IT'S NOT THE TASK!; IT'S THE FOLLOW-UP!

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IT'S SO SAD

- You find a great task and use it, but it doesn't feel great.
- Maybe it wasn't great, but maybe you just didn't get out of it what you could.

SOME EXAMPLES

- **I will draw examples from topics in Grades 6 to 8, so you can see how it's not just the task, but the follow-up that can make the difference.**

LET'S START WITH

- **It turns out that a school library is supposed to have between 15 and 20 books for each child.**

- **If a school has about 13,000 books and meets the recommendation for how many books per student, about how many students do you think the school might have?**

I SUSPECT

- **Some of you divided 13,000 by 15 or 20 to decide there were about 870 or 650 students, or somewhere between.**

FOLLOW UP

- **Could the school have 1000 students?**
- **Is the enrollment probably closer to 500 or 1000 or are you not sure? Why do you think that?**
- **500: 7500 – 10,000**
- **1000: 15,000-20,000**
- **Can you be sure how many students there are? Why or why not?**

FOLLOW UP

- **Why do some people think you find the answer by multiplying but some people think you should divide?**

- **If one school has double the enrollment of another and both follow the guidelines, could the larger enrollment school have an extra 5000 books? When would that happen?**

- **5000 extra books means 5000÷ 15 or 5000÷ 20 extra students, so 250 – 333 extra students.**

OR A TASK MIGHT BE

- Sometimes when you get instruction for building a geometric shape, you can only build one shape, sometimes a few, sometimes a whole lot and sometimes none.

- For example, there is only one shape possible if I ask for a square with a side length of 5 cm but lots of shapes possible if I ask for a shape with one square corner.

SO I MIGHT ASK

- **Without using my examples, give rules for each of these situations:**
- **Only one shape is possible**
- **Only a couple of shapes are possible**
- **Lots and lots of shapes are possible**
- **No shapes are possible**

OR A TASK MIGHT BE

- **Only one shape is possible (equilateral triangle with side length 10'')**
- **Only a couple of shapes are possible (rectangle with whole number length sides and perimeter of 10 cm)**
- **Lots and lots of shapes are possible (rectangle)**
- **No shapes are possible (Equilateral triangle with an angle of 40°)**
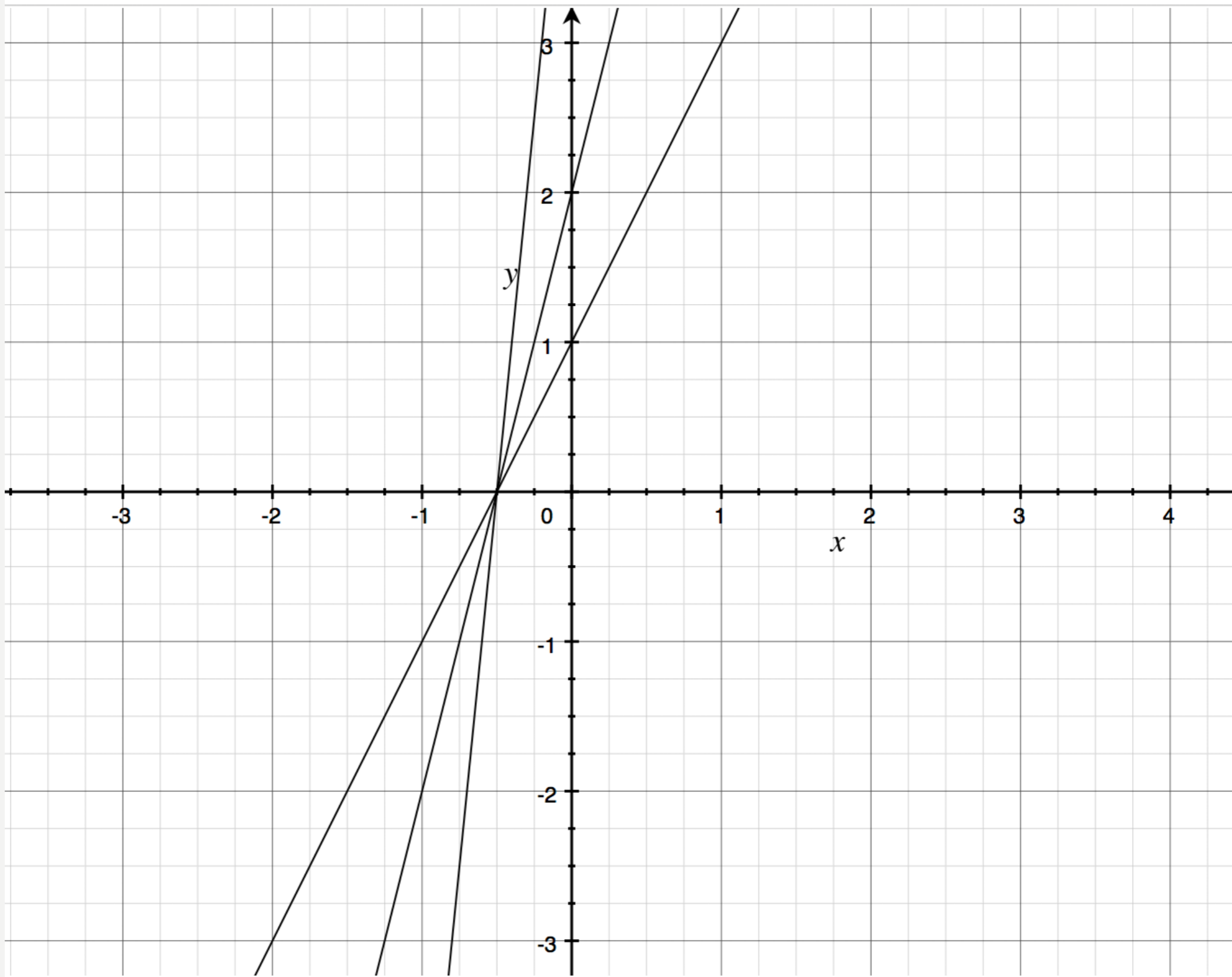
FOLLOW UP

- **Suppose you give someone two angles and one side length. Is it always possible to come up with a shape? Only one shape or a few or a lot?**

- **Suppose you are told every side length you are supposed to use, but none of the angles. Could it be impossible to make the shape?**

- **(E.g. can't make triangle with 3-4 -20)**

FOLLOW UP

- **Suppose you know all the angles of a shape but none of the side lengths. Is it possible there is only one shape?**

- **Suppose you know only one angle and one side length, could it be impossible to make the shape?**

ALGEBRA

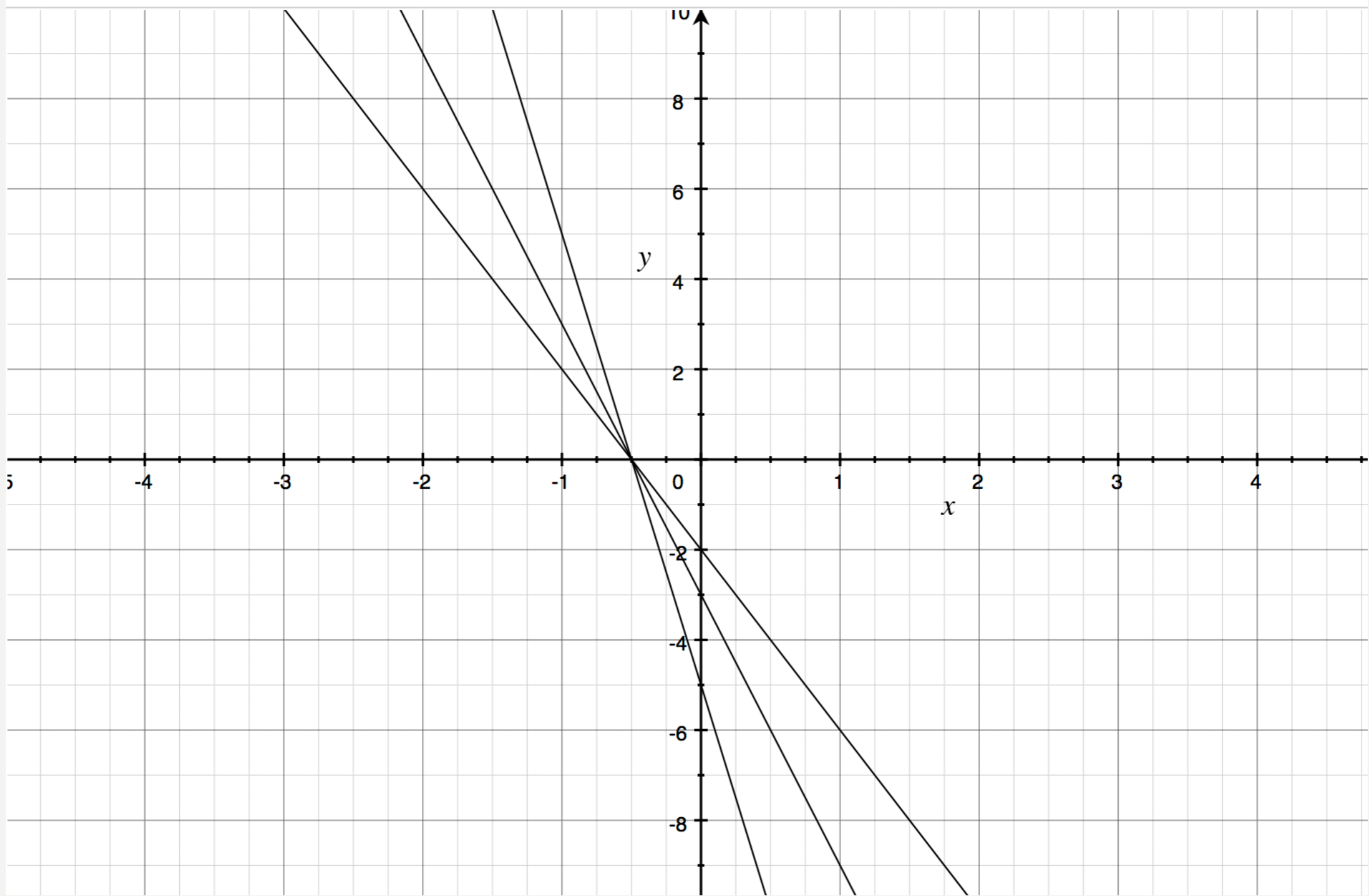- **Plot at least 5 lines of the form $y = 2mx + m$. (e.g. $y = 4x + 2$ or $6x + 3$ or...)**

SO WHAT DO I ASK?

- It could be *What do you notice?*
- But there are lots of other critical questions to ask.

SO WHAT FOLLOW-UP SHOULD I USE?

- **The lines we showed do not go through Quadrant IV. Could they?**

- **If any do, what else is true about them?**

SO WHAT DO I ASK?

- Why did they intersect where they do? (y =2mx + m)
- E.g. 4x + 2 = 6x + 3 if 2x = 1

SO WHAT DO I ASK?

- **Are you sure every other line of that form will also go through that point? How do you know?**

- **2mx + m = 0 if x = -0.5 no matter what the m value is.**

SO WHAT DO I ASK?

- **Do any of these lines or how many of them go through, e.g. (5, 2)?**
- **2 = 2m(5) + m**
- **2 = 11 m   m = 11**

SO WHAT DO I ASK?

- **What about through, e.g. (5,10)?**
- **$10 = 2m(5) + m$, so $11m = 10$**
- **Does one of these lines go through every point on the plane?**

SO WHAT DO I ASK?

- How would you change the task so the intersection happens at (+0.5,0). Why does your suggestion make sense?

- $y = -2mx + m$

SO WHAT DO I ASK?

- **Suppose the lines are of the form y = kmx + m for k ≠ 2.**
- **Will all of the lines for a particular value of k intersect? Where?**

ANOTHER TASK

- **This is a percent task.**

A POSSIBLE TASK

- **Oliver paid for a new game where the price was reduced by 50%.**
- **Jason paid for one where the price was reduced by 25%.**
- **They both paid an exact number of dollars (no cents).**

FOLLOW-UP QUESTIONS

- **Could Oliver (50% off) have paid more? How?**

- **Yes if Oliver's price was $50 and Jason's was $12.**

FOLLOW-UP QUESTIONS

- **Could Jason (25% off) have paid more? How?**

- **Yes if Jason's original price was $48 and Oliver's was $50.**

FOLLOW-UP QUESTIONS

- **Could Oliver (50% off) have paid more than $100? How?**

- **Yes, if original price was more than $200.**

FOLLOW-UP QUESTIONS

- **Could Jason (25% off) have paid more than $100? How?**

- **Yes if original price was more than $133.**

FOLLOW-UP QUESTIONS

- **What do you notice about every possible original price for Oliver (50% off)?**

- **What do you notice about every possible original price for Jason (25% off)?**
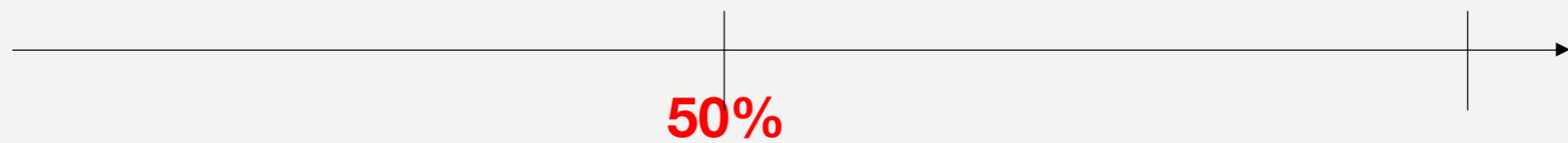
A POSSIBLE TASK

- **Could Oliver(50% off) and Jason (25% off) have paid the same amount?**
- **Yes- e.g. original Oliver is 150 and original Jason is 100.**
- **Is there more than one possibility?**
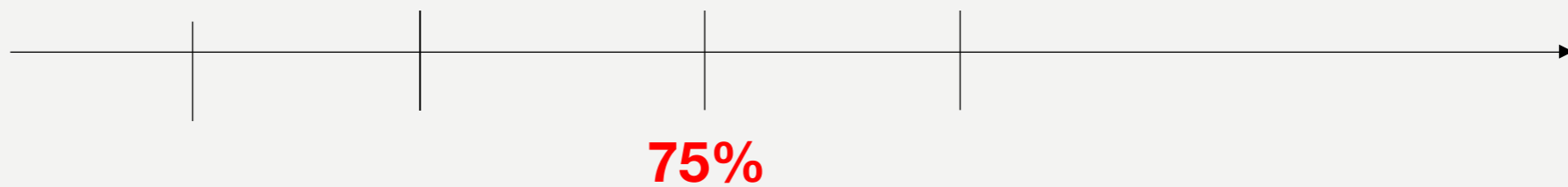- **Yes- e.g. original Oliver is 30 and original Jason is 20.**

MORE GENERALLY

- $0.50O = 0.75J$
- $50O = 75J$
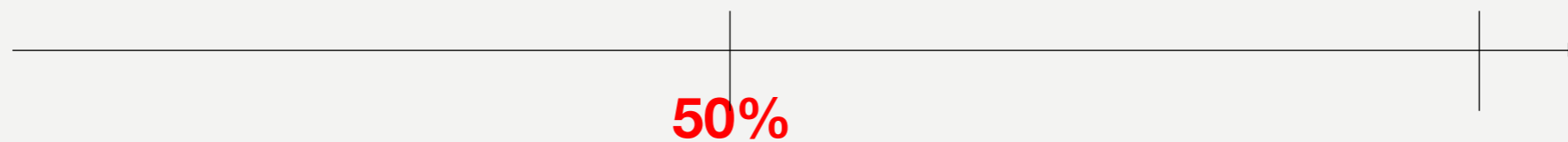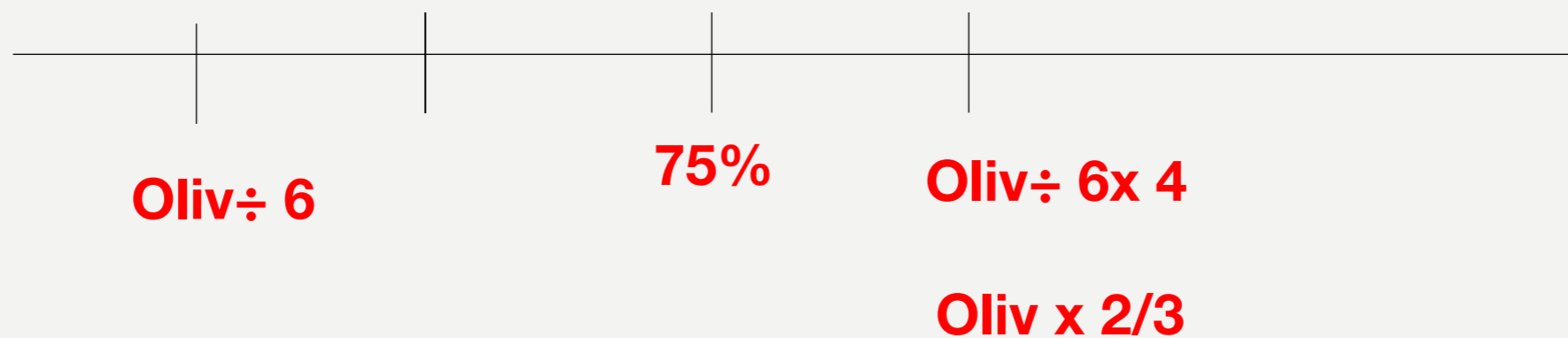- $2O=3J$
- $O = 1.5J$

A POSSIBLE VISUAL

- O

50%

- J

75%

A POSSIBLE VISUAL

- O

50%

- J

Oliv÷ 6

75%

Oliv÷ 6x 4

Oliv x 2/3

A POSSIBLE TASK

- **Create a set of at least 5 pieces of data where the median is 1/3 of the mean.**

MAYBE

- 5, 5, 10, 20, 110

- 10, 10, 30, 200, 200

QUESTIONS TO ASK

- **Could all of your data values be close? Explain why or why not.**

- **It means median is close to mean, so 3x and x are close; x is little**

QUESTIONS TO ASK

- **Could they be very far apart? Explain why or why not.**
- **Yes, e.g. if median is 100 and mean is 300, so 1, 1, 300, 598, 600**

POSSIBLE QUESTIONS

- **Could your data have an outlier?**
- **Maybe, e.g. 1, 1, 100, 100, 1298**

QUESTIONS TO ASK

- **Would it be easier or more difficult to come up with a set of data where the median was 3 times the mean?**

- **Explain.**

ANOTHER TASK

- **You divide two fractions and the numerator of the quotient is 12, i.e.   a/b ÷ c/d = 12/[].**

- **What are some possibilities for what the two fractions could be?**

- **E.g. 4/5 ÷ 8/3   4/a ÷ b/3**

I MIGHT ASK...

- **Could the first fraction be less than the second?**
- **Yes, e.g. 4/5 ÷ 8/3**
- **Could it be greater?**
- **Yes, e.g 4/2 ÷ 4/3**

I MIGHT ASK...

- **Could the first numerator be 8?**
- **E.g. yes 8/5 ÷ 2/3 = 24/10 = 12/5**

I MIGHT ASK...

- **Could the first numerator be 6?**
- **Yes, e.g. 6/3 ÷ 3/6 (36/9 = 12/3)**

I MIGHT ASK...

- **Are there values the first numerator cannot be?**

I MIGHT ASK...

- **Amy said that if the fractions are a/b ÷ c/d, then a•d must be 12.**

- **Do you agree?**

WHAT IS A RICH TASK?

- Is there such a thing?
- Or does it depend on what you bring out of it?
- I suspect you know what I'm thinking.

USUALLY

- **It helps if the question is open-ended and broad.**

- It is hard to do much with :

- What is the area of this circle?

3 cm

BUT WE'LL TRY

QUESTIONS TO ASK..

* How does the area change if the 3 cm becomes the radius and not the diameter?

QUESTIONS TO ASK..

- How does the area change if the 3 cm becomes the circumference and not the diameter?

QUESTIONS TO ASK..

- **How would I need to change the diameter to get exactly 1 more unit of area?**

I BELIEVE...

- **the trick is getting better at asking the follow-up questions.**

- **You can see that you need tasks that are not too closed and not too low-level or else you really need to learn to extend them.**

I STRONGLY BELIEVE

- **that, other than loving to work with kids,**

- **asking strong questions is one of the critical parts of good teaching**

I STRONGLY BELIEVE

- **that there are tasks with little potential and tasks with more, but…**

- **there is no such thing as a rich task.**

I HOPE

- **that being specific, as I have, will help you see exactly what I mean.**

PRESENTATION WILL BE AVAILABLE, IF YOU WISH

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