Creating POSITIVE *Math Identities*

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bit.ly/YESmath

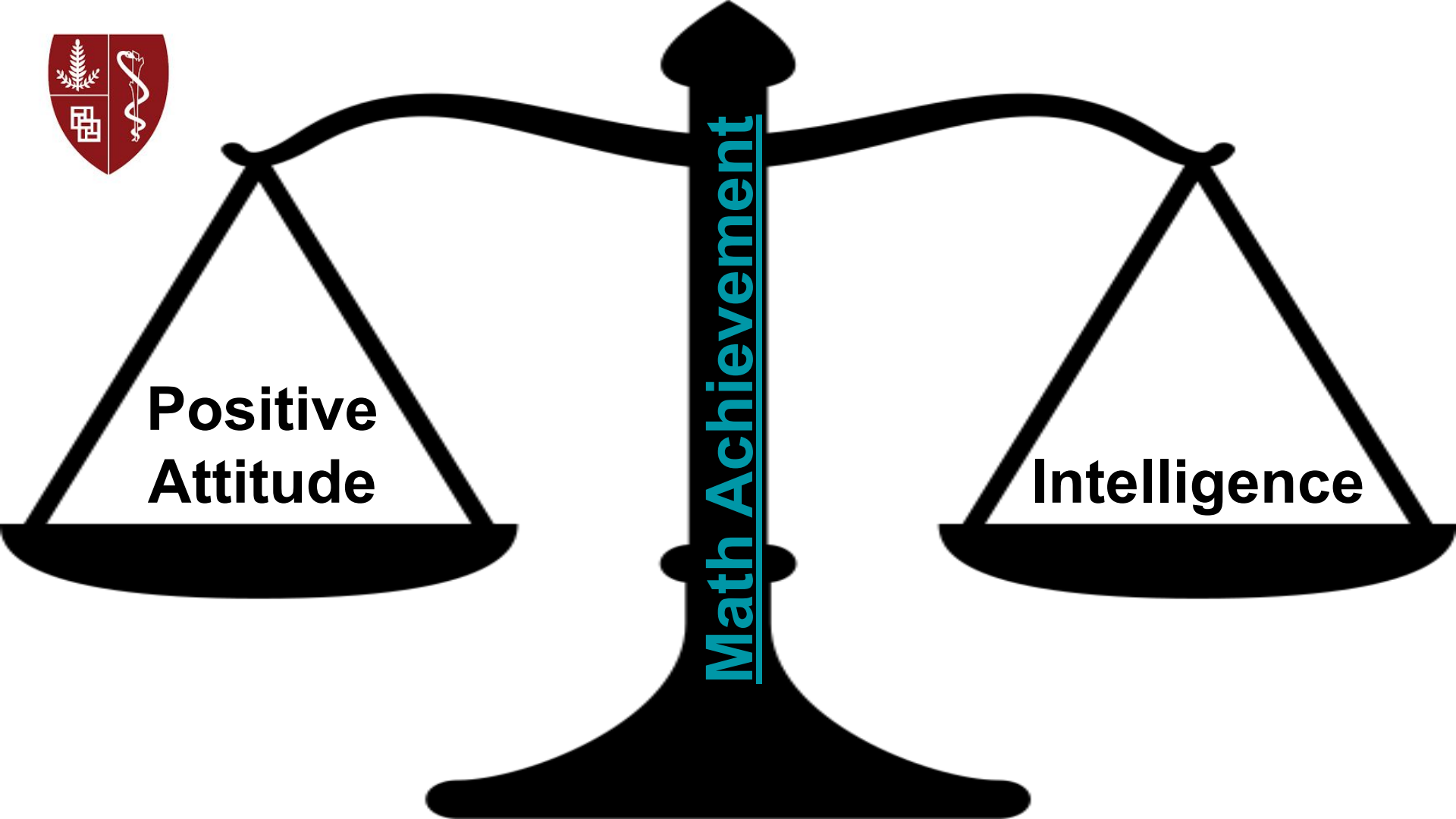
MATH DRILL

You have 1 minute to complete the FRONT of the BLUE WORKSHEET.

SOL PRETEST

You have 3 minutes to solve the released SOL questions on the BACK of the BLUE WORKSHEET.

NO TALKING


Positive Attitude
Math Achievement
Intelligence

Learning Intention

- Educators will cultivate a community of positive math identities in their classrooms.

Success Criteria:

- <u>Content:</u> Understand strategies that promote positive math identities
- <u>Language:</u> Use precise mathematical vocabulary to promote mathematical thinking
- <u>Social:</u> Confidently integrate strategies that build student agency, identity, and equity

To be successful in math, I ___

Mathematics Identity

"Students learn to see themselves as **capable or incapable of succeeding,** and they begin to **internalize** what it means to do mathematics **based on the tasks assigned and how they are facilitated.**"
(Boaler and Greeno 2000)

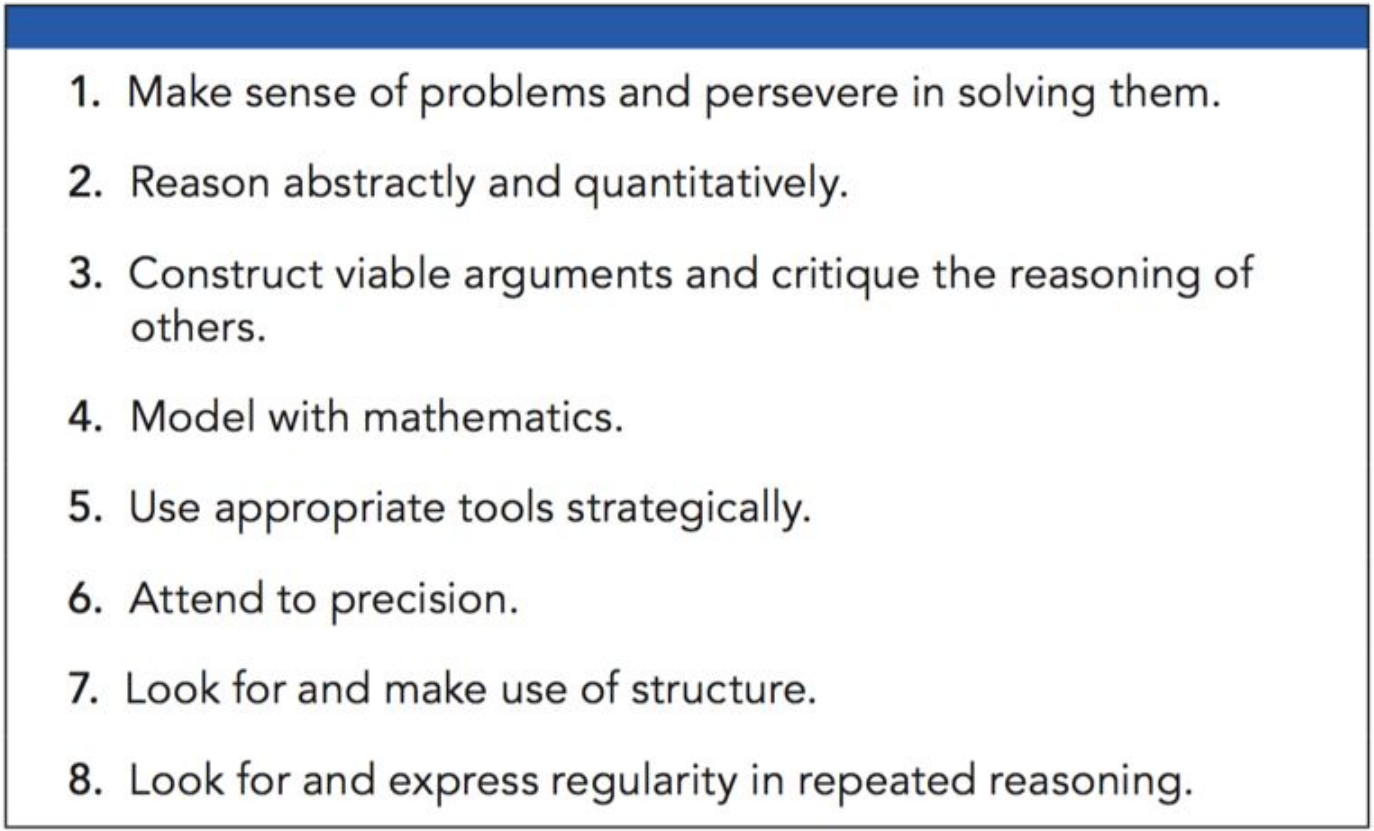


Fig. 1. Standards for Mathematical Practice (NGO Center and CCSSO 2010, pp. 6–8)

Math Tasks

- “Rich mathematical tasks **engage students in sense-making** through deeper learning that **require high levels of thinking, reasoning, and problem solving.**” (2019 VDOE Rich Math Task Lead Developers)
- “Math tasks **combine curiosity, connection making, challenge, creativity, and usually involve collaboration** - 5 C’s of mathematics engagement.” (Boaler, Mathematical Mindsets)

Traditional VS Tasks

What's the difference?

Traditional Instruction	Tasks
Explain then practice	Explore solutions to solve a problem
Practicing procedures without connection	Developing conceptual strategies
Similar examples of one standard	Encompasses multiple standards
Single strategy/solution focused on answer	Open to a range of rich solutions
Teacher providing structure for solving: Narrow thinking	Student engaged in inquiry and justification: Broad thinking with application
Teacher is doing the math and thinking	Students are doing the math and thinking

Jo Boaler, Mathematical Mindsets, Ch 5
NCTM, Taking Action, Ch3

3 Phase Lesson Format

Phase 1 | **Phase 2** | Phase 3

LAUNCH:

- Activate prior knowledge
- Present the task & expectations for learning

EXPLORE or Let GO:

- Allow students to explore
- Listen to conversation & thinking
- Ask purposeful questions to scaffold or extend

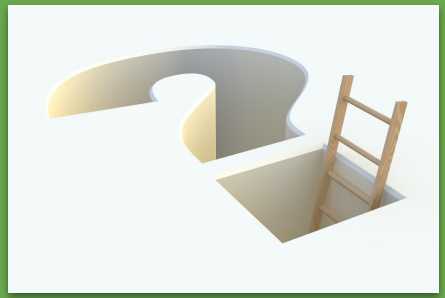
DISCUSS:

- Engage class in student-led discussion of strategies used
- Encourage math language & accountable talk
- Summarize learning

Van de Walle, Elementary and Middle School Math, Teaching Developmentally, 7th Edition, p43-54

What does this look & sound like?

Characteristics

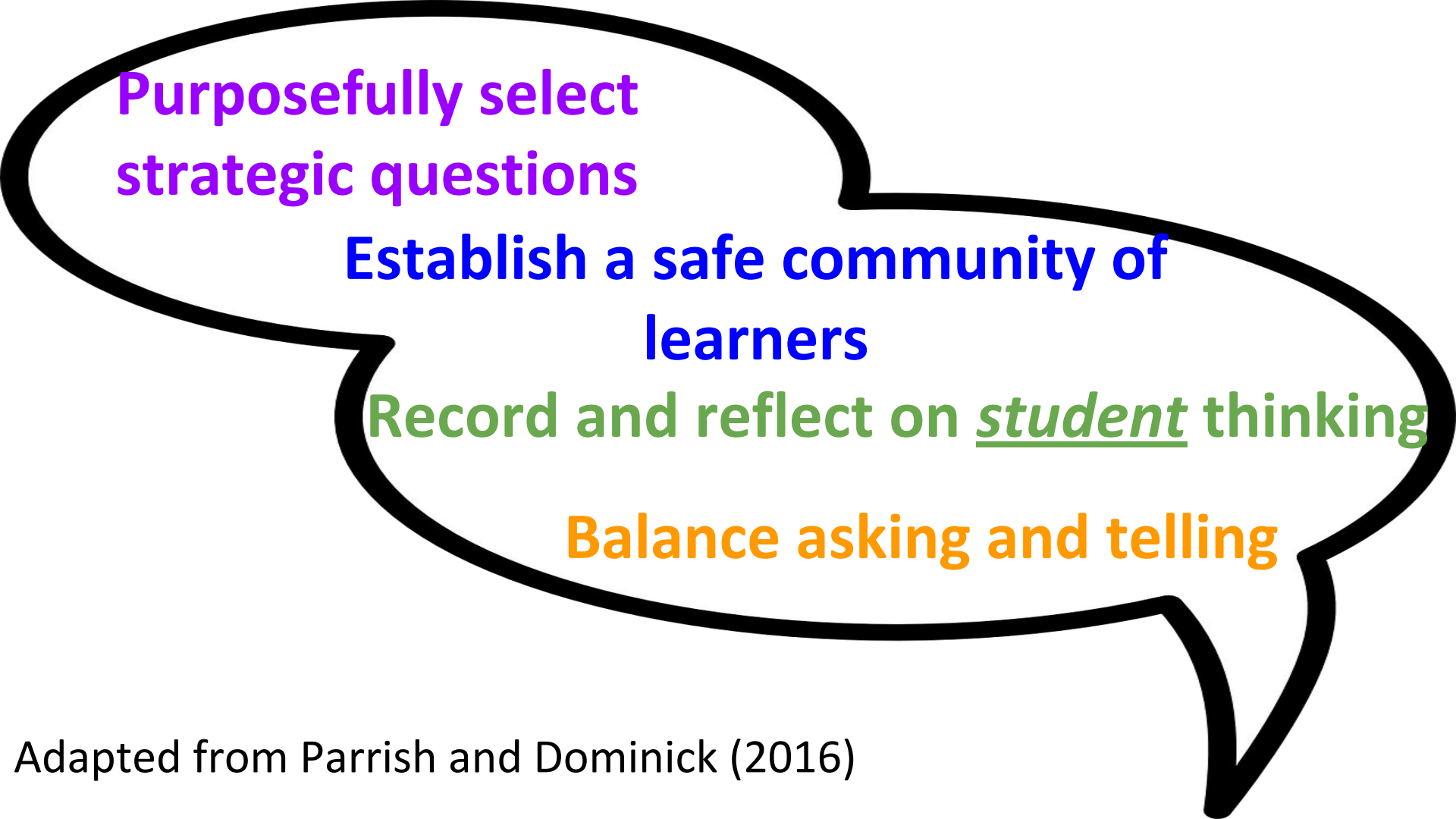


- The problem requires math to solve. Problems must be **accessible to students** and **require justifications and explanations** for answers or methods (Van de Walle, 2003)

- Tasks represent **opportunities for students to develop new mathematical ideas**; that is, the mathematics will be problematic for them, and **there will be struggle**.

NCTM, Problem Solving for All Seasons, 2000, p68-69


PROBLEM



Adapted from Parrish and Dominick (2016)

PIE

Michael has 10 pies to serve. He has already served some pie.

Michael has a total of 10 pies to serve. This table shows the amounts of pie Michael has already served.

Michael's Pies

Pie	Cherry	Peach	Apple
Amount Served	$2\frac{3}{4}$	$1\frac{2}{3}$	$3\frac{1}{2}$

From: http://www.doe.virginia.gov/testing/sol/released_tests/2013/gr_5_math_released_in_spring_2014.pdf

Key Talk Moves

"Ensure the child is making sense of the [problem]"

"Explore details of the child's existing strategy"

"Encourage the child to consider other strategies"

"Students reflect on thinking/thinking of others"

Adapted from Franke, Levi, and Fennema (2001)

Promoting Discourse

39 What is this problem about? What can you **tell me about it?**

40 Do you need to **define or set limits** for the problem?

41 How would you **interpret** that?

42 Could you **reword that in simpler terms?**

48 **What would happen if ___?**

49 Do you see a **pattern?**

50 What are some **possibilities** here?

51 Where could you find the **information** you need?

52 How would you **check your steps** or your answer?

53 What **did not work?**

100 Questions that Promote Mathematical Discourse, 2016 Curriculum Associates

Final Thoughts

- What messages am I sending about the nature of mathematics? What identities are being created?

- As much as possible, allow students to generate their own ideas for understanding and solving problems.

Final Thoughts

- Facilitate student metacognition through intentional questioning and reflection.

- Discourse is a powerful tool for constructing meaningful knowledge that is transferable beyond the classroom.

References

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