I AM NOT WHAT YOU WOULD CALL A "MATH PERSON."
I AM A MATH PERSON

I AM A NOT MATH PERSON
Developing a Mathematical Mindset

New Hire Orientation 2018
Office of Teaching & Learning
Our Objective:

TWBAT thoughtfully examine the way they think about mathematics instruction IOT develop an open mindset about research recommended practices.
Raise your hand if you are not a reading person.
The beliefs a teacher holds about mathematics consistently predict how they teach math.
What do you believe about mathematics?
Complete the beliefs questionnaire.
New evidence from brain research . . .

. . . tells us that **everyone**, with the right teaching and messages, **can be successful in math** . . . for the vast majority of children -- about 95% -- **any** levels of school math are within their reach.

Not just these guys!
Why Mindset Matters . . .

Read the excerpt. Mark 3 reasons that mindset matters in math.
When students believe that everybody’s ability can grow, achievement improves significantly.

When teachers believe that everybody’s ability can grow, and they give all students opportunities to achieve at high levels, students achieve at high levels.

More from Jo Boaler: Do you believe?
A cultural closed mindset about mathematics
1. Praise effectively.
The wrong kind of praise may have the most damaging effect on students’ mathematical mindset and, as a result, their achievement.

For example, in a recent study . . .
Four hundred fifth graders took an easy short test -- almost all performed well.

As the tests were passed back . . .

Half the students were told
You worked really hard!

And, half were told
You are really smart!
What is being complimented?

“You’re really smart”

“You worked really hard”

Work in groups of 2-3 to sort the compliments and write your own.
1. Praise effectively.

2. Create “low floor/high ceiling” tasks.
If you are not confident in your own math skills . . .

Check out the *Developing Essential Understanding* series from NCTM.
GOOD AT MATH
BAD AT MATH

RIGHT ANSWER
GOOD AT MATH

WRONG ANSWER
BAD AT MATH
Give tasks that promote struggle and growth
MATCHING

1. Answer-getting

2. Conceptual understanding
Let’s look at an example . . .

\[ 965 \div 5 = 193 \]

If you already know the answer, is there any point in working the problem? It depends.
965 = 500 + 465

465 = 400 + 65

65 = 50 + 15

100 + 80 + 10 + 3 = 193

Explain this solution to a partner.
1000 ÷ 5 = 200

965 + 10 = 975
975 + 10 = 985
985 + 10 = 995
995 + 5 = 1000

35 = 7 × 5
200 − 7 = 193
But this way is so much faster. Why teach all that other stuff? It’s just confusing them.
Yes, but only if finding the answer to this one problem is your objective.

And, actually, if speed and accuracy are the goal . . .
1. Praise effectively.

2. Create “low floor/high ceiling” tasks.

3. Celebrate mistakes.
Celebrate mistakes? WHY?
MISTAKES GROW THE BRAIN
1. Praise effectively.

2. Create “low floor/high ceiling” tasks.

3. Celebrate mistakes.
HOW DO COMMON MATH INSTRUCTIONAL PRACTICES MEASURE UP?
Memorization of math facts
Timed computation tests

LOW FLOOR / HIGH CEILING

CELEBRATE MISTAKES
LOW FLOOR / HIGH CEILING

CELEBRATE MISTAKES

Repeated computation practice
I do, we do, you do

LOW FLOOR / HIGH CEILING

CELEBRATE MISTAKES
MNEMONIC STRATEGIES LIKE C.U.B.E.S.

LOW FLOOR / HIGH CEILING

CELEBRATE MISTAKES

Word Problem Steps

- Circle the Numbers
- Underline the Question
- Box the Key Words
- Eliminate & Evaluate
- Solve and Check

√
DOING MATH \rightarrow UNDERSTANDING MATH
You are required by the State of Pennsylvania to teach students to understand numbers, the number system, and how to use them to solve real problems.
2 sets of math standards

Grade
Level
Content
Standards

K-12
Practice
Standards
GRADE 3 MATHEMATICS CONTENT STANDARDS

1. Apply place-value understanding and properties of operations to perform multi-digit arithmetic.
2. Explore and develop an understanding of fractions as numbers.
3. Represent and solve problems involving multiplication and division.
4. Understand properties of multiplication and the relationship between multiplication and division.
5. Demonstrate multiplication and division fluency.
6. Solve problems involving the four operations, and identify and explain patterns in arithmetic.
7. Identify, compare, and classify shapes and their attributes.
8. Use the understanding of fractions to partition shapes into parts with equal areas and express the area of each part as a unit fraction of the whole.
9. Solve problems involving measurement and estimation of temperature, liquid volume, mass or length.
10. Tell and write time to the nearest minute and solve problems by calculating time intervals.
11. Solve problems involving money using a combination of coins and bills.
12. Represent and interpret data using tally, chart, table, pictograph, line plots, and bar graphs.
Common Core Mathematical Practice Standards

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.
Solve this problem 3 ways

49 + 16
Look at the Standards for Mathematical Practice.
Which practice standards did your methods of solving the problem employ?
Raise your hand if you might be a math person.