Noticing and Wondering in the Elementary Grades

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Slides and links to related resources will be available on my blog after the talk:

annie.mathematicalthinking.org


WORLD'S
ASANT


Huron
HOME
OF THE WORLD'S
LARGEST PHEASANT

Story Time

What Did You Hear?

Let's Hear It Again

What Did You Hear?

I Notice	I Wonder

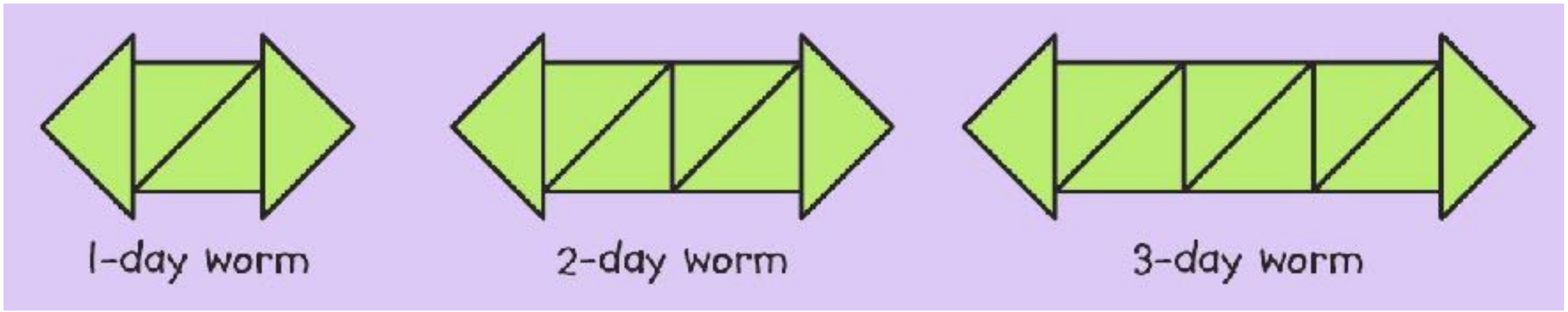
Problem of the Week Scenario

Wooden Legs

Wendy builds wooden dollhouse furniture. She uses the same kind of legs to make 3-legged stools and 4-legged tables.

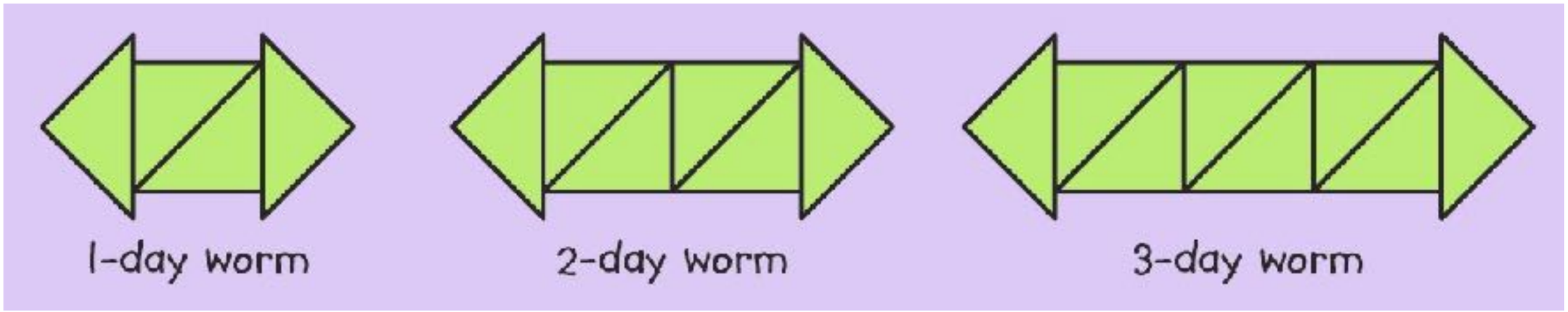
She has a supply of 31 legs.

Growing Worms Scenario



What Did You See?

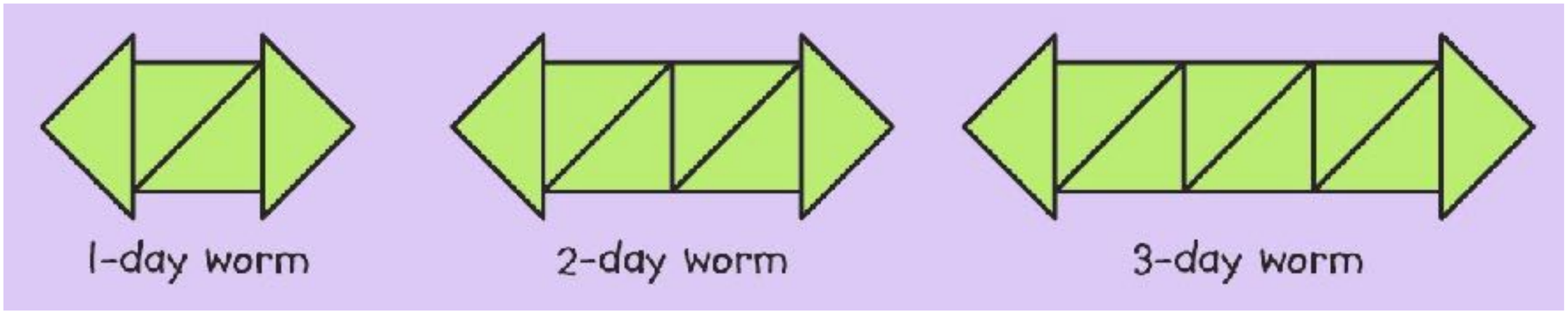
Growing Worms Scenario



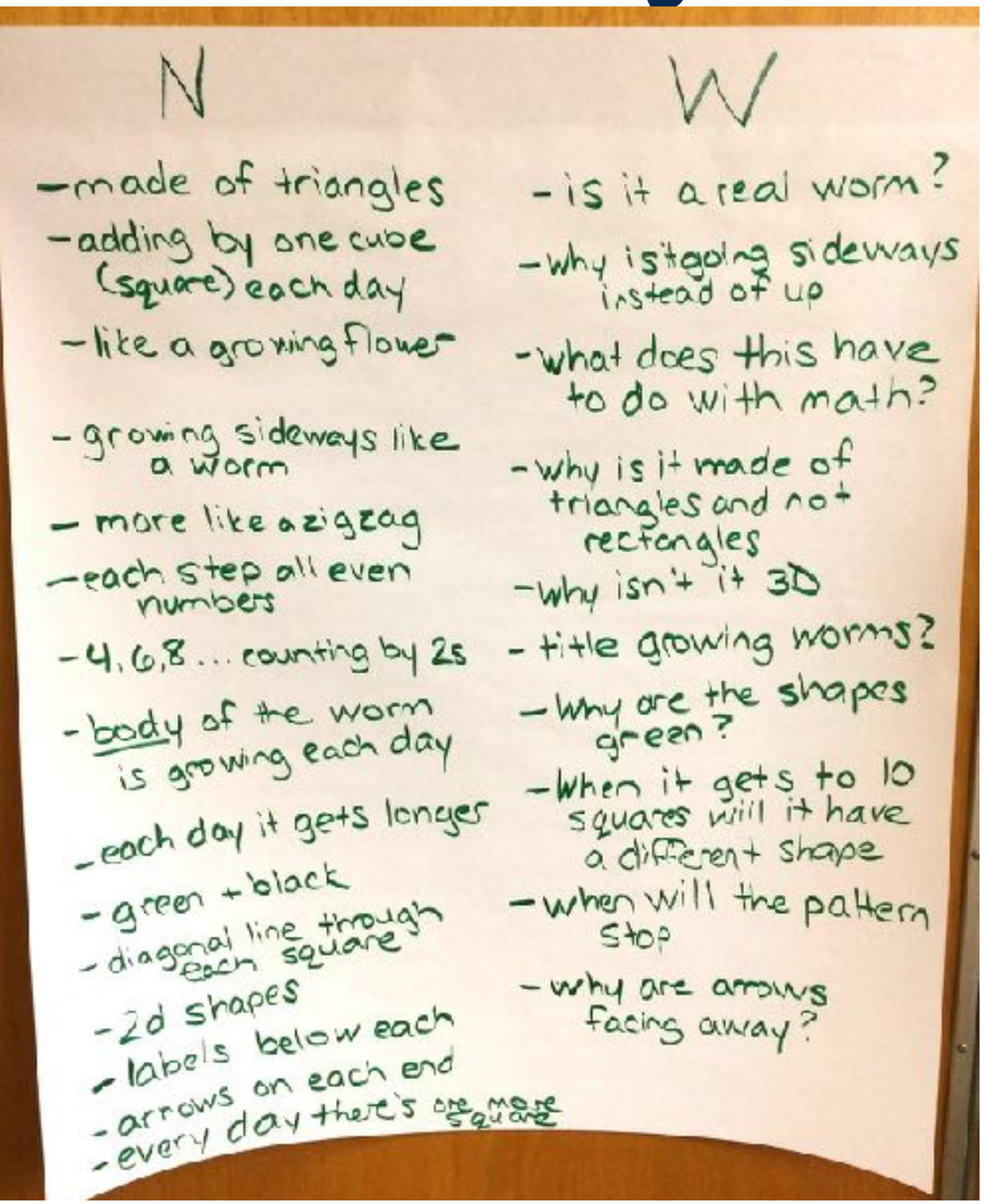
What Did You See?

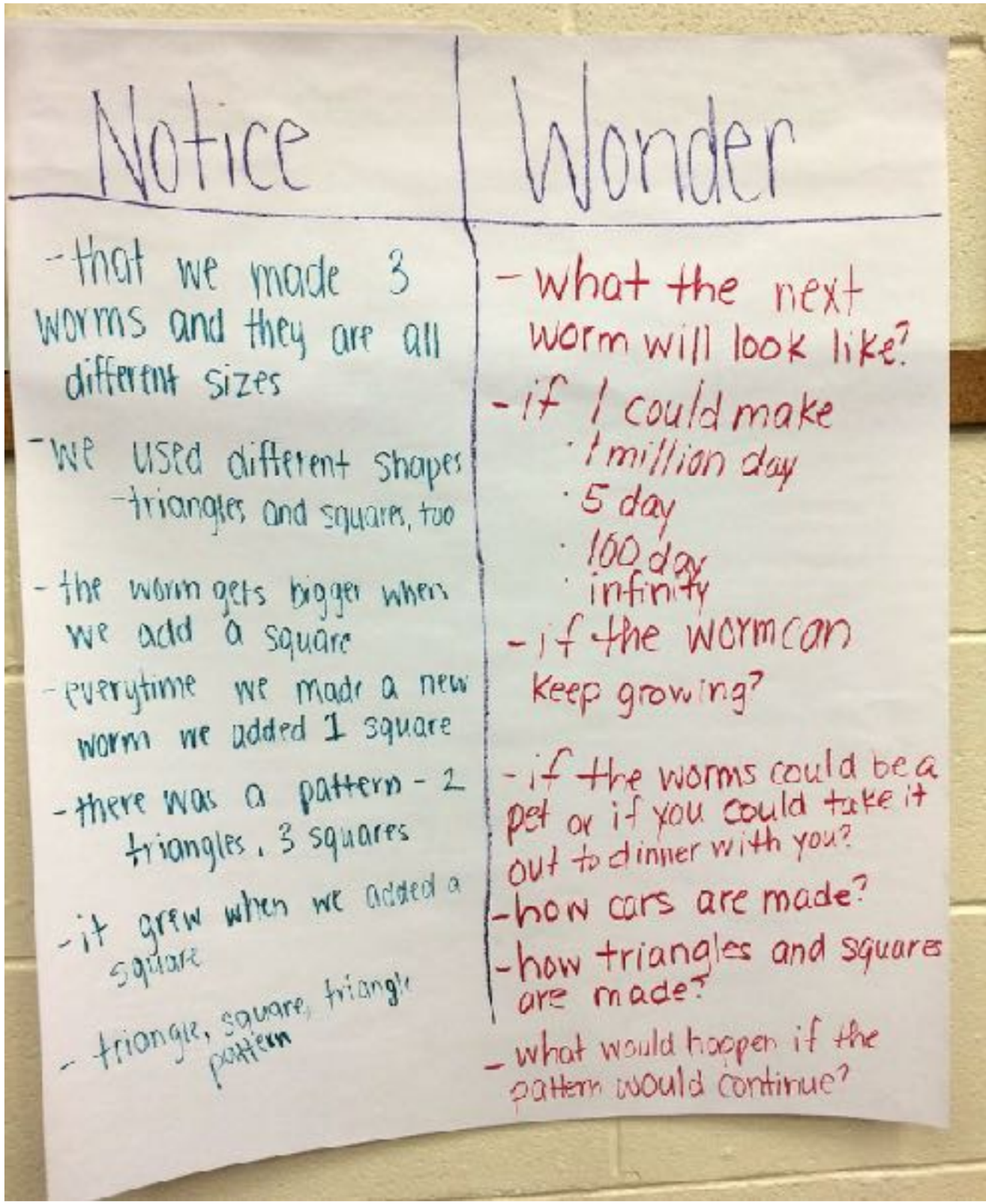
I Notice	I Wonder

Growing Worms Scenario



Growing Worms Student NW





N

- made of triangles
- adding by one cube (square) each day
- like a growing flower
- growing sideways like a worm
- more like a zigzag
- each step all even numbers
- 4, 6, 8 ... counting by 2s
- body of the worm is growing each day
- each day it gets longer
- green + black
- diagonal line through each square
- 2d shapes
- labels below each
- arrows on each end
- every day there's one more square

W

- is it a real worm?
- why is it going sideways instead of up
- what does this have to do with math?
- why is it made of triangles and not rectangles
- why isn't it 3D
- title growing worms?
- why are the shapes green?
- when it gets to 10 squares will it have a different shape
- when will the pattern stop
- why are arrows facing away?

Notice

- that we made 3 worms and they are all different sizes
- we used different shapes
  - triangles and squares, too
- the worm gets bigger when we add a square
- everytime we made a new worm we added 1 square
- there was a pattern - 2 triangles, 3 squares
- it grew when we added a square
- triangle, square, triangle pattern

Wonder

- what the next worm will look like?
- if I could make
  - 1 million day
  - 5 day
  - 100 day
  - infinity
- if the worm can keep growing?
- if the worms could be a pet or if you could take it out to dinner with you?
- how cars are made?
- how triangles and squares are made?
- what would happen if the pattern would continue?

I Notice	I Wonder

Problem of the Week Scenario

Frog Farming

Farmer Mead would like to raise frogs.

She wants to build a rectangular pen for them and has found 36 meters of fencing in her barn that she would like to use.

She knows that each frog needs one square meter of area (1 m^2).

I Notice	I Wonder

CCSS Mathematical Practice 1

Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution.

They analyze givens, constraints, relationships, and goals.

They make conjectures about the form and meaning of the solution and plan a solution pathway **rather than simply jumping into a solution attempt.**

#NoticeWonder with Textbooks

Apple juice costs 50¢. The juice machine accepts quarters, dimes, and nickels.

Mr. Gavin has a ladder that is 100 centimeters tall.

Ms. Cornell has a ladder that is 2 meters tall.

To make a stained glass window, Robert used 16 pieces of glass. Seven of the pieces were red.

#NoticeWonder with Textbooks

Mike had 3 puzzles.
Now he has 5 puzzles.

A store has the floor plan shown. The area of the women's department is

Using NW to Figure Out Rules

Math Message Follow-Up

WHOLE-CLASS ACTIVITY

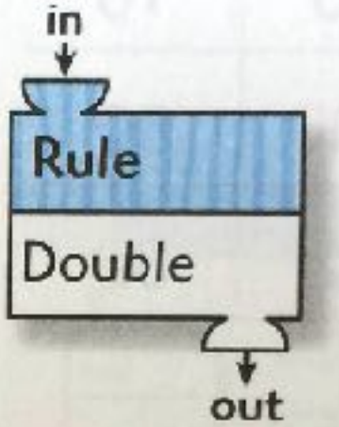
Draw or display a function machine and "What's My Rule?" table. (See Advance Preparation.)

Ask children to imagine that the **function machine** works like this:

- A number (the **input**) is dropped into the machine,
- the machine changes the number according to a rule,
- and a new number (the **output**) comes out the other end.

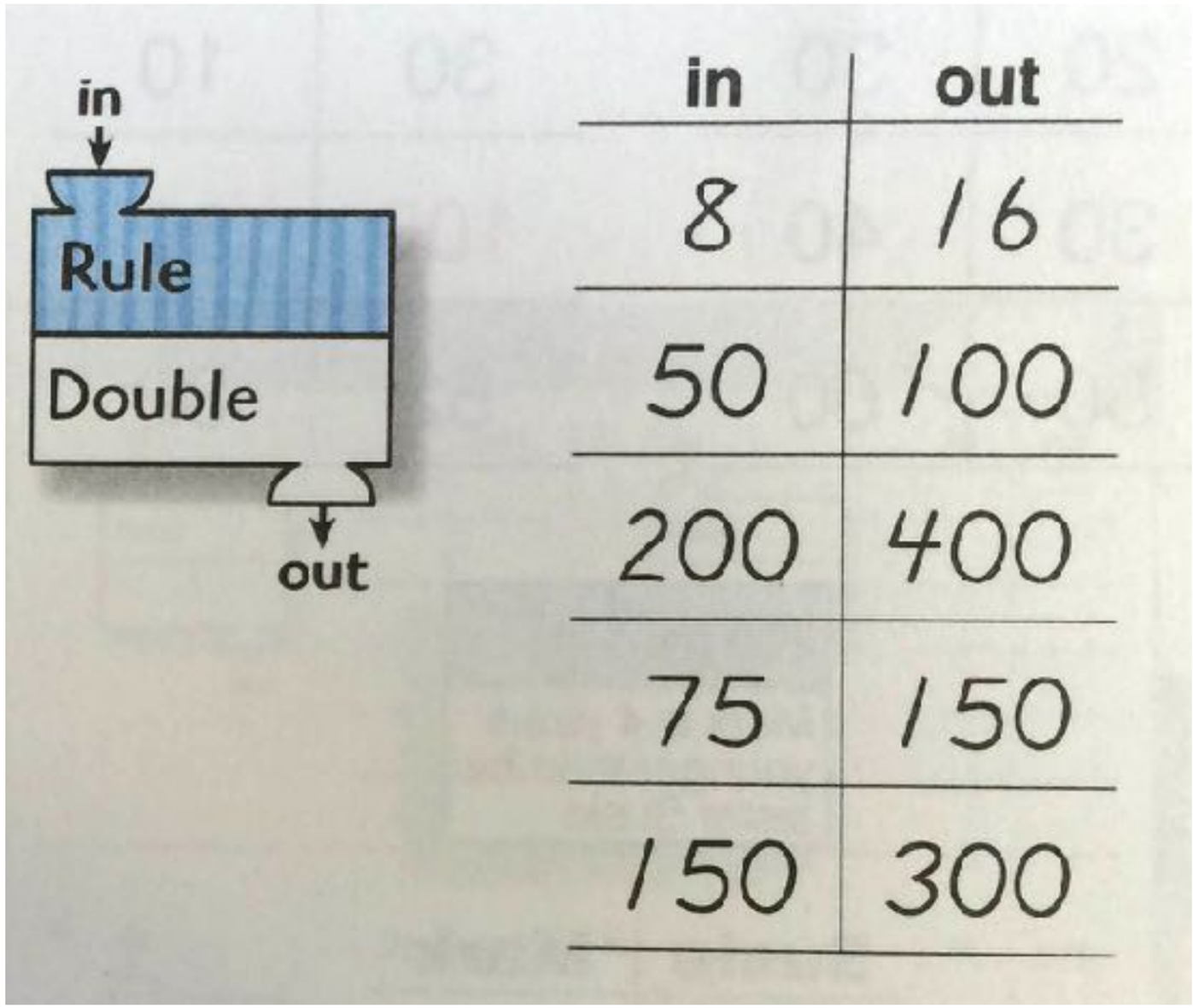
The **rule** for the Math Message problem is "Double the number." Write the word *Double* in the function machine.

Point out the **"What's My Rule?"** table. Discuss the 8 in the *in* column and the 16 in the *out* column. Explain to children that numbers in the *in* column represent the numbers of bacteria now. Corresponding numbers in the *out* column represent the numbers of bacteria 20 minutes from now.



in	out
8	16
50	100
200	400
75	150
150	300

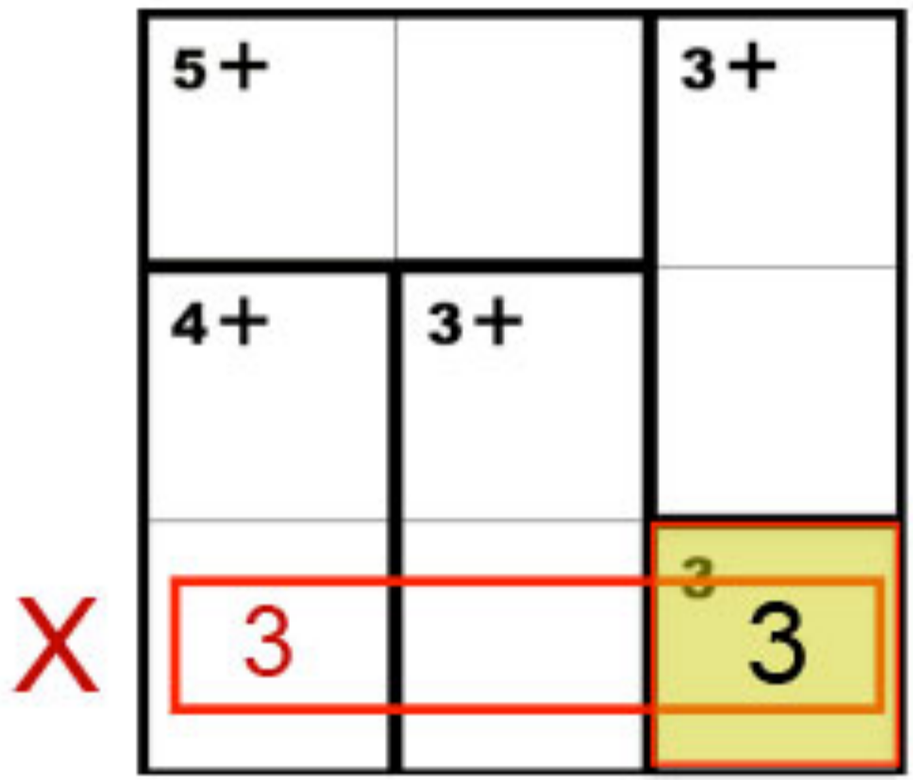
Using NW to Figure Out Rules



in	out
8	16
50	100
200	400
75	150
150	300

Using NW to Figure Out Rules

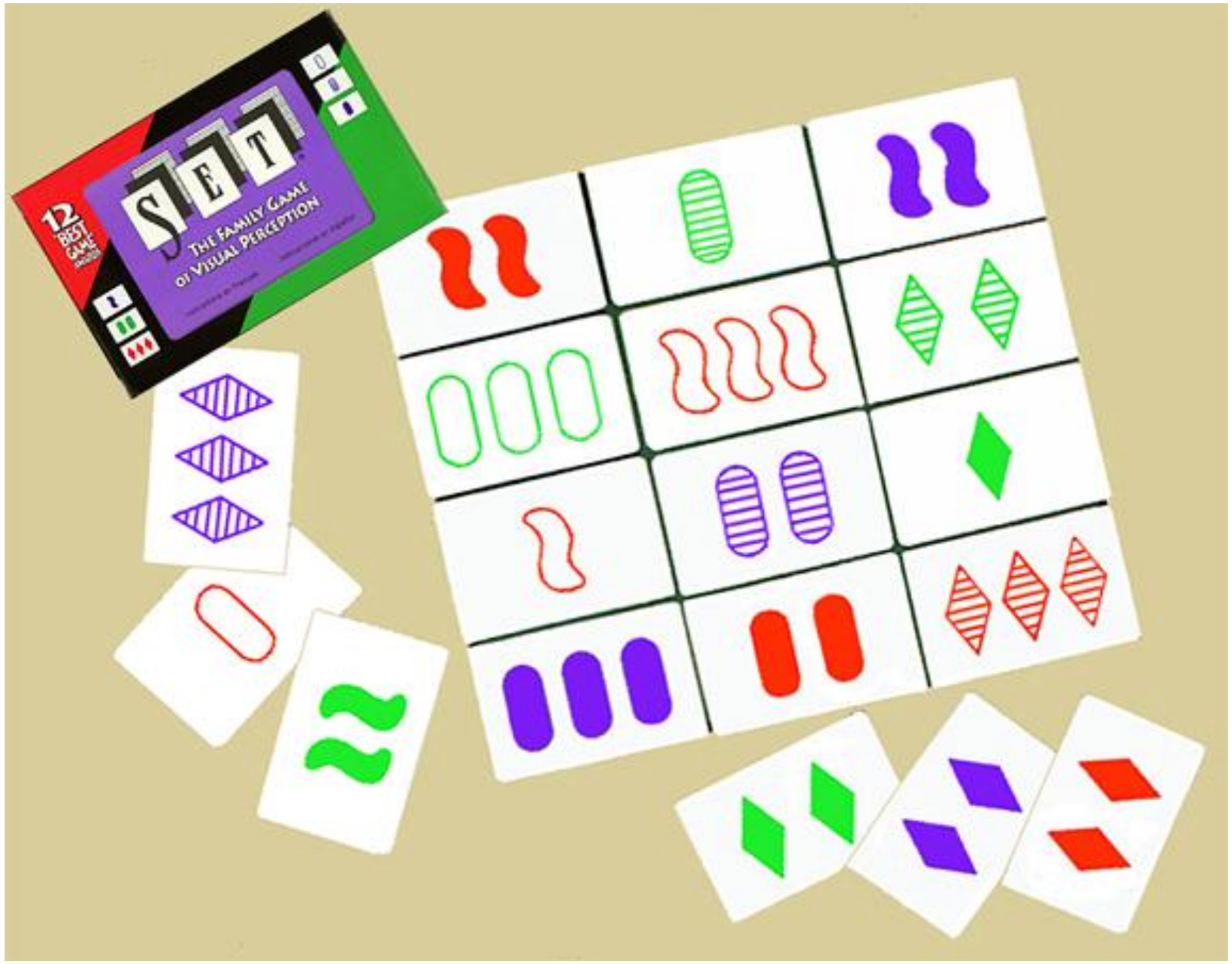
A number cannot be repeated within the same row or column.



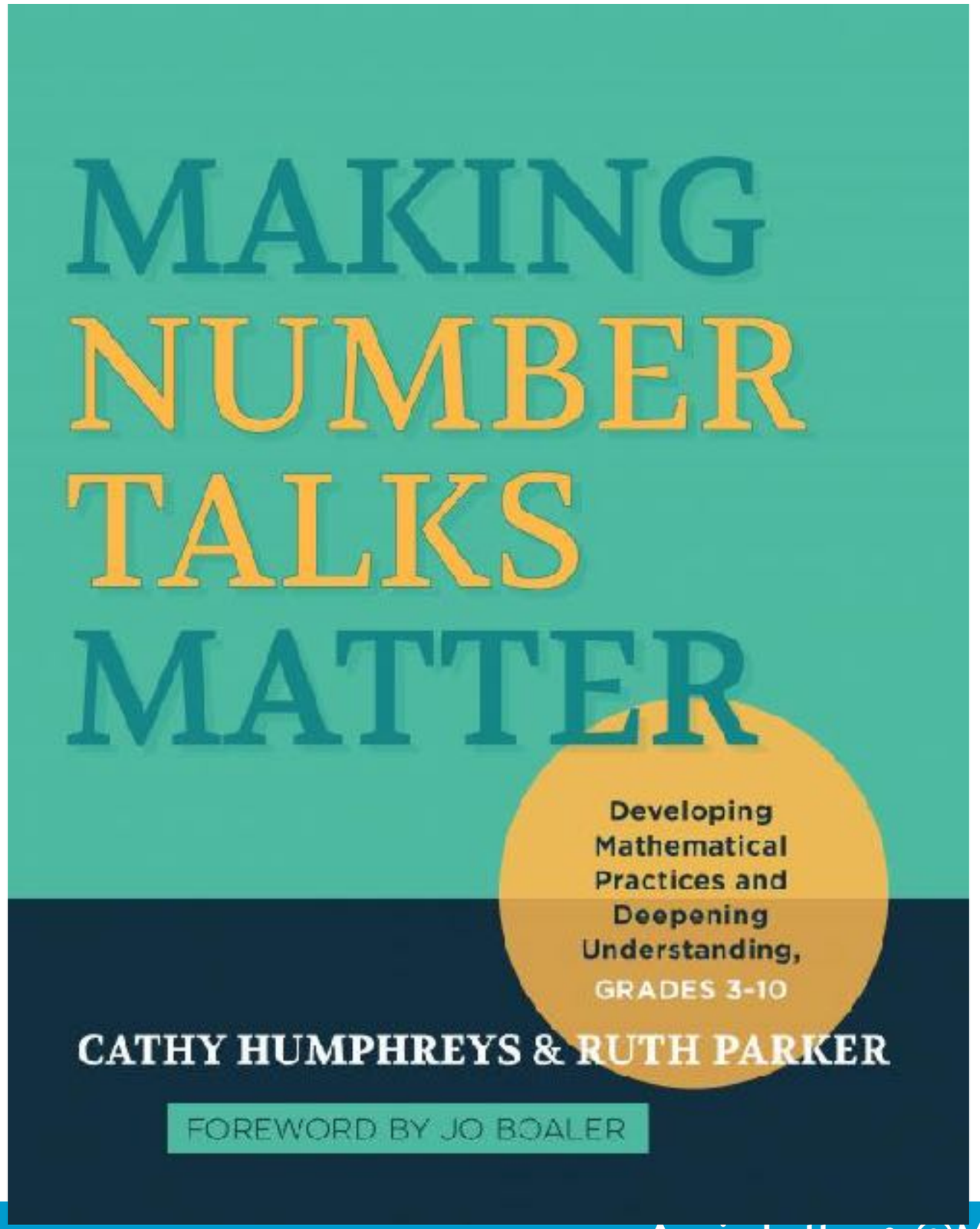
Using NW to Figure Out Rules

			+
4+ 1	3	3+ 2	6+ 4
7+ 3	4	1	2
3+ 2	1	7+ 4	3
4 4	6+ 2	3	1

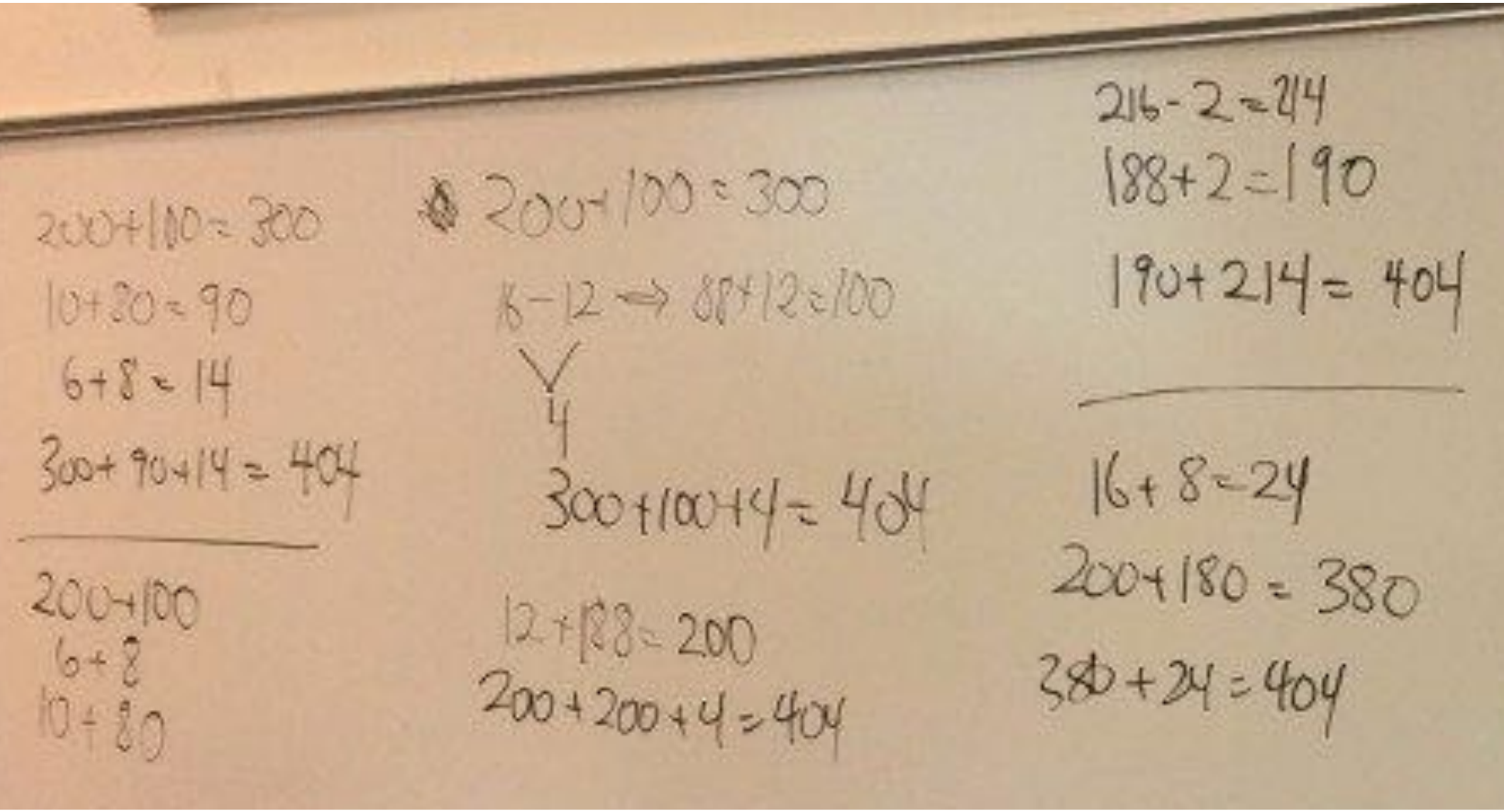
Using NW to Figure Out Rules



Using NW to Reflect



NW to Reflect: 216 + 188

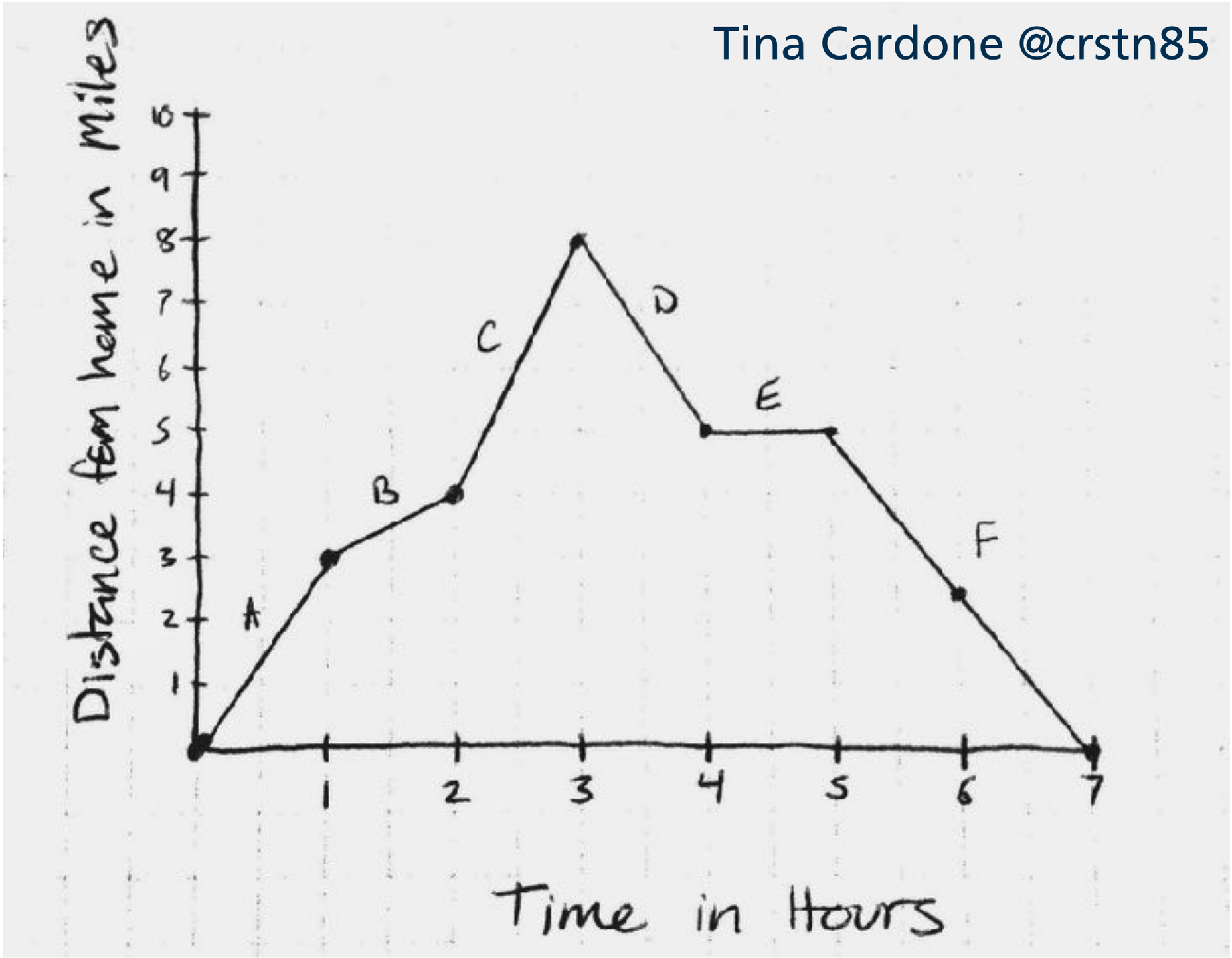


Doesn't It Take a Lot of Time?

Time We Don't Have?

#NoticeWonder as a Launch

Tina Cardone @crstn85



Tina Cardone @crstn85 · Nov 24

@MFAnnie when I gave the graph and did notice/wonder first I didn't have to answer nearly so many questions when they did the handout

Tina Cardone @crstn85 · Nov 24

@MFAnnie worth the few minutes it took and meant we skipped wrap up discussion (they already had it)
drawingonmath.blogspot.com/2014/11/distan…

2

http://drawingonmath.blogspot.com/2014/11/distance-graph.html

How Long Does it Take?

What If It Doesn't Work?

(meaning they don't wonder the thing you want them to)

What If It Doesn't Work?

(meaning they don't wonder the thing you want them to)

Fawn Nguyen

@fawnpnguyen

Replying to @MrsGoytia @MFAnnie

I'd want to honor that they don't. But in a class of 35 Ss, I can't remember a time when they collectively did not.

10:50pm · 4 Apr 2017 · TweetDeck

#NoticeWonder School Culture

Beth Brandenburg @Brandell1974 · 15 Aug 2016
@MFAnnie visits @BesterWCPS! Thanks for stopping in!!! Come back when we have kids in classes.
pic.twitter.com/1BrfFv9LEP

2 4

Other Tips from Twitter

Melynee Naegele
@MNmMath

Replying to @MFAnnie @bkdidact and 2 others

#NoticeWonder is for everyone! Given real think time ALL can & do think critically It is life changing for everyone involved. POWERFULSTUFF!

10:22am · 1 Apr 2017 · Twitter for Android
Verdigris, OK, United States

Andrew Gael
@bkdidact

Replying to @MFAnnie @MNmMath and 2 others

#noticewonder creates access for all Ss by focusing on sense-making and not answer-getting. Levels the playing field. Creates ownership!

11:05am · 1 Apr 2017 · Twitter for iPhone

Joe Schwartz
@JSchwartz10a

Replying to @MFAnnie @MNmMath and 2 others

I'd say: Be sure to read Max's book. N/W isn't just an end in itself, it's a means to an end: problem solving/mathematizing @maxmathforum

5:56pm · 1 Apr 2017 · Twitter Web Client

Beth Brandenburg
@Brandeli1974

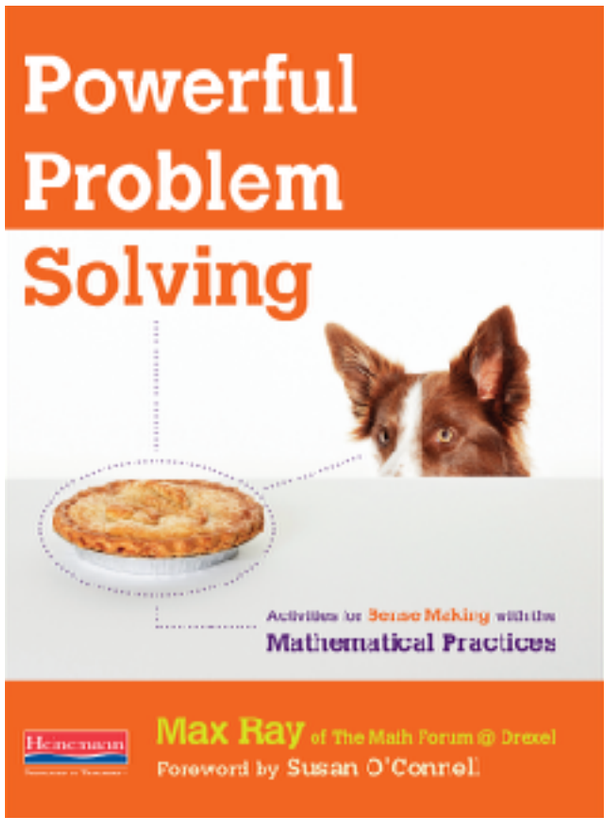
Replying to @MFAnnie @MNmMath and 2 others

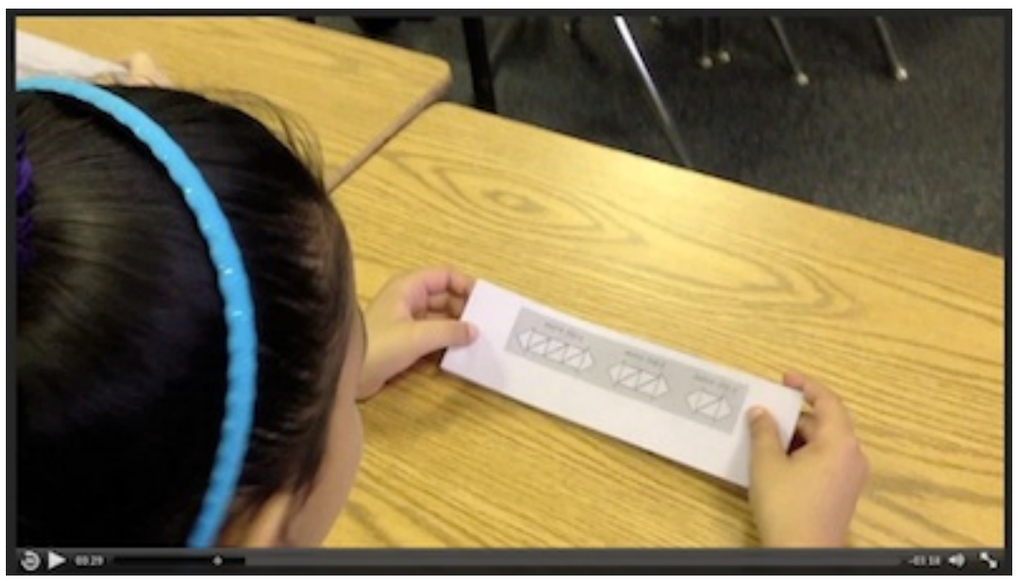
#noticewonder also levels the playing field so that ALL students have an entry point into problems.

More Resources - Ignite Video

More Resources – Book + Videos

- *Powerful Problem Solving*, by Max Ray-Riek
- Videos of grades 3-8 doing Notice and Wonder (including Teresa's Tiles and Growing Worms) from http://mathforum.org/pps/





More Resources - #NoticeWonder

Next Steps

Write down two things you noticed today and two things you're wondering.

Thank you!

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https://mathematicalthinking.org/annie/