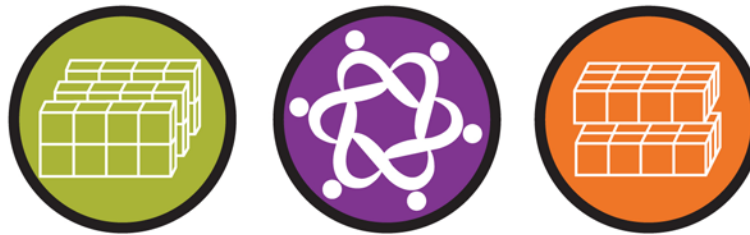# Welcome to …

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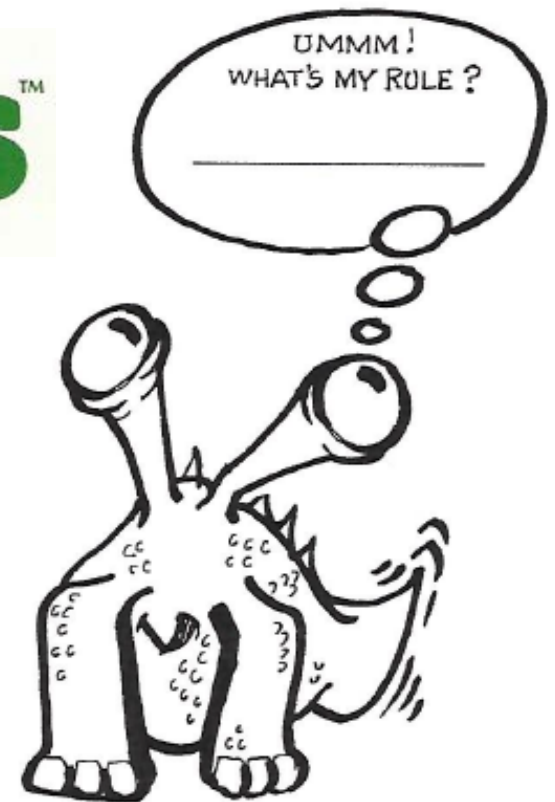Common Core for Mathematical Proficiency in Elementary Schools

Agenda

- Wollygoggles
- Connecting Arithmetic to Algebra
- Consecutive Numbers
- Lunch
- Beams
- Bridges
- Marcy's Dots
- Reflection

Morning Warm-Up

Connecting Arithmetic to Algebra

"Children spend much time in mathematics solving individual problems. But the core of the discipline of mathematics is looking across multiple examples to find patterns, notice underlying structure, form conjectures about mathematical relationships, and eventually articulate and prove general statements."

- Russell, Shifter, and Bastable (2011)

Connecting Arithmetic to Algebra

Read page 3 to page 6 (stop after the Grade 4 example).

Discuss as a group your thoughts on these questions:

- What relationships between two arithmetic expressions are students noticing?

- If you were the teacher in one of these classrooms, what questions might you ask to help students pursue these beginning ideas further?

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Connecting Arithmetic to Algebra

Focus Question #2 (pg. 7)

The beginning of the second section of Chapter 1 states that having students generalize in the context of arithmetic should not be seen as extra or additional content but as a regular focus of the class, enhancing the work already included in the curriculum.

- What are your thoughts about that statement?
- What are the implications of that statement?
- How might that work in your classroom?

Consecutive Counting Number Sums

- What are "counting numbers"?

- What other sets of numbers do we know?

- What does it mean to be "consecutive"?

- Let's find some consecutive counting numbers that sum to other numbers

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Consecutive Whole Number Sums

1 + 2 = 3

5 + 6 = 11

7 + 8 + 9 = 24

2 + 3 + 4 + 5 = 14

2 + 4 = 6 can NOT be used
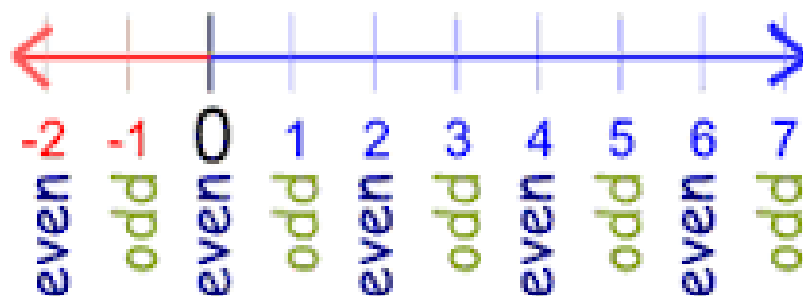
Consecutive Whole Number Sums

- Which numbers *can* be written as the sum of Consecutive Whole Numbers?

- Are there multiple ways of writing the same numbers as sums?

- Which numbers *cannot* be written this way?

- What patterns do we notice?

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Sums Extended …

Now let's take what we learned from the last problem and see if we can extend it to a related problem about even and odd sums …

Even and Odd Numbers

Sum of 4 Numbers Conjecture

The sum of any four Consecutive Whole Numbers must be an even number.

True or False? Justify/Prove your answer.

Four consecutive numbers is either

$$\underbrace{odd + even}_{odd} + \underbrace{odd + even}_{odd} = even$$

$$odd \quad + \quad odd$$

or $\quad \underbrace{even + odd}_{odd} + \underbrace{even + odd}_{odd} = even$

$$odd \quad + \quad odd$$

So it has to be <u>even</u>.

Sample Responses to Discuss: Alex

Let the four numbers be

$$n-1, \quad n \quad, \quad n+1, \quad n+2$$

Sum $= 4n + 2$ $\qquad = $ even

$\uparrow$ even

$\nwarrow$ even

Sample Responses to Discuss: Rumana

Multiple of 2?

$$1 + 2 + 3 + 4 = 10$$
$$2 + 3 + 4 + 5 = 14 \quad 2+4 \qquad \checkmark$$
$$3 + 4 + 5 + 6 = 18 \quad 2+4 \qquad \checkmark$$

Every time, each of the four numbers on the left is 1 bigger, so the sum is 4 bigger. If we start with 10 and keep adding 4s then all the answers will be even.

Sample Responses to Discuss: Steph

$5 + 6 + 7 + 8$

4 consecutive numbers

Four rows means that the total is a multiple of 4.

same 4 consecutive numbers
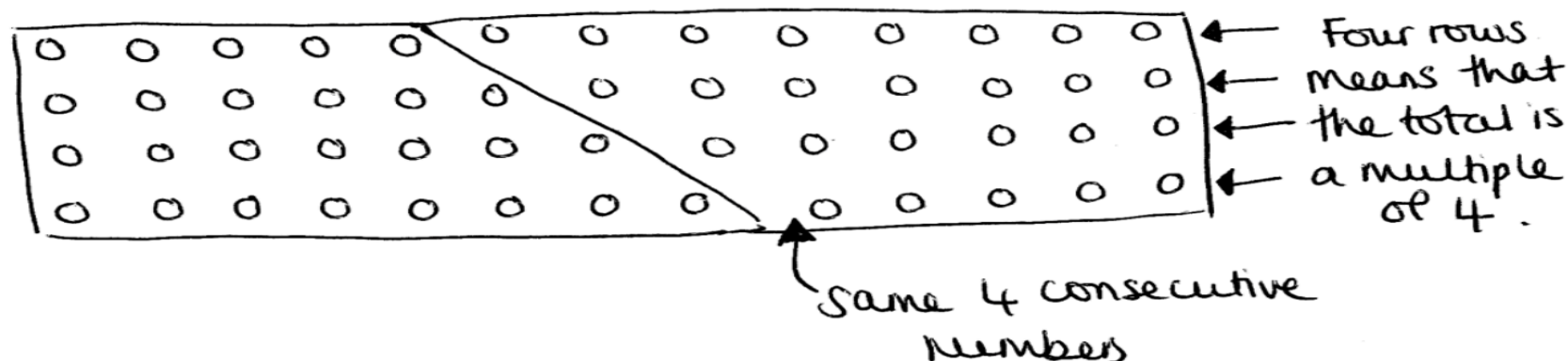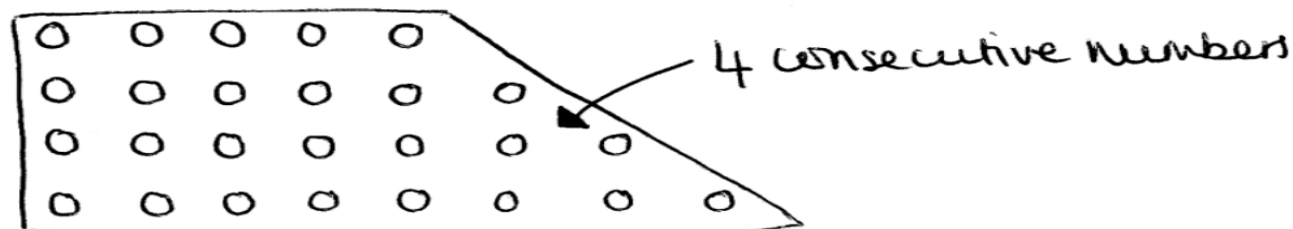
Since twice the sum of 4 consecutive numbers is a multiple of 4, the sum of 4 consecutive numbers must be a multiple of 2 (even).
This works for all cases!

Visual Learners

- 65% of the population is made up of visual learners

- The brain processes visual information 60,000 times as fast as text

- The use of visuals in the classroom improves academic performance

Source: The Visual Teaching Alliance

Lunch

Dice Sums Game

- Place 10 counters anywhere on the gameboard that you want them, where each number represents a possible sum
- Roll the dice, add the numbers, and if your sum comes up, remove the counter
- Pass the dice to the next person and continue
- The first to remove all of the counters wins the game

Dice Sums Game

- What did you learn after playing the game the first time?

- What patterns did you see?

- Where are the "ideal" placements of the counters and what drives your decision?

Algebra Curriculum – Walk Across

- For this task we will need to work in Across grade level teams and take a focused look at the Common Core Math Standards for K-5 students learning of Algebra.

- Objective 1: Look closely at all K-5 grade level math standards and discern which ones most directly relate to supporting students to think algebraically.

- Objective 2: On a large post it sheet create a representation of the connections among these standards from grade level to grade level.

Time of Reflection

Take a few moments to reflect on our time of thinking and learning today.

-- Jot down the meaningful and significant things you thought about.

-- Jot down the ways you thought mathematically and pedagogically.

-- Jot down how you contributed to our shared community of professionals.

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Stay Safe

- Please help us put the room in proper order.

- Please leave your name tags for next time.

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