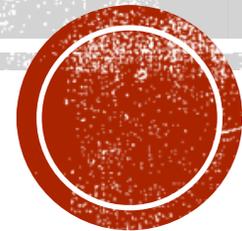


LET'S FOCUS

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OUR FOCUS TODAY

- Today we will talk about:
- why you think your students are at risk
- the board assessments and what they tell us
- moving away from texts
- using more open questions
- co-creating lessons
- deconstructing existing lessons



YOUR TOP 3

- Independently, list the top three reasons you think your students (overall) are struggling in math.



YOUR TOP 3

- If none of them involved something you could control, think of one or two more reasons that you think you could have some effect on.
- Talk to colleagues to see how closely your ideas align.



THESE IDEAS

- Should be ones we work on this semester.
- I have some ideas that I have brought today (not knowing your list), but will consider your list before we meet next.



BEFORE WE GO THERE

- I was asked to talk about the results of the board numeracy assessment and how it might affect you.
- Let's look at each item in terms of what we are really hoping for from our students.



MOVING AWAY FROM TEXTS

- I think we should BUT this only works if a teacher has the time, knowledge and energy to think through why they choose the tasks they do.



OPEN QUESTIONS



SAMPLE QUESTIONS

- A fraction is a little less than $0.111\dots$. What might it be?



SAMPLE QUESTIONS

- Choose three of these fractions:
- $1/3$ $2/5$ $3/8$
- $8/10$ $16/32$
- Color that fraction of a 100 grid and get a percent name for each.



SAMPLE QUESTIONS

- You have to figure out which is greater. Which question is easiest for you? Why?
- $68/95$ compared to $1/10$
- $2/3$ compared to $7/8$
- $147/300$ compared to $152/612$



SAMPLE QUESTIONS

- Do you agree or disagree?
- To get a fraction between a/b and c/d you can use $(a+c)/(b+d)$. (e.g. between $\frac{3}{4}$ and $9/8$ is $12/12$.)



SAMPLE QUESTIONS

- Choose two fractions to add so the answer is a little more than 1.



SAMPLE QUESTIONS

- You use an operation with two fractions. The result is $19/15$.
- What fractions? What operation?



SAMPLE QUESTIONS

- Describe a situation where you would want to divide $\frac{2}{3}$ by $\frac{1}{4}$.



SAMPLE QUESTIONS

- You do an operation with two different values and the result is a rational (or irrational) number close to 10.
- What calculation might you have done?



SAMPLE QUESTIONS

- You multiply two fractions.
- The product is A LITTLE LESS than one of them and A LOT MORE than the other.
- What could they be?



SAMPLE QUESTIONS

- _____ is 80% (or 250%) of _____.



SAMPLE QUESTIONS

- Which bank account do you think grew more?
- Amy: from \$80 to \$120
- Liam: from \$200 to \$250



SAMPLE QUESTIONS

- Kayleigh has \$35.
- It is a **BIG** percent of the cost of a jacket.
- How much might the jacket cost?
- What percent of it is \$35?



SAMPLE QUESTIONS

- Kayleigh has \$35.
- It is a *SMALL* percent of the cost of a hoverboard.
- How much might the hoverboard cost?
- What percent of it is \$35?



SAMPLE QUESTIONS

- You invest \$1000 at a bank that pays compound interest.
- After a year, your investment, with no additional principal, is about \$1200.
- What might the rate and compounding period have been?



SAMPLE QUESTIONS

- Choose prices so it costs just a little more for 1 t-shirt than one pair of shorts.
- 3 t-shirts cost \$_____
- 5 pairs of shorts cost \$_____.



SAMPLE QUESTIONS

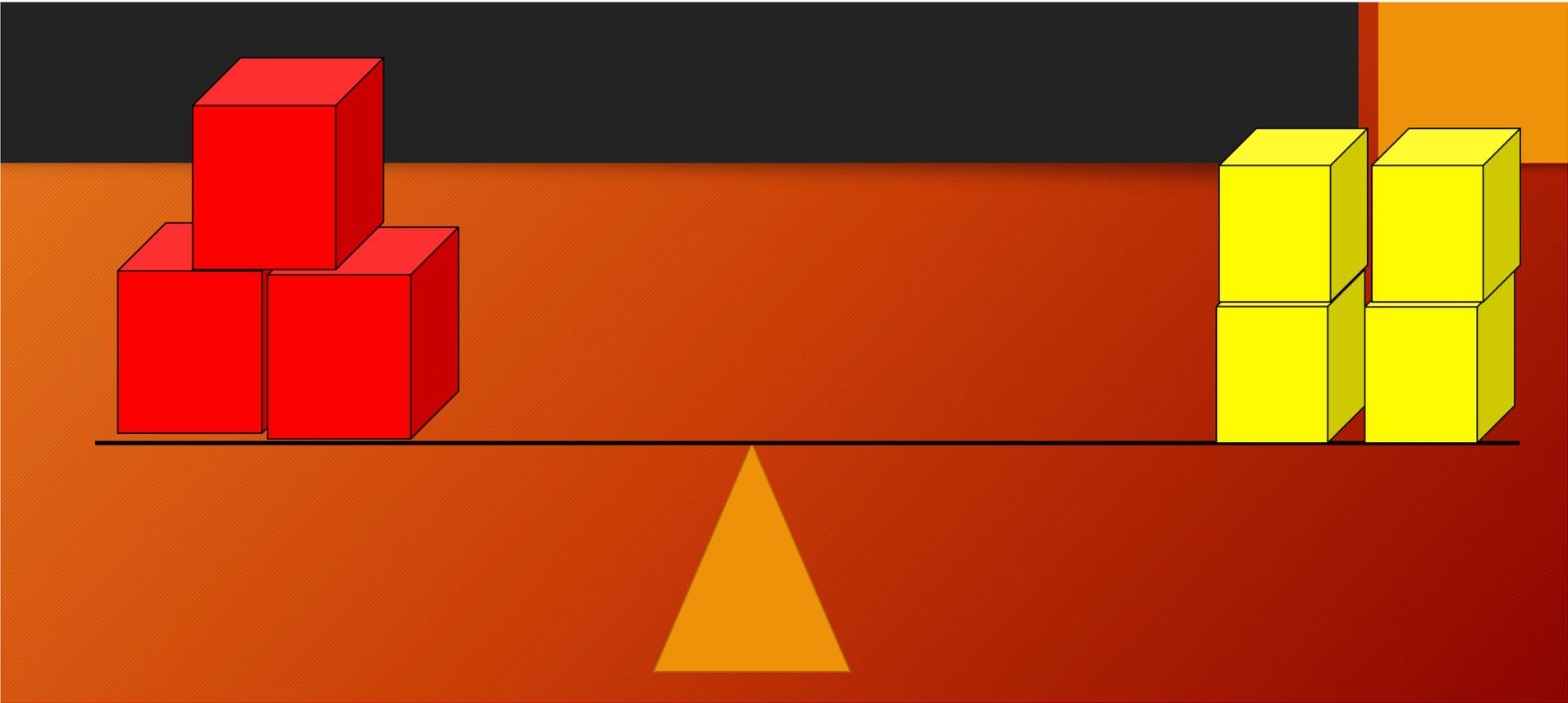
- Write a proportion:
- $\underline{\quad} / \underline{\quad} = \underline{\quad} / x$
- Write a story that would be solved by your proportion



SAMPLE QUESTIONS

- What do you know about the relationship between the mass of the yellow and red boxes?





SAMPLE QUESTIONS

- Choose a car speed. Describe that speed using as many rates as you can.



SAMPLE QUESTIONS

- Think of two variables where one doubles when the other doubles.
- Create a table of values and draw a graph that shows that relationship. What do you notice?



SAMPLE QUESTIONS

- Choose a value that you want $Ax - B$ to be worth when x is about 10.
- What values would you use for A and B ? Think of lots of possibilities.



SAMPLE QUESTIONS

- An inequality involving the variable m is true when $m = 4$, but false when $m = 8$. List some possible inequalities.



SAMPLE QUESTIONS

- You simplify an algebraic expression and the result is $14x - 37$.
- What could the unsimplified expression have been?



SAMPLE QUESTIONS

- The equation $4x - 5 = 15$ describes two very different situations. What might those situations be?



SAMPLE QUESTIONS

- How can you more efficiently do this?
- Double a number.
- Add triple the number that is one more than your first number.
- Add 2 to the sum.



SAMPLE QUESTIONS

- Create an algebraic expression that you know is:
- Always more than $2m+1$
- Sometimes more than $-2m$



SAMPLE QUESTIONS

- Which two of these are most alike and why ?

$$y = 3x - 4$$

$$y = 3x + 8$$

$$y = -3x - 4$$



SAMPLE QUESTIONS

- Which two of these are most alike and why ?

$$y = 3x^2 - 4$$

$$y = 3x^2 - 10$$

$$y = 2x^2 - 10$$



SAMPLE QUESTIONS

- Draw a graph of a parabola that grows quickly as x increases from 10 to 20 and the graph of a parabola that grows slowly in that domain. What are their equations?



SAMPLE QUESTIONS

- You use algebra tiles to factor a quadratic expression.
- There were 3 rows of 5 tiles.
- What might the quadratic and factors have been?



SAMPLE QUESTIONS

- Suppose you know that $3x + 4 = 10$.
- Without solving the equation, tell what else you know about x .



SAMPLE QUESTIONS

- You know that a line goes through the point $(4, 2)$ and that it slants up and to the right. Name at least one other thing that you are sure is NOT true about that line.



SAMPLE QUESTIONS

- Create a situation involving a quadratic relationship where the maximum value is 22 when the independent variable has a value of 4. Tell one other thing about it.



SAMPLE QUESTIONS

- An angle in a right triangle has a sine of 0.2. What else do you know about the triangle?



SAMPLE QUESTIONS

- One of the trig ratios of an angle in a right triangle is really close to 1.
- What could the angle be?



OPENING UP STRATEGIES

- Start with an answer. The student creates the question.

[e.g. You subtracted and the answer is $-4x + 8$. What might you have subtracted?]



OPENING UP STRATEGIES

- Look for similarities and differences.

[e.g. How is factoring $x^2 + 5x + 6$ like factoring $x^2 - 5x + 4$? How is it different?]



OPENING UP STRATEGIES

- Leave pieces of the question out.

[e.g. Choose numbers for the blanks.

Then evaluate when $x = 10^\circ$

$$[\]\sin x + [\]\cos x]$$



OPENING UP STRATEGIES

- Create a sentence.

[e.g. Create a sentence that uses the words and numbers: *faster 30km per 800*]



YOUR TURN

- List at least 3 or 4 "closed" questions that you typically ask.
- Open them up!



CO=CREATING LESSONS

- Our plan:
- There has to be a learning goal that is not just the restatement of an expectation or topic but says what the student will understand (not just do) at the end.



CO=CREATING LESSONS

- There has to be a problem that leads to this learning goal that kids work on without modelling.



CO=CREATING LESSONS

- There has to be a consolidation that focuses not so much on solutions to the problem as to the math ideas that are meant to be brought out.



FOR EXAMPLE

- Perhaps I want students to really understand that when you divide two fractions, you are figuring out how many copies of fraction 2 fit into fraction 1.



I MIGHT SHOW A FRACTION TOWER



1																			
$\frac{1}{2}$										$\frac{1}{2}$									
$\frac{1}{3}$						$\frac{1}{3}$						$\frac{1}{3}$							
$\frac{1}{4}$					$\frac{1}{4}$					$\frac{1}{4}$					$\frac{1}{4}$				
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I ASK

One fraction fits into another exactly twice; what could they be?

One fraction fits into another exactly three times; what could they be?



I ASK

One fraction fits into another exactly two and a half times? What could they be?

One fraction fits into another barely more than one time? What could they be?



CONSOLIDATION

Without looking at the tower, how could you predict that $7/8 \div 1/10$ is a lot?

Without looking at the tower, how could you predict that $1/10 \div 7/8$ is very small?



CONSOLIDATION

Without looking at the tower, how could you predict what $4/[] \div 2/[]$ is?

Without looking at the tower, how could you predict what $6/[] \div 2/[]$ is?



WE MIGHT GO BACK AND PLAN AN ACTIVATION (OR MINDS=ON)

- How do you know that $100 \div 3$ is a LOT more than $100 \div 7$ without actually getting answers?



LET'S GO BACK TO EITHER

- Deconstructing the lessons you brought and/or planning a new lesson.



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