

BUILDING
**THINKING
CLASSROOMS**
in MATHEMATICS

GRADES K-12

14 TEACHING
PRACTICES
FOR ENHANCING
LEARNING



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CORWIN Mathematic

Building a Thinking Classroom

Thinking Task

The Answers

Are:

Using each of the numbers 1 to 10 EXACTLY once and each of the operations $+$, $-$, \times , \div at least once (one will be used twice), make five expressions whose answers are 17, 2, 21, 3, 2.



5 8 13 24, 20



8 8 8 8 8 /



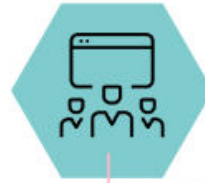
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Whiteboard Moves

Building Thinking
Skills in our
classroom

What other skills
are we building?



Random groups

Stand with your group at your whiteboard.

One marker per group

The person explaining their thinking should be different from the person writing. Take turns.



Record the task

Listen carefully to the task. Record key information at the top of your whiteboard.

Work with your group

Collaborate. Persevere. Be responsible for the learning of every member. Look at other groups' work when needed. Take risks.



Erase with care

Ask permission to erase someone else's ideas. Don't erase work that is circled by the teacher.

BUILDING THINKING CLASSROOMS

RESEARCH: @pgljedahl
 SKETCHNOTE: @wheeler_laura

① Begin w/ a Problem

Give a problem-solving task

To start: Problems should be

- engaging
- non-curricular
- collaborative

Later: Problems can be curricular eg textbook problems

↳ promote talking

② Visibly Random Groups




- Randomly assigned eg playing cards
- Daily & in front of students
- 2 or 3 students / group



- Sit & stand together

③ Vertical NonPermanent Surfaces

- Vertical
- Erasable






WHITEBOARD CHALKBOARD WINDOW

- 1 marker or chalk per group

↳ promotes discussion

④ Oral Instructions



give instructions orally

Project


- data
- long expressions
- diagrams

↳ groups will discuss (instead of decoding text)


⑤ De-front the room

Desks

- orient in various directions
- pull away from wall (room to stand @ VNPS)



Teacher addresses the class from a variety of locations.



⑥ Answering Questions

Acknowledge, but don't answer:

- Proximity questions (b/c teacher is close by)
- Stop thinking questions

Answer: Keep thinking questions

↳ give HINTS not answers

is this right?

⑦ Build Autonomy

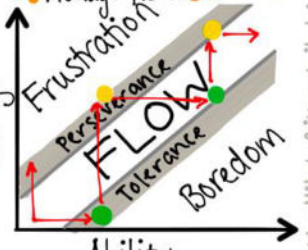
- Model how groups can visit other groups when they are stuck or done.
- Hints & extensions come from peers (not just the teacher).

↳ Helps manage flow



⑧ Hints & Extensions

Manage flow



Challenge

Frustration

Persistence

FLOW

Tolerance

Boredom

Ability

⑨ Level to the Bottom

- debrief
- class discussion
- direct teaching the "lesson"

Once all groups pass & minimum threshold.

Debrief 1 or more groups' solutions!

Work through a new problem w/ whole group

FLOW → Mihaly Csikszentmihalyi


⑩ Student Notes

Student created:

- select
- synthesize
- reorganize

ideas

Provide time for this after levelling.



⑪ Assessment

Process > Product

Group work + Individual work



Student learning

- Where are they?
- Where are they going?



VISIBLY RANDOM GROUPS

in math classrooms

| | |
|---|--|
| <p>Strategic Groupings Goals</p> <p>Educational</p> <ul style="list-style-type: none"> pedagogical productivity peacefulness <p>Social</p> <ul style="list-style-type: none"> diversity integration socialization  | <p>Visibly Random Groups</p> <p>students need to see!</p> <p>teacher assigns students choose</p> <p>••• 3s are ideal</p>  |
|---|--|

SEPT 1 Can be introduced ANYTIME in a course so Start → TODAY! & repeat DAILY!

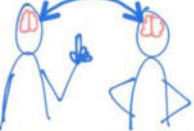
Students become agreeable to WORK in any GROUP they are placed in




Eliminates social barriers




Mobility of Knowledge between students



↓ Reliance on teacher for answers




↑ Reliance within and between groups for answers



↑ Engagement on task



↑ Enthusiasm for the class (even if the subject is not their favourite)



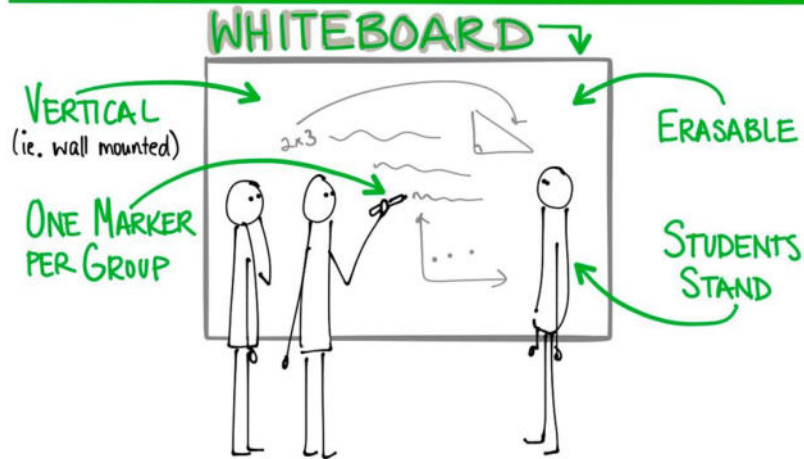
Sketchnote: @wheeler_laura

Research: Peter Lijedahl

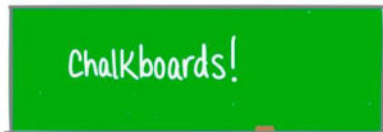
Where to start?

VERTICAL NON-PERMANENT SURFACES

in math class



You can also use...



Windows with whiteboard markers

Where to start?

↓ TIME TO 1ST NOTATION

Start writing faster
 → take risks
 → erasable!

$3x + 5 = 10$

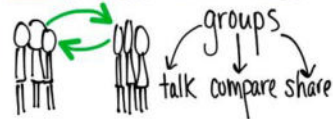
↑ Eagerness
 Participation
 Discussion
 Persistence



↑ NON-LINEARITY of work

more accurately reflects thinking process

↑ MOBILITY OF KNOWLEDGE



Research: @pgiljedahl

Sketchnote: @wheeler_laura

Anchor: 5 minutes (announcements, info for task)

Thinking Task: A problem or set of problems that builds on prior knowledge to introduce a new topic

- Start with low-level questions & build to questions higher than their ability
- Not all groups need to get to all questions
- Work in random groups on vertical boards

Consolidation: Use student work to highlight important ideas

Student Notes: Can use student work & teacher summary

Check Your Understanding: Worksheet, Kahoot, Quizizz, Group assignment, etc...

**What
does a
lesson
look
like?**



*How can you use
BTC in your
classroom?*

Questions?