Teaching Mathematics Through Literature and Problem Solving

Algebra I

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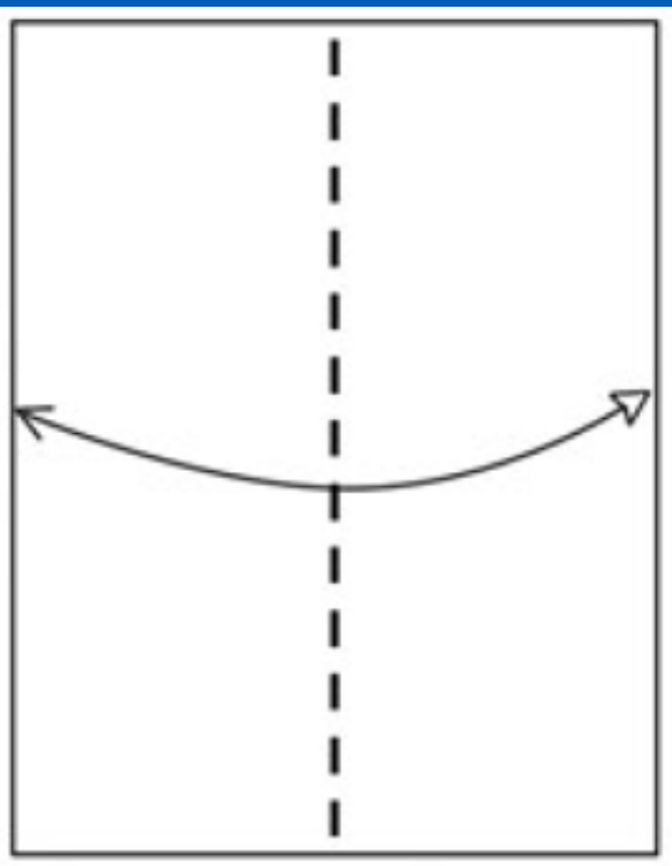
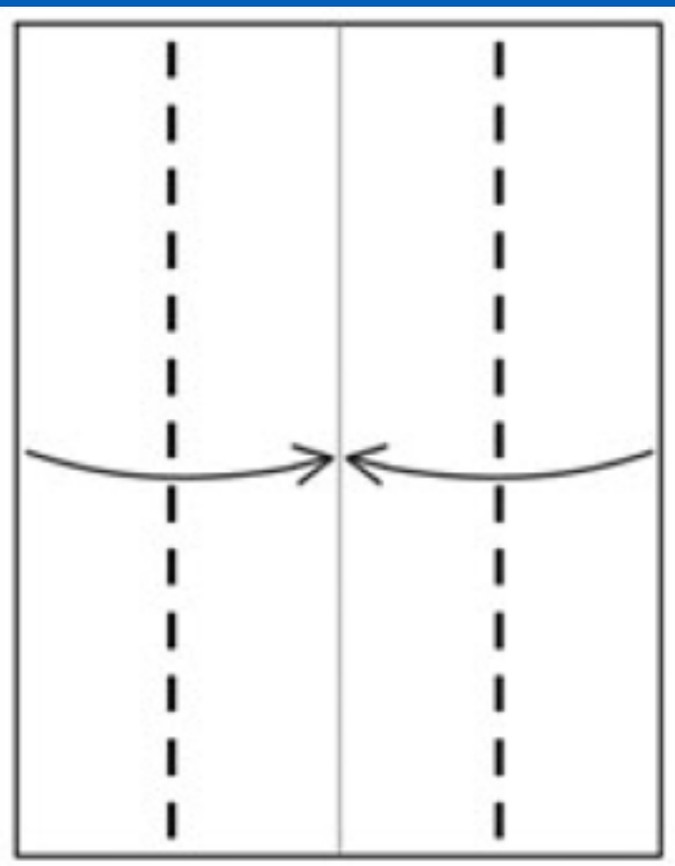
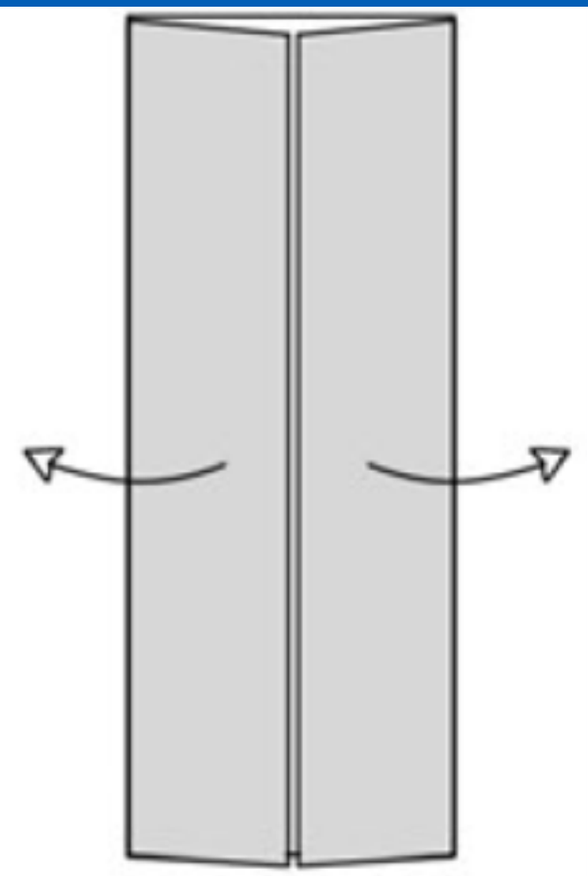


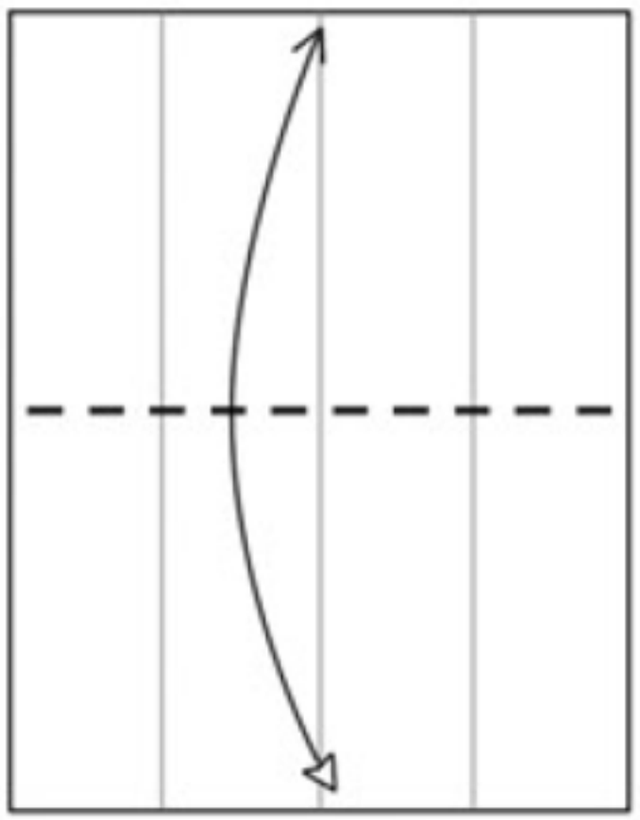
1. Begin white side up.
Valley fold and unfold.



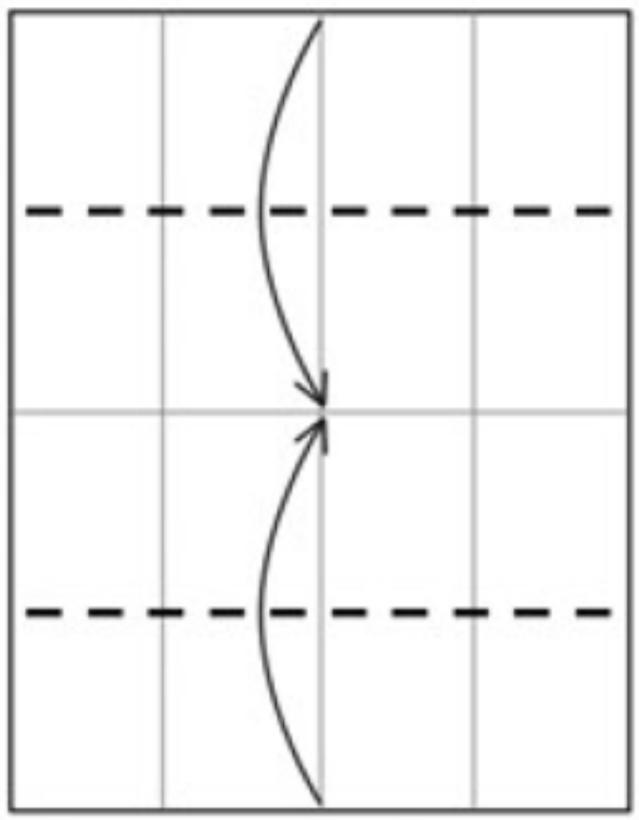
2. Valley fold the sides to the center.



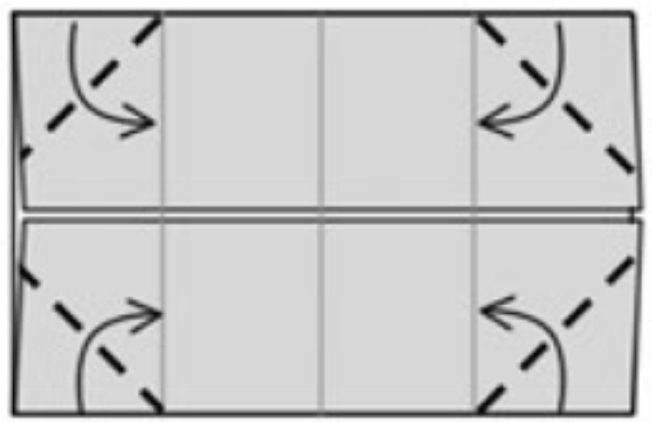
3. Unfold.



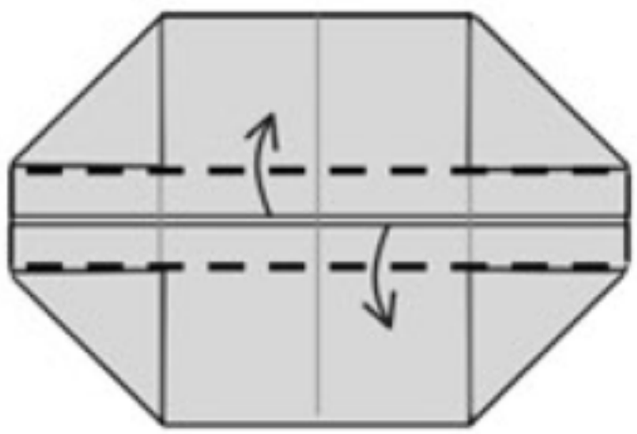
4. Valley fold and unfold.



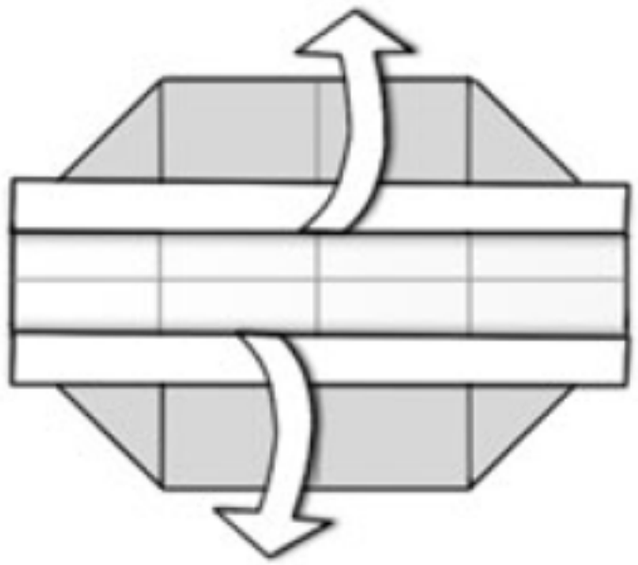
5. Valley fold to the center.



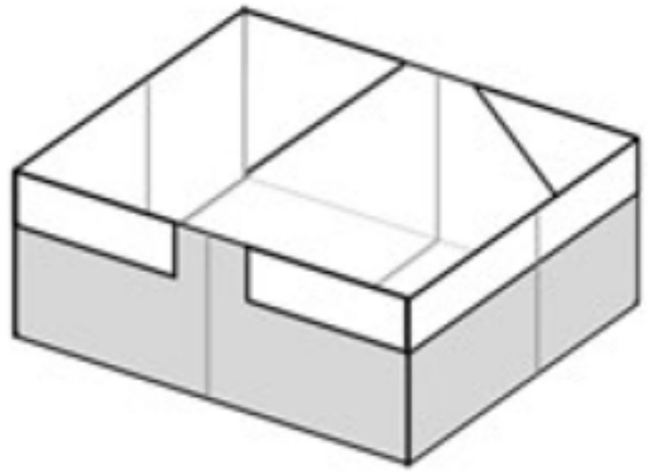
6. Valley fold the folded edge to the crease line. Repeat on the all corners.



7. Valley fold the edges.



8. Open up and shape into a box.



9. Box completed.
If you want to make a lid, the size of the box bottom's paper should be slightly smaller.

Conceptual Understanding

Rigor

Depth of Knowledge - DOK

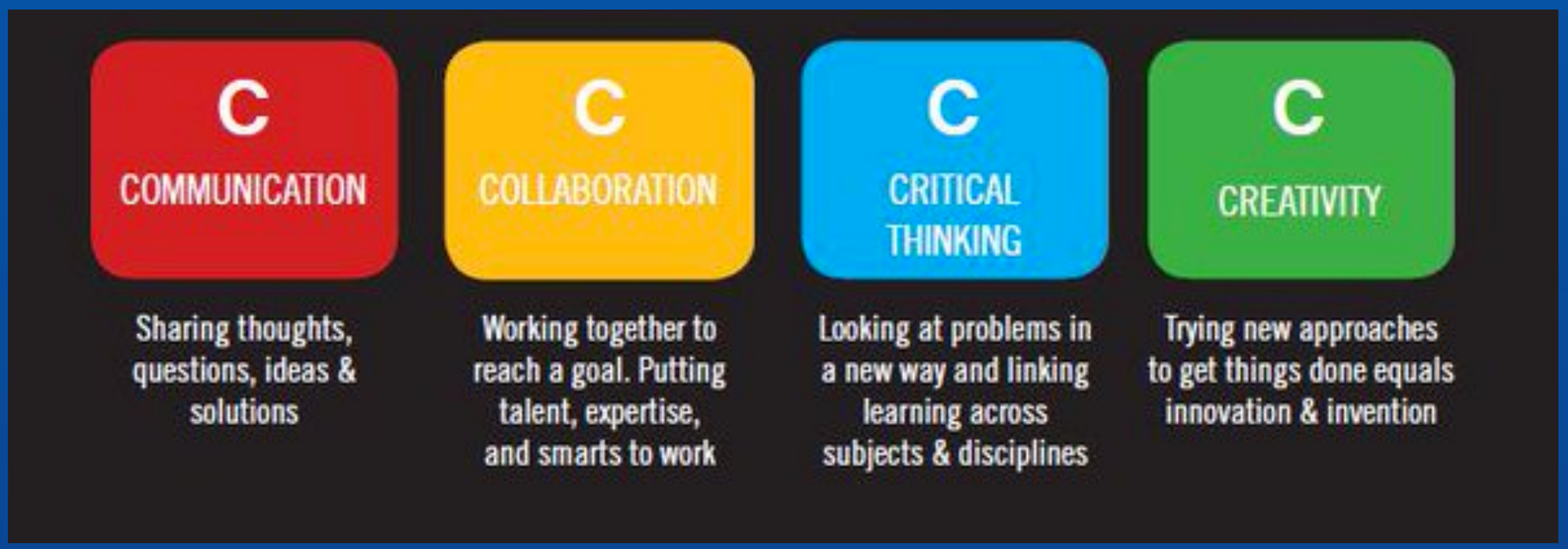
Conceptual Understanding
Rigor
Depth of Knowledge - DOK

- What do each of these terms mean?
- What are teachers doing if these are evident in the math classroom?
- What are students doing if these are evident in the math classroom?

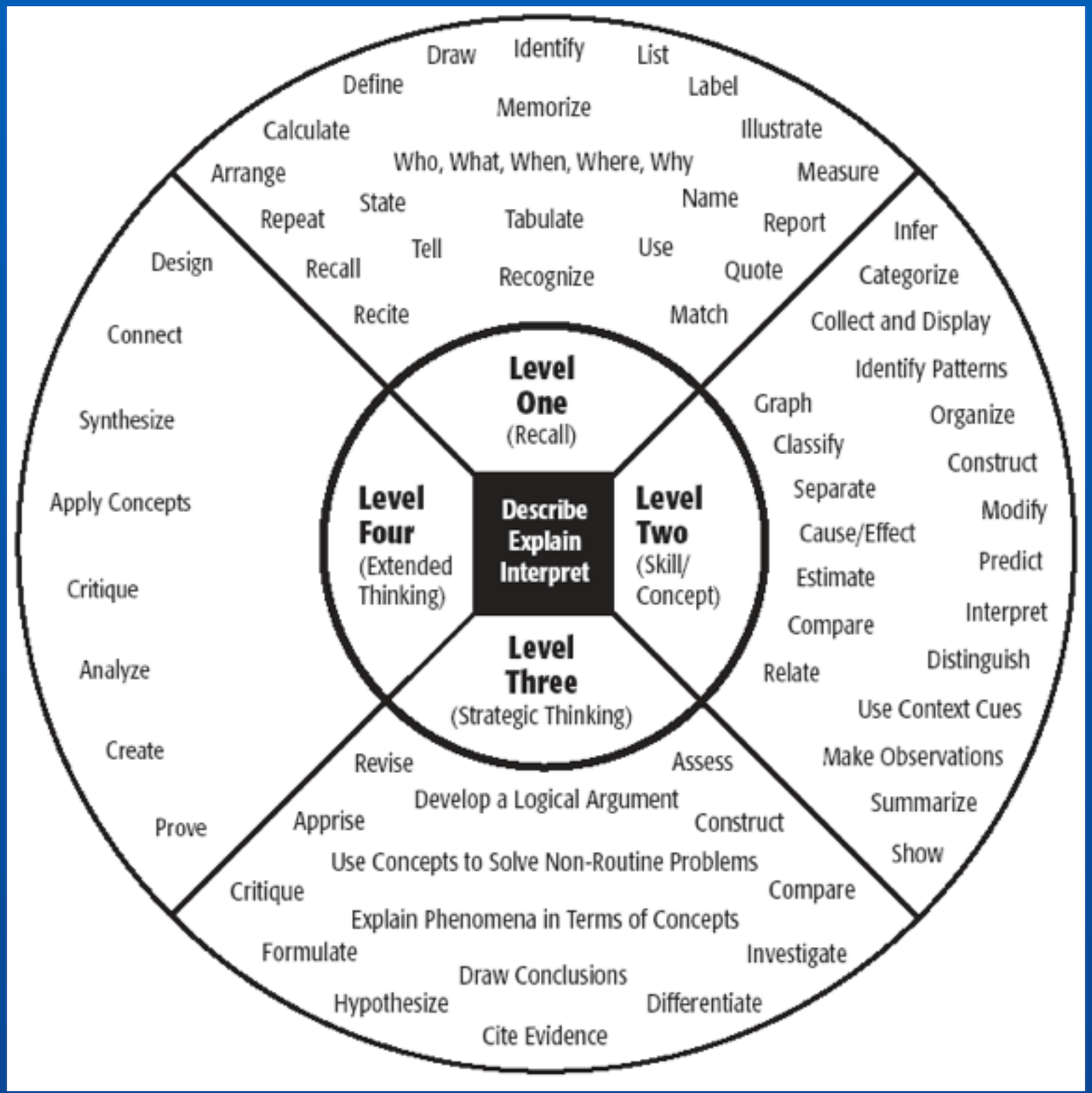
7 Myths of Rigor

1. Lots of homework is a sign of rigor.
2. Rigor means doing more.
3. Rigor is not for everyone.
4. Providing support means lessening rigor.
5. Resources equal rigor.
6. Standards alone take care of rigor.
7. Rigor is just one more thing to do.

Rigor is creating an environment in which…

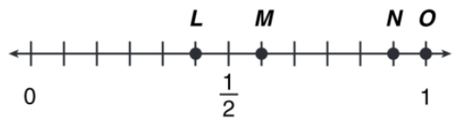
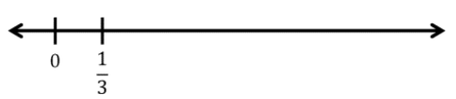
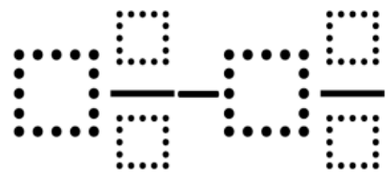


D.O.K.


Level One
(Recall)
Level Two
(Skill/ Concept)
Level Three
(Strategic Thinking)
Level Four
(Extended Thinking)
Describe
Explain
Interpret
Draw
Identify
List
Define
Label
Memorize
Calculate
Illustrate
Who, What, When, Where, Why
Arrange
Measure
State
Name
Repeat
Tabulate
Report
Tell
Use
Design
Recall
Quote
Recognize
Recite
Match
Connect
Infer
Categorize
Collect and Display
Identify Patterns
Synthesize
Graph
Organize
Classify
Construct
Apply Concepts
Separate
Modify
Cause/Effect
Critique
Predict
Estimate
Interpret
Compare
Analyze
Distinguish
Relate
Use Context Cues
Create
Make Observations
Revise
Assess
Summarize
Develop a Logical Argument
Prove
Apprise
Construct
Show
Use Concepts to Solve Non-Routine Problems
Critique
Compare
Explain Phenomena in Terms of Concepts
Formulate
Investigate
Draw Conclusions
Hypothesize
Differentiate
Cite Evidence

D.O.K.

DOK | Distinguishing Between Depth of Knowledge Levels in Mathematics

Topic	Adding Whole Numbers	Money	Fractions on a Number Line	Area and Perimeter	Subtracting Mixed Numbers
CCSS Standard(s)	• 1.NBT.4 • 2.NBT.5	• 2.MD.8	• 3.NF.2	• 3.MD.8 • 4.MD.3	• 5.NF.1
DOK 1 Example	Find the sum. $44 + 27 =$	If you have 2 dimes and 3 pennies, how many cents do you have	Which point is located at $\frac{7}{12}$ below? 	Find the perimeter of a rectangle that measures 4 units by 8 units.	Find the difference. $5\frac{1}{2} - 4\frac{2}{3} =$
DOK 2 Example	Fill in the boxes below using the whole numbers 1 through 9, no more than one time each, so that you make a true equation. $\square\square + 53 = \square\square$	Make 47¢ in three different ways with either quarters, dimes, nickels, or pennies.	Label the point where $\frac{3}{4}$ belongs on the number line below. Be as precise as possible. 	List the measurements of three different rectangles that each has a perimeter of 20 units.	Create three different mixed numbers that will make the equation true by using the whole numbers 1 through 9, no more than one time each. You may reuse the same whole numbers for each of the three mixed numbers. $5\frac{4}{5} - \square\frac{\square}{\square} = 3\frac{1}{20}$
DOK 3 Example	Make the largest sum by filling in the boxes below using the whole numbers 1 through 9, no more than one time each. $\square\square + \square\square =$	Make 47¢ using exactly 6 coins with either quarters, dimes, nickels, or pennies.	Create 5 fractions using the whole numbers 0 through 9, exactly one time each as numerators and denominators, and place them all on a number line.	What is the greatest area you can make with a rectangle that has a perimeter of 24 units?	Make the smallest difference by filling in the boxes below using the whole numbers 1 through 9, no more than one time each. 

Rational Numbers

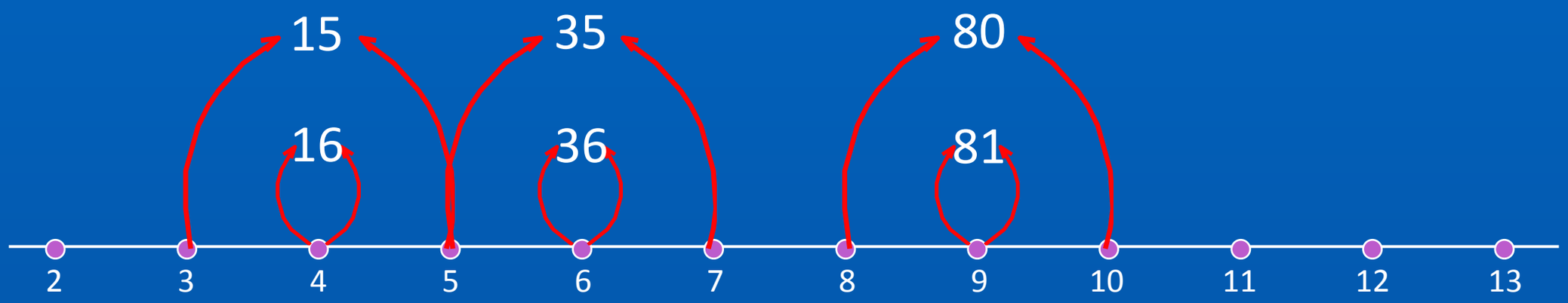
Using the numbers -5 to 5 at most once each, write an expression that will have the greatest (or least) absolute value.

$$\frac{\square}{\square}(\square - \square) - \square(\square - \square)$$

Teaching Without Talking

Shhh… Students Thinking

Source: Paul Goldenberg

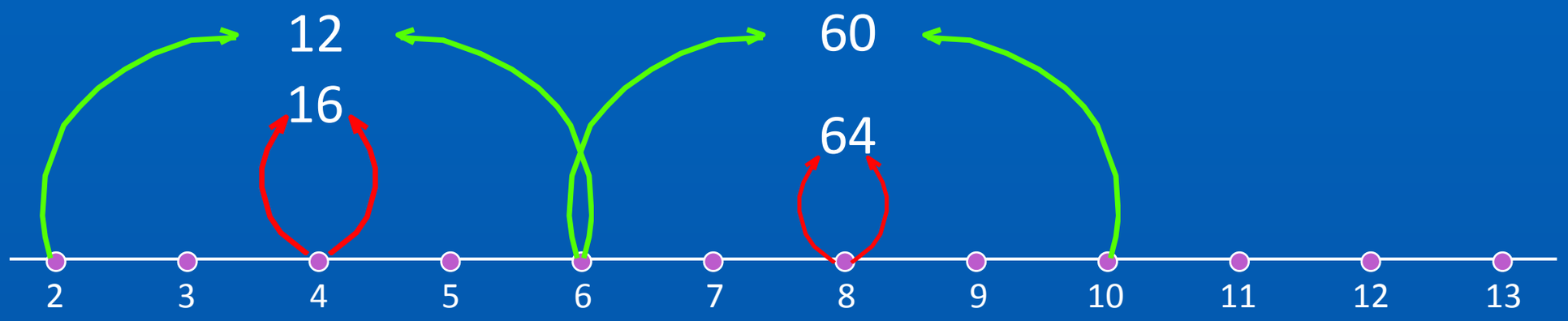


Wow! Will it always work? Big numbers?

Teaching Without Talking

Shhh… Students Thinking

Source: Paul Goldenberg



Again!? Always? Try some bigger numbers.

Take it even further…

Source: Paul Goldenberg

What about 3 steps out?

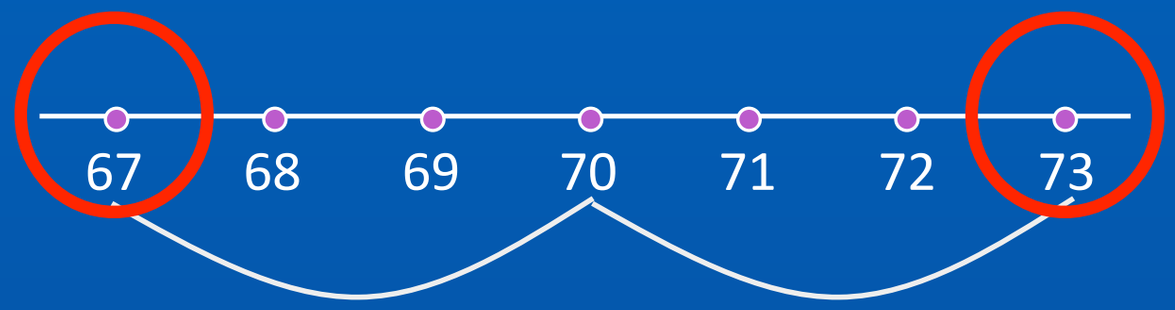
What about 4?

What about 5?

"Hey, Mom. Give me a 2-digit number."

"Ok, 73."

"Great."



"I choose 67. Multiply 73 x 67 and see if you can beat me (and you can use a calculator)."

Think...

70 x 70 = 4900

3 x 3 = 9

4900 - 9 = 4891