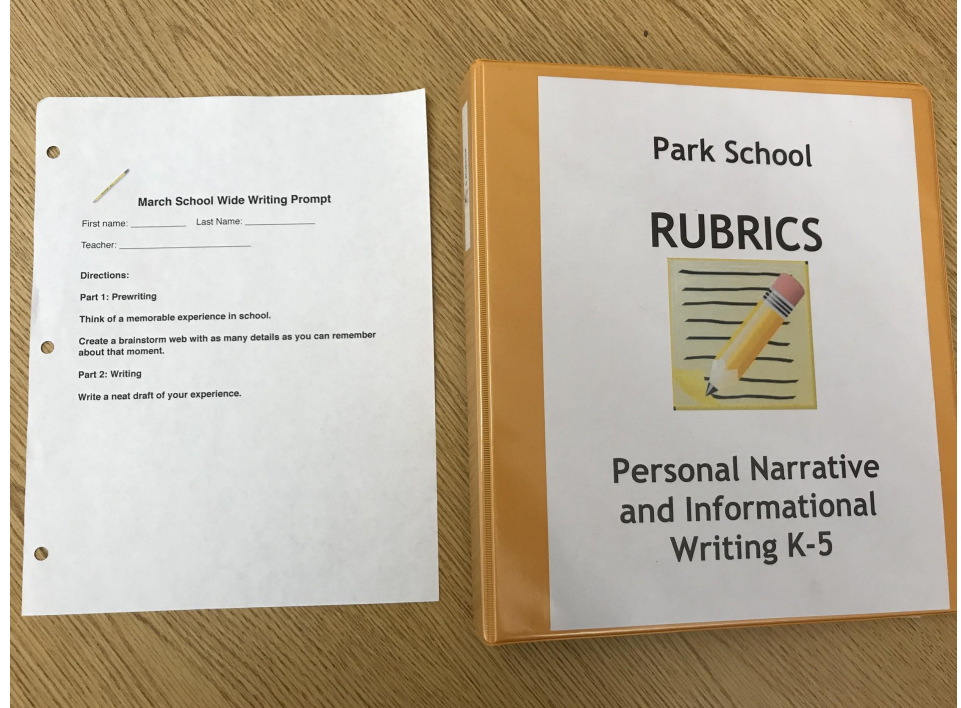


Park School's Mathematical Journey



February 11, 2021

School Wide (K-5) - Oceans Study & Writing Assessment



Inspirations



Paul Giganti



Cathy Fosnot



Greg Tang



Jo Boaler

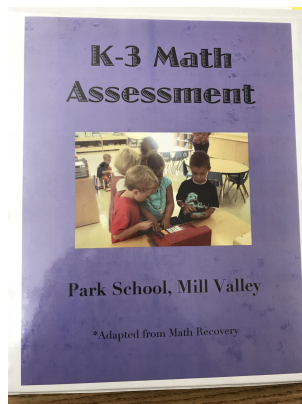
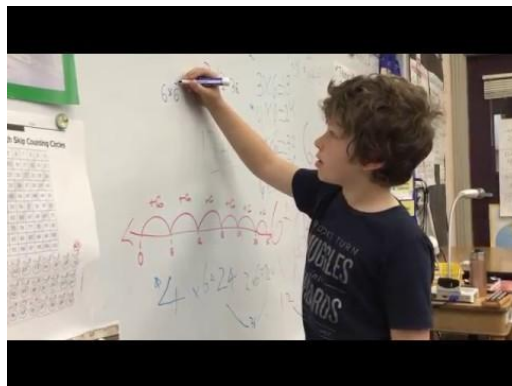


Eileen Smith

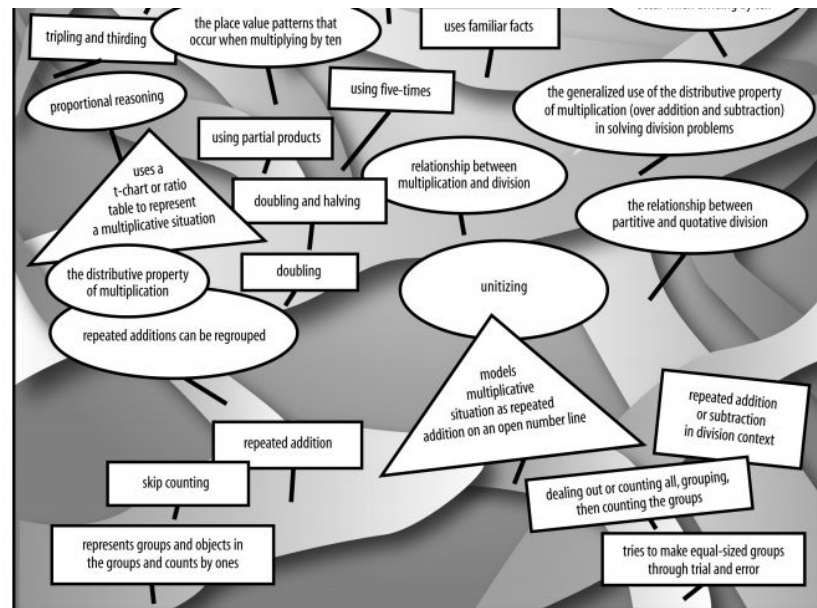


Marilyn Burns

Example of number talk in the classroom

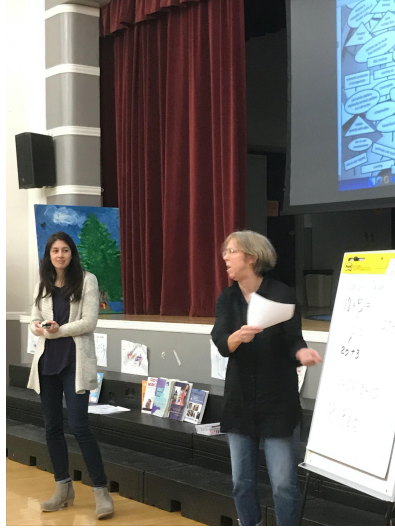


Fosnot's Landscape of Learning...

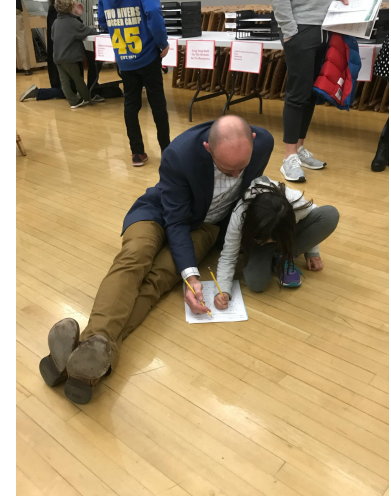
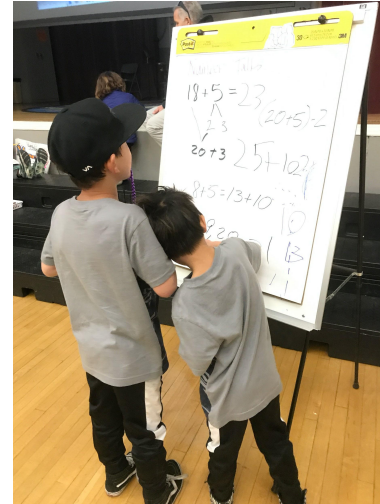
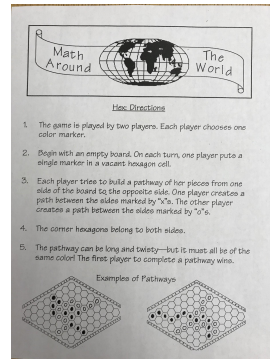


Number Sense Assessment System for K-3

Parent Ed Night: strategies and fun!



Greg Tang sharing strategic thinking for math equations



Park's professional development cycle over the years:

- **Immersion**
- **Application**
- **Alignment**

...all teacher driven

Common Core Standards for Mathematical Practices (not just skills on their own):

Math Practice #6



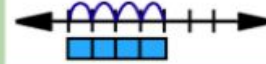
I can attend to precision.

Math Practice #3



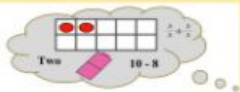
I can explain my thinking.

Math Practice #4



I can model with mathematics.

Math Practice #2



I can think about numbers in many ways.

Math Practice #5



I can use math tools.

Math Practice #7



I can look for and use structure.

Math Practice #8



I can look for patterns.

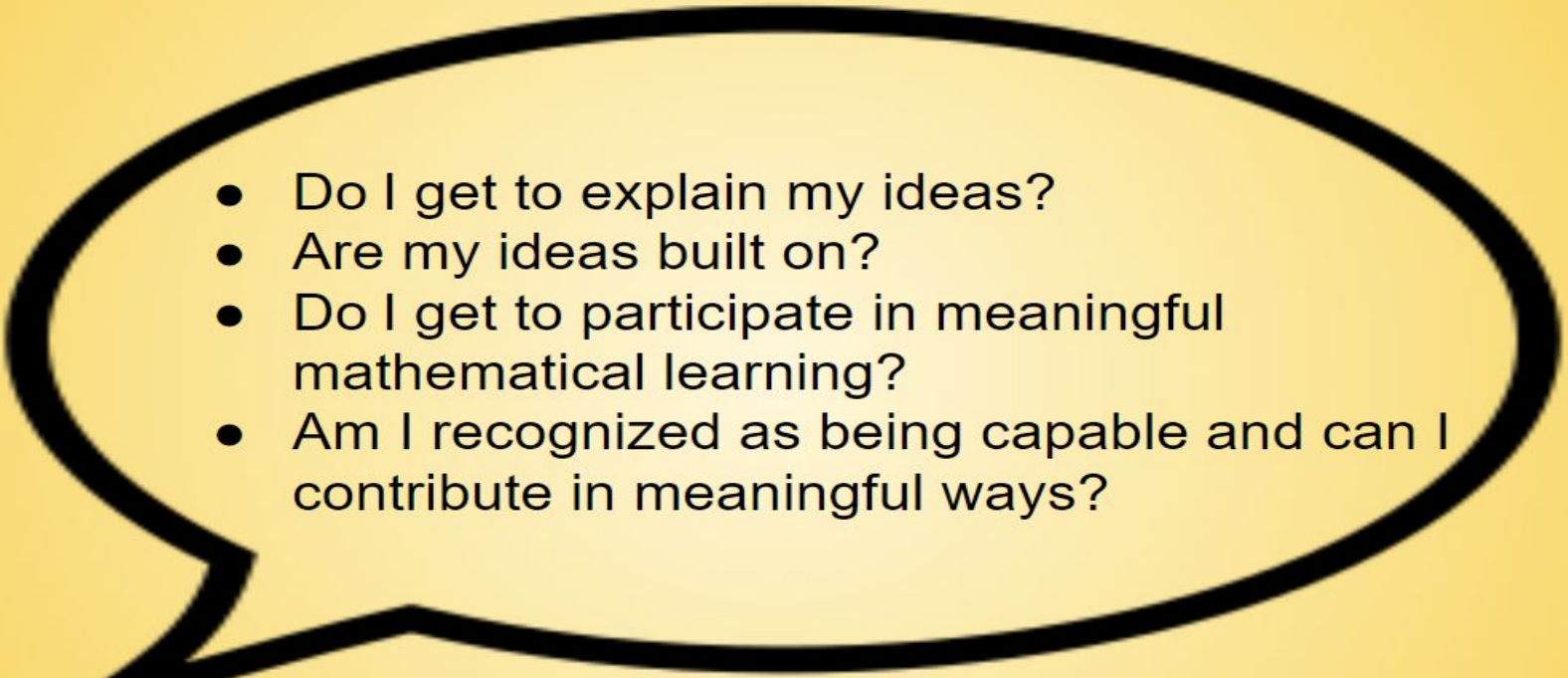
Math Practice #1



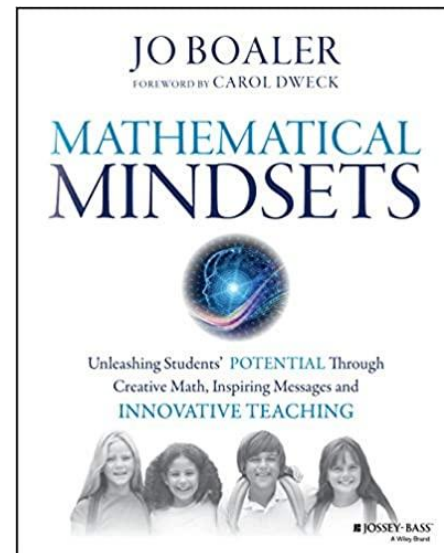
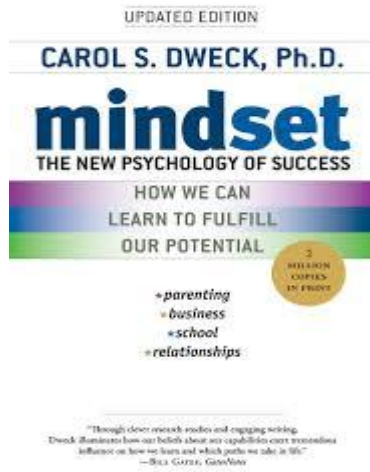
I can persevere.

Math Practices

Can students answer yes to these questions?

- 
- Do I get to explain my ideas?
 - Are my ideas built on?
 - Do I get to participate in meaningful mathematical learning?
 - Am I recognized as being capable and can I contribute in meaningful ways?

Growth Mindset in mathematics



Positive Norms to Encourage in Math Class

By Jo Boaler

1. Everyone Can Learn Math to the Highest Levels.

Encourage students to believe in themselves. There is no such thing as a “math” person. Everyone can reach the highest levels they want to, with hard work.

2. Mistakes are Valuable

Mistakes grow your brain! It is good to struggle and make mistakes.

3. Questions are Really Important

Always ask questions, always answer questions. Ask yourself: why does that make sense?



4. Math is about Creativity and Making Sense

Math is a very creative subject that is, at its core, about visualizing patterns and creating solution paths that others can see, discuss and critique.

5. Math is about Connections and Communicating

Math is a connected subject, and a form of communication. Represent math in different forms eg words, a picture, a graph, an equation, and link them. Color code!

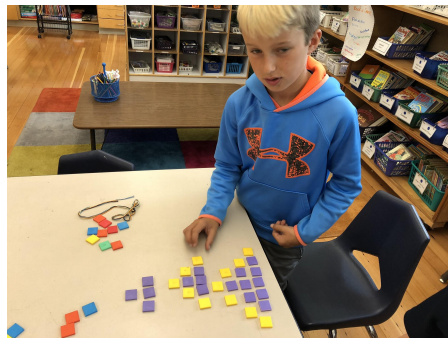
6. Depth is much more Important than Speed

Top mathematicians, such as Laurent Schwartz, think slowly and deeply.

7. Math Class is about Learning not Performing

Math is a growth subject, it takes time to learn and it is all about effort.

Third graders building visual models...



50% Of The Population Has Math Anxiety


“Unfortunately many classrooms focus on math facts in unproductive ways, giving students the impression that math facts are the essence of mathematics, and, even worse that the fast recall of math facts is what it means to be a strong mathematics student. Both of these ideas are wrong and it is critical that we remove them from classrooms, as they play a large role in the production of math anxious and disaffected students.” (Jo Boaler)

Equity

Of all Google searches starting “Is my 2-year-old,” the most common next word is “gifted.” But this question is not asked equally about young boys and young girls. Parents are two and a half times more likely to ask “Is my son gifted?” than “Is my daughter gifted?” (New York Times, Seth Stephens-Davidowitz)

According to the National Center for Education Statistics (U.S. Department of Education), women earned 57%, 60% and 52% of all Bachelor’s, Master’s and Doctoral degrees respectively in the U.S. in 2013-14. However, women earned only 43%, 41% and 29% of the Bachelor’s, Master’s and Doctoral degrees respectively in mathematics and statistics in the U.S. in the same year.

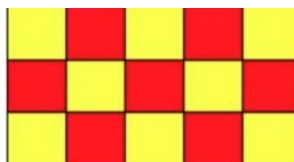
Sample tasks
by grade
level and
topic...



Bowl A Fact

2 3 4 5 6 7

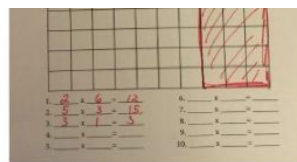
Number Sense



Moving Colors

K 1 2 3

Number Sense



How Close to 100?

3 4 5 6 7 8

Number Sense

Shape, Space + Measures

9×4	4×9
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Math Cards

3 4 5 6 7 8

Number Sense



The Four 4's

3 4 5 6 7 8

9 10 11 12

Number Sense



Ice Cream Scoop

3 4 5 6 7 8

9 10 11 12

Number Sense

Data, Probability + Statistics



Robot Stepper

3 4 5

Number Sense



Leo The Rabbit

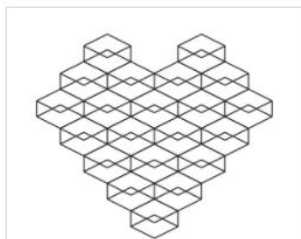
3 4 5 6 7 8

9 10 11 12

Number Sense

Data, Probability + Statistics

Data Science



Youcubed My Heart

3 4 5 6 7 8



Seven Flipped

3 4 5

Number Sense

Patterns + Generalizations

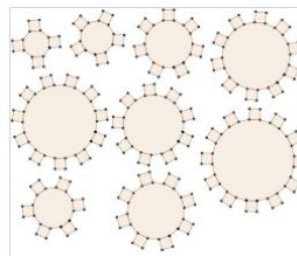


Seven Flipped

3 4 5

Number Sense

Patterns + Generalizations



Counting Cogs

3 4 5 6 7

Number Sense

Patterns + Generalizations

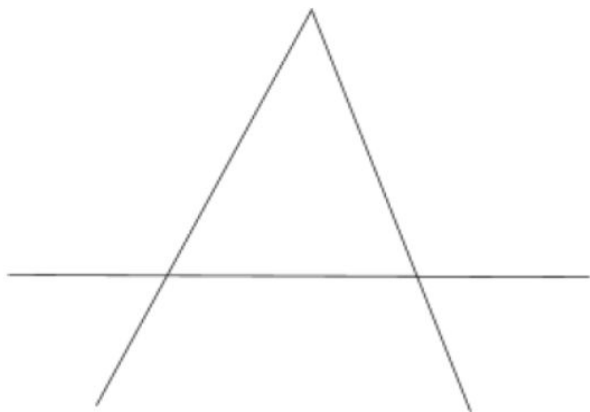
Why math?

The Future...

“The world has changed dramatically in recent years, but our mathematics curriculum has stayed the same,” said Boaler, the Nomellini and Olivier Professor of Education at Stanford and co-founder of [youcubed.org](https://www.youcubed.org), an organization providing resources for math learning. “We urgently need to teach kids what they’re actually going to use in their lives and their work. So we brought together the people we think can make this movement happen.”-Jo Boaler (currently rewriting the Math Framework in California)

We will be exploring these ideas further on a Park School Parent Ed Night Zoom. You are all invited to join. We will leave you with this task in the meantime...

2.



Draw 2 additional lines, to make a total of 10 triangles.