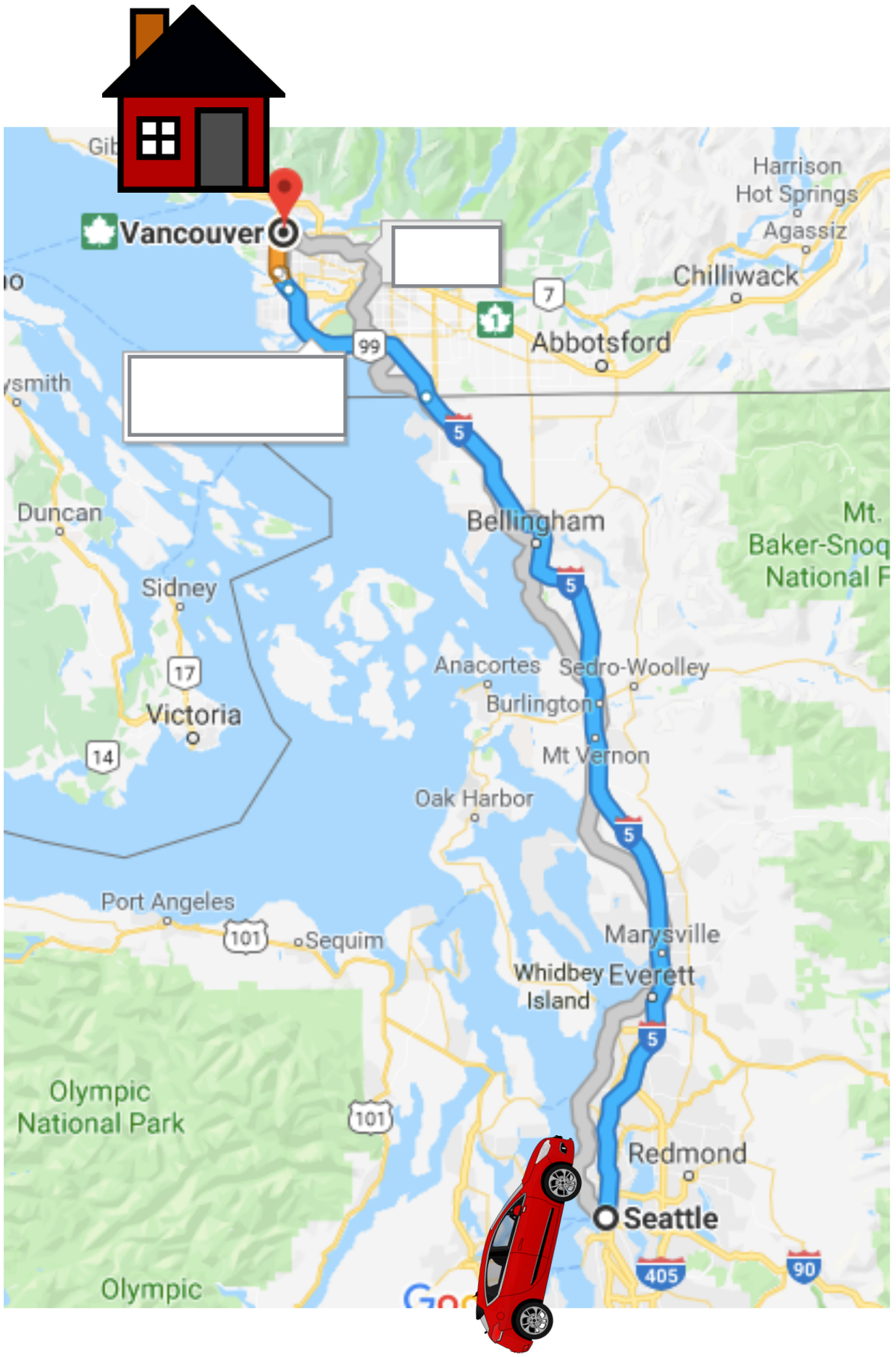
THREE ACT TASKS

Presented by Jen Barker - Surrey, BC
NCTM Regional - Seattle, Washington
November 30th, 2018


Vancouver
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Sedro-Woolley
Burlington
Mt Vernon
Oak Harbor
Port Angeles
Sequim
Marysville
Whidbey Island
Everett
Olympic National Park
Redmond
Seattle
Olympic
99
5
7
1
17
14
101
405
90

What do you **NOTICE**?

What do you **WONDER**?

What **INFORMATION** do you need to know to solve your question??

Act Two

Travel at 60 miles per hour

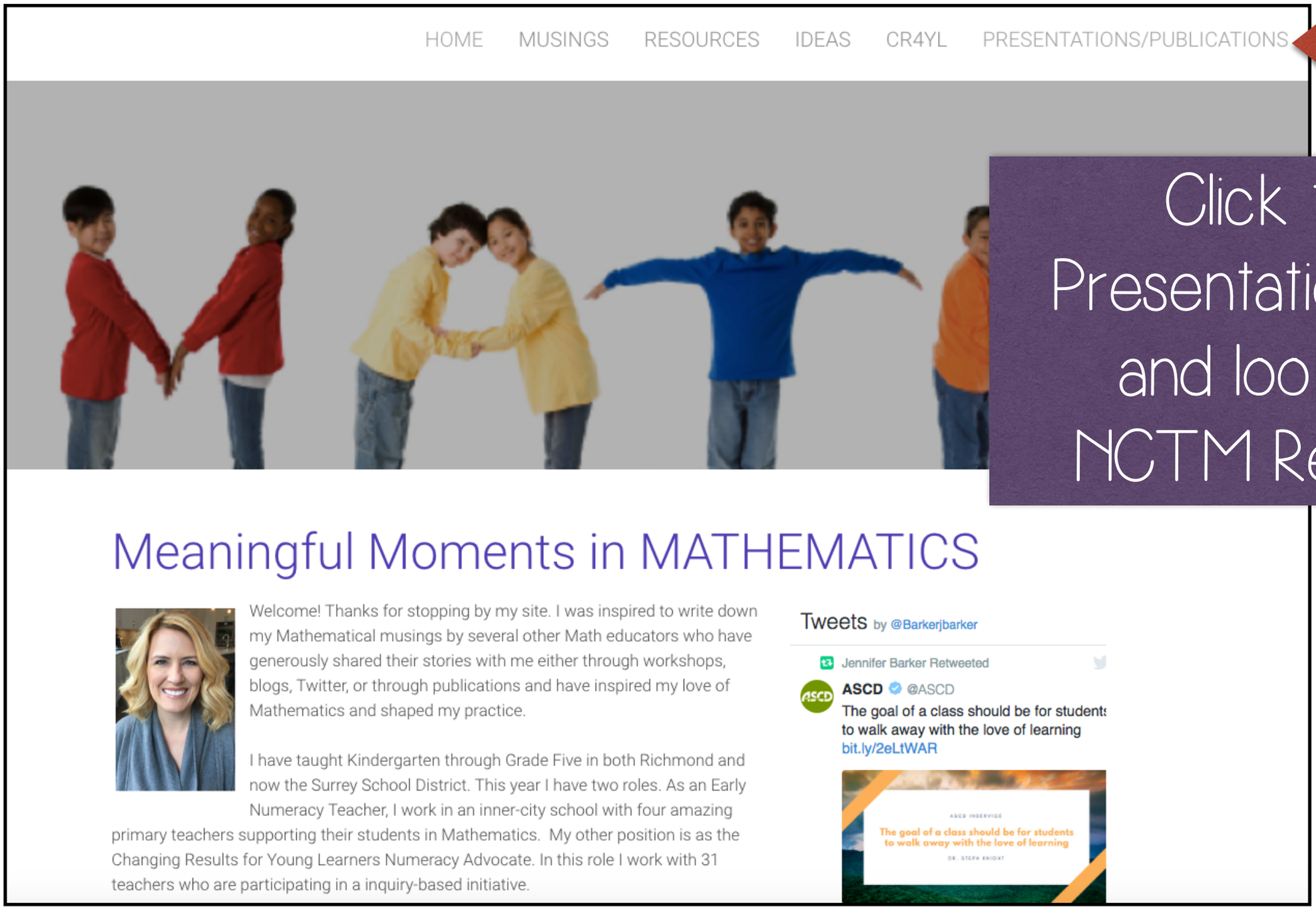
Distance between the two cities is 142 miles

A little about Me…

- I am a Numeracy Helping Teacher in Surrey, BC
- Have 20 years experience in classrooms K - 5
- Mom to M&M, aged 15 and 13
- Twitter: @BarkerJbarker
- Email: barker_jennifer@surreyschools.ca
- Believe Math should be meaningful,, engaging and build conceptual understanding

Where can you find the PPT?

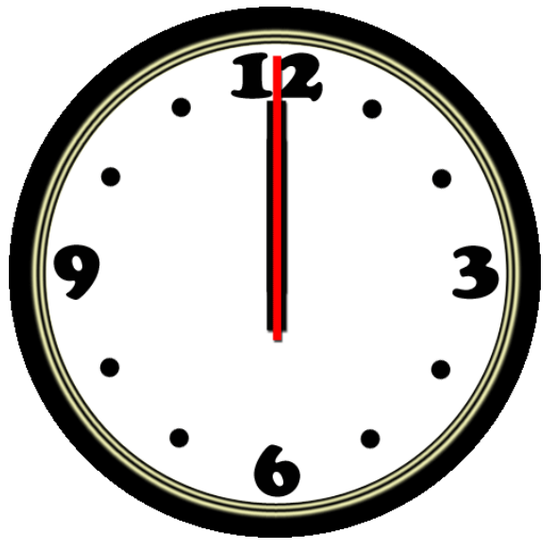
www.meaningfulmathmoments.com



Click the Presentations tab and look for NCTM Regional

During our hour…

- What is a “Three Act Task”?
- Do a task together
- Explore some student work
- Role of the teacher
- Facilitating discourse
- Benefits of the approach
- See a few more examples



Dan Meyer
Secondary

Graham Fletcher
Elementary

Kendra Lomax
Elementary

Background…

THREE IS THE MAGIC NUMBER

ACT 1

BEGINNING (SET-UP)

- Notice/Wonder
- A question is determined
- Estimation

ACT 2

MIDDLE (CONFLICT)

- Students identify the information they will need to solve the problem
- Students work to answer the question

ACT 3

END (RESOLUTION)

- Share strategies
- The teacher may compare and connect students' strategies
- The Reveal

Act One

Act One

How can we help everyone to have clean water?

What do we NOTICE?

What do we WONDER?

Our Estimates

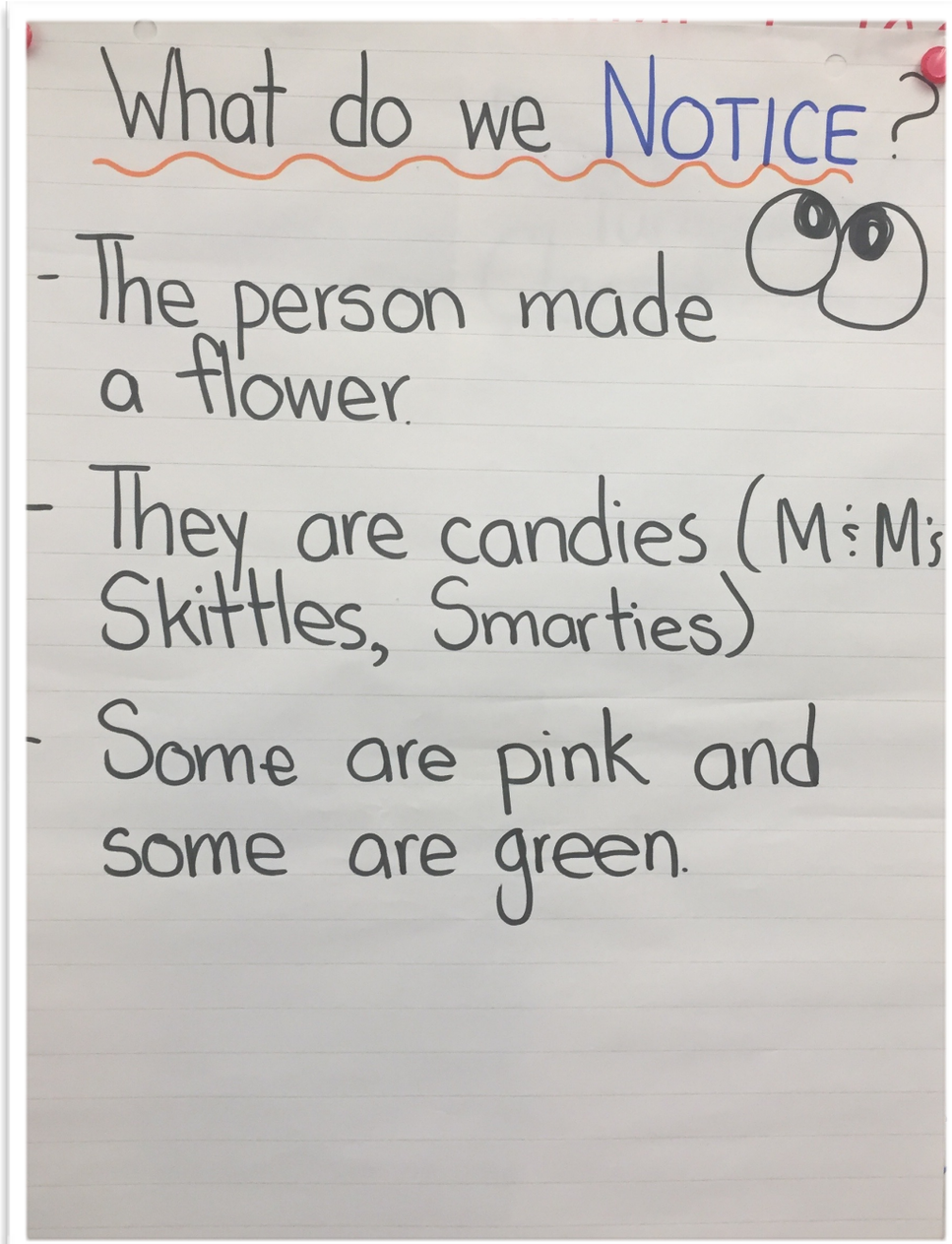
Today's number is

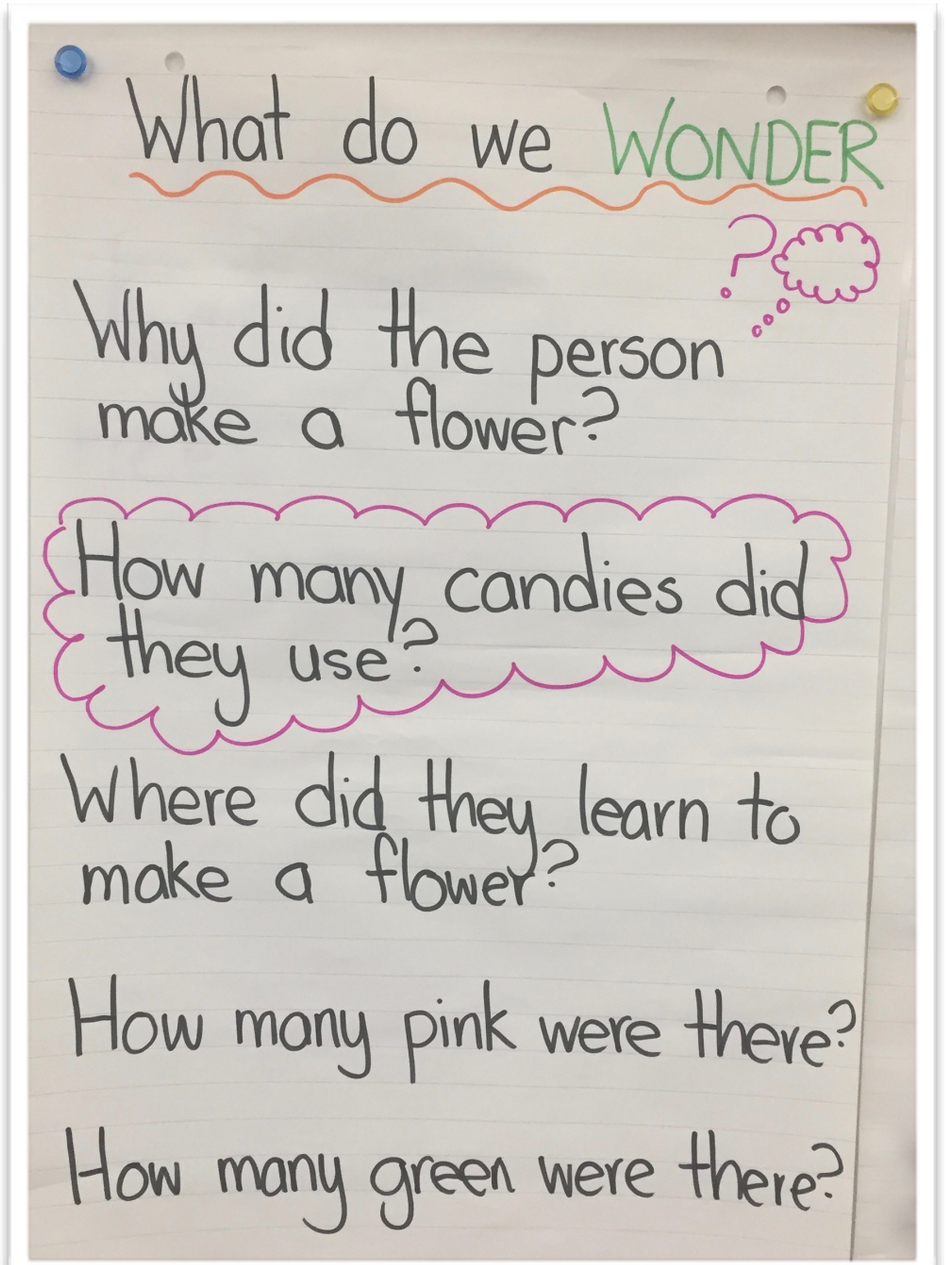
What do you **NOTICE**?

What do you **NOTICE**?

What do you **WONDER**?

Notice/Wonder





What information do you need to solve this problem?

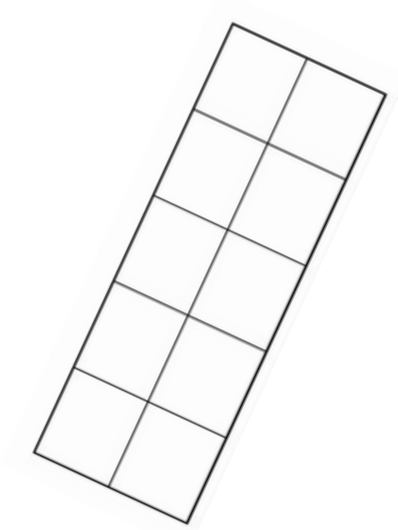
Act Two

29 **Green**

26 **Pink**

Materials provided…

- Counters in colours other than pink and green
- Blank ten frames and mini ten-frames repenting quantities
- Hundreds charts
- Number lines and open number lines
- Pencils, coloured pencils and paper



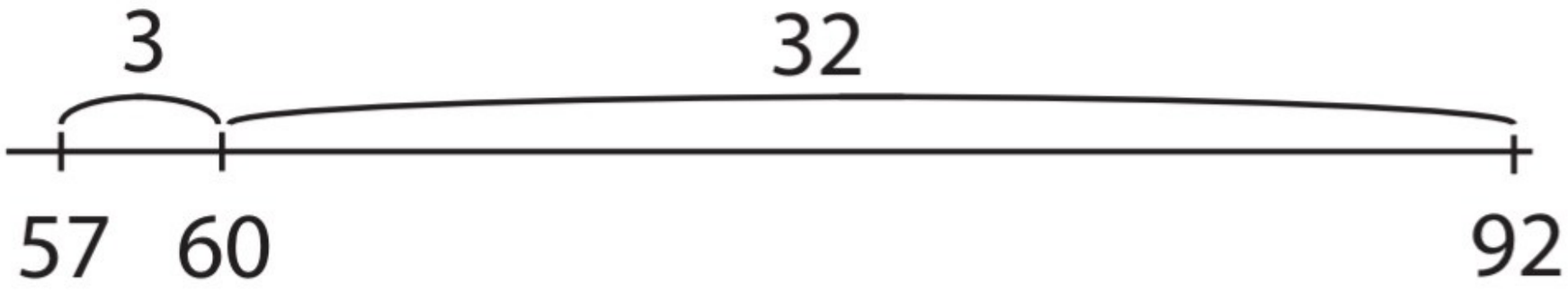
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Strategies vs Models

- A **STRATEGY** is how you *mess with* the numbers, how you use **relationships and connections**.

- A **MODEL** is a **representation** of a strategy, how you show your thinking.

57 + 35



– Pam Harris

What strategies do you anticipate?

- Who **counted all**?
  - Do students have one-to-one correspondence? If they make a mistake do they catch themselves and self-correct?

- Who **counted on**?
  - Are students counting on from the largest quantity?

- Who **adds in chunks**?
  e.g., 29 + 26 =
  (29 + 20) + 6 =
  (49 + 1) + 5 =
  50 + 5 = 55

- Who made **friendly tens**?
  e.g., 29 + 26 =
  (29 + 1) + 25 =
  30 + 25 = 55

- Who used a **place value strategy**?
  e.g., 29 + 26 =
  (20 + 9) + (20 + 6) =
  (20 + 20) + (9 + 6) =
  40 + 15 = 55

- Who used a **place value strategy**?
  e.g., 29 + 26 =
  (20 + 9) + (20 + 6) =
  (20 + 20) + (9 + 6) =
  40 + 15 = 55

- Who **broke one addend apart**?
  e.g., 29 + 26 =
  (29 + 20) = 49
  49 + 6 = 55

- Who used **compensation**?
  e.g., 29 26
  + 1 - 1
  30 + 25 = 55

- Who **made landmark or friendly numbers**?
  e.g., 29 + 26 =
  + 1
  30 + 26 = 56
  56 – 1 = 55

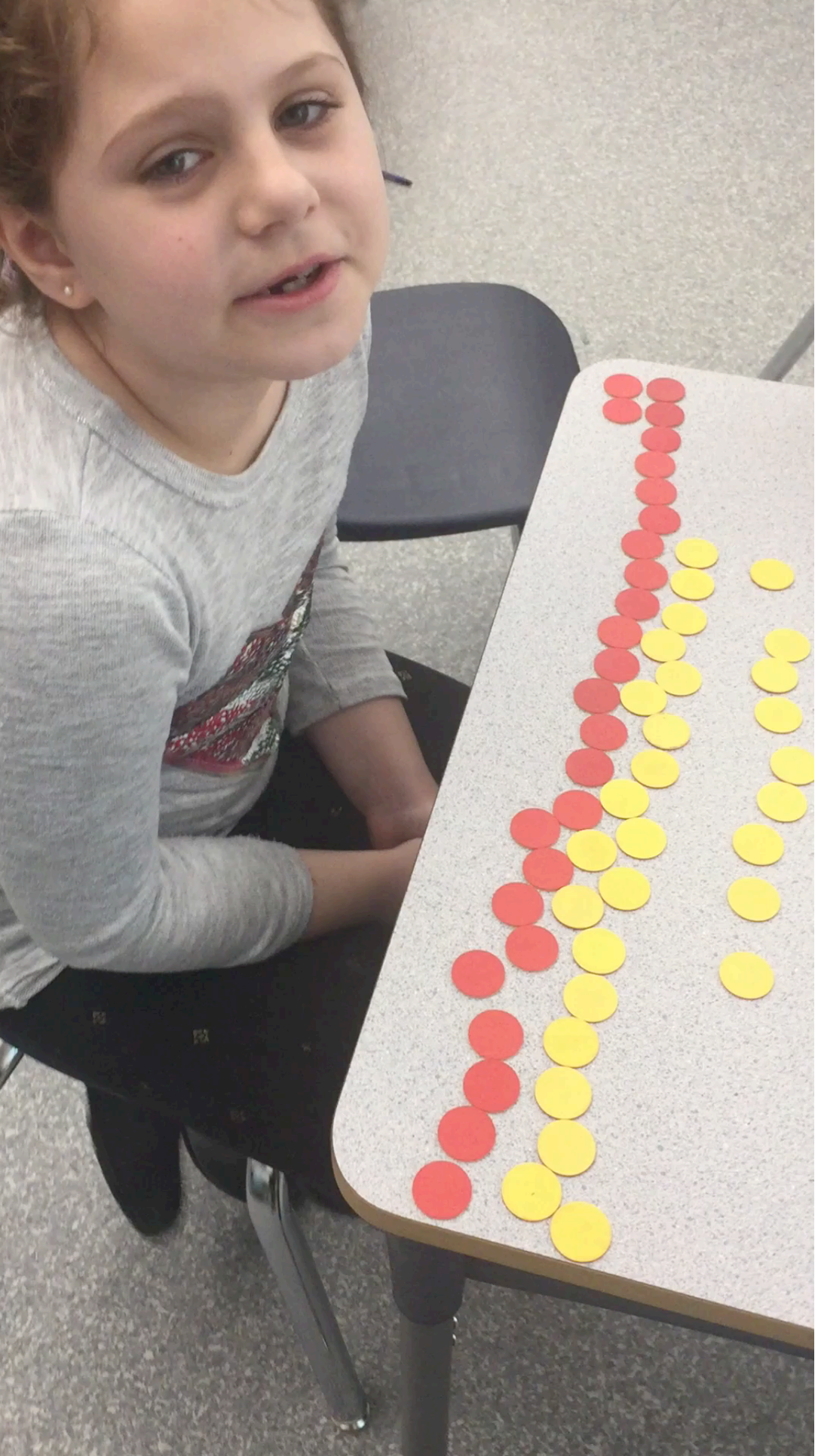
- doubles/**near doubles strategy**?
  e.g., 29 + 26 =
  (25 + 4) + (25 + 1) =
  (25 + 25) + (4 + 1) =
  50 + 5 = 55

My goal for the lesson…

Find out what strategies students were using and then being responsive to what I observed, nudge the learning forward.

What is the teacher's role

- Observing and noticing how students are approaching the problem
- What tools/models are they choosing to represent their thinking?
- Are they able to think abstractly and use different coloured or all the same coloured counters to represent the pink and green smarties?
- Are students able to explain their thinking?
- What strategies are they using?
- Can they identify the strategies they are using?



Leena

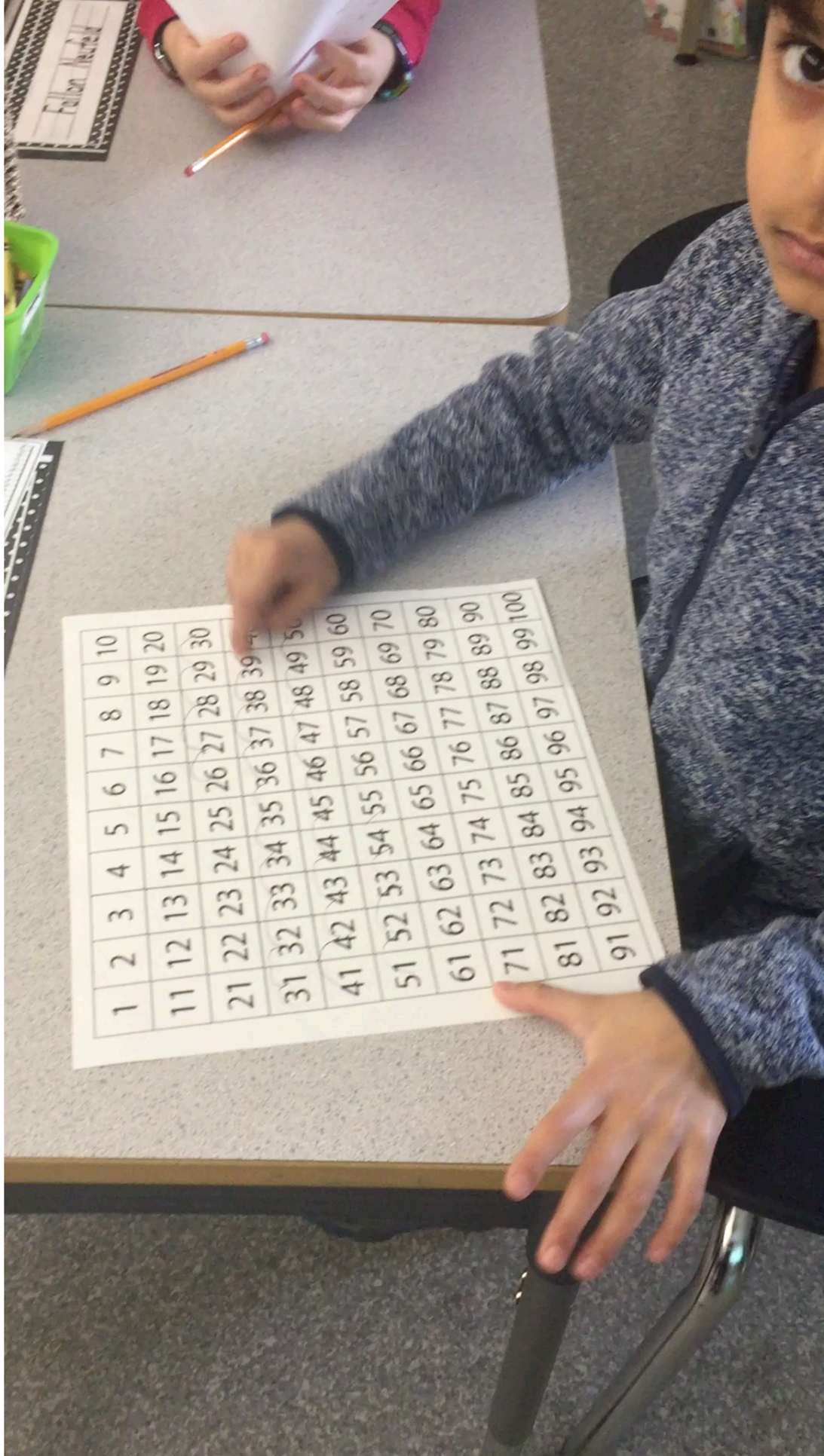
Counters

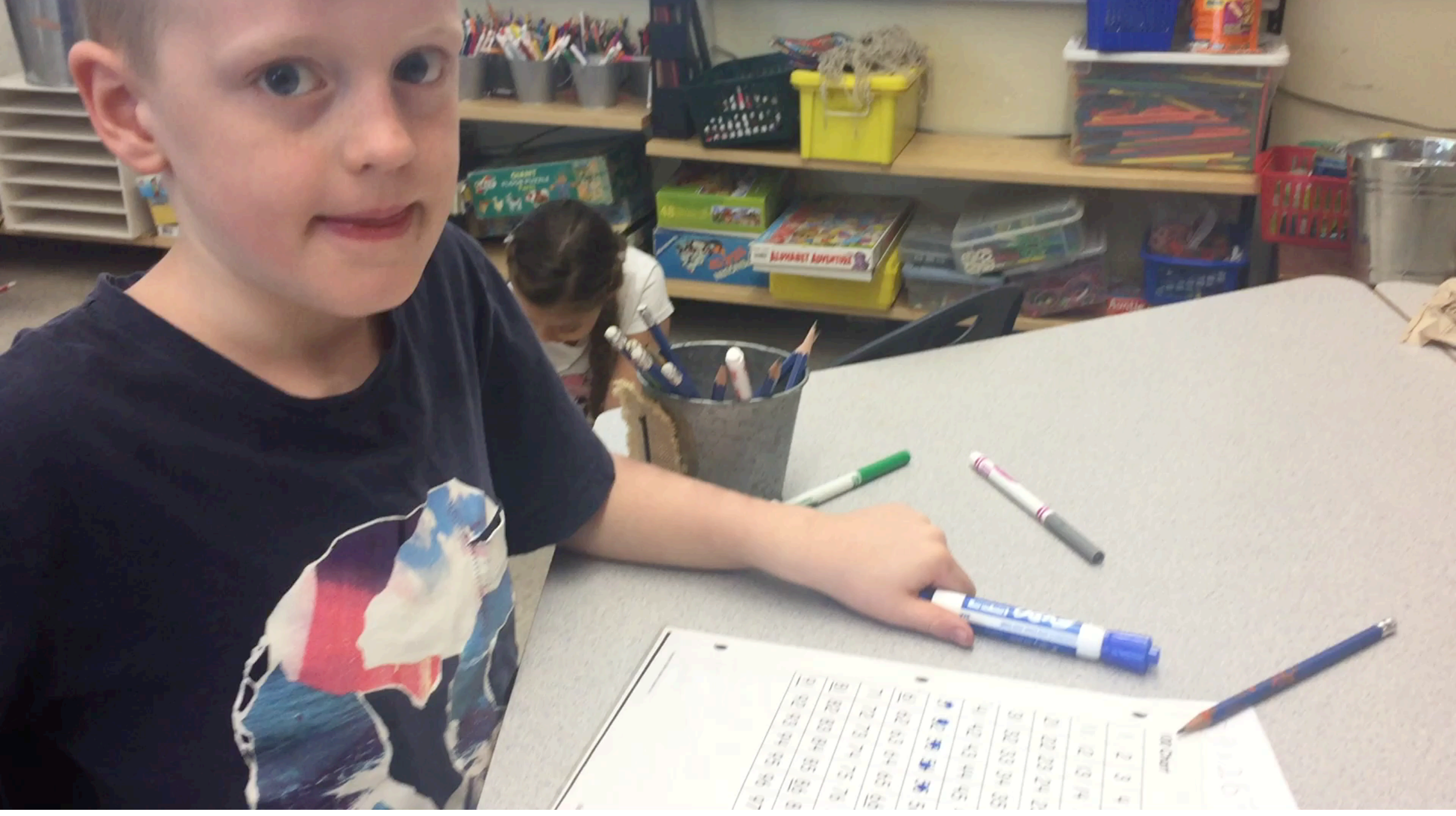
Count All

Iain

Hundreds Chart

Count On





Rylan

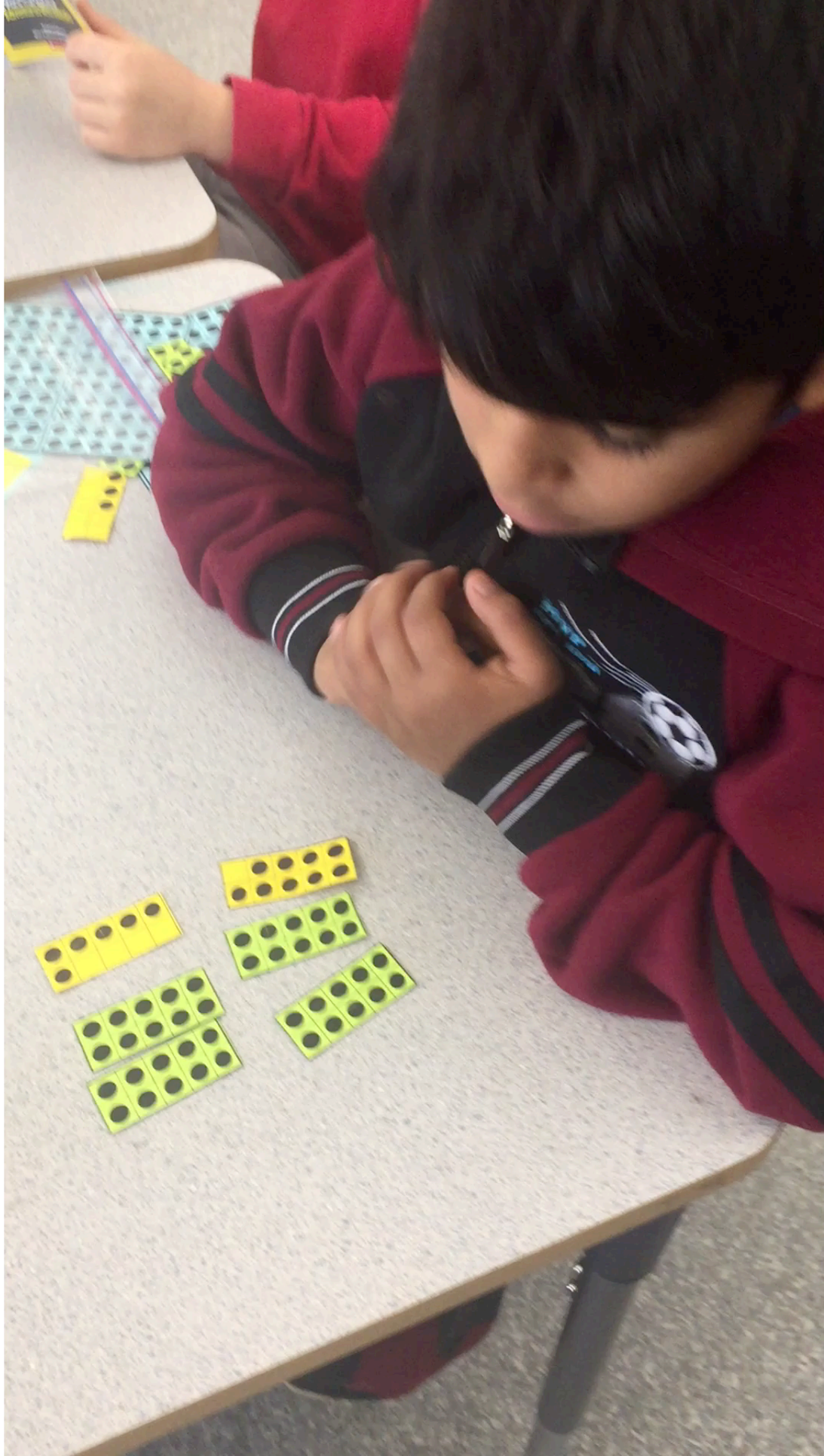
Hundreds Chart

Add Tens Add Ones

Yousaf

Mini Ten Frames

Added tens the counting on by one



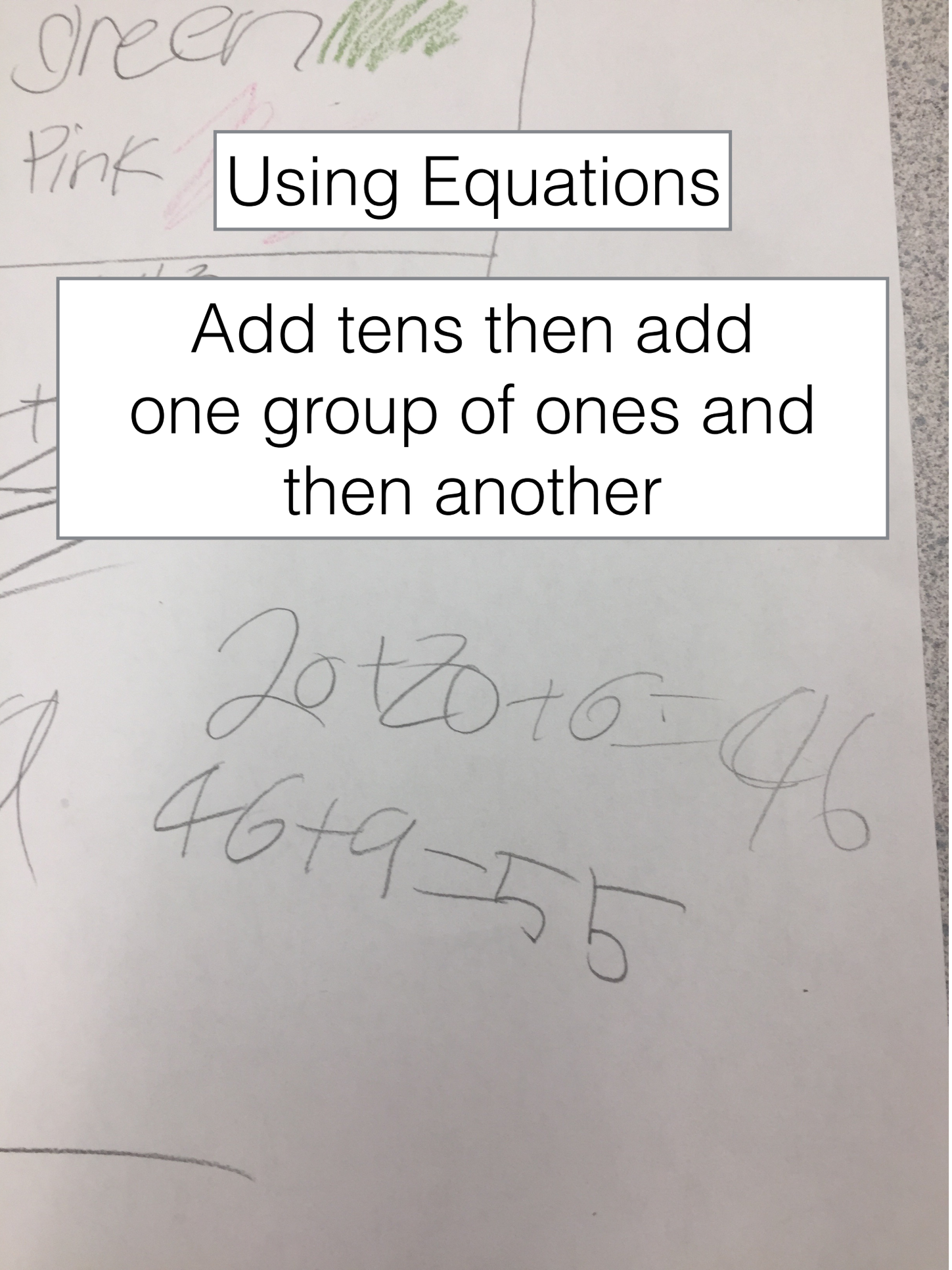
Reflecting on what we've seen so far, what practices are highlighted in a task?

- Reasoning and Analyzing
- Understanding and Solving
- Communicating and Representing
- Connecting and Reflecting

- British Columbia Curricular Standards, 2016

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning

- Common Core Standards Initiative, 2012



Michelle

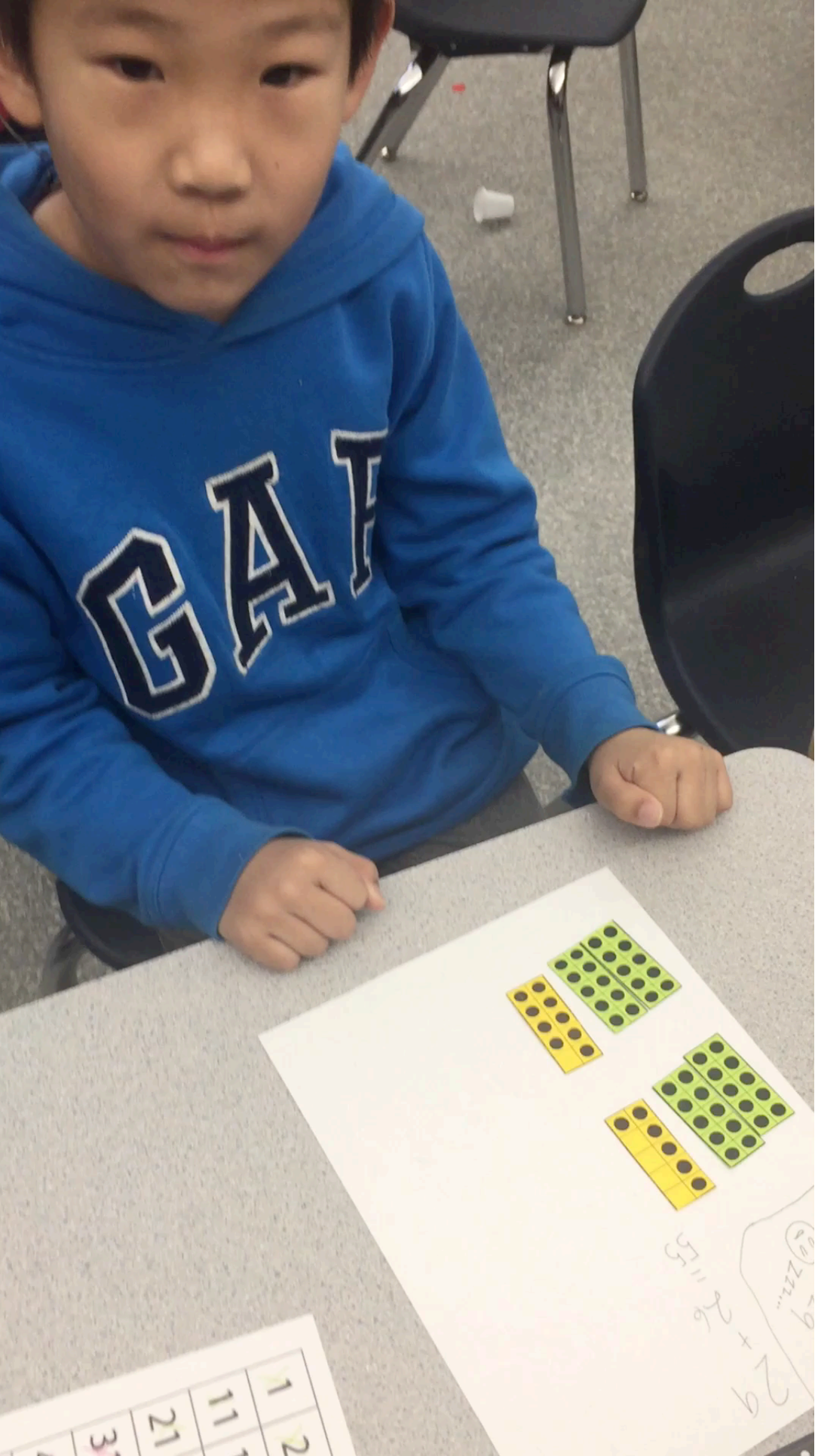
"I added the tens first and then I added the 6. That made 46. Then I added 9 to 46."

Me

"How did you know 46 and 9 was 55?"

Michelle

"I counted on my fingers."



Allan

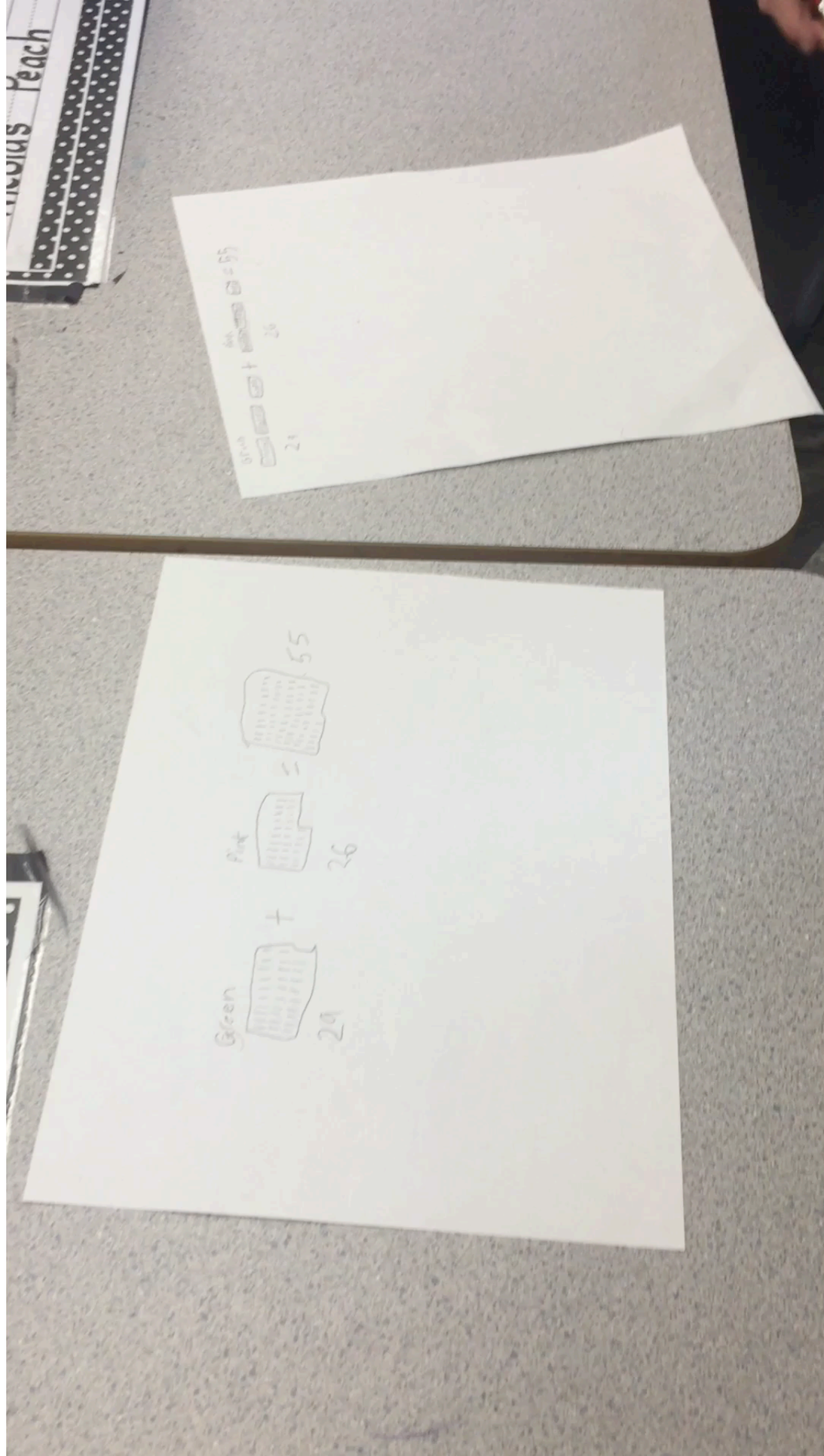
Mini Ten Frames

Added tens first then when counting the ones he broke an addend apart to make another ten and added the ones

Friends

Drew a picture / Tally Marks

Added tens
then added nine
he broke on addend apart
to make a friendly ten



Friends

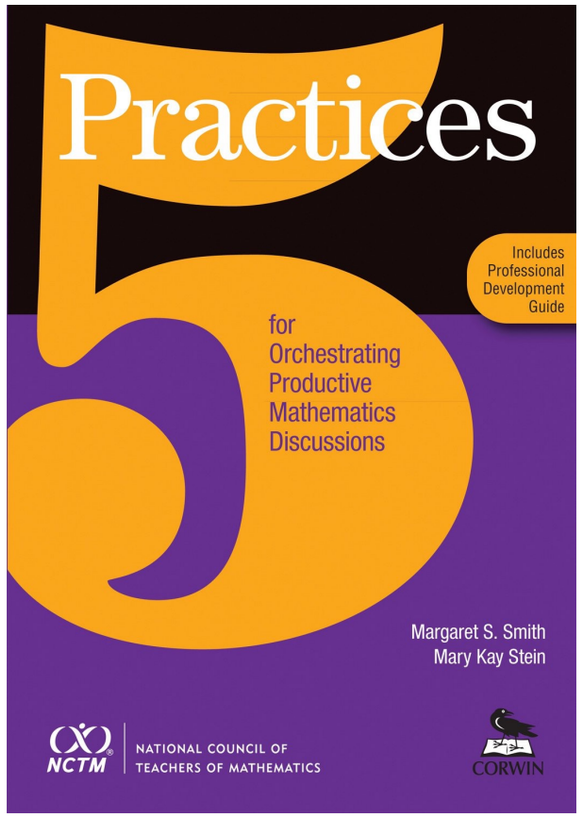
Used counters

Skip counted by 5’s

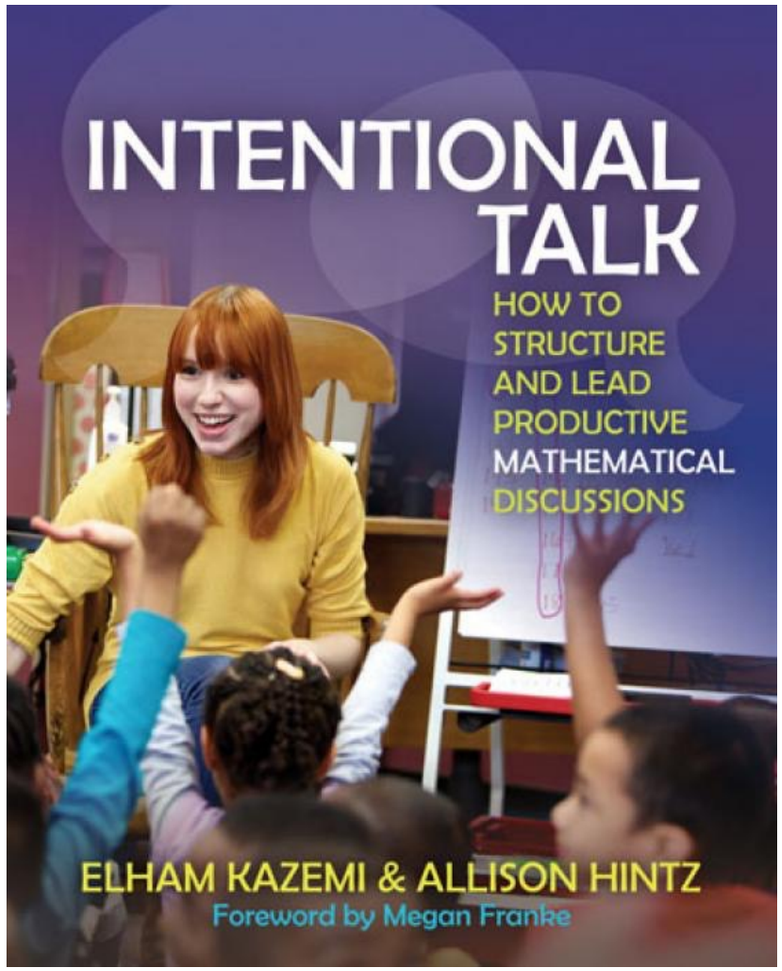
Strategies we observed…

- **Count All** - 2 students
- **Count On** - 9 students
- **Add Tens, Add Ones counting by ones** - 4 students
- **Add Tens, Add Ones but broke one addend apart to make another ten** - 3 students
- **Count by 5's** - 2 students

1. ANTICIPATE
   - Do the problem yourself
   - What strategies are your students likely to use
2. MONITOR
   - Circulate, observe, listen
   - Identify and keep track of the strategies used
   - Ask questions to discover and nudge thinking
3. SELECT
   - Crucial Step - what do you want to highlight?
   - Purposely select those that will advance mathematical ideas
4. SEQUENCE
   - In what order do you want to present the student work samples?
5. CONNECT
   - Craft questions to make the mathematics visible.
   - Compare/contrast 2 or 3 students' work - what are the mathematical relationships?



Determining the goal for the discussion…

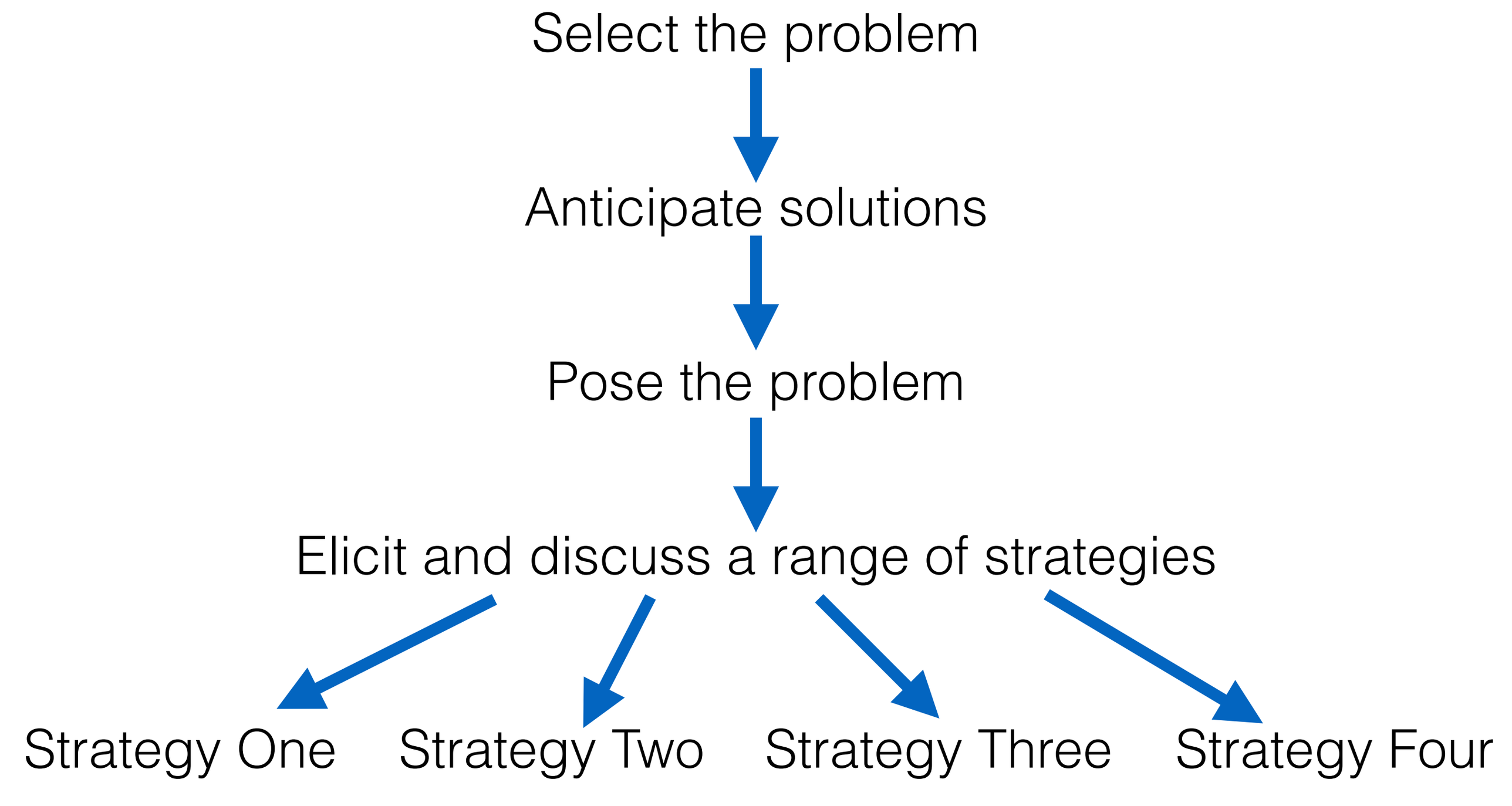


Being intentional!

- goal acts as your compass
- helps decide what to listen for, which ideas to pursue, and which to highlight
- Distinguishing two types discussions
  - Open Sharing Strategy
  - Targeted Sharing Strategy

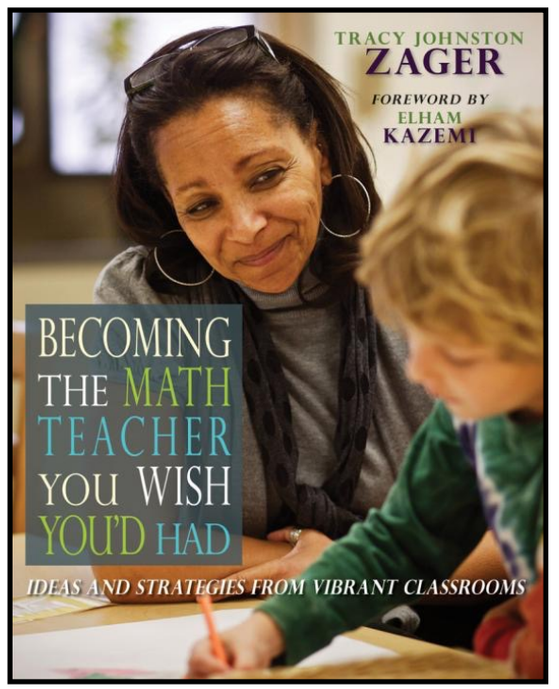
Open Sharing Strategy

Goal: Building students' repertoire of strategies



When I sequence, I am doing so for mathematical and cultural goals. I'm trying to share solutions that will reveal the mathematics, will surprise and delight, will enable students to make connections, will spark new questions and conversations that will keep going after we pause our discussion. I'm trying to build a conversation and understanding, not build toward some culminating, "best" solution.

- Tracy Zager (2018) August 29th blogpost http://tjzager.com/2018/08/29/satisfied/



Targeted Sharing

- **Compare and Connect**: to compare similarities among strategies
- **Why? Let's Justify**: to generate justifications for why a particular strategy works
- **What's Best and Why**: to determine the best (most efficient) strategy in particular circumstances
- **Define and Clarify**: to define and discuss appropriate ways to use mathematical models, tools, vocabulary or notation
- **Troubleshoot and Revise**: to reason through which strategy produces a correct solution or figuring out where a strategy went awry

Kazemi & Hintz (2014) Intentional Talk: How to Structure and Lead Productive Mathematical Discussions.Portland, ME: Stenhouse Publishers, page 54.

Reasons to use Compare and Connect

- The problem can be solved in more than one way, and you know, based on your students, that they will have a variety of ways to approach it.

- You want to support your students in making sense of the different strategies that they have generated in order to make sure students don't see the mathematics in the solutions as disconnected.

- You're promoting students along to a slightly more sophisticated strategy.

- You want to compare the use of two different mathematical tools or representations to solve the problem.

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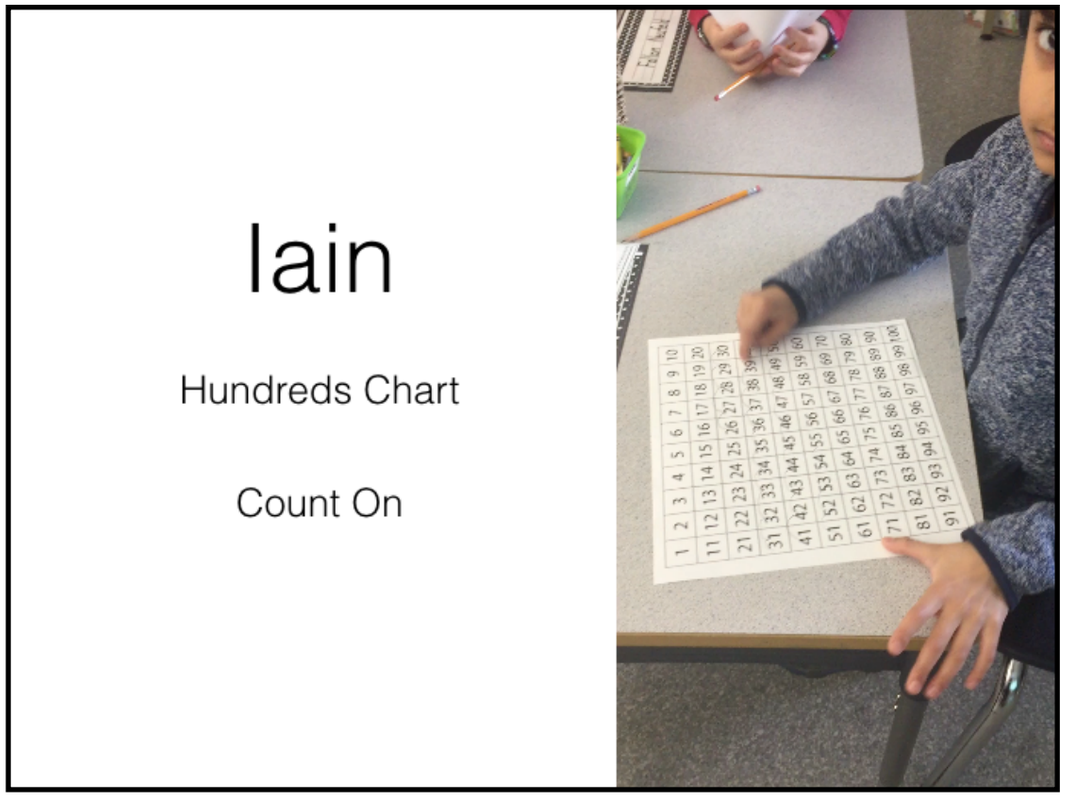
Compare and Connect

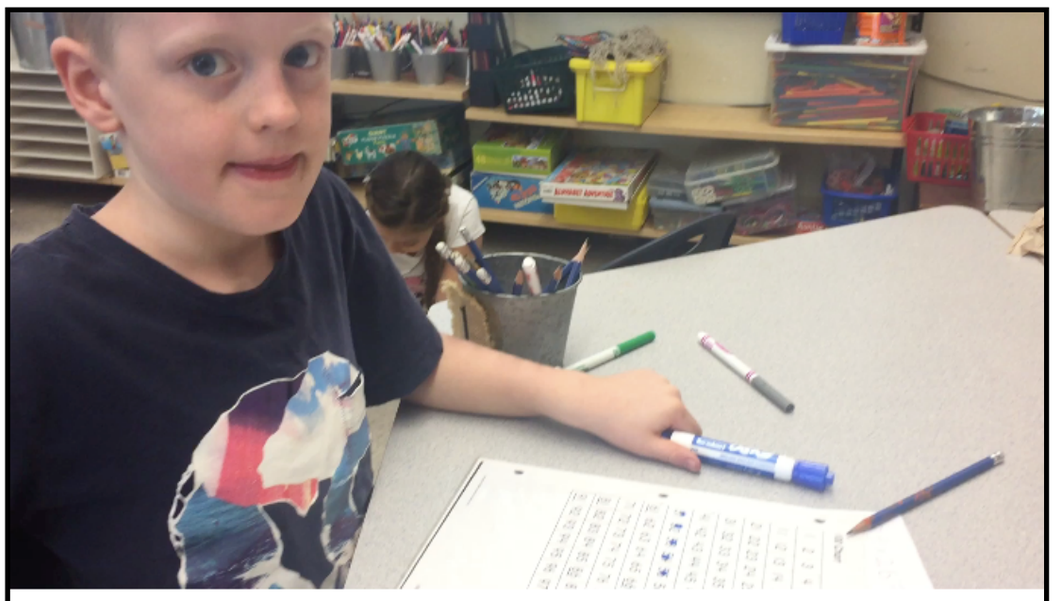
Goal:To nudge the learning forward… move from counting on to a more efficient strategy



Iain

Hundreds Chart

Count On



Rylan

Hundreds Chart

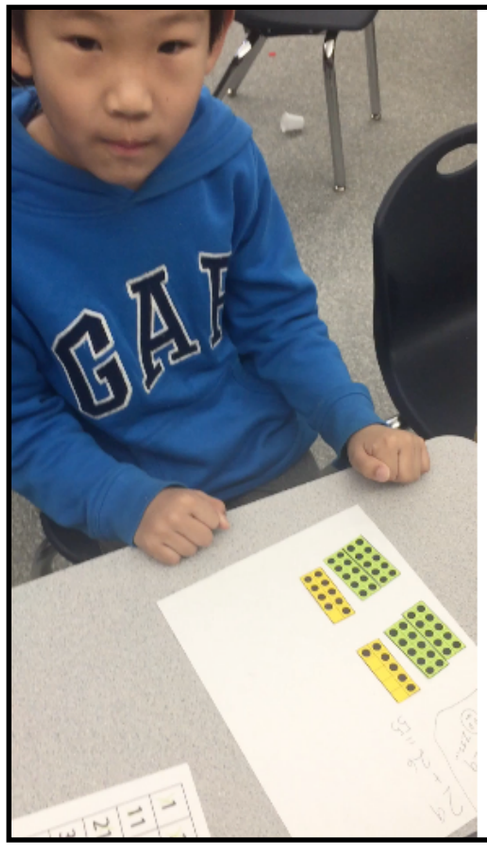
Adding in Chunks

What questions could we ask during our discussion?

Yousaf

Mini Ten Frames

Added tens Add Ones



Allan

Mini Ten Frames

Added tens first then when counting the ones he broke an addend apart to make another ten and added the ones

Why might we select and share these two solutions?

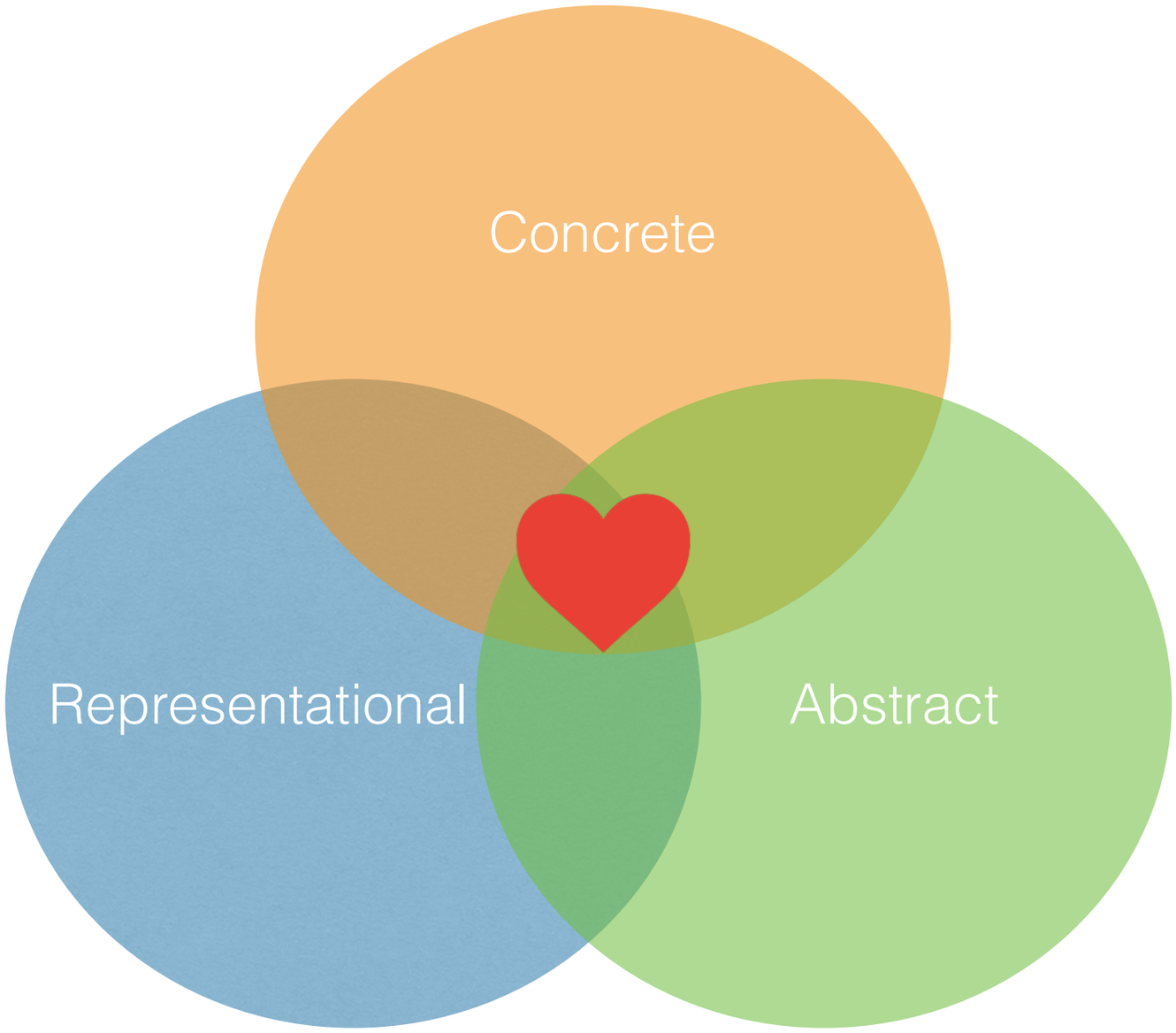
Act Three

Why “Three Act Tasks”?

- Everyone has **ACCESS**
- Students can **IDENTIFY AS MATHEMATICIANS**
- Elevates the **MATHEMATICAL PRACTICES**

- **modeling with mathematics (SMP 4)**
- **making sense of contextual problems (SMP 1)**
- **bringing mathematical structure to a situation (SMP7)**
- **analyzing the reasoning of others (SMP3)**
- **selecting the information and tools they need to model the situation (SMP 5)**

Mathematical Models
Concrete-Representational- Abstract



Adapted from Tondevold (2018)

HALLOWEEN SCARIES

THREE ACT TASK

Act One


Nestlé
SCARIES
TM / MC
CANDY COATED MILK CHOCOLATE
CHOCOLAT AU LAIT ENROBÉ D'UNE COQUILLE DE SUCRE

What do you **NOTICE**?

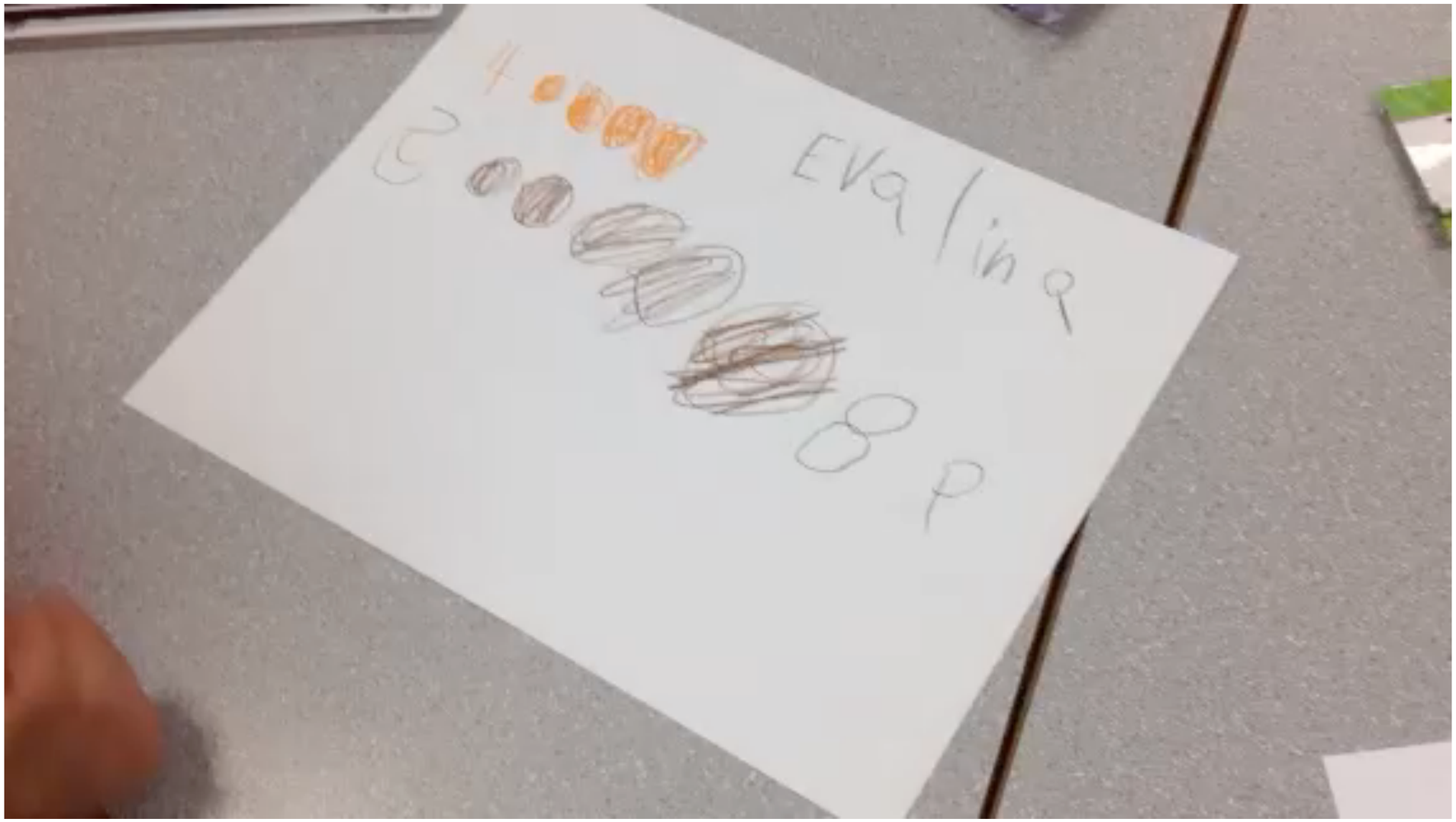
What do you **WONDER**?

Act Two

4 ORANGE

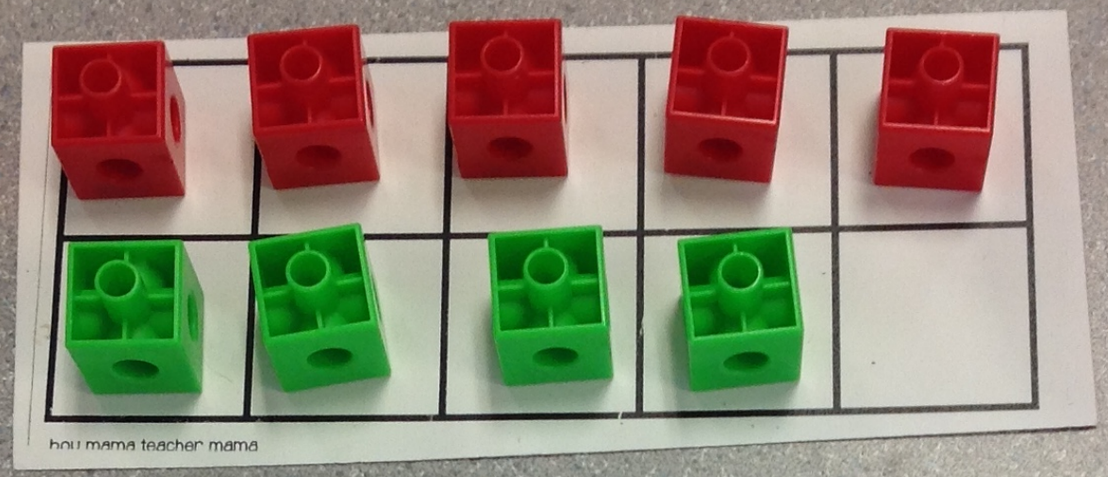
5 BROWN

Act Three


Evalina
8 p

5

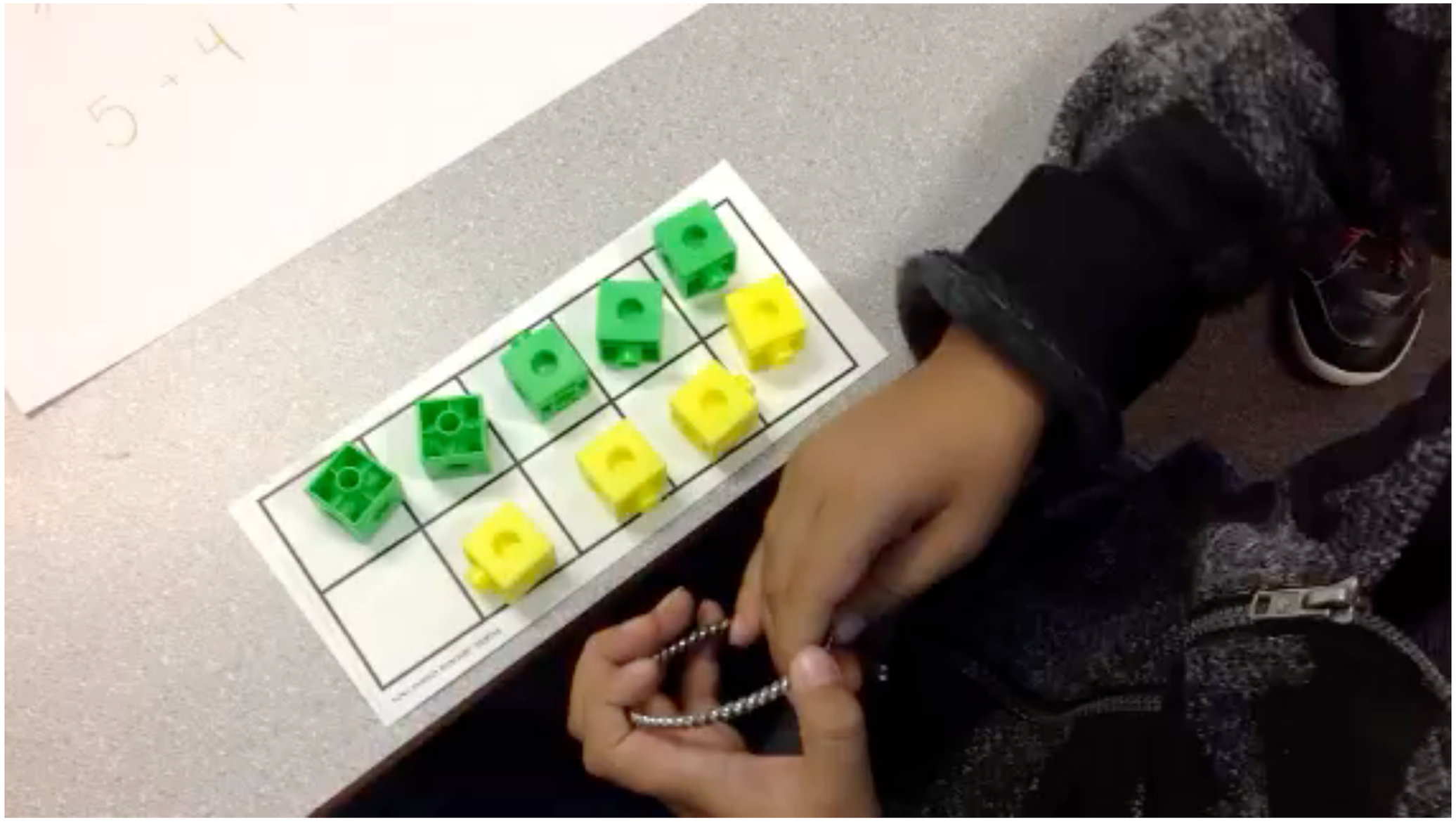
4

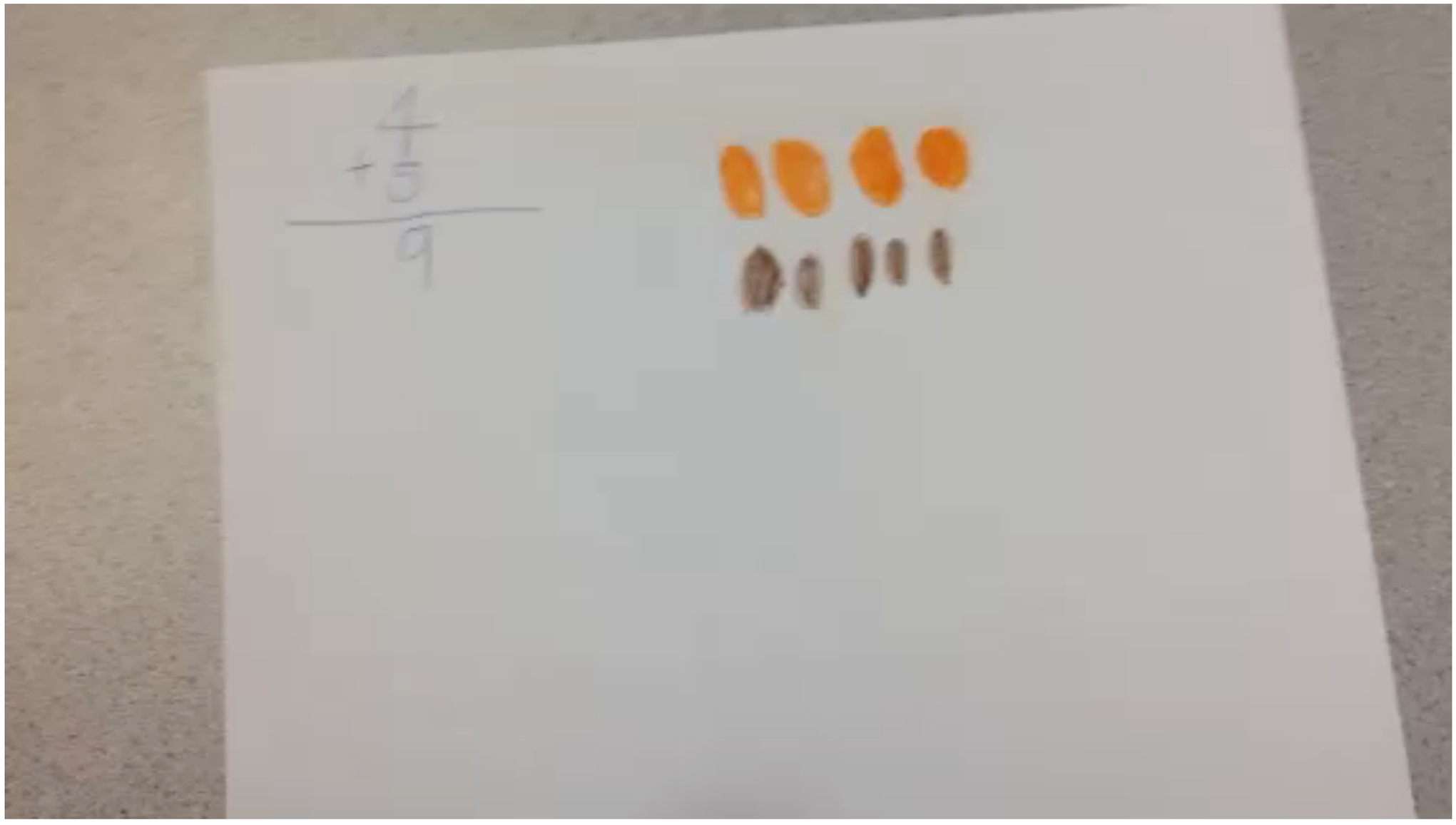


subtract

1 2 3 4

5 + 4 = 9 5 6 7 8 9



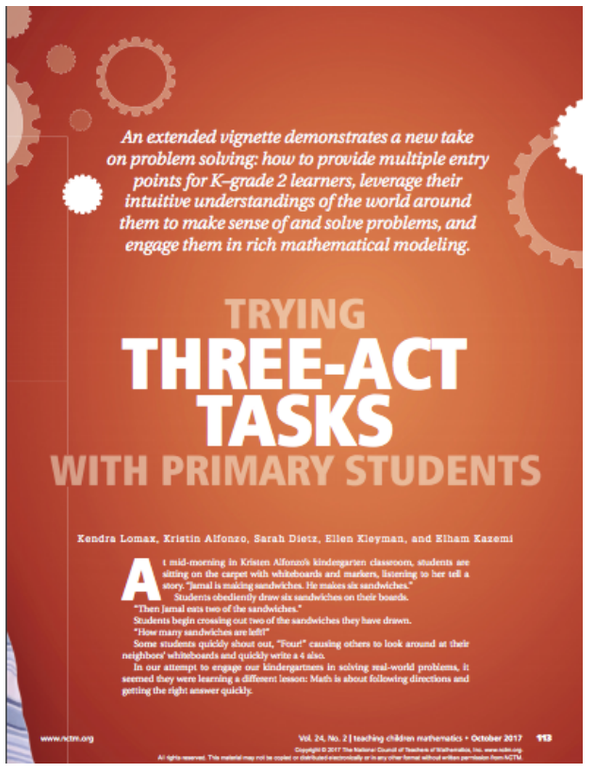

4
+5
9

Resources…

Graham Fletcher https://gfletchy.com/3-act-lessons/

Kendra Lomax https://learningfromchildren.org/3-act-tasks/

My site Jen Barker http://www.meaningfulmathmoments.com/three-act-tasks.html



NCTM Teaching Children's Mathematics October 2017 had an excellent article on this topic.

Any questions…

Thank you for spending your time with me!