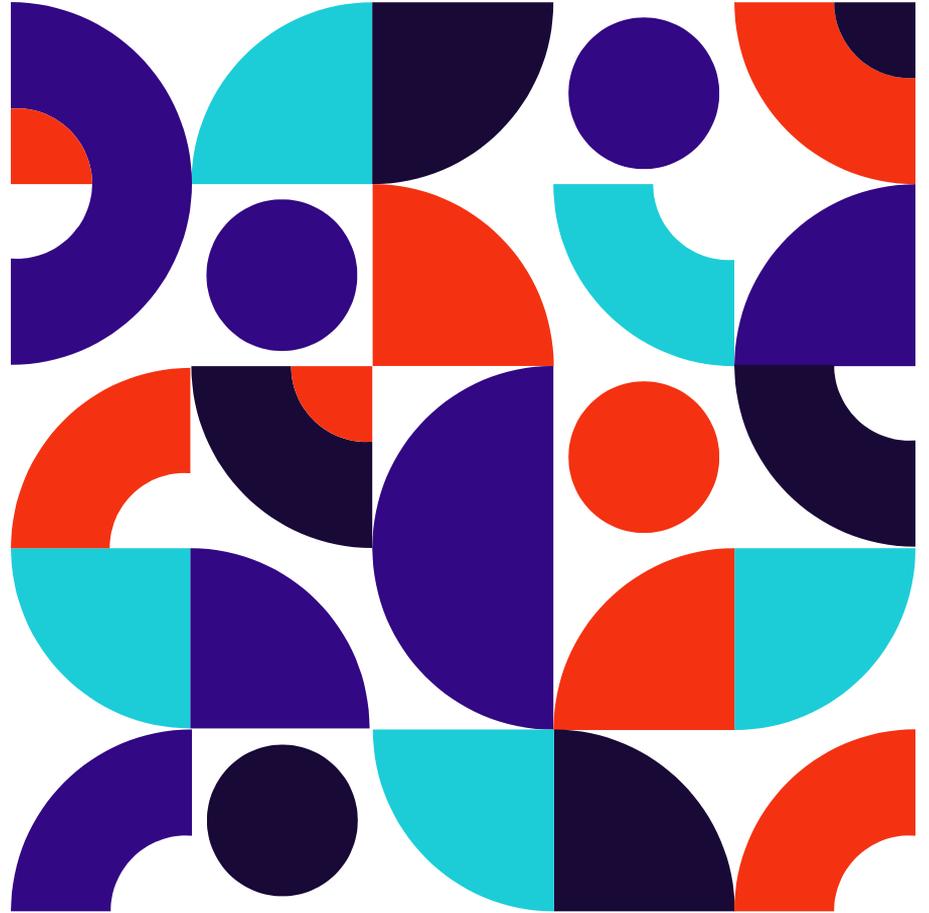


How do we Math?

What we do when
we learn and teach
about math.





Ingredients for Mathing

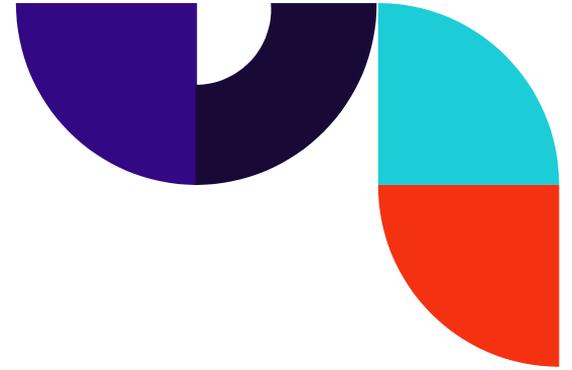
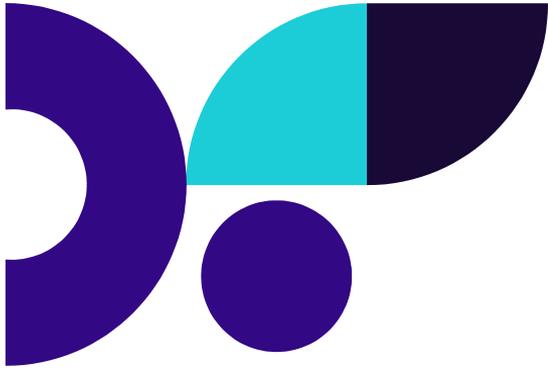
1. Pencil
2. Several Papers
3. Enthusiasm

1

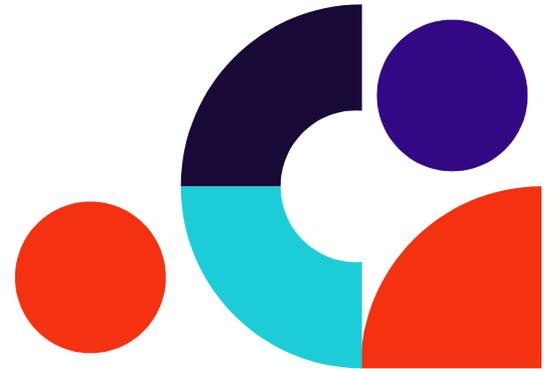
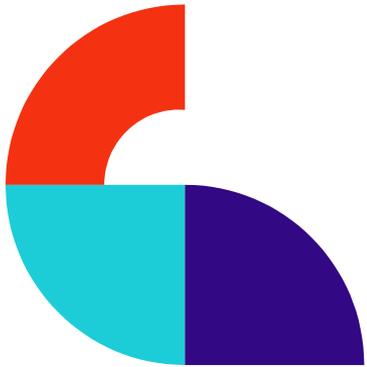
Math: Let's Do It

You have 1 minute to solve the problem correctly.





$$1200 - 599 = ?$$

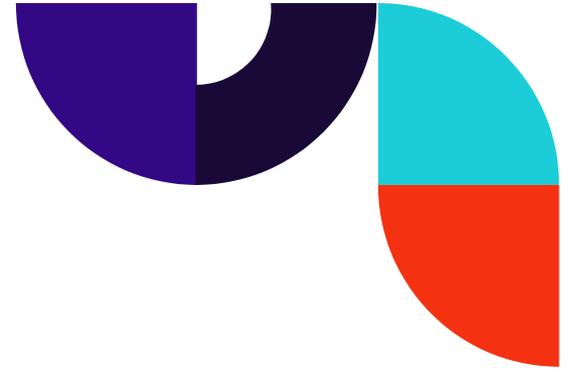
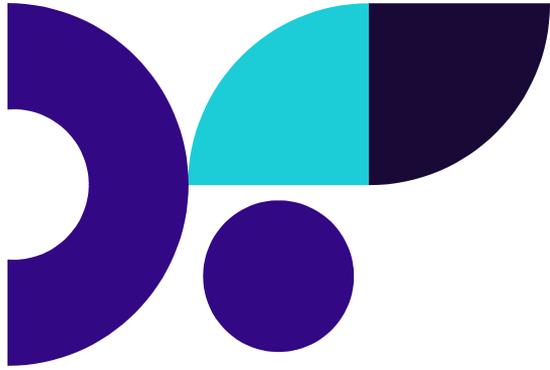


Math: 2 Times is Twice as Nice

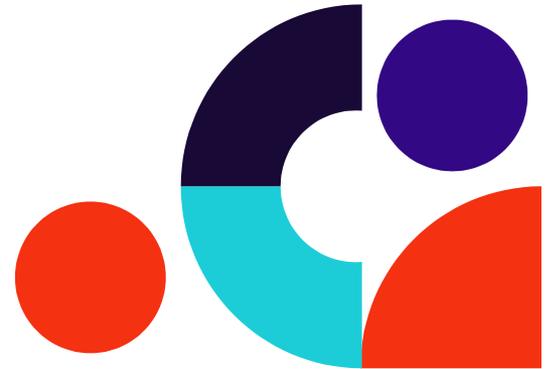
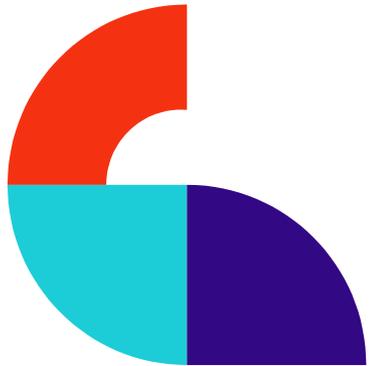
2

Take 5 mins to: a) individually make a drawing to show the problem and how you solved it; b) discuss in your group, in order to c) decide which representation your group will share and why.





$$17 \times 7 = ?$$

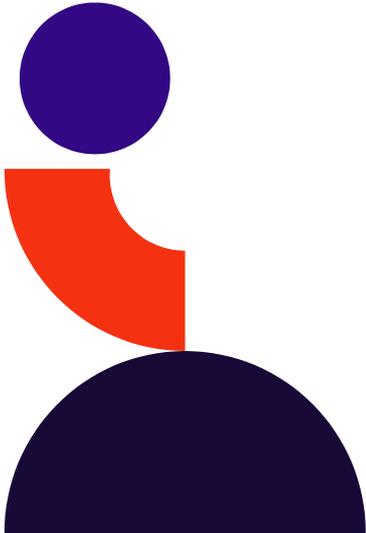


Mathematics is a language.



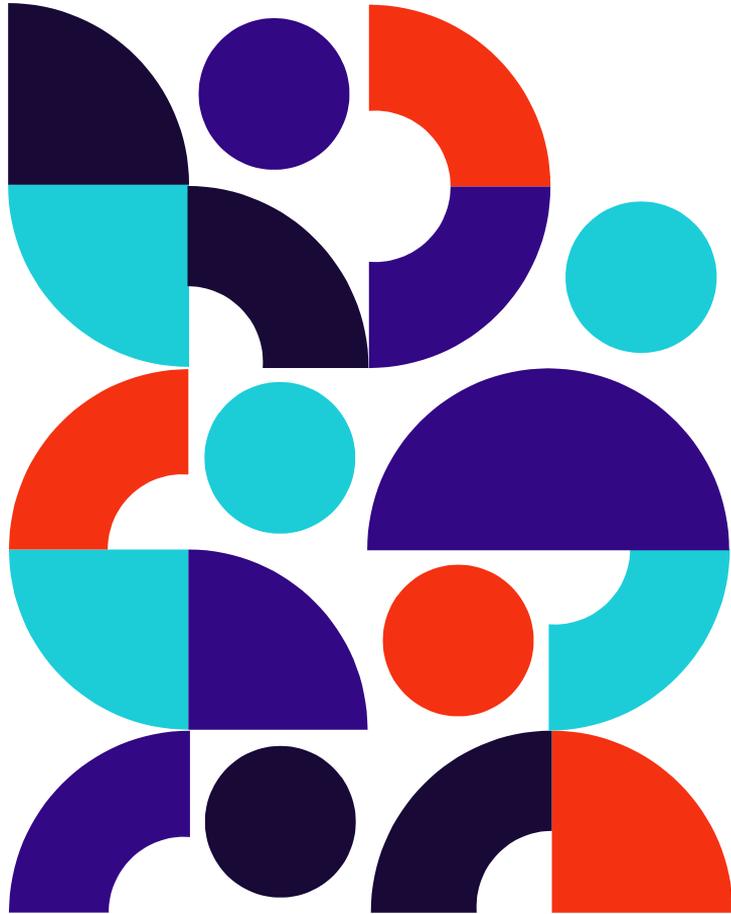
This has implications.

- Learning is social.
- Communication vs. the quickest right answer (calculators and wizards).
- Explaining a thing is understanding a thing.
- Algorithmical shortcuts/short circuits, and procedural crutches are corrosive to actual learning.



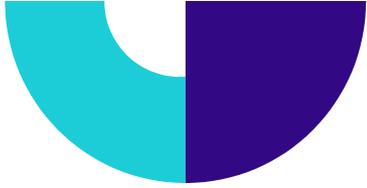


What is Investigations?

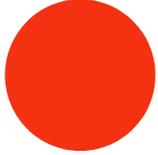


Priorities

- Being mathematicians
- Learning how to know (process/concept) with what to know (content/accuracy).
- Critical and flexible thinking.
- Learning through meaningful doing (“playing”).
- Math unfolds: development and appropriateness (concrete → abstract)

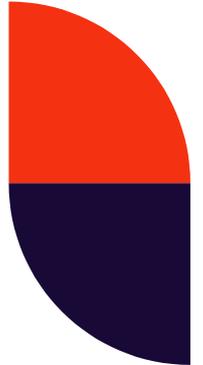


Directions: Click the red title below to open up the detailed descriptions of the CCSS standards for mathematical practice.



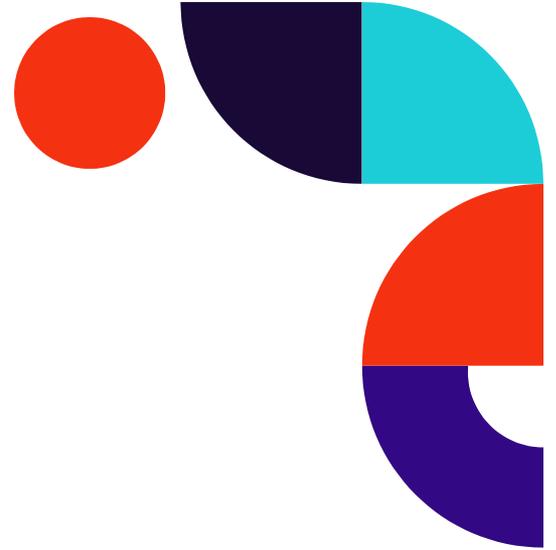
CCSS standards for mathematical practice:

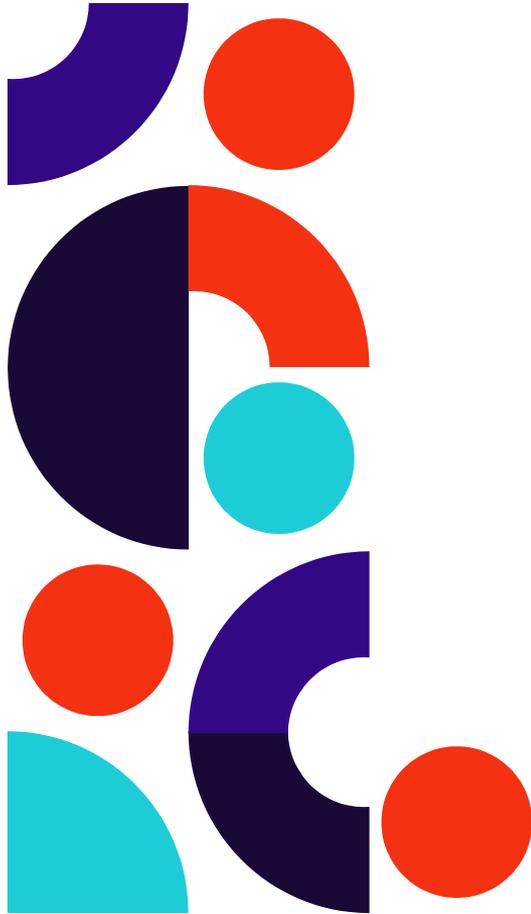
- 1. Make sense of problems and persevere in solving them.**
- 2. Reason abstractly and quantitatively.**
- 3. Construct viable arguments and critique the reasoning of others.**
- 4. Model with mathematics.**
- 5. Use appropriate tools strategically.**
- 6. Attend to precision.**
- 7. Look for and make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



SAVVAS Realize (<--click)

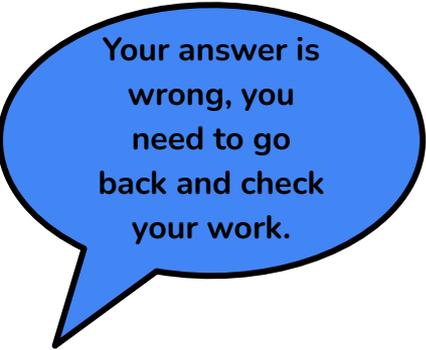
- A useful portal and resource for your scholar and you!
- Contains games, virtual versions of workbooks, and explanations of strategies.





Helping with Mathematics

- Homework is for revision or extension
- Let your child do the work
- Encourage your child to think of similar problems that they have solved and strategies they have used
- Encourage your child to change the names in word problems to people that they know.
- Encourage students to visualize or draw before solving.
- Instead of telling, ask!
- Celebrate mistakes and progress

CAREGIVER SAYS...**CHILD SAYS...****TRY THIS INSTEAD...**

Your answer is wrong, you need to go back and check your work.

- Can you teach me how to solve the problem the same way you did?
- Can you explain to me how you solved the problem?
- Can you walk me through what you did, step by step?

The goal: To give children the space to be self-reflective and correct their mistakes on their own.



I can't do this, it's too hard.

- I understand that you feel this is too hard. Let's pause and take a deep breath.
- Can we problem solve our way through this?
- Is there a part of this that you do understand? What can we do when we feel something is too hard?

The goal: To encourage problem solving skills and to empathize with children's feelings.

CAREGIVER SAYS...**CHILD SAYS...****TRY THIS INSTEAD...**

I don't know
how to do
this.

- Let's think of a solution together.
- That sounds frustrating, tell me more.

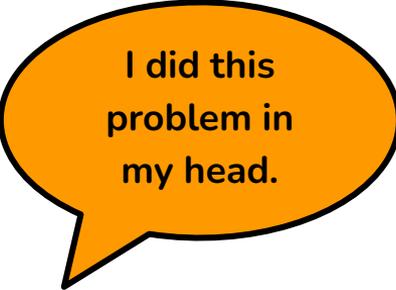
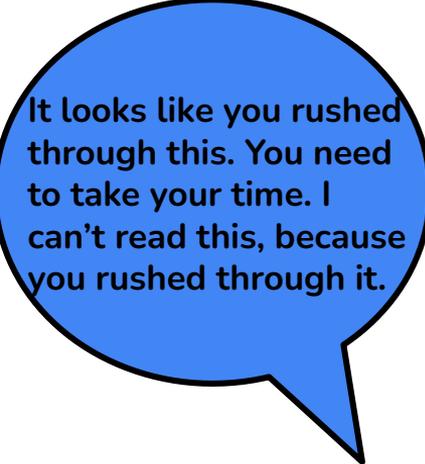
The goal: To encourage problem solving skills and to empathize with children's feelings.



I don't want
to do this.

- I understand that you don't want to do this right now, when would be a better time to get this done?
- I understand that you don't want to do this right now. I am thinking that if we get this done now, then that will give us more free time for other things that we want to do later. What do you think?

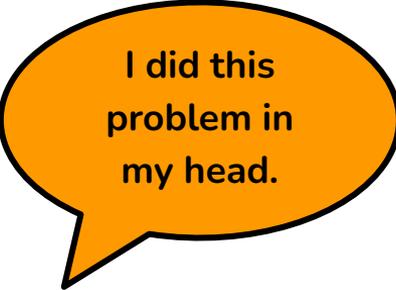
The goal: To encourage children to solve problems independently, but to also have them think about cause and effect.

CAREGIVER SAYS...	CHILD SAYS...	TRY THIS INSTEAD...
	 <p>I did this problem in my head.</p>	<ul style="list-style-type: none">• Can you show me how to do it on paper, so I can learn to do it the way that you did it? <p><i>The goal: To get students to show you how they did it, but to also have them take it step by step so that they can see their mistakes (if there are any). Also so you are not telling students to do it on paper, but showing them that it can be better than doing everything in your head.</i></p>
 <p>It looks like you rushed through this. You need to take your time. I can't read this, because you rushed through it.</p>		<ul style="list-style-type: none">• Is this your best work?• If you had to give yourself a grade on this assignment, what grade would you give yourself and why?• Did you make yourself proud? <p><i>The goal: To encourage autonomous self-reflection, so that children set expectations for themselves and to encourage intrinsic motivation.</i></p>

CAREGIVER SAYS...

CHILD SAYS...

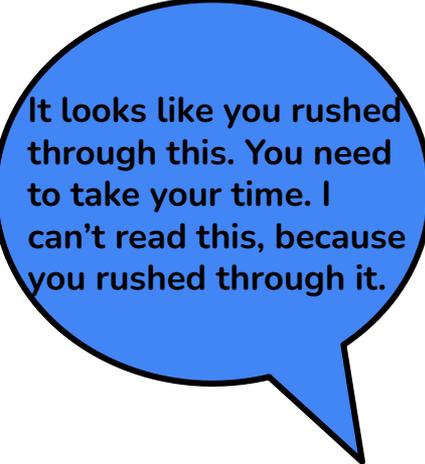
TRY THIS INSTEAD...



I did this problem in my head.

- Can you show me how to do it on paper, so I can learn to do it the way that you did it?

The goal: To get students to show you how they did it, but to also have them take it step by step so that they can see their mistakes (if there are any). Also so you are not telling students to do it on paper, but showing them that it can be better than doing everything in your head.



It looks like you rushed through this. You need to take your time. I can't read this, because you rushed through it.

- Is this your best work?
- If you had to give yourself a grade on this assignment, what grade would you give yourself and why?
- Did you make yourself proud?

The goal: To encourage autonomous self-reflection, so that children set expectations for themselves and to encourage intrinsic motivation.

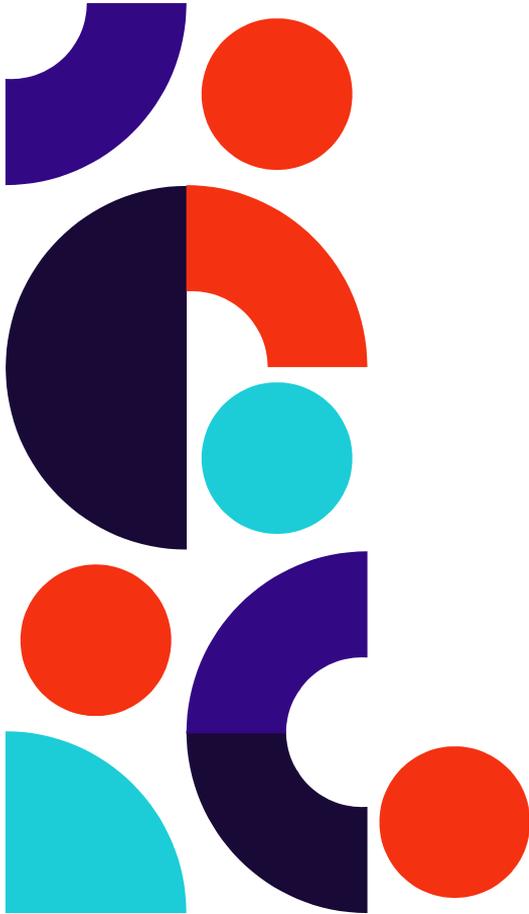
CAREGIVER SAYS...	CHILD SAYS...	TRY THIS INSTEAD...
	 <p>I need help.</p>	<ul style="list-style-type: none">● Okay, I understand. Sometimes I need help too. How can I help?● What have you tried already?● Does this look like something that you've done before?● Are there any parts of this that you do know about/ how to solve? <p><i>The goal: To encourage children to think about what they are actually asking for, to determine if it's reasonable, and then to see if there are things that they can do or try themselves before asking for help.</i></p>

Positive Math Norms for the Classroom (Jo Boaler/ YouCubed)

Courtesy of: <https://mathematizing4all.com> --an excellent constructivist SPED math resource by Rachel Lambert.

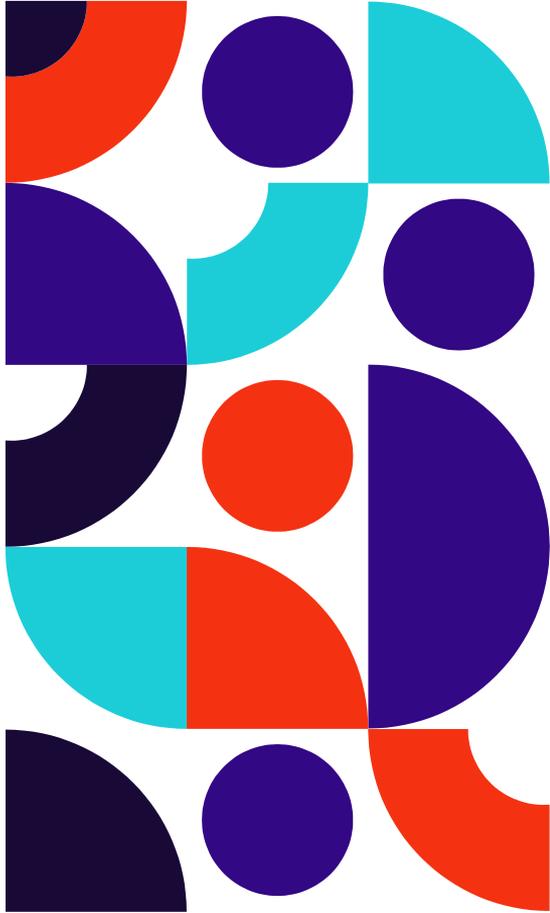
- Everyone can learn math to the highest levels
- Mistakes are valuable
- Questions are really important
- Math is about creativity and making sense
- Math is about connections and communicating
- Math class is about learning not performing
- Depth is more important than speed





The Gift of Mathematics

- Understanding and Breaking Down Problems
- Devising Solutions Using What you Know as an Entry Point
- Building Stable Knowledge Systematically from Conjecture and Confirmation
- Consensus Comes from Discussion and Exploration of Valid Ideas Communicated Compellingly
- Thinkers, not Calculators.



Thanks, Awesome Mathematicians!



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