Using Open Questions to Create Open Students

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Grade focus

• Suggestions today will deal with K- Grade 8.
• I use open questions for four reasons:
  • To allow entry to all
  • To give strong kids more to chew on
  • To create rich conversations
  • To change student perception of what math is
Sample questions

• A number is represented using base ten blocks.

• There are exactly three fewer ten-rods than one cubes. What could the number be?
Sample questions

• Yes it could be 14 or 25 or 36, but...

• It could also be 91 (8 tens and 11 ones) or 223 (20 tens and 23 ones)
Sample questions

• What are reasonable names for the two numbers represented by $s$?
Sample questions

• It could be 3 and 4 OR 100 and 115 OR....
Sample questions

• A fraction is just a LITTLE more than $\frac{1}{2}$.
• What could it be?
Sample questions

• Yes it could be $\frac{5}{8}$, but it could also be $\frac{5001}{10,000}$ or it could be $\frac{5}{9}$. 
Sample question

• You know that triple a number is less than 50.
• What else do you know about it?
Sample question

• Not only is it less than $16 \frac{2}{3}$, but

• It is less than 17 or 100 or....
Sample questions

• You buy 2 items for less than $5 and 2 items for more than $5.
• You spend not too much more than $30.
• What could the items cost?
Sample responses

• $1, $1, $15, $15
• $1, $3, $13, $14
Sample questions

• ____ is \( \frac{4}{5} \) of _____.
• OR
• ____ is 4 more than _____.
• OR
• ____ is 3 times as much as _____. 
Sample questions

• Represent $\frac{2}{3}$ in two different ways that show something entirely different about $\frac{2}{3}$. 
Sample questions

• Maybe:
• The product of two numbers is in the 20s.
• What could they be?
• The product of two numbers has a 2 in the tens place.
• What might the numbers be?
Sample responses

• It could be simple like 5 x 5 or 6 x 4...

• Or it could be something like 25 x 25.
Sample questions

• Choose two fractions to add so the answer is a little less than $1\frac{1}{4}$.
Sample questions

• You use an operation with two fractions. The result is $\frac{19}{15}$.

• What fractions? What operation?
Sample questions

• Describe a situation that would lead you to divide $\frac{2}{3}$ by $\frac{1}{4}$.
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 responses

• \( \frac{9}{10} \times \frac{21}{2} \)

• \( \frac{99}{100} \times \frac{21}{3} \)
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

• 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 responses

• Choose prices so it costs just a LITTLE more for 1 shirt than one pair of shorts.
• 3 shirts cost $30
• 5 pairs of shorts cost $45.
Sample responses

• Choose prices so it costs just a LITTLE more for 1 shirt than one pair of shorts.
• 3 shirts cost $30
• 5 pairs of shorts cost $49.
Sample questions

• Choose values for a, b, c.
  \[ \frac{a}{b} = \frac{c}{x} \]

• Write a story that would be solved by solving your proportion.
Or for primary

• Write an equation:
• \[ \underline{\text{____}} \div \underline{\text{_____}} = [\underline{} + \underline{\text{______}}] \]

• Write a story that would be solved by using your equation.
Sample questions

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

• Choose a car speed (or price for 6 items). Describe that speed (or price) using as many rates as you can.
Sample questions

• An algebraic expression has the value 25 when \( x = 5 \).
• What might the expression be?
Sample questions

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

• For what values of [] is $4 + [] = [] + 2 + 2$?

• Create an equation involving variables and division signs that you know is ALWAYS true. Tell why it is true.
Sample questions

• For what values of $p$ is $3p \div 4 = (9p + 12) \div 3$?

• Create an equation involving variables and integer exponents that you know is ALWAYS true. Tell why it is true.
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?
Or for younger grades

• The equation \([\square] - 5 = 15\) describes two very different situations. What might those situations be?
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 do you think are most alike and why?

$Y = 3x - 4$
$Y = 3x + 8$
$Y = -3x - 4$
Sample questions

• Which two of these patterns do you think are most alike and why?
Sample Question

• You use base ten blocks to build a rectangle.
• There are 2 rows of 5 blocks.
• What might the length, width and area have been?
Maybe
Maybe
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.
Getting students and parents comfortable

• Unless they are very young, it takes a bit of effort.

• Let’s talk about that a bit.
Opening up Strategies

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

[e.g. You subtracted and the answer is \(18\) OR \(\frac{4}{5}\). What might you have subtracted?]
Opening up Strategies

• Look for similarities and differences.
  [e.g. How is multiplying by 9 like multiplying by 99? How is it different?
  How is 8 like 80? How is it different?]
Opening up Strategies

• Leave pieces of the question out.
  e.g. [] x 3[] is more than 100. Choose numbers for the blanks to make it true. OR
  Choose numbers for the blanks. []x – [] is more than 50 when x = 10.
Opening up Strategies

• Create a sentence.

[e.g. Create a sentence that uses the words and numbers:

*cookies 20 2 8*

*faster 30km per 800]*
Opening up Strategies

• Give me a WRONG answer. Tell me why it’s wrong.
  [e.g. Tell me a value that 42 + 79 CANNOT be. Tell me why.
  Tell me a value that x CANNOT be if 4:x = 175:312.]
Any questions?

• Do you want to raise any questions now?
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