

Words Matter

The words we use as teachers in math class have a great impact on how deeply our students learn and how they experience math as learners. Come share how you have changed some of your teaching language to foster confidence and build understanding.

If you participated in the T3IC Coffee Chat 2/25/24 please add your ideas to this document. Or if you missed it but have something to add, feel free to do so.

1 - Language about math operations, notation, precision:

Ambiguous words

- Cancel [instead, name the operation: “divide away common factor”, “-2 and 2 add to zero”, inverse operations]
- Simplify [be specific: “rewrite” with common denominators, or without common factors, or with all positive exponents, or with no radicals in denominator]
- Move to the other side [name the inverse operation]
- Plug In [Substitute or sub in]
- Pull Out [Factor or divide away]
- Solve (vs. Evaluate) ... help students distinguish equations vs. expressions
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Specific but not general words or Acronyms that might not be understood conceptually

- Foil [say “multiply polynomials” or “distribute fully”]
- Cross Multiply
- Keep-Change-Flip: an acronym can be useful shorthand but also discuss conceptually: dividing fractions means multiply by reciprocal, show inverse operations
 - [Howie Hua](#) has great video explainers for this
 - [Why does "keep change flip" work? An algebraic and visual approach #math](#)
 - [Why does "keep change flip" work? An algebraic and visual approach #math](#)
 - [If we write fraction division like this, people can see why "keep change flip" works #math](#)
 - You can follow Howie on [Facebook](#), Twitter, TikTok, Instagram, or YouTube

Words to support math understanding

- Slope: rate of change, or $\frac{\Delta y}{\Delta x}$ better than “rise over run”
- Function transformations: Use vertical language for changes to y-values, horizontal language for changes to x-values [for example, say that $y = a \cdot x^2$ gets “stretched” when a gets larger, not “skinnier”]
- Preview vocabulary such as concave up/ concave down when students learn parabolas (earlier than calculus)
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Notation

- Use words that indicate these notations: x^2 x_2 x^{-1} or $\frac{1}{x}$ $f^{-1}(x)$
- Greater than $>$, less than $<$... be an “alligator hater”
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2 - Language about learning math

- “This is easy” is problematic, especially for students who are feeling challenged: they are already having trouble, and it’s now worse because they “should” be able to get it. Read more at Tracy Zager’s post here: [“This is easy”: The little phrase that causes big problems - National Council of Teachers of Mathematics](#)
- Instead: [from Tracy Z]
 - “This is familiar to me.”
 - “I used to struggle with this kind of math, but now I can do it.”
 - “I know something that I can use here.”
 - “I feel confident about this kind of math.”Or
 - “This seemed hard at first, but I think I can do it!”
 - “Oh! Now I understand the question!”
 - “I see a way to start.”
 - “I have an idea to try.”
- Instead: (from coffee chat)
 - It’s a challenge we can do together
 - I have something fun for today
 - This one has [e.g.] 3 parts, and you’ll need to use the [technique]. (the point is to be *descriptive* about what they’ll encounter, not give it a *difficulty* per se)
- Show your work instead: Show your mathematical thinking / Narrate your work

- Guess & Check instead: Try and Revise– to promote idea that we are being systematic & mathematical
 - Take a *strategic* or *careful* guess
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Ways to generating thinking & discussion

- Do you have any questions? Instead: Ask me a question / Ask me 2 Qs
- What if?
- Carefully consider messages about speed / doing it in your head
- Making room for mistakes [look for the “kernel of truth” in a student error, so you can build on their thinking instead of moving on to someone else who will “get it right”]
 - “My superpower is unstucking brains”
 - “What have you tried?”
 - Show me your efforts
- Who is doing the talking in the classroom? Involve all learners, and learners more than the teacher.
- Phrases that model how math learners can speak to each other
[<https://x.com/RBMSCarty/status/1730969570737860989?s=20>]
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3 - Language about our identities as learners

- Everyone is a math person
- Students seeing themselves represented in math [use non-gendered language & examples of diverse mathematicians]
 - <https://kristopherchilds.com/black-mathematician-month>
 - [The Mathematicians Project: Mathematicians Are Not Just White Dudes – arbitrarilyclose](#)
 - [Share Science - Download Posters from Perimeter Institute](#)
 - [#MathGals](#)
- Asset orientation [every student has strengths, avoid labeling “high/low students”]
 - <http://showyourthinkingmath.blogspot.com/2018/05/the-low-kids-and-high-kids.html>
 - <https://feltonkoestler.wixsite.com/realworldmath/post/2018/11/30/the-trouble-with-high-and-low>
 - <https://www.nctm.org/Standards-and-Positions/Position-Statements/Ability-Labels--Disrupting-%E2%80%9CHigh,%E2%80%9D-%E2%80%9CMedium,%E2%80%9D-and-%E2%80%9CLow%E2%80%9D-in-Mathematics-Education/>

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- Making room for students' voices & identities
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