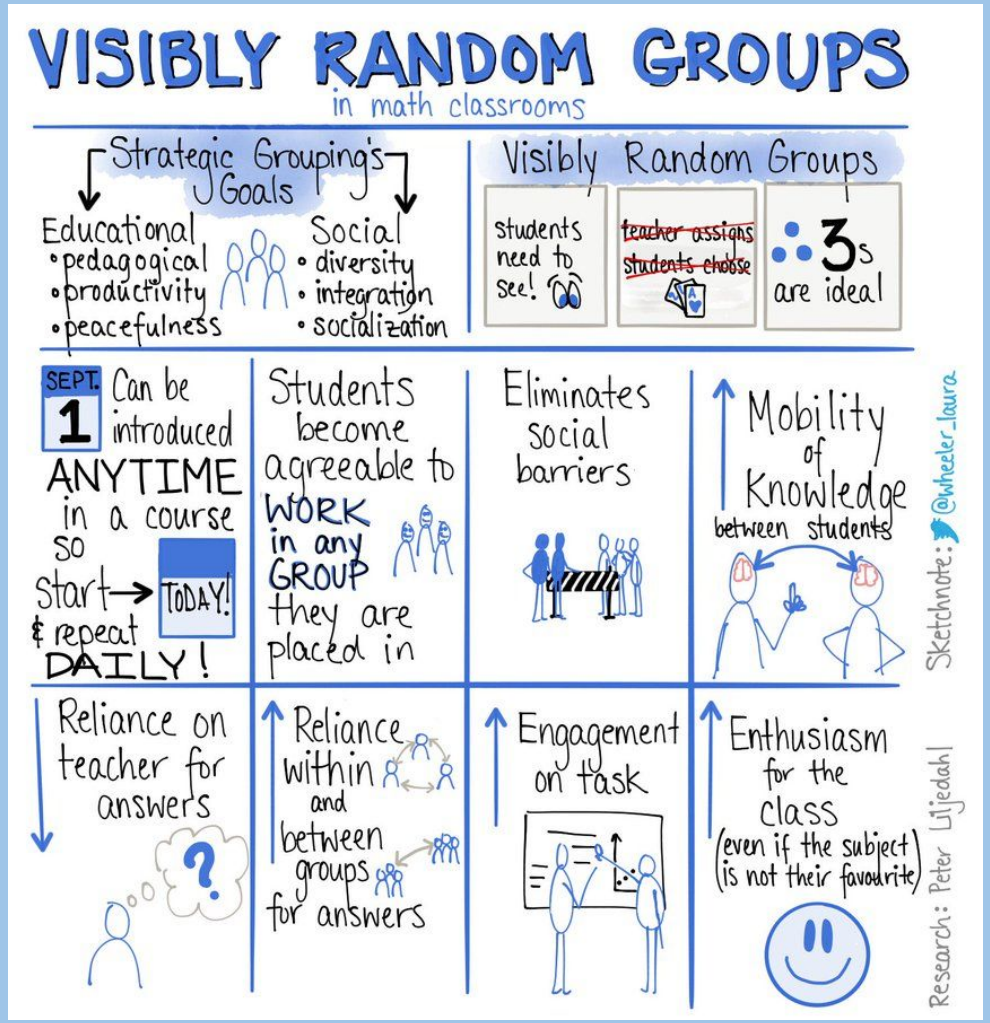
Invest in a deck of cards

Random Groups #thinkingclassroom


SMART BOARD
Wall
Wall
Wall
Wall
Window
Group 4
Group 3
Group 2
Group 1
Ace
Window
Group 8
Group 7
Group 6
Group 5
Window
Window
Break Out Room
Group 9
DOOR

Laura Wheeler Tweet



Practice #3 Where Students Work

Location

Location

Location

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Vertical Spaces

Windows

Whiteboards

Static Whiteboard Sheets

Movable Whiteboards

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Vertical Spaces

Whiteboards

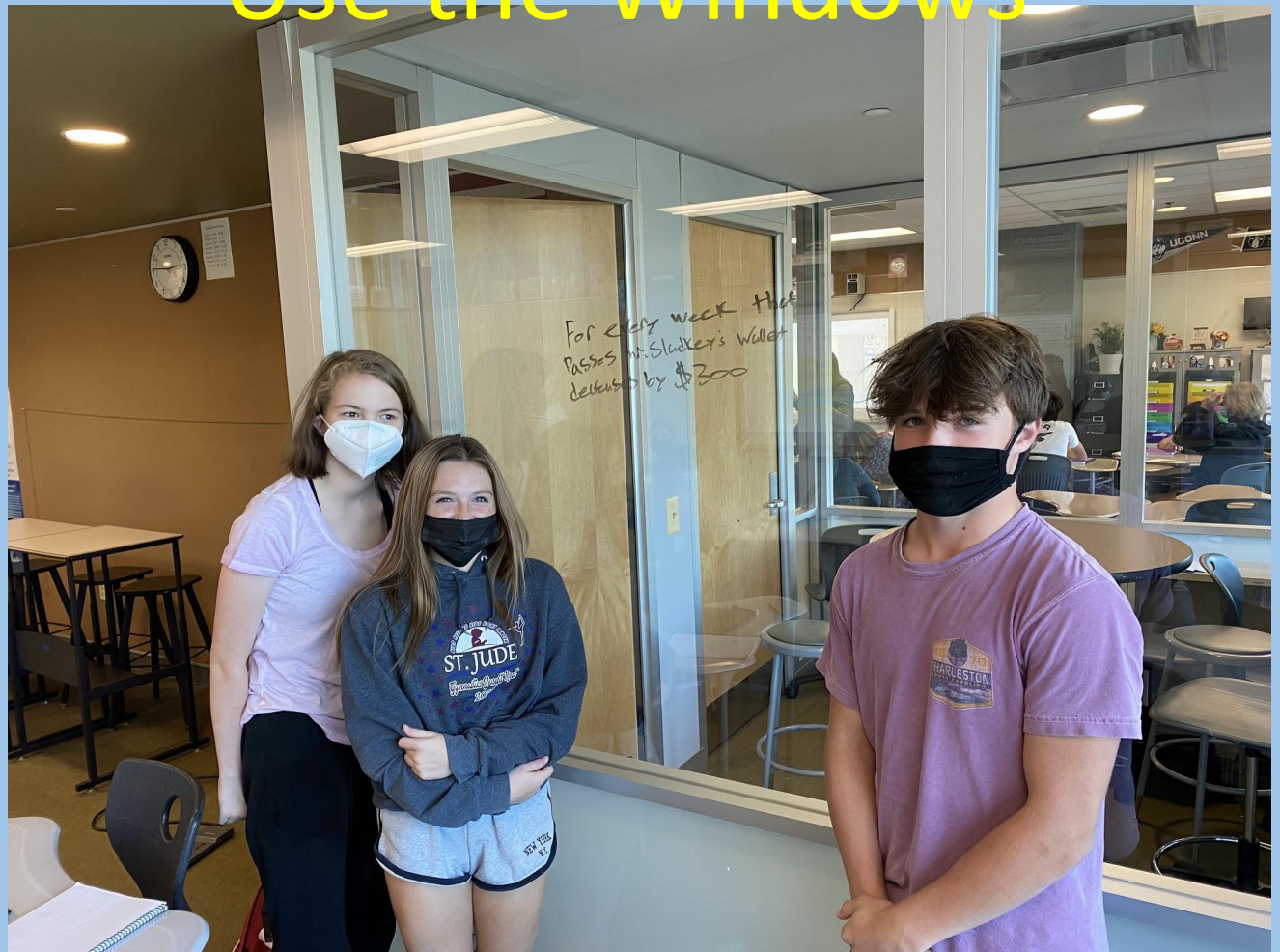
Movable Whiteboards

Static Cling Whiteboard Sheets

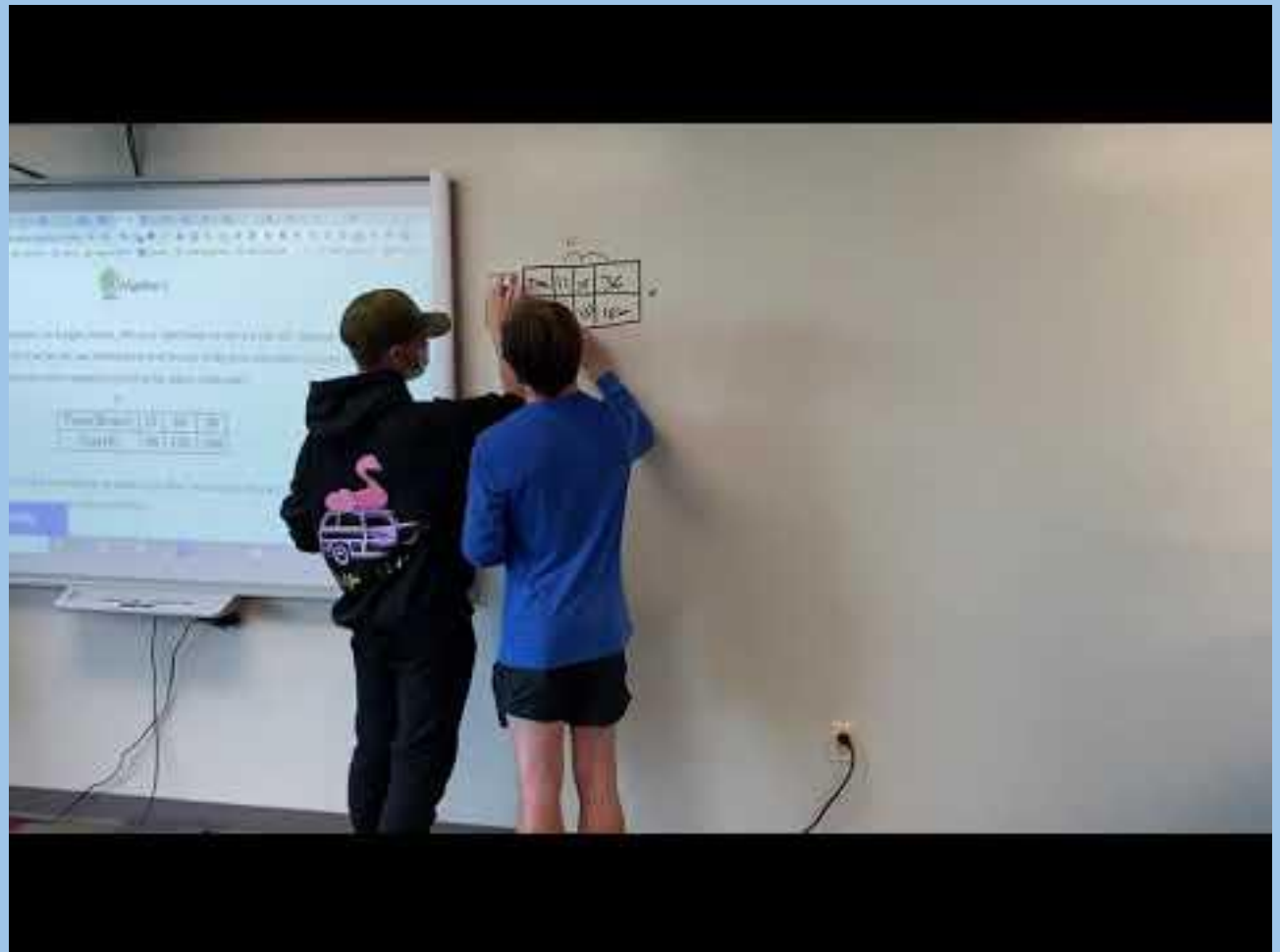
Hardy Board at HOME-DEPOT

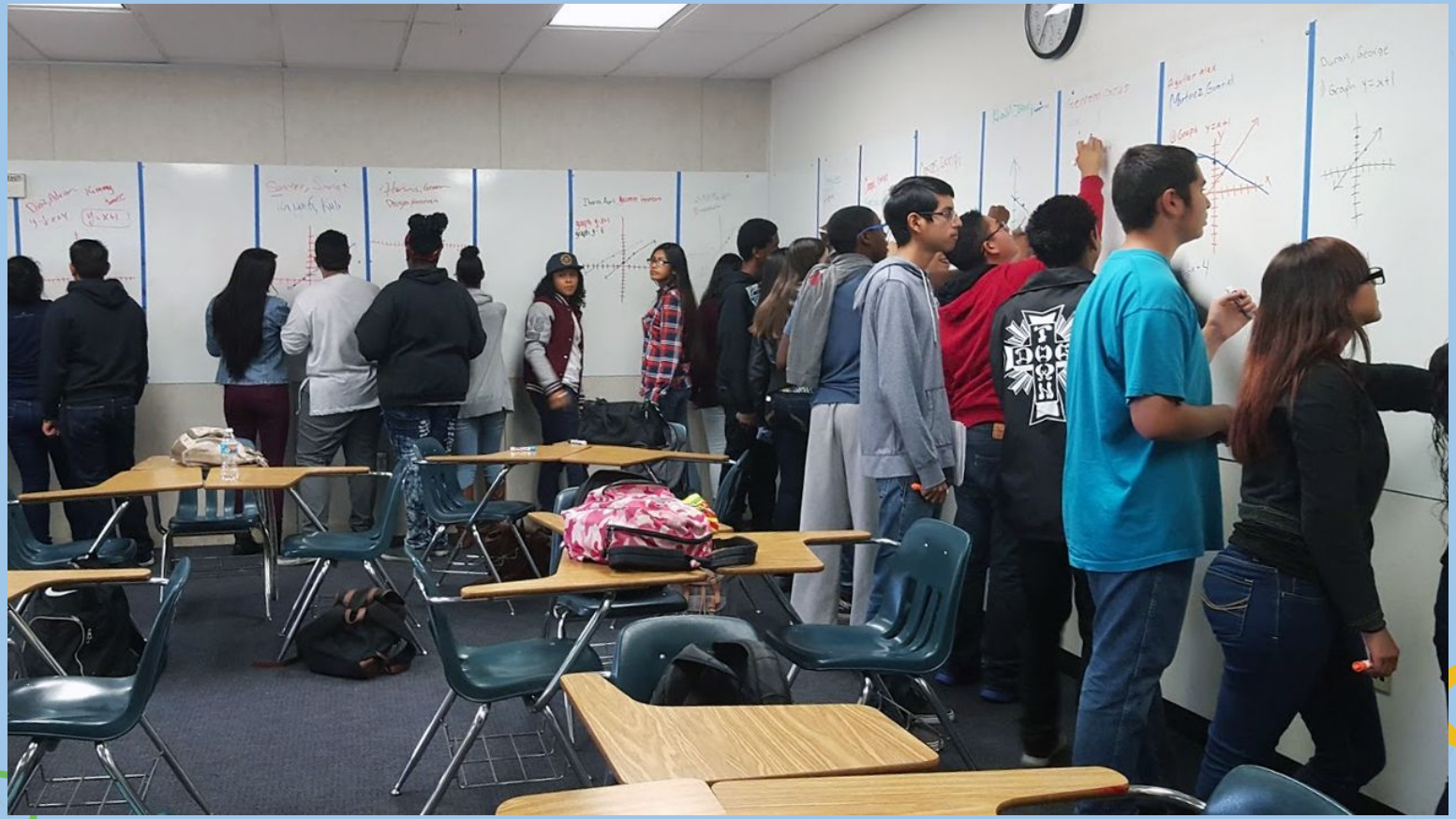
Vertical Spaces

Use the Windows



Vertical Spaces #thinkingclassroom





Random Groups and Vertical Spaces
Student Comments

I like random groups, it gives opportunity to have a problem explained from different perspectives.

I like the chance to work with different people everyday and this way, I also solve problems on the vertical surfaces in various ways because I usually stick to the easiest method for myself when working alone.

I like random groups i get put with my friends or have a chance to meet new people and I think I work better when I work with different people sometimes.

I really like the vertical surfaces, it gives a big work surface which helps the entire group see what's going on.

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Vertical Surfaces
PASS THE PEN!

Pass the pen every so often.

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Vertical Surfaces Short Problems:

- Short Questions
- Each Person has the pen for the whole problem.
- Keep the pace high

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I LEARNED THE HARD WAY

- Only give 1 pen per group
- Encourage students to take notes or a picture after finished or during the problem.
- ALLOW and ENCOURAGE looking at other groups work (this is not cheating)

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Say 21 and WIN

partner

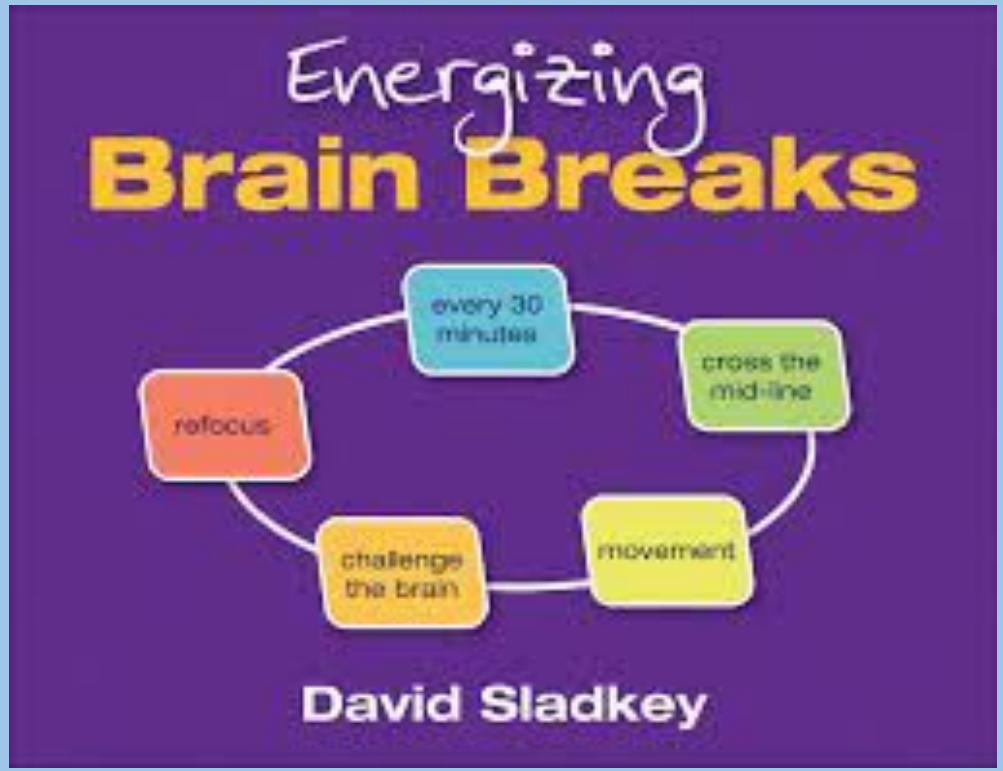
You and your partner are trying to count by ones up to twenty-one. The first person to say "21" will win.

1. Stand up and find a partner. Decide who is A and who is B.
2. The goal is to be the first person to say the number 21.
3. You will alternately say consecutive numbers starting at "1" until someone says "21". However, at your turn you have your choice of saying only one number or two numbers at a time. (For example, if person A just finished their turn and said "7", then person B could either say just "8" or "8" then "9").
4. Person A will start counting at "1."

If you finish one game, continue with another until the brain break is over.

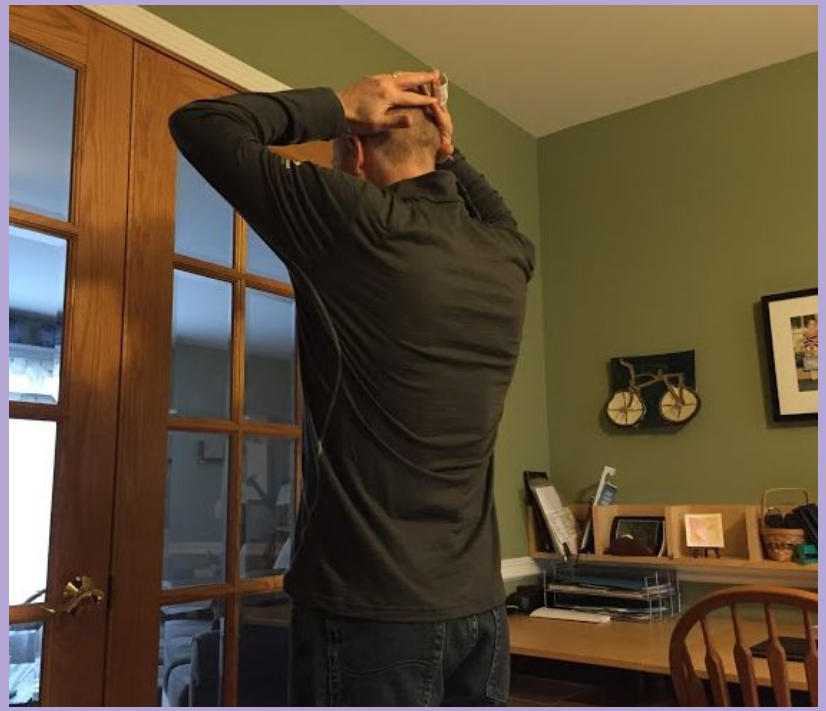
Idea from Sue McKay

Energizing Brain Breaks Google Slides Link



MOVE
AND
LEARN

Giving Away Books
HEADS or TAILS



Practice #5 How We Answer Questions

Who is answering the questions?

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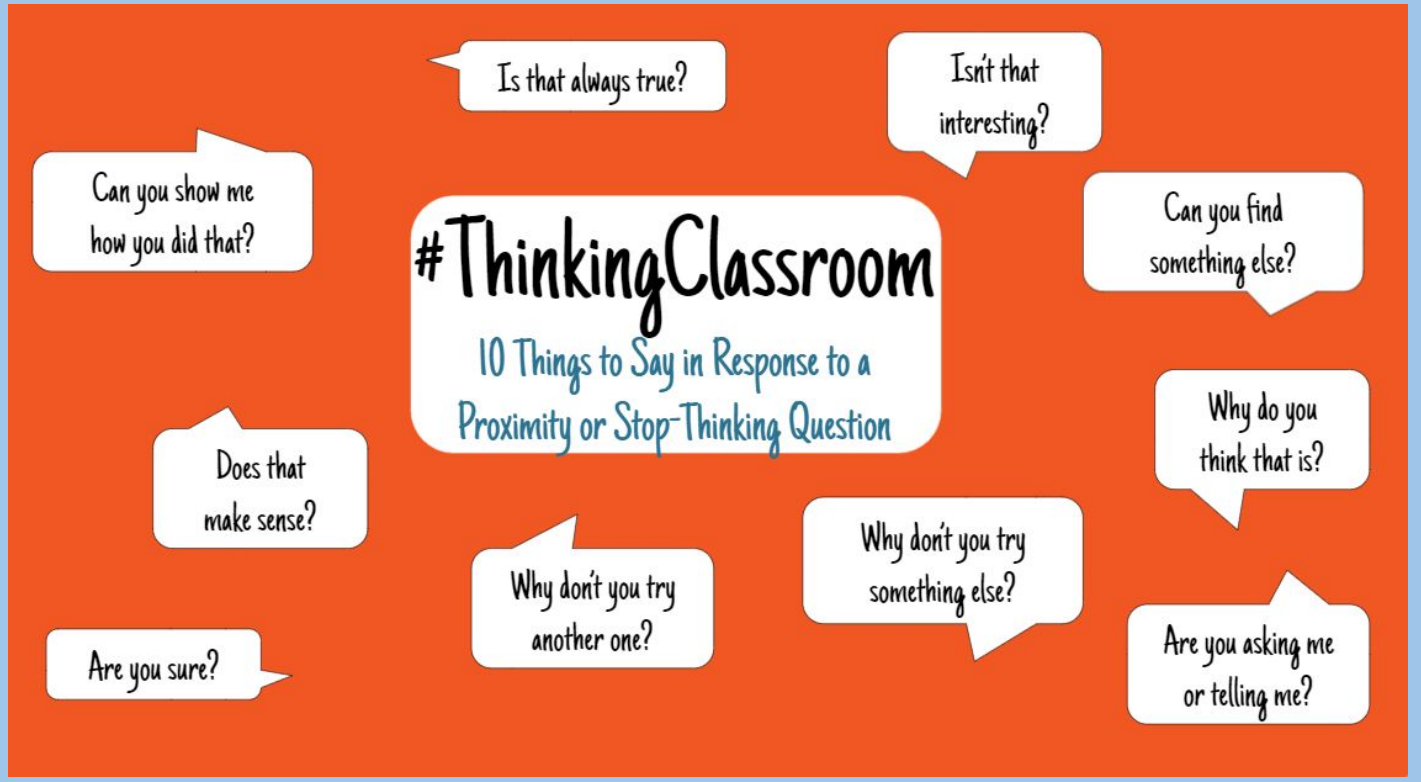
Cool Blog: Wheeler's Thoughts on Teaching



https://mslwheeler.wordpress.com/tag/thinking-classroom/

Replies to Questions

1. Isn’t that interesting.
2. Can you find something else?
3. Can you show me how you did that?
4. Is that always true?
5. Why do you think that is?

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Replies to Questions

6. Are you sure?
7. Does that make sense?
8. Why don’t you try something else?
9. Why don’t you try another one?
10. Are you asking me or telling me?

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Some of my answers to Questions

A. Did you ask your teammates (in your group)?
B. How did the other groups deal with that?
C. Did you check with technology?
D. What resources could you use?

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Watch for turning a Rich Task into a Mimicking Task

Non-routine task: Cash or Gas

Congratulations! You have just won the state lottery, and now you must choose your prize—either $250,000 in cash or free gas for life.

1. Calculate which prize would be likely to have the greatest monetary value for you. Support your answer mathematically. Discuss your reasoning and any assumptions that you make.

2. Show in detail how changing one or more of your assumptions in question 1 could change the prize that is best for you to pick. Include specific calculations to support your answer.

Procedural Task: Cash or Gas

Congratulations! You have just won the state lottery, and now you must choose your prize—either $250,000 in cash or free gas for life.

1. Subtract your age from 76.

2. How much do you spend on gas in a week? In a year? (Hint: multiply by 52)

3. Multiply the total amount you spend on gas in a year by your answer in number 1.

Too much scaffolding!!!

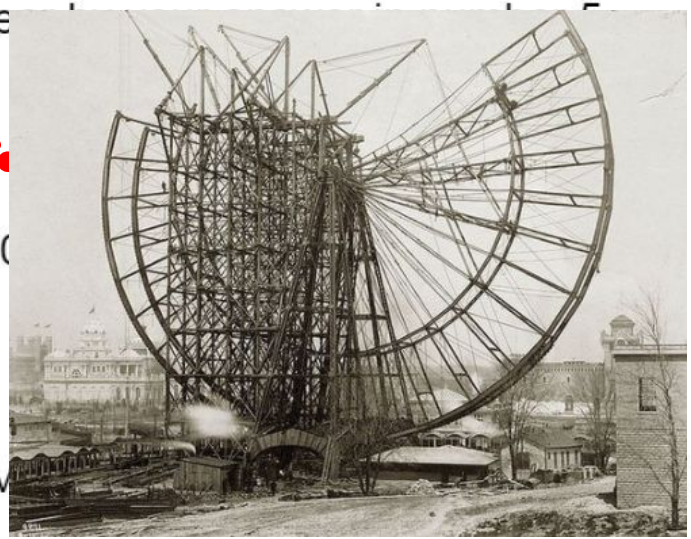
4. Which is more, your answer in number 3 or $250,000?

5. Change your age to 20. Subtract this from 76.

6. Multiply the total amount you spend on gas in a ye

7. Which is more, your answer in number 6 or $250,0

8. Double the amount you spend on gas in a year. M in number 1.



Too much scaffolding!!!

9. Which is more, your answer in number 8 or $250,000?

10. Double the amount you spend on gas in a year. Multiply this number by your answer in number 5.

Extra Credit: Bring in a box of tissues

Too much scaffolding!!!!

Practice #4 How We Arrange the Furniture

Where does the teacher stand?

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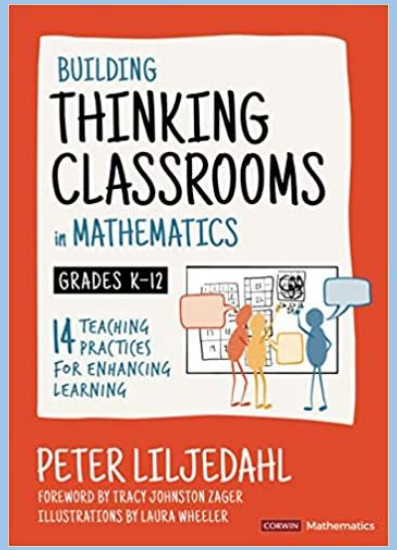
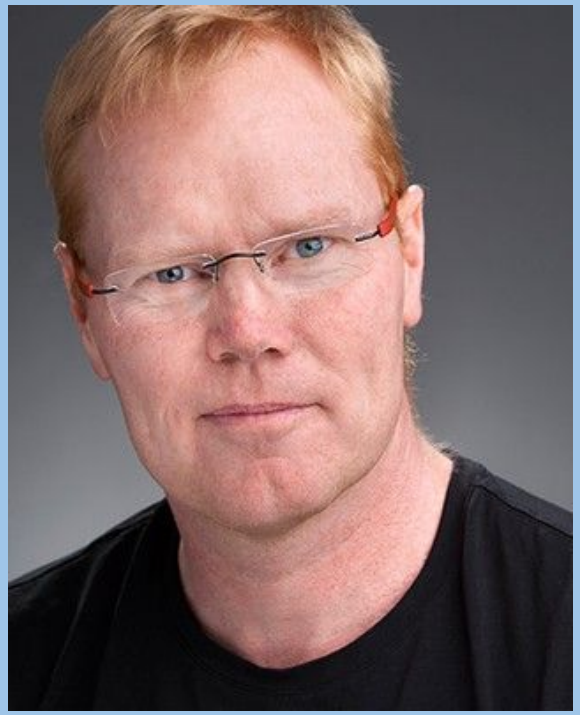
Defront the Class #thinkingclassroom

Thinking Classrooms





Peter Liljedahl

https://www.peterliljedahl.com/

Summative Changes (typical timetable)

Day 1 One day of summative review (I used to have two days)

Day 2 Give the summative

Day 3 Pass back highlighted mistakes and give time for corrections

Day 4 Retake (extention for those above 80%)

Give your thoughts on this?

As a teacher you can divide 100% of class time between two categories:

-teacher talking/instructing

-teacher listening/providing feedback

What's the ideal breakdown?

#%,#%

“If I want students to learn how to communicate mathematically, I need to ask them to communicate .”

-*Dan Meyer*

Evaluation Link

Thanks So Much

Please say hello on twitter

@dsladkey

Reflections of a High School Math Teacher

http://teachhighschoolmath.blogspot.com/2021/12/the-magic-of-students-doing-challenging.html

Access to many of the presentations today!

https://www.gvsu.edu/mathinaction/files2022