$3x + 5y = 15$

What IS and what COULD be...

Thoughtful Problem Posing for More Effective Learning Outcomes

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$25/4 + 8y = 52/4$

$5(5/4) + 8y = 13$

Welcome to NCTM ‘23 in DC!

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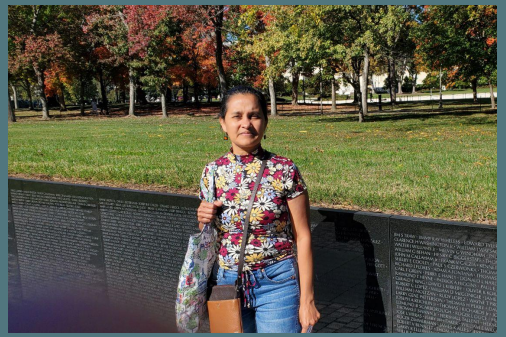

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Thinking Task #1:

What could be the area of a rectangle, given that its perimeter is 24?

DESMOS

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x_1	y_1
11	1
10	2
9	3
8	4
7	5
6	6
8.5	3.5

DESMOS

$y_1 \sim ax_1 + b$

STATISTICS

$r^2 = 1$

$r = -1$

RESIDUALS

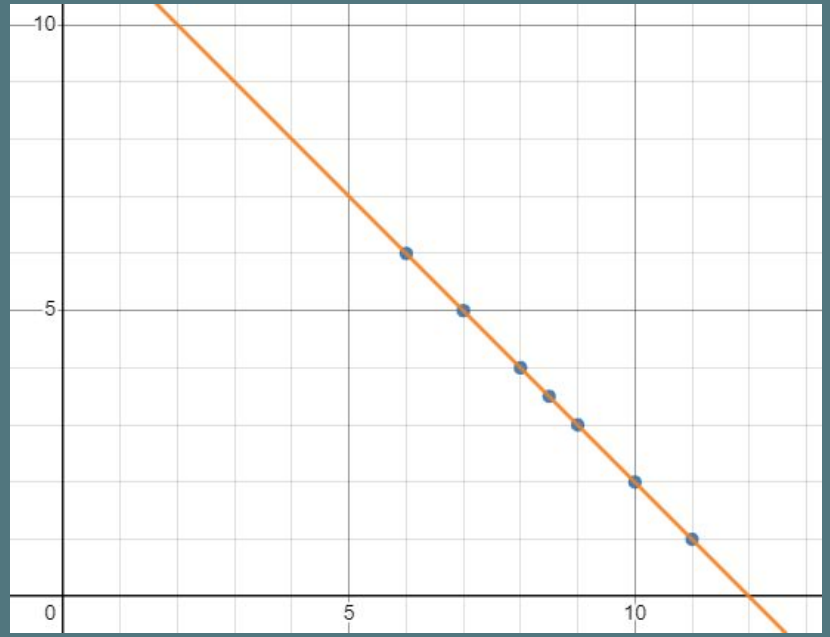
e_1 plot

PARAMETERS

$a = -1$

$b = 12$

Y = -X + 12



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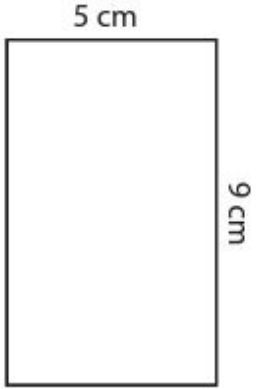
Typical Math Text Problems

Find the perimeter of each rectangle.

1)



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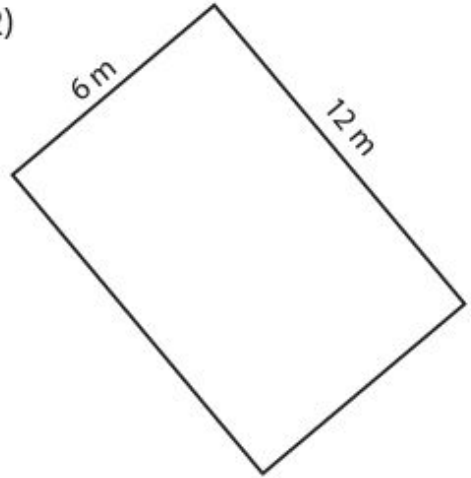


3)

Depth of Knowledge (DOK)

DOK Level 1
Recall

Basic recall of info such as facts, definitions, or using a formula.

DOK Level 2
Skills & Concepts

Complete multiple steps in order to find a solution to a problem.

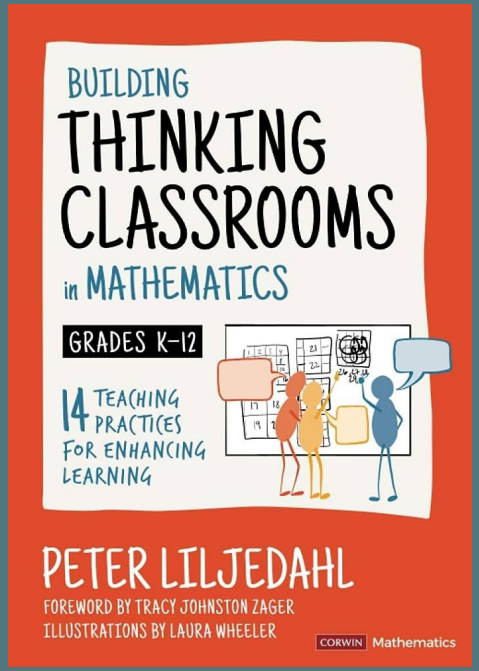
DOK Level 3
Strategic Thinking

Reasoning, planning, using evidence, higher level of thinking.

DOK Level 4
Extended Thinking

Complex reasoning, developing or thinking over a period of time.

Thinking Classroom



Thinking Task #2:

What could be the perimeter of a rectangle, given that its area is 60?

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One Inspiration for Today's Topic

Problem in the textbook:

Anya has 12 seashells. She gives 5 seashells to a friend. How many seashells does she have left?

Sonali's version:

Anya has 12 seashells. If she gives some to her friend and keeps some for herself, how many could she give away and how many would she have left for herself?

Typical Math Classroom

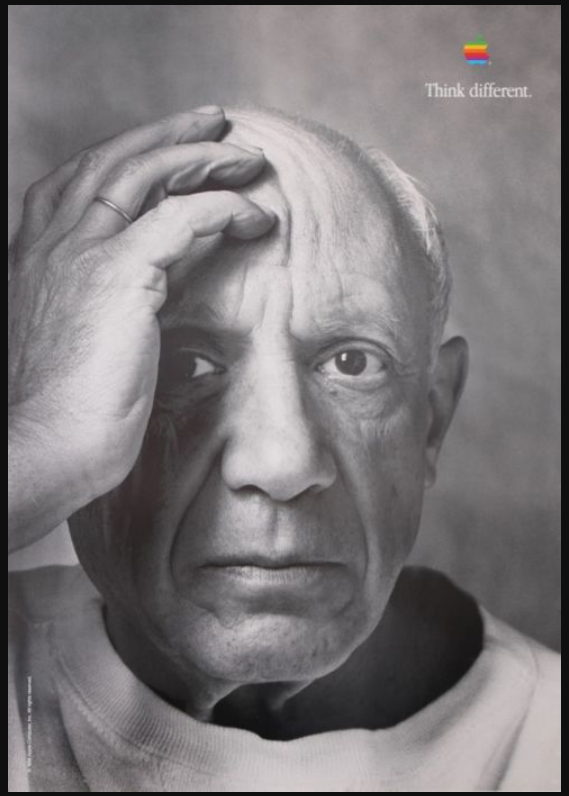
- Lacks creativity and imagination
- Students follow teacher directions (mimic)
- One preferred (teacher) path to a solution
- Fastest students get the attention
- All about answer-getting
- Low engagement

A Better Math Classroom

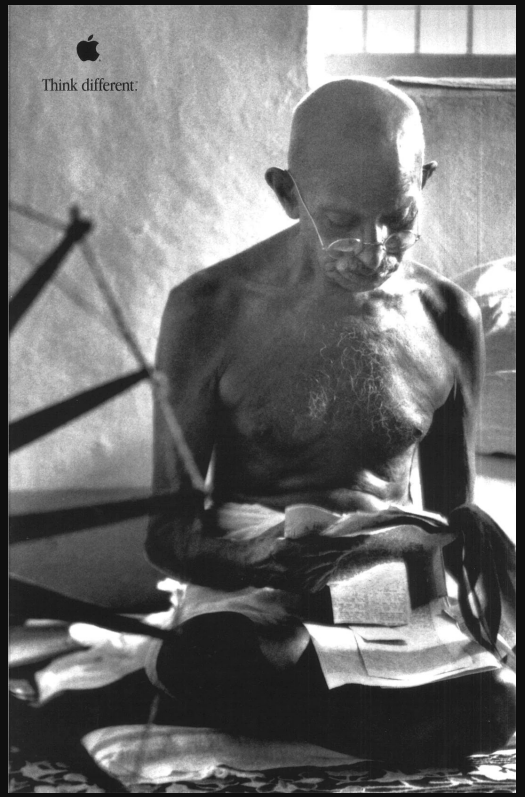
- Student-centered
- Builds on what students already know
- Allows for creativity
- Allows for multiple pathways to solutions
- Respects and honors the voice and mathematical thinking of ALL students

Math is ...

Think different.


Think different.

Think different.


Think different.

Teach Differently than you were taught

1. Eliminate “I do, we do, you do”
2. Fewer topics, More depth
3. Don’t *cover* math – *uncover* it instead
4. Rethink homework, traditional assessments
5. Make math more meaningful and enjoyable
6. Regularly use non-curricular math tasks
7. Take daily “field trips” outside of the textbook
8. Use technology where appropriate

Thinking Task #3:

If the graph of a linear equation passes through the point (3, -2), what could be the equation of the line?

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Thinking Task #4:

If the graph of a linear equation passes through the point (-4, 1) and has a positive y-intercept, what could be the equation of the line?

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Thinking Task #5:

If the solution to a system of two equations is (-3, -5), what could be the two equations in the system?

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Thinking Task #6:

If the volume of a right cylinder is 72π cubic cm, what could be the dimensions of the cylinder?

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Thinking Task #7:

If the midpoint of two given points is (2, -5), what could the coordinates of the two points?

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Thinking Task #8:

If the area of a right triangle is 30 square units, what could the hypotenuse of the triangle be?

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Thinking Task #9:

A jar contains blue and red marbles, such that the probability of selecting a blue marble at random is 2/5. What could be the number of blue and the number of red marbles in the jar?

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Thinking Task #10:

A jar contains blue and red marbles. If you draw two consecutive marbles, without replacement, the probability that they are both red is 1/3. What could be the number of blue and the number of red marbles in the jar?

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Let's Write a New Problem #1

Simplify each expression.

1) $(5p^2 - 3) + (2p^2 - 3p^3)$

14) $(9r^3 + 5r^2 + 11r) + (-2r^3 + 9r - 8r^2)$

Let's Write a New Problem #2

Find the distance between each pair of points.

10) $(8, 5), (-1, 3)$

11) $(-10, -7), (-8, 1)$

Let's Write a New Problem #3

Given the first term and the common difference of an arithmetic sequence find the first five terms and the explicit formula

11) $a_1 = 28,\ d = 10$

13) $a_1 = -34,\ d = -10$

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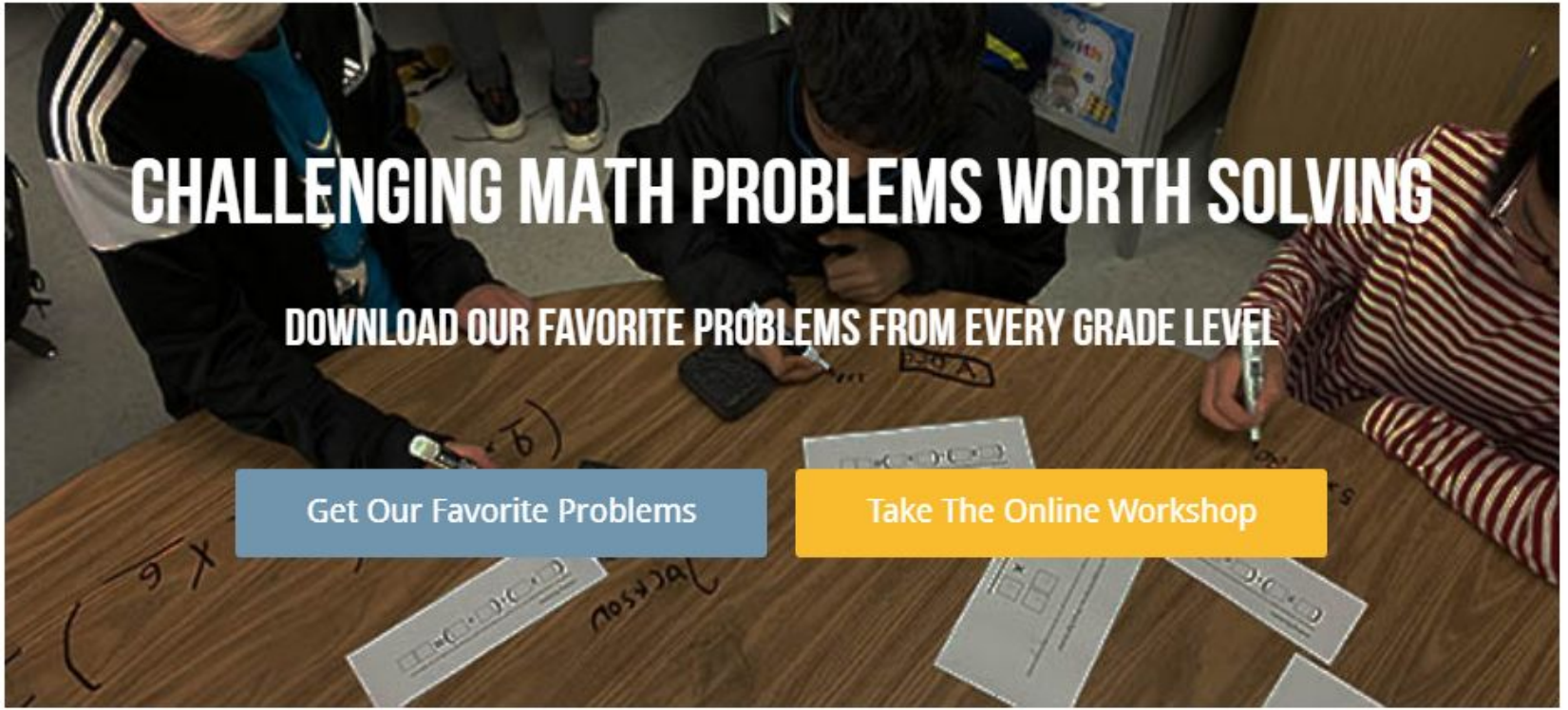
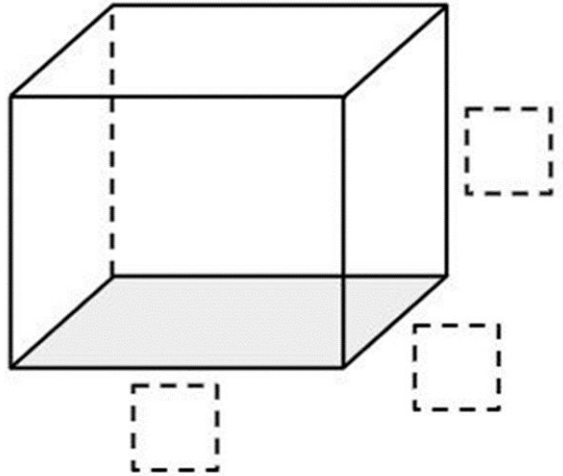
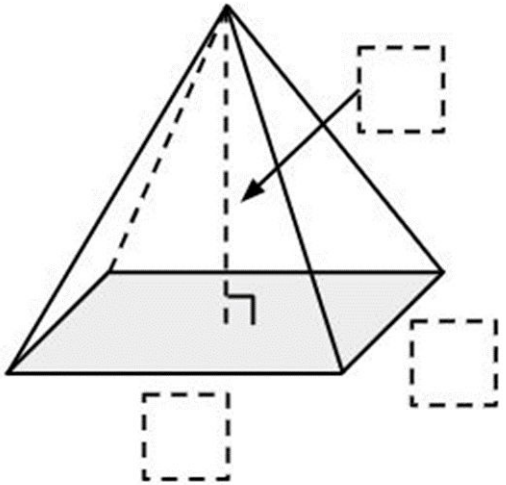


Directions: Using the digits 0 to 9 at most one time each, fill in the boxes to write three equations whose solution is -1/2.

$$\square x + \square = \square x + \square$$

Directions: Using the digits 1 to 9 at most one time each, place a digit in each box to list the dimensions of a rectangular prism and rectangular pyramid so that both shapes have equal volumes.





Directions: Using the digits 0 to 9 at most one time each, place a digit in each box to create a true statement.

$$\frac{\square(x+\square)(x-\square)}{\square(x^2+\square x-\square\square)}=\square$$

Directions: Using the digits 1 to 9, at most one time each, to fill in the boxes to make each expression evaluate to a perfect square number.

$18 \times \square \times 2$

$\square \times 15 \times 3$

$\square \times 14 \times \square$

$2 \times \square$

$6 \times \square \times 2 \times \square$

Thank you for being with us!

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