

Look fors in 7–12 Math

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January 2017

LOOK FORS

- Let's discuss what you would like to see when you see students in a math class.

LOOK FORS

- Before I share my beliefs, I'd like you, at your table, to come up with 5 things you would want to see.
- We can then compare these to my list and see where we agree/disagree and work this through.

My LOOK FORS

- Collaboration, but...
- How does the teacher get to the point where students regularly collaborate and feel comfortable doing that?
- How are teachers choosing groupings? What are some options?

My LOOK FORS

- Real math conversation, but...
- What does real math conversation look like?
- It needs to be more than just saying what they did, but include making judgments, analyzing problems, etc. How do we model it?
- Let's look at an example.

Math Conversation

- What are some different ways we can make sense of WHY $\frac{2}{3} \times \frac{3}{2} = 1$.
- Talk that over at your table.
- If you present a way, you have to tell what made you think of it and convince the others it really makes sense.
- One way: $\frac{2}{3}$ OF $\frac{3}{2}$ is two out of the three half pieces you have, but 2 halves is 1.

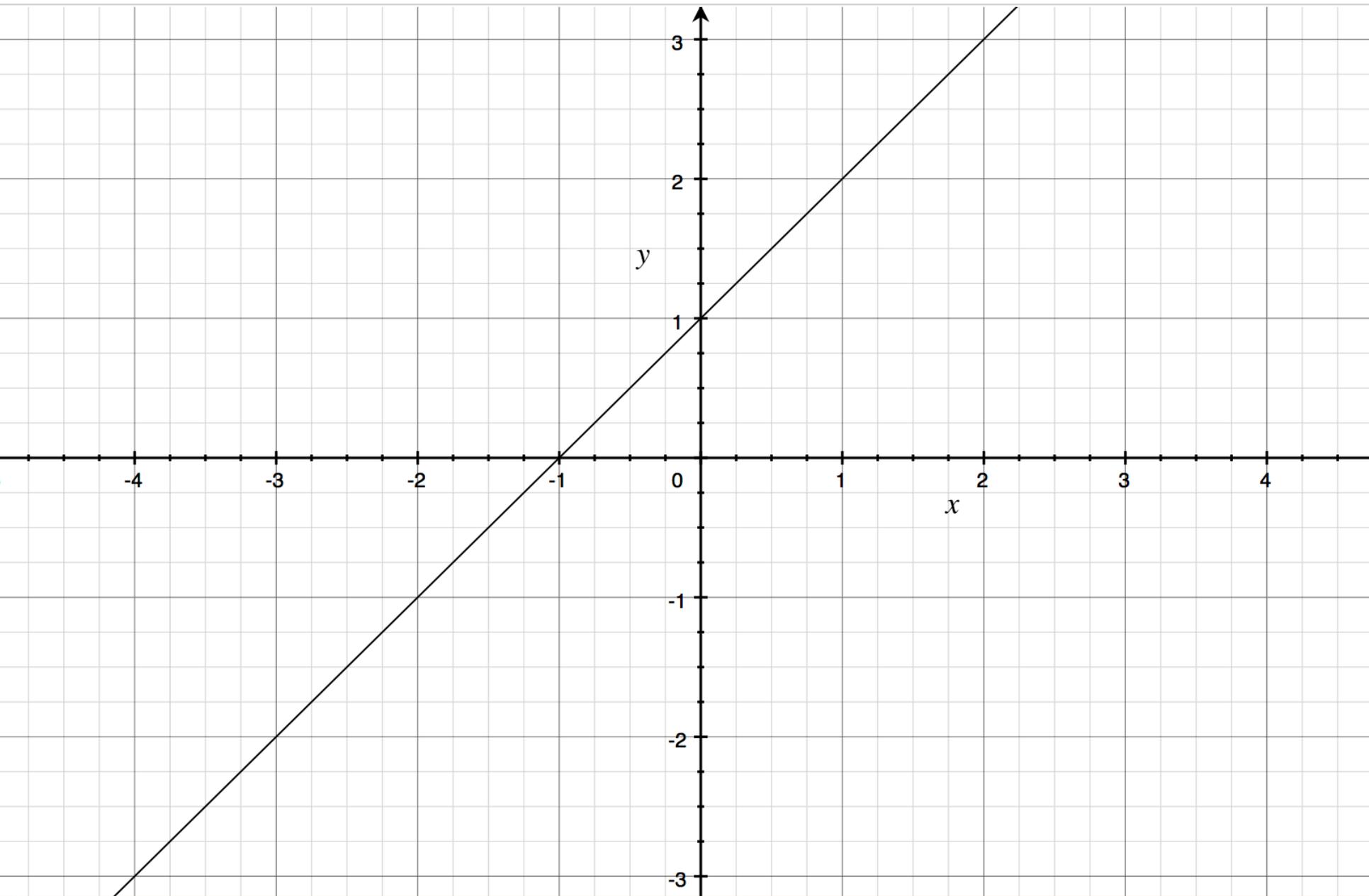
My LOOK FORS

- Kids asking substantive questions, but...
- How do we teach kids to ask each other and ask the teacher more substantive questions?
- Do we actually practice requiring kids to ask two questions about the math before we move on?
- Do we give them “starters”?

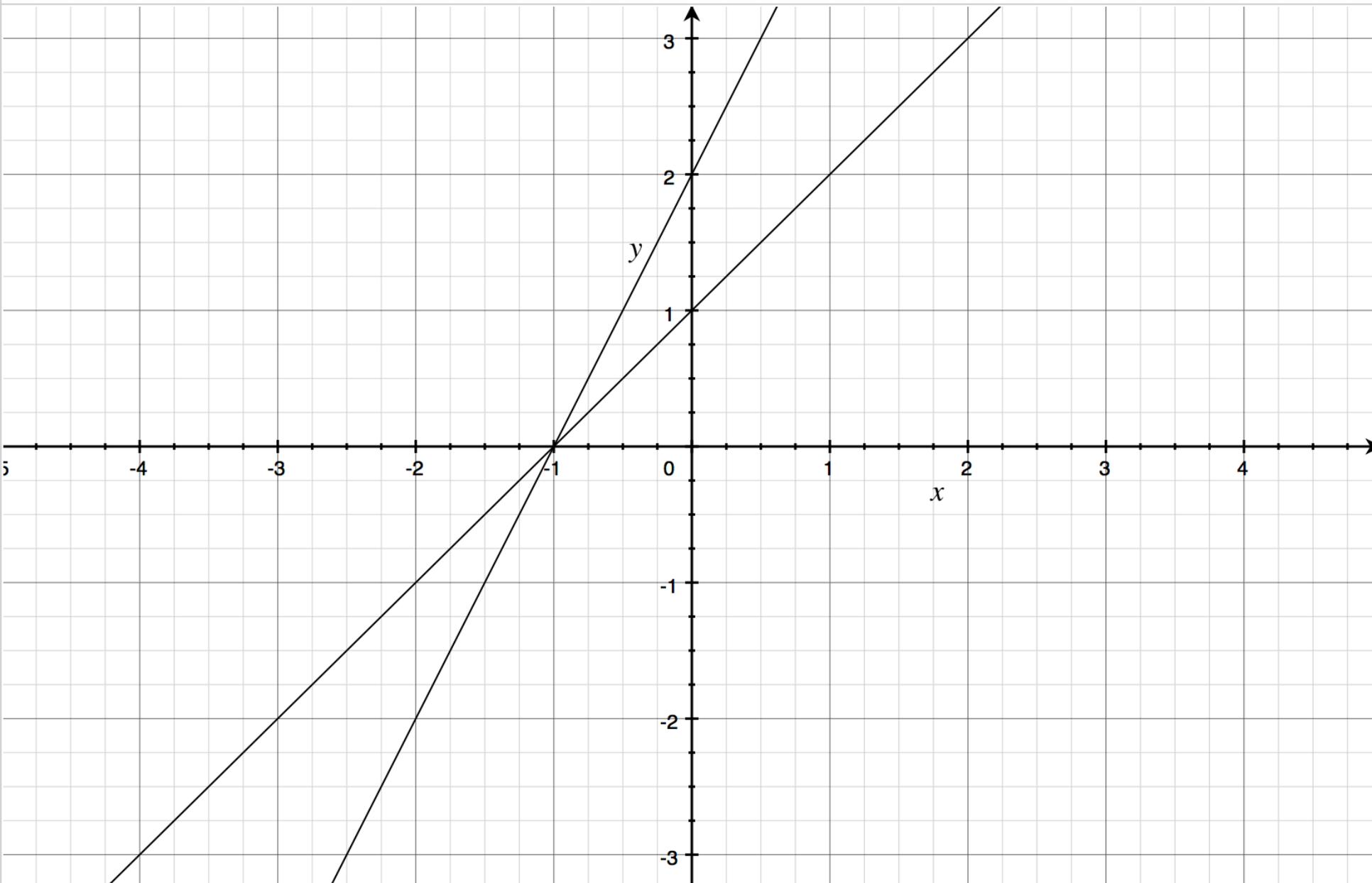
My LOOK FORS

- Use of technology in a rich way, but...
- What does it mean to use manipulatives or technology in a rich way?
- E.g. What do the graphs of $y = mx + m$ look like? Why does that make sense?

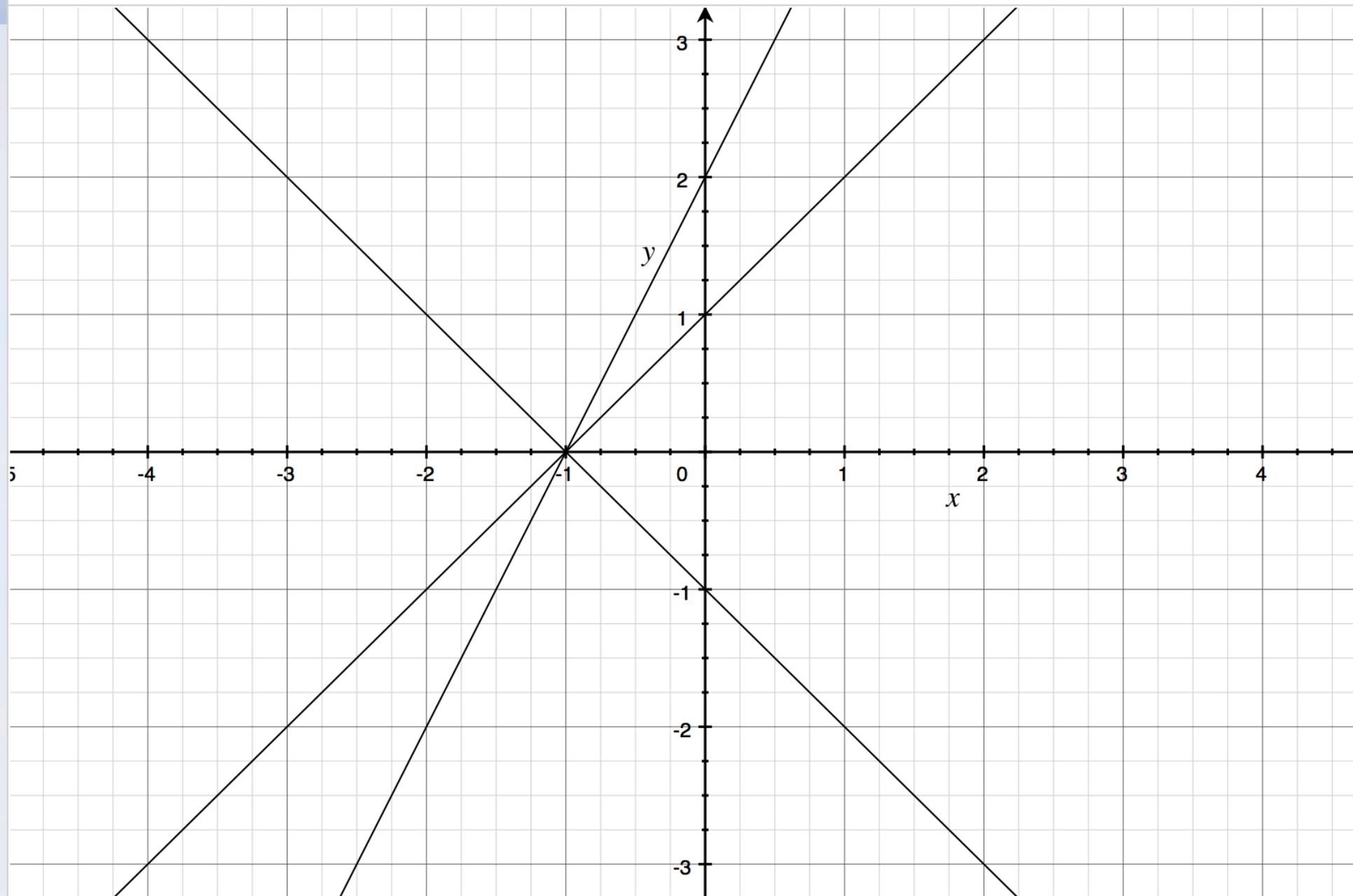
$$y = x + 1$$



$$y=2x+2$$



$$y = -x - 1$$



My LOOK FORS

- Enthusiasm, or at least real engagement

My LOOK FORS

- Do students keep asking why to try to make sense?
- Do teachers encourage it?

My LOOK FORS

- Lots of student explanation, but...
- How do we get students comfortable in explaining their thinking and not just rehashing what they did?
- We need to practice, I think. Here is an example.

A problem

- You have to explain why the solutions to $3x + 5 = 14$ and $6x + 10 = 28$ HAVE TO BE THE SAME.
- What could/should I say?

My LOOK FORS

- How do we get kids to not seek approval for every move?
- How do we get kids to persevere?
- How do we get them to want to go their own way and not conform?

My LOOK FORS

- How does a teacher use time more effectively?
- Some of it is having established routines, e.g. kids know that as soon as they come in, there is a question waiting for them or...

My LOOK FORS

- Do we spend too much time working on a single problem to completion too often?

My LOOK FORS

- Teaching through problem solving, but what does teaching through problem solving look like?

My LOOK FORS

- Attractive problems, but what kinds of problems attract kids?
- Generally they are not lengthy.
- They may or may not be real life, but they are “puzzlish”.

My LOOK FORS

- A focus on understanding rather than just repetition
- Recall our discussion of View 1 and View 2 teachers last time.

For example

- I might ask students for different ways to represent the equation $y = 3x + 10$. OR
- I might ask students to think about when representing $y = 3x + 10$ as an equation rather than a graph would be helpful.

My LOOK FORs

- Giving kids time to figure things out– not rushing.
- Do your teachers do too much telling or do they trust kids to figure it out?
- How much time do your teachers spend listening to what kids say rather than talking?
- How much more likely is it that when helping a struggling student teachers probe rather than show?

My LOOK FORs

- Do your teachers encourage divergent thinking, even in math?

My LOOK FORs

- Do strong students get enough extension or do they just do enough to show they have met expectations?

What really matters most

- Beyond a healthy, classroom environment where students are heard and are curious,.....

We need to change to

- A focus on reasoning and thinking and less doing
- And consolidations of lessons that focus on reasoning/thinking and not just sharing.

An example

- The main task for a grade 7 lesson might have been;



Create pairs of integers that meet the following requirements. Explain your thinking.

- a) The sum of a positive and negative integer is the same as the sum of two positive integers.
- b) The sum of a positive and negative integer is the same as the sum of two negative integers.
- c) The difference between a positive and negative integer is the same as the difference between two negative integers.

Possible solutions

- A) $8 + (-2) = 3 + 3$
- B) $-8 + 2 = -3 + (-3)$
- C) $8 - (-2) = -18 - (-12)$

Consolidation

- Could the sum of -40 and 8 have been the sum of two positives? Why not? (want students to see that the sum of positive and negative is the same as sum of positives ONLY if the positive is closer to 0 than the negative)
- Could the sum of -40 and 8 have been the sum of two negatives? Why? (as above)
- Want students to see that difference is about how far apart so just move everybody back the same amount.

Grade 9

The slope of a line is $\frac{2}{3}$. Provide the **coordinates** for two points on the line.

Consolidate questions

- Could $(1,3)$ have been on the line? Could $(5, -2)$?
- I want students to realize that ANY point could be on such a line.
- If it was on the line, name another point on the line and another one not.
- I want students to realize they just move 3 to the right and 2 up and get another point (but 3 to the right and 1 up does not work) or any multiple of 3 to the right and 1 up.
- Could (x,y) and $(x+4, y+ 6)$ be on the line? (x,y) and $(x + 6, y + 4)$?
- I want students to realize they just move any multiple of 3 to the right and 1 up but the 3 goes with y , not x .

We need to work on...

- Ensuring teachers view consolidation as a critical time to highlight the math we need students to attend to.

What I am working on

- Look for lists for:
- Observing students while in the classroom
- Observing teachers while in the classroom
- Off-line conversations with teachers about their instruction
- These are coming out soon.

Any questions?

- There is a little time (I hope) for a few questions from you.

Download

- www.onetwoinfinity.ca
- HWSec