Strategies to Open (Modify) Tasks*

Goal: Increase the level of thinking required by certain mathematical tasks so that students can engage with the content more meaningfully.

Strategies to Open Tasks

1. Turn around the question
2. Remove constraints
3. Ask for similarities and differences
4. Ask for reasoning
5. Turn into Notice & Wonder
6. Use "soft" words
7. Give the answer and ask for the question
8. Prompt students to debate which is the "better way"

Strategies in Action

1. <u>Turn around the question</u>
   Rather than ask students for the answer when there is only one possible correct response, ask them to think about possible answers by incorporating the solution from the closed scenario into the open scenario.

   - ➢ CLOSED: Find the difference between 23 and 7.
   - ➢ **OPEN**: *The difference between two numbers is 16. What might the numbers be? Explain your thinking. (This can be used with integers in 7th grade as well.)*

   - ➢ CLOSED: Round 56.34 to the nearest whole number.
   - ➢ **OPEN**: *A number has been rounded to 56. What might the number be?*

   - ➢ CLOSED: Jonathan started his homework at 3:45 pm and finished his homework at 4:55 pm. How long did it take him to complete his homework?
   - ➢ **OPEN**: *Jonathan spent 1 hour and 10 minutes on his homework. When could he have started and when could he have finished his homework?*

   - ➢ CLOSED: Simplify $x^4y^3 \cdot 3x^{-2}y^2$
   - ➢ **OPEN**: *Write an expression that simplifies to:* $3x^2y^5$

2. <u>Remove or change the constraints</u>
   Rather than state the specific parameters in the problem, create a problem that allows for multiple solutions before introducing the closed version.

   - ➢ CLOSED: How many quarts are in 2 gallons?
   - ➢ **OPEN:** *What ways can you make 2 gallons using any combination of cups, quarts, gallons, pints, or ounces?*

   - ➢ CLOSED: The mean of 4 consecutive even numbers is 41.
   - ➢ **OPEN:** *The mean of 4 numbers is 41. What could the numbers be?*

3. <u>Ask for reasoning</u>

   - ➢ CLOSED: Which is greater: ⅖ or ¾?
   - ➢ **OPEN:** *Write two fractions with different denominators and explain how you could compare them.*

   - ➢ CLOSED: What is the width of this rectangular prism if V= 56 cm³, l = 7 cm, and h = 4 cm.
   - ➢ **OPEN:** *If you know the length of two edges of a rectangular prism and you know the volume, explain how you might find the length of the other edge?*

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4. <u>Ask for similarities and differences</u>
   Rather than ask students to make a specific comparison, ask students how two or more things (numbers, shapes, graphs, probabilities, measurements, etc.) are the same and how they are different.

   ➢ CLOSED: List the attributes of a rectangle.
   ➢ **OPEN:** *How is a rectangle similar to a square? How are they different?*

   ➢ CLOSED: In the line plot above, what's the most number of books a student read? The least?
   ➢ **OPEN:** *In the line plots above, what's similar about the data and what's different?*

5. <u>Turn into Notice & Wonder</u>
   Make it a statement by deleting the question. Then turn it into a Notice & Wonder. Have students answer one of their questions they came up with or reveal the "real" question to have everyone solve after they noticed and wondered. You can discuss what notices were especially helpful for solving the problem.
   more information at https://www.nctm.org/Classroom-Resources/Problems-of-the-Week/I-Notice-I-Wonder/

   ➢ CLOSED: Cat food comes in 22 lb bags. My cat eats 7 lbs a month. How many bags do I need a year?
   ➢ **OPEN:** *Cat food comes in 22 lb bags. My cat eats 7 lbs a month. What do you notice? What do you wonder?*

   ➢ CLOSED: The rule of the pattern is the number of circles increases by three. What is the 6th term?
   ➢ **OPEN:** *Here is a pattern made with circles. What do you notice? What do you wonder?*

6. <u>Use "soft" words</u>
   Allow for numbers or sketches that are "close to", "might be", "estimates of" a scenario, rather than an exact solution or graph.

   ➢ CLOSED: 30 x 20 =
   ➢ **OPEN:** *What are two numbers whose product is almost 600? Explain.*

   ➢ CLOSED: Create a rectangle with an area of 20 square inches.
   ➢ **OPEN:** *Create two rectangles with different, but close to each other, areas.*

7. <u>Give the answer and ask for the question</u>

   ➢ CLOSED: How many nickels are needed to make $0.45?
   ➢ **OPEN:** *What could the question be if the answer is 9 nickels?*

   ➢ CLOSED: 3 ¾ - 1 ¼ =
   ➢ **OPEN:** *The solution to a subtraction scenario is 2 ¼. What could the scenario be?*

8. <u>Prompt students to debate which is the "better way" or compare different strategies</u>
   Pose a problem that has been solved in at least two different ways with all the thinking shown. Then have your students discuss the strategies.
   examples and more information at https://scholar.harvard.edu/contrastingcases/book/materials-0

   ➢ CLOSED: Solve for x when x/4 – x/5 = -2
   ➢ **OPEN:** *Alex and Morgan solved x/4 – x/5 = -2 in two different ways. Which is the better way? Why?*

   ➢ CLOSED: Solve 4302-299
   ➢ **OPEN:** *On the board are different ways another class solved the problem. What's similar about the strategies. What's different? Is there one that you'd like to use in the future?*

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