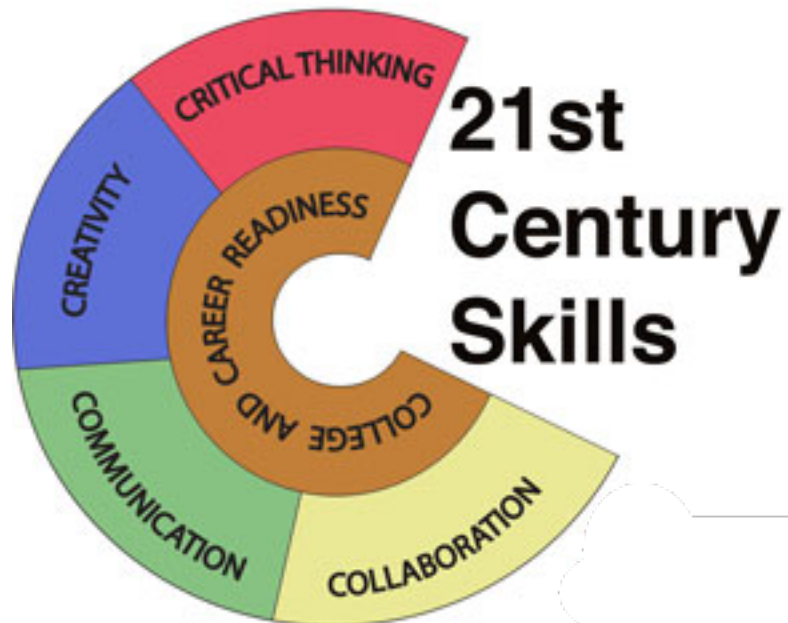


21st Century Math For All



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@MathProjects
#21stCenturyMath



What is Your Million-Dollar Talent?



21st Century Math For All

Purpose of the 21st Century Standards

Perseverance through the Change

Progression towards the Goal



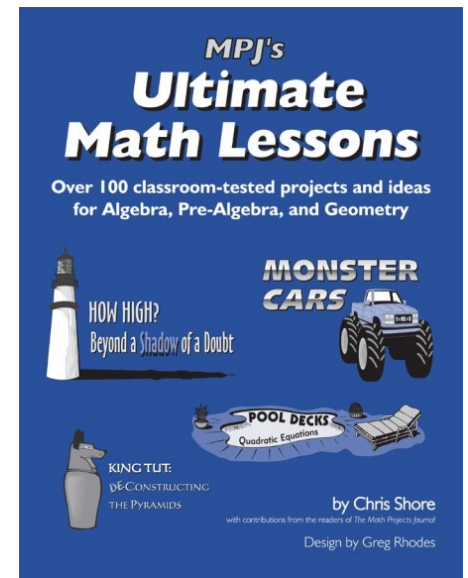
21st Century Math For All

Purpose



21st Century Math For All

My Experience with 21st Century Learning



21st Century Math Defined



Teach students to **THINK**
and **COMMUNICATE** their
thinking.

These are the 21st Century Skills.

21st Century Math Defined



21st Century Math Defined



Think & Communicate

are the 21st Century Skills.



Obtain & Retain

were the 20th Century Skills.



21st Century Math For All

$$6 + 4 + 4 + 8 = 21$$

The 6 Shifts

engage^{ny}

We are redefining RIGOR.

Shift 1	Focus	Teachers significantly narrow and deepen the scope of how time and energy is spent in the math classroom. They do so in order to focus deeply on only the concepts that are prioritized in the standards.
Shift 2	Coherence	Principals and teachers carefully connect the learning within and across grades so that students can build new understanding onto foundations built in previous years.
Shift 3	Fluency	Students are expected to have speed and accuracy with simple calculations; teachers structure class time and/or homework time for students to memorize, through repetition, core functions.
Shift 4	Deep Understanding	Students deeply understand and can operate easily within a math concept before moving on. They learn more than the trick to get the answer right. They learn the math.
Shift 5	Application	Students are expected to use math and choose the appropriate concept for application even when they are not prompted to do so.
Shift 6	Dual Intensity	Students are practicing and understanding. There is more than a balance between these two things in the classroom – both are occurring with intensity.

21st Century Math For All

Think & Communicate

The 6 Shifts = The 21st Century Skills



The 4 C's

We are redefining LEARNING
and SCHOOL.

EdLeader21

Critical Thinking

Communication

Collaboration

Creativity

60%



The 4 C's

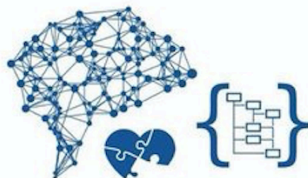
Our students' future is defining itself.

EdLeader21

Top 10 skills

in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility



in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



21st Century Math For All

Think & Communicate

The 4 C's = The 21st Century Skills



The 4 Claims



We are redefining
ASSESSMENT.

Concepts & Procedures

30%

Critical Thinking

Communicate Reasoning

Construct Models



Old School vs New School






- 1** What is 6050.287 rounded to the nearest ten?
- A 6050
 - B 6100
 - C 6050.29
 - D 6050.3

Old School vs New School

43025



Five swimmers compete in the 50-meter race. The finish time for each swimmer is shown in the video.

	23.42
	23.18
	23.21
	23.35
	23.24
Men's 50 Meter Freestyle	

Explain how the results of the race would change if the race used a clock that rounded to the nearest tenth.

Old School vs New School

33

$$2\frac{1}{3} + 4\frac{1}{2} =$$

A $6\frac{1}{6}$

B $6\frac{1}{5}$

C $6\frac{2}{5}$

D $6\frac{5}{6}$

Old School vs New School

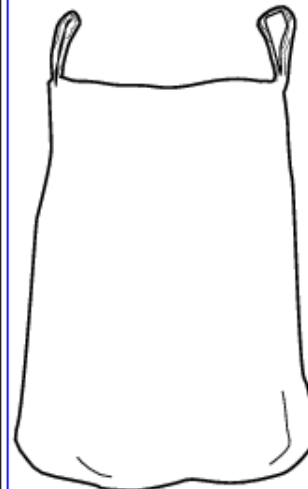
43328

Jared is testing how much weight a bag can hold. He plans to put juice bottles into three bags. He wants each bag to have a total weight within the given range.

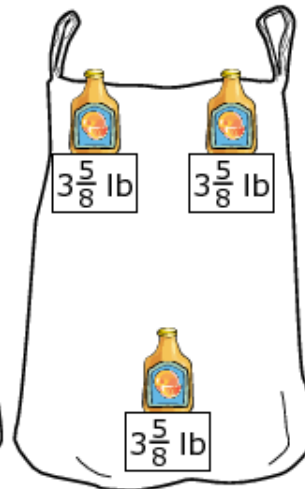
- Drag juice bottles into each bag so that the weight is within the given range.
- Leave the bag empty if the given range is not possible using juice bottles.



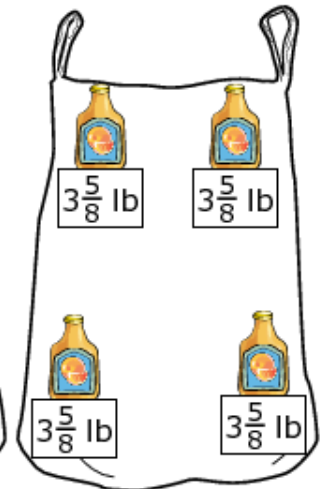
$3\frac{5}{8}$ lb



**Between
6 lb and 7 lb**



**Between
10 lb and 11 lb**



**Between
14 lb and 15 lb**

SBAC Claim: Concepts & Procedures

	Equal to $4 \times \frac{2}{3}$	Not Equal to $4 \times \frac{2}{3}$
$2 \times \frac{4}{3}$	<input type="checkbox"/>	<input type="checkbox"/>
$3 \times \frac{2}{4}$	<input type="checkbox"/>	<input type="checkbox"/>
$8 \times \frac{1}{3}$	<input type="checkbox"/>	<input type="checkbox"/>

SBAC Claim: Concepts & Procedures

42906



- A. Drag into the box exactly three unique expressions whose sum is less than 10.
- B. Drag into the box exactly three unique expressions whose sum is between 10 and 20.
- C. Drag into the box exactly three unique expressions whose sum is greater than 20.

$$5\sqrt{7}$$

$$\sqrt{13}$$

$$\frac{3^8}{3^6}$$

$$20 - \sqrt{20}$$

$$(4^{-2})^{-\frac{1}{2}}$$

$$8^{\frac{1}{3}}$$

Delete

A. Three unique expressions whose sum is less than 10

B. Three unique expressions whose sum is between 10 and 20

C. Three unique expressions whose sum is greater than 20

SBAC Claim: Critical Thinking

The table shows the number of books in four third-grade classrooms. One of the teachers is Tim's teacher, and one of the teachers is Sue's teacher.

Teacher	Number of Books
Mr. Smith	136
Ms. Rose	148
Mr. Brown	172
Mrs. Lee	122

Tim's teacher has 26 more books than Sue's teacher.

Who is Tim's teacher?

- Ⓐ Mr. Smith
- Ⓑ Ms. Rose
- Ⓒ Mr. Brown
- Ⓓ Mrs. Lee

SBAC Claim: Critical Thinking

42968



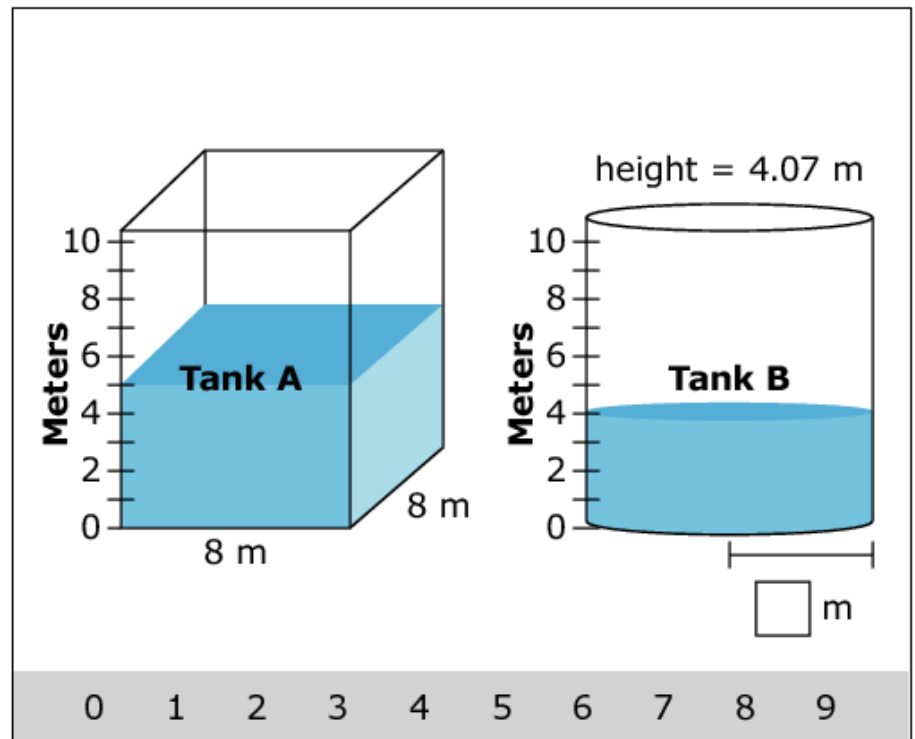
Two water tanks are shown. Tank A is a rectangular prism and Tank B is a cylinder. The tanks are not drawn to scale.

Tank A is filled with water to the 10-meter mark.

Click Tank A to change the water level. The volume of water that leaves Tank A is transferred to Tank B, and the height of the water in Tank B is shown.

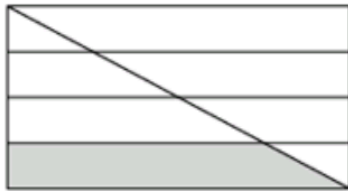
Drag one number into the box to show the approximate radius of the base of Tank B.

Question



SBAC Claim: Communicate Reasoning

Jamie drew this shape.



She says, "I divided the shape into 8 parts. I shaded 1 part. So $\frac{1}{8}$ of the shape is shaded."

Is Jamie correct? Select the statement that explains why.

- Ⓐ Yes, because there is 1 large piece shaded.
- Ⓑ Yes, because the shape is divided into 8 parts.
- Ⓒ No, because the 8 parts should be the same size.
- Ⓓ No, because there should be 1 medium piece shaded.

SBAC Claim: Communicate Reasoning

43052



Tony is buying a used car. He will choose between two cars. The table below shows information about each car.

Car	Cost	Miles Per Gallon (MPG)	Estimated Immediate Repairs
Car A	\$3200	18	\$700
Car B	\$4700	24	\$300

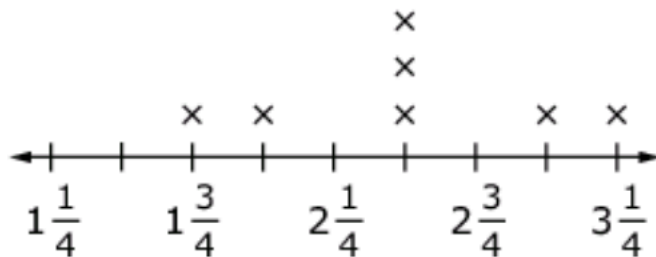
Tony wants to compare the total costs of buying and using these cars.

- Tony estimates he will drive at least 200 miles per month.
- The average cost of gasoline per gallon in his area is \$3.70.
- Tony plans on owning the car for 4 years.

Calculate and explain which car will cost Tony the least to buy and use.

SBAC Claim: Models & Data

The line plot shows the distances, in miles, Rex walked on seven days.



Each x represents one day.

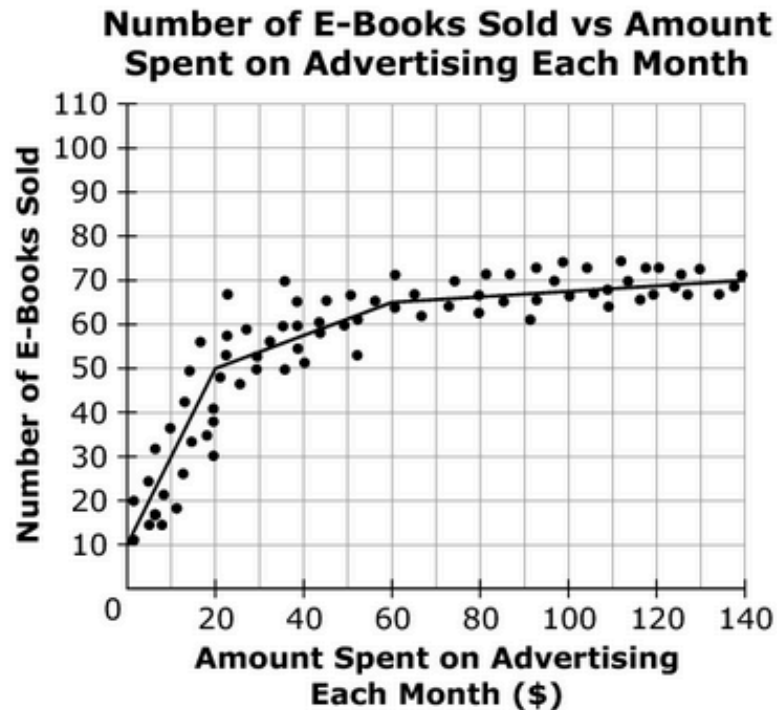
Distances Rex Walked (mi)

Enter the total distance, in miles, Rex walked for all seven days.

SBAC Claim: Models & Data

43028

Tyler earns \$3.00 for every e-book he sells on his website. (E-books are books that are available electronically.) He investigated the relationship between the amount spent on advertising each month and the number of e-books sold. He used this information to determine the lines of best fit shown in this graph.



What is the greatest amount Tyler should spend on advertising each month? Show your work or explain how you found your answer.

21st Century Math For All

Think & Communicate

The 4 Claims = The 21st Century Skills



The 8 Practices



The Practices are for the students.

Common Core Math is all about the Practices.

Mathematical Practices

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.



21st Century Math For All

Think & Communicate

The 8 Practices =

The 21st Century Skills



21st Century Math For All

The 6 Shifts

+ **The 4 C's**

+ **The 4 Claims**

+ **The 8 Practices**

= The 21st Century Skills

21st Century Math For All

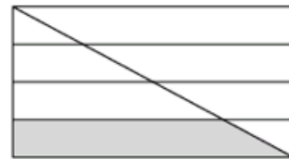
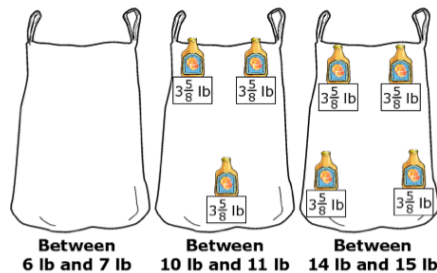
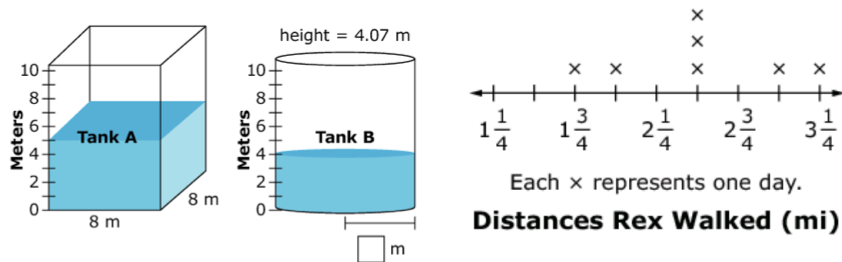
$$6 + 4 + 4 + 8 = 21$$

21st Century Math For All

Perseverance



What Does This Say About Your New Job Description?



	Equal to $4 \times \frac{2}{3}$	Not Equal to $4 \times \frac{2}{3}$
$2 \times \frac{4}{3}$	<input type="checkbox"/>	<input type="checkbox"/>
$3 \times \frac{2}{4}$	<input type="checkbox"/>	<input type="checkbox"/>
$8 \times \frac{1}{3}$	<input type="checkbox"/>	<input type="checkbox"/>

Car	Cost	Miles Per Gallon (MPG)	Estimated Immediate Repairs
Car A	\$3200	18	\$700
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$$5\sqrt{7}$$

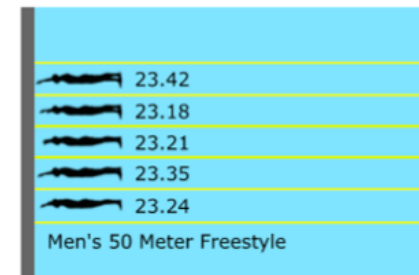
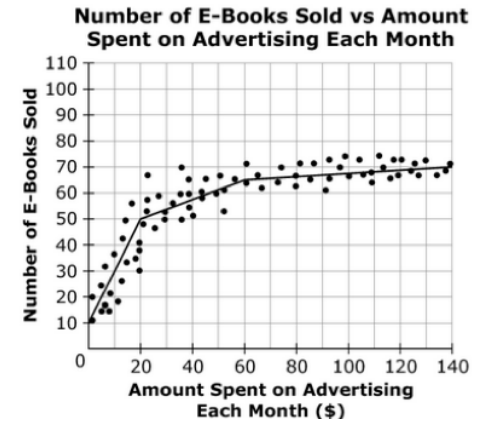
$$\sqrt{13}$$

$$\frac{3^8}{3^6}$$

$$20 - \sqrt{20}$$

$$(4^{-2})^{-\frac{1}{2}}$$

$$8^{\frac{1}{3}}$$



Teacher	Number of Books
Mr. Smith	136
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21st Century Math For All

Progression



Explicit Teaching of Thinking

H.O.T.S.

Dr. John Star



“Math does not teach Problem Solving.”

“Only the explicit teaching of thinking teaches thinking.”



Re-Orientation:

This is THE Progression!



Notes-Oriented



Task-Oriented

30%

Dual Targets

70%

Content and Practice



Daily!

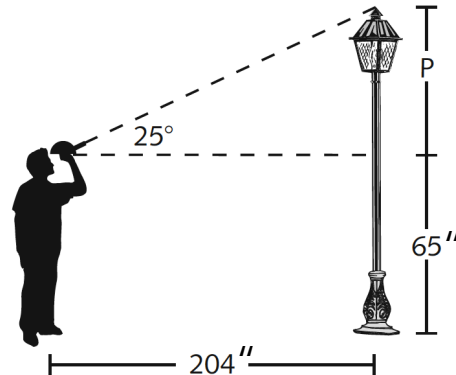


Explicit Instruction through Tasks in Geometry

Target: We will *“not quit”* *persevere* in solving problems with *trigonometry*.

Use Ratios
Substitute
Plot Points

Use Formulas
Test Assumptions
Write an Equations
Guess-n-Check
Measure



Common Sense
Fight the Gravity Storm
Use Tools
Reverse the Steps
Draw
Use Properties
Teamwork
Wrestle the Bear

The Take-Aways

Purpose

A 21st Century Education is all about teaching students to *think & communicate*,

Perseverance

so our *job description* has changed ...

Progression

to the *explicit teaching* of the Standards of Content & the Standards of Practice by being *task-oriented*.



Call to Action

Fail Grandly

No Real Risk



10%

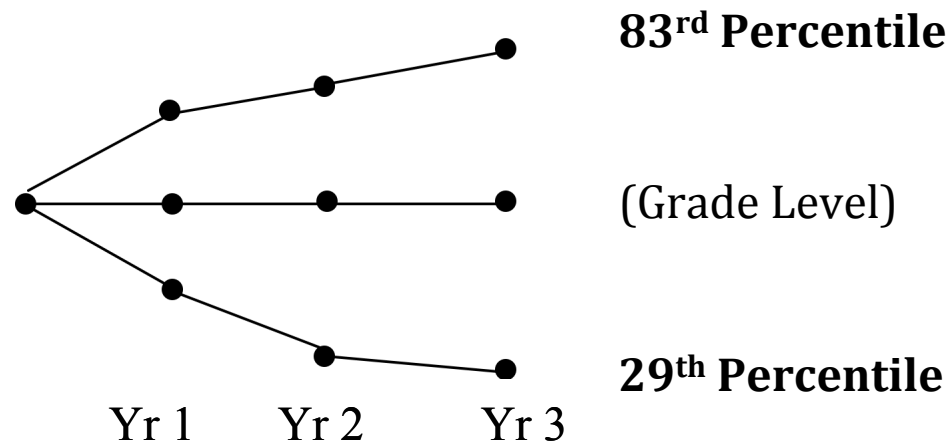
2-Week Rule



Teacher Action is the Difference

“The greatest influence in the quality of the education that a student receives is the decisions that a teacher makes on a daily basis.”

-- Dr. William Schmidt, University of Michigan



Teacher Action is the Difference



Teachers matter most.

-- Dr. William Schmidt, University of Michigan

Teachers matter most.

-- Peg Smith, University of Pittsburgh

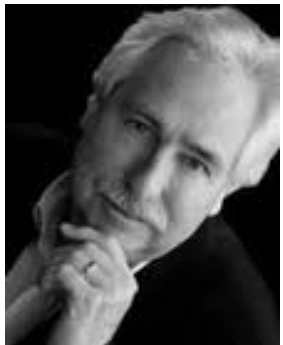


Teachers matter most.

-- Tim Kanold, Adlai E. Stevenson HS, Chicago

Poverty matters ... a lot.

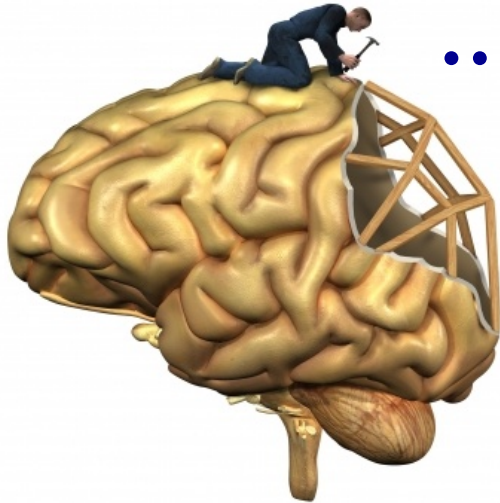
-- Dr. Uri Treisman, University of Texas, Austin



Teachers matter most.

-- David Foster, Silicon Valley Math Initiative, CA

Teach students to *think & communicate* ...



**...with the faith that they can learn it,
and that we can teach it to them,
because what we do matters...
the most.**