Number Routines in K - 3

Presented by Jen Barker

UBC - TC Mini Conference

November 17th, 2016

A little about Me…

- I teach in Surrey as an Early Numeracy Teacher
- Have 18 years experience in classrooms K - 5
- Mom to M&M, aged 13 and 11
- Twitter: @BarkerJbarker
- www.meaningfulmathmoments.com
- Email: barker_jennifer@surreyschools.ca
- Believe Math should be meaningful, authentic, engaging and build conceptual understanding

Learning Intentions

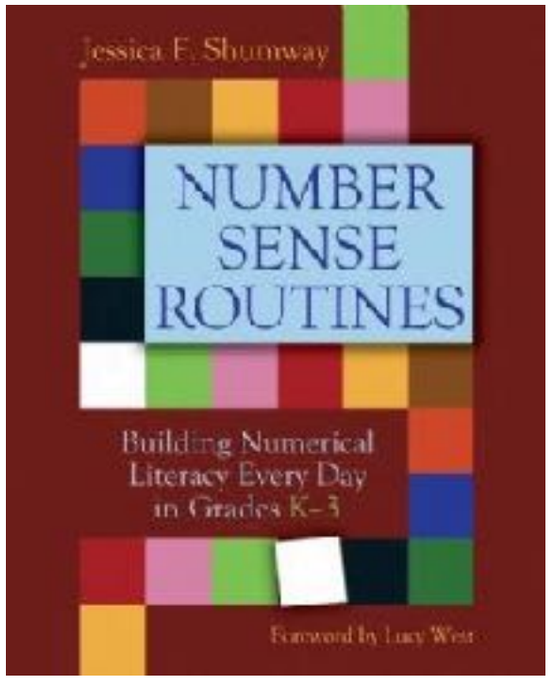
- I understand how using 5 - 10 minute daily Number Routines can develop my students' number sense, computational fluency and spatial sense.

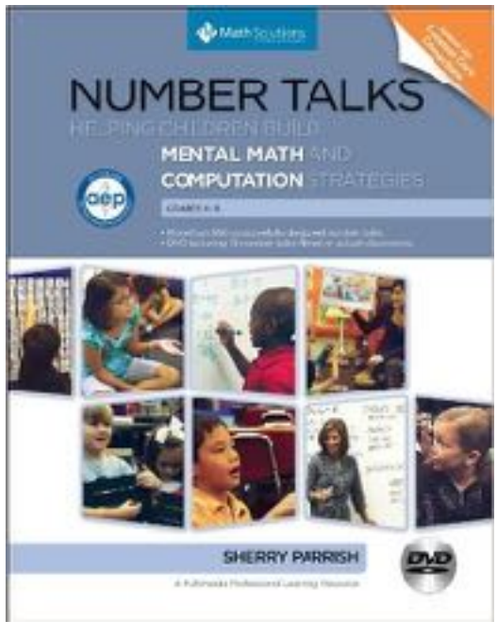
- I understand how using Number Routines helps to build a Mathematical Community and encourages my students to share and communicate their thinking

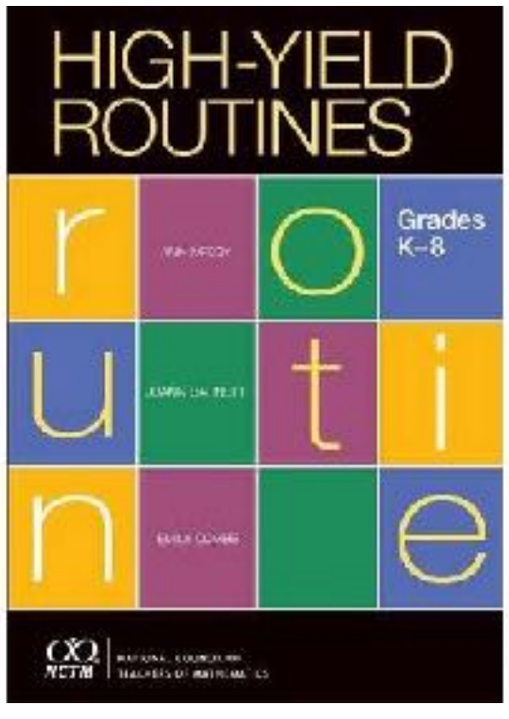
- I have one or two Number Routines that I feel comfortable exploring with my class and I understand how to differentiate these to meet the needs of my students.

What are Number Routines?

- Collection of quick, low-prep 5 to 10 minute activities.
- They focus on the big ideas in Mathematics.
- They serve to reteach, reinforce, and enrich.
- Can be used as warm ups, mini lesson, with the whole class or in small groups.





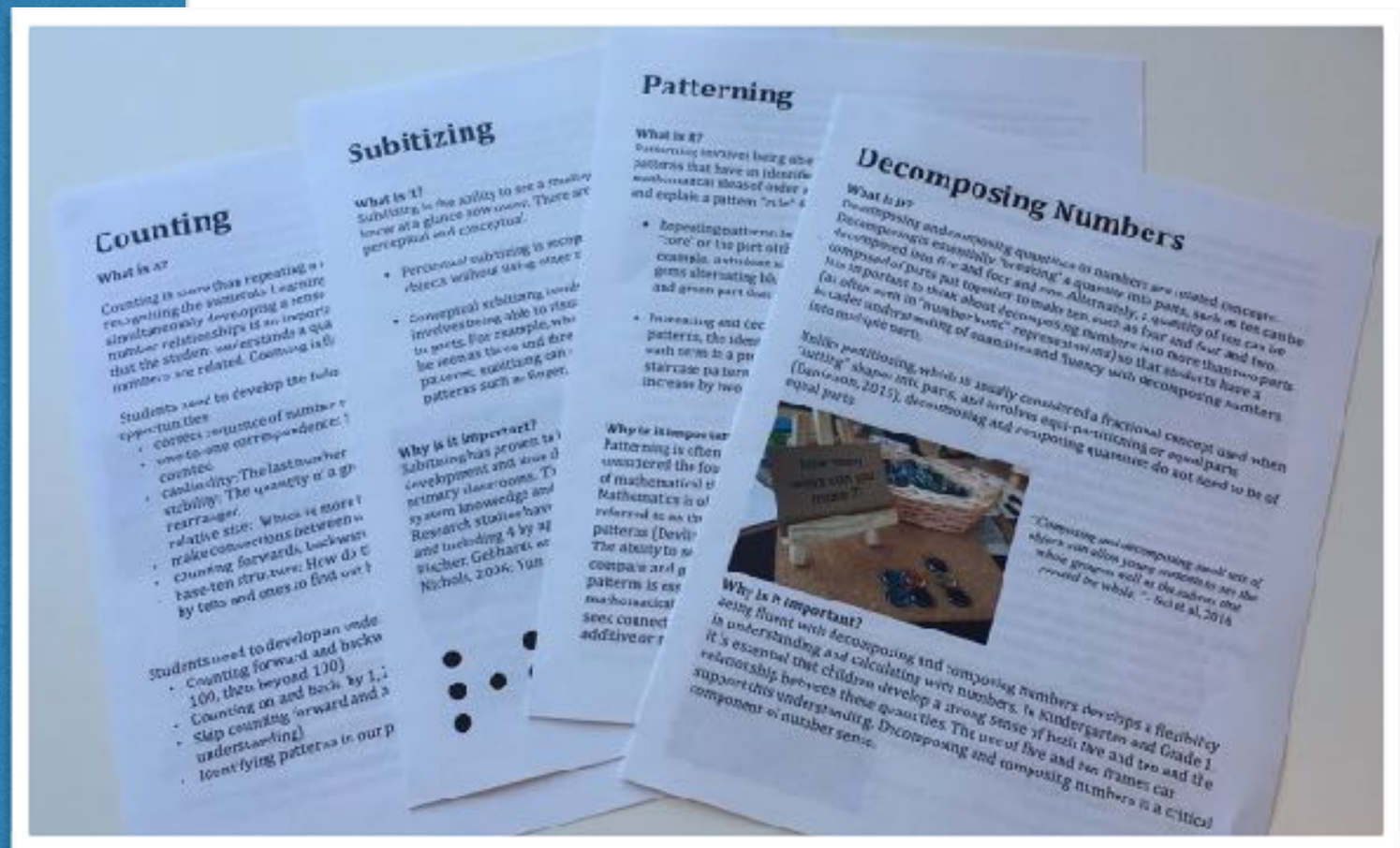


Why use Number Routines?

- Builds a Math community where students feel safe to take risks and can learn from one and other
- Provides daily number sense experiences
- Fosters discussion about numbers and their relationships
- Responsive to students' understandings
- Allows for spiralling through concepts and helps students make connections to the big ideas in mathematics
- Emphasizes the core and curricular competencies in relation to mathematical content.

What are the BIG ideas in Number for Primary Students?

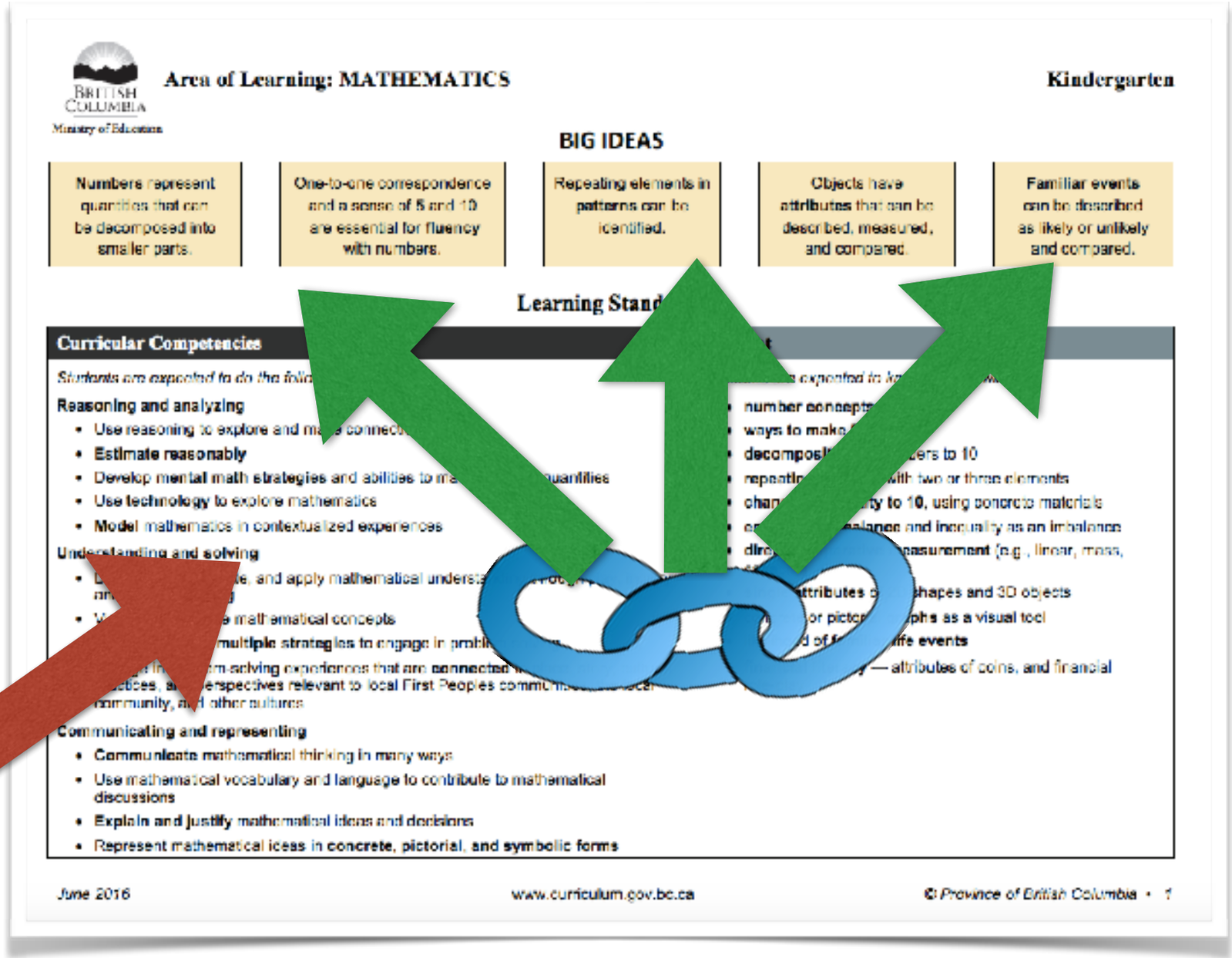
- Subitizing
- Counting
- Place Value
- Decomposing
- Patterning
- Spatial Awareness



These one pagers were created by Sandra Ball and Janice Novakowski.
They can be found at http://janicenovkam.typepad.com/reggioinspired_mathematic/instructional-resources.html

How does this relate to the revised Curriculum?

The mathematical discussions embedded in the routines foster the curricular competencies in relation to the content.



What Curricular Competencies are fostered?

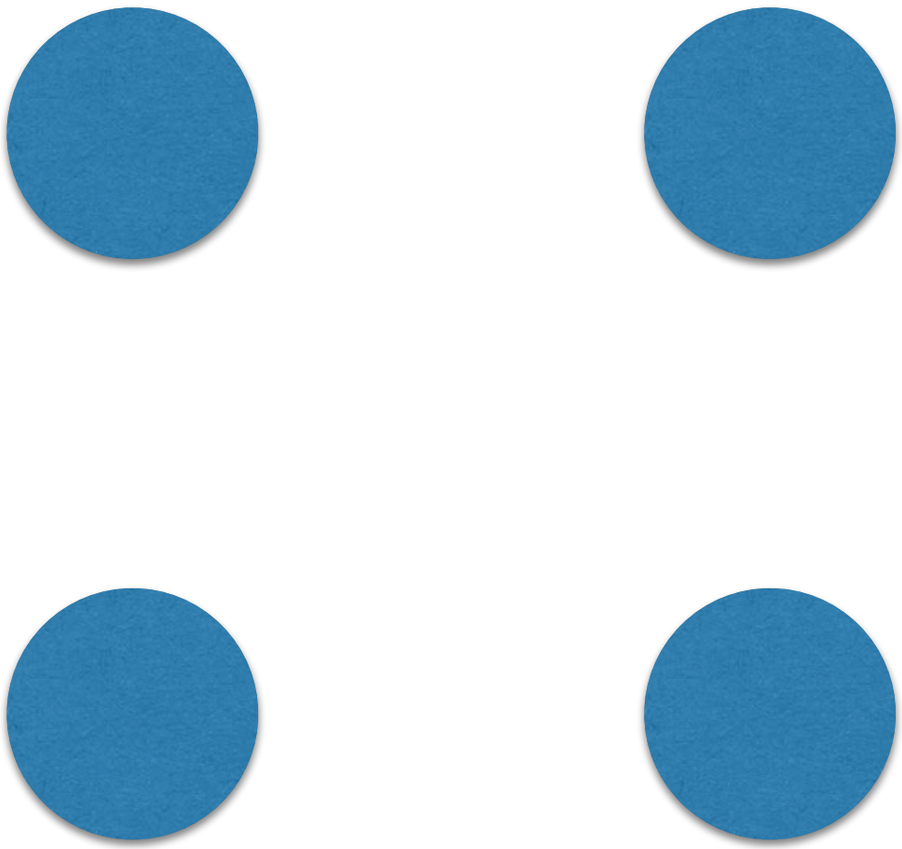
- Reasoning abstractly and quantitatively
- Analyzing by looking for and making use of structure
- Understanding by making sense of problems and persevering in solving them
- Communicating their thinking not only orally but through concrete materials and pictorial representations
- Connecting through seeing themselves as mathematicians - math to math connections - math to world connections.

SUBITIZING

It is the ability to instantly see how many!

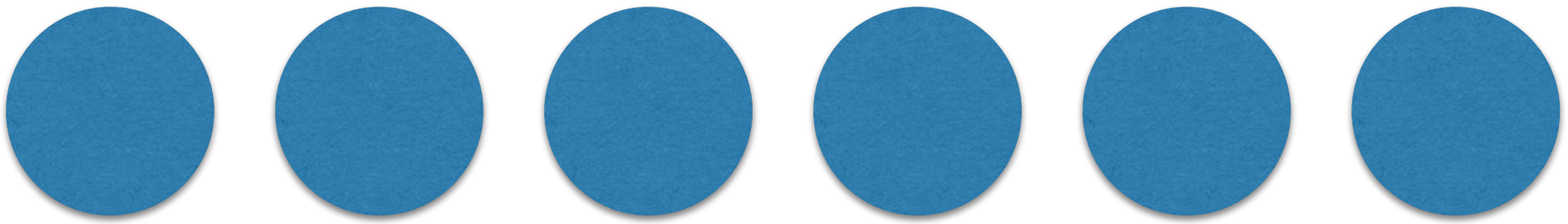
It is important because students need to develop:

- ability to move beyond counting to see spatial patterns
- seeing groups/sets of #'s
- using benchmarks of five and ten
- develop part-part whole understanding



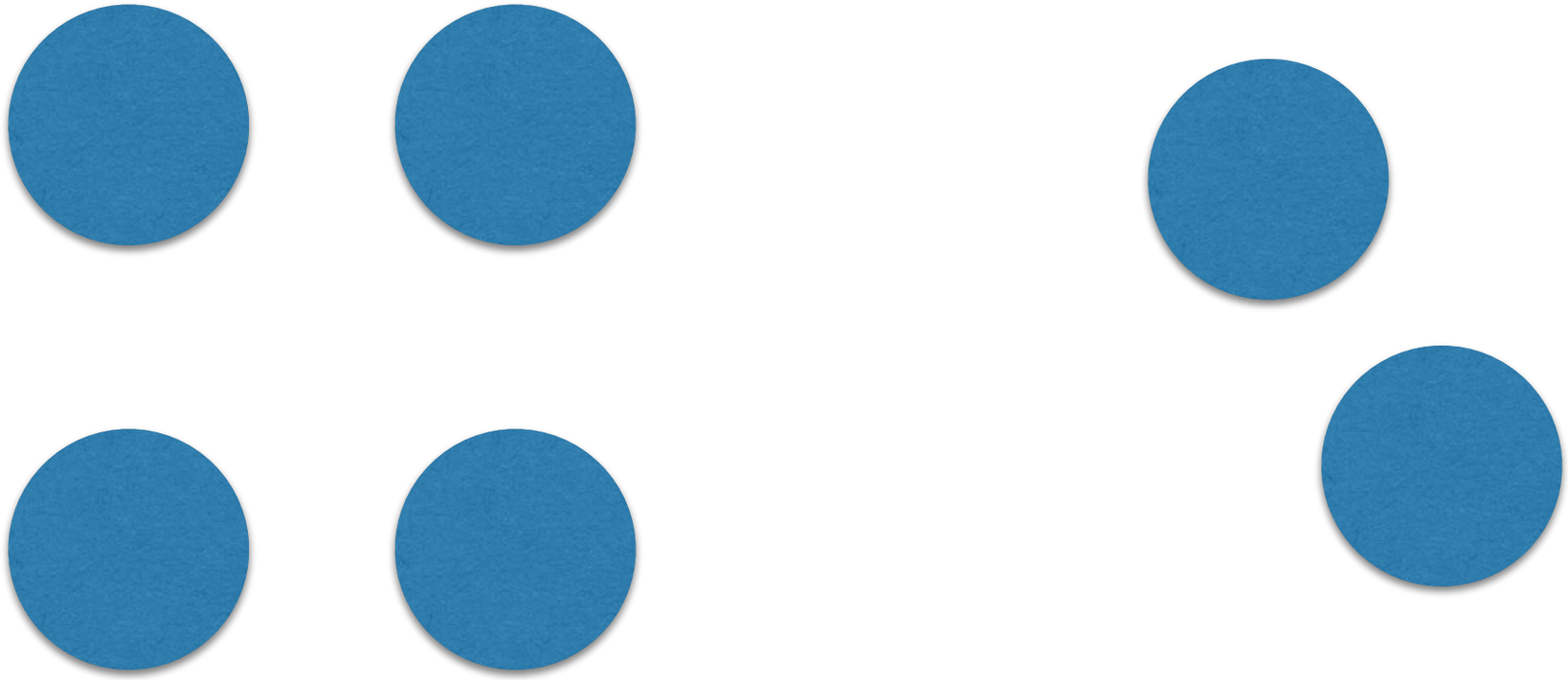
How many?

How did you see them?



How many?

How did you see them?



Quick Images

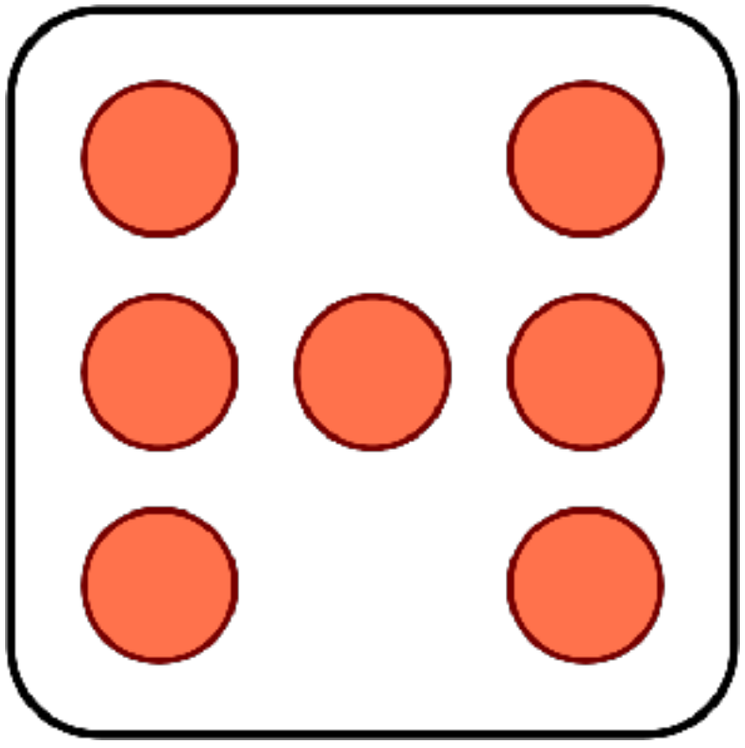
Learning Intentions:

- Subtilizing (Perceptual and Conceptual)
- Visualization
- Decomposing and Recomposing
- Mental Math Strategies

<u>Perceptual Subtizing</u>
Taking a “mental picture” and quickly being able to know how many are there.

<u>Conceptual Subitizing</u>
Seeing quantities in groups (e.g., I see 3 and 3 and know it is 6)

Dot Cards



Flash and Say

Flash and Show

Give SILENT thumbs up!

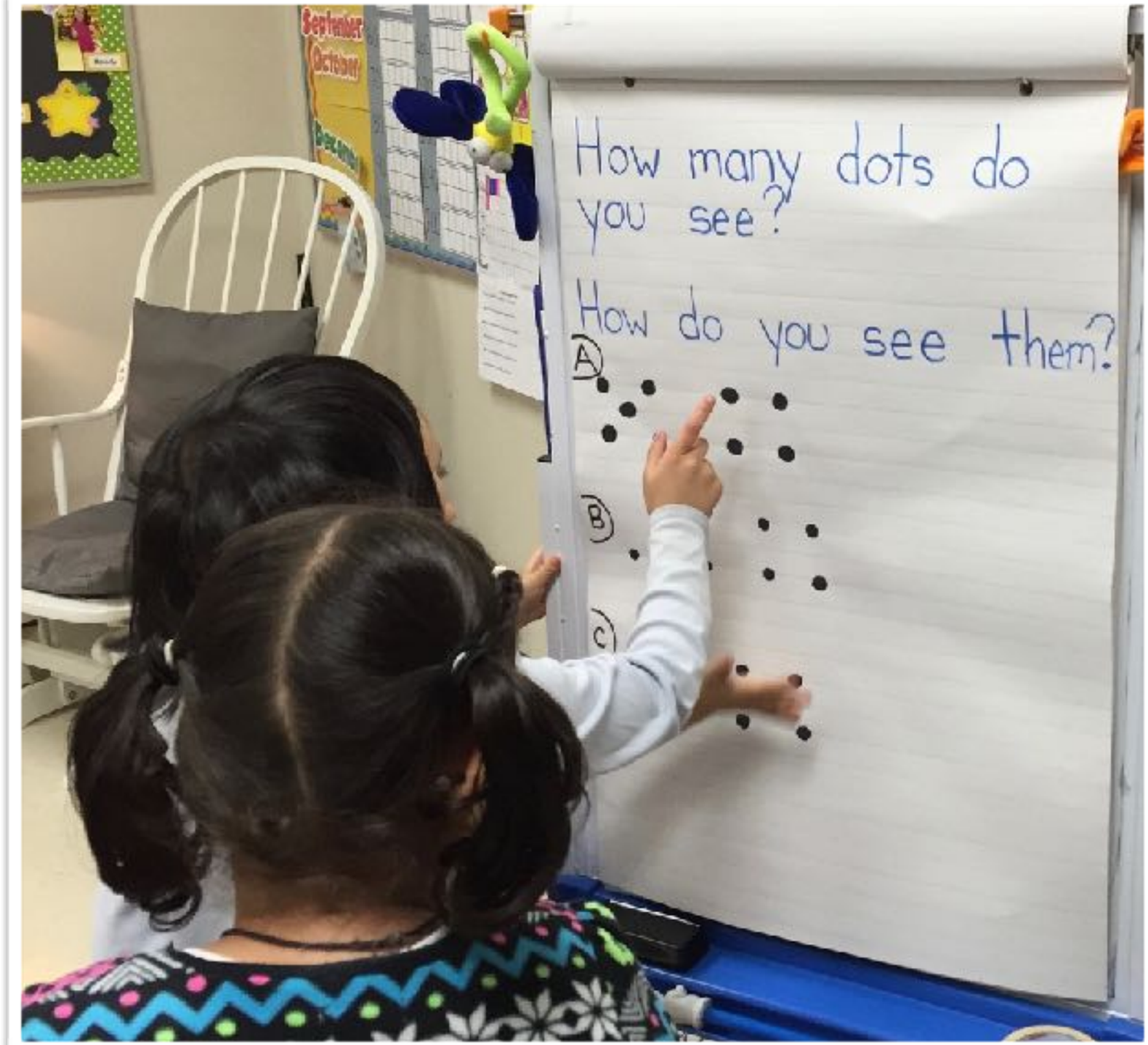
“How many do you see?”

“How did you know so quickly?”

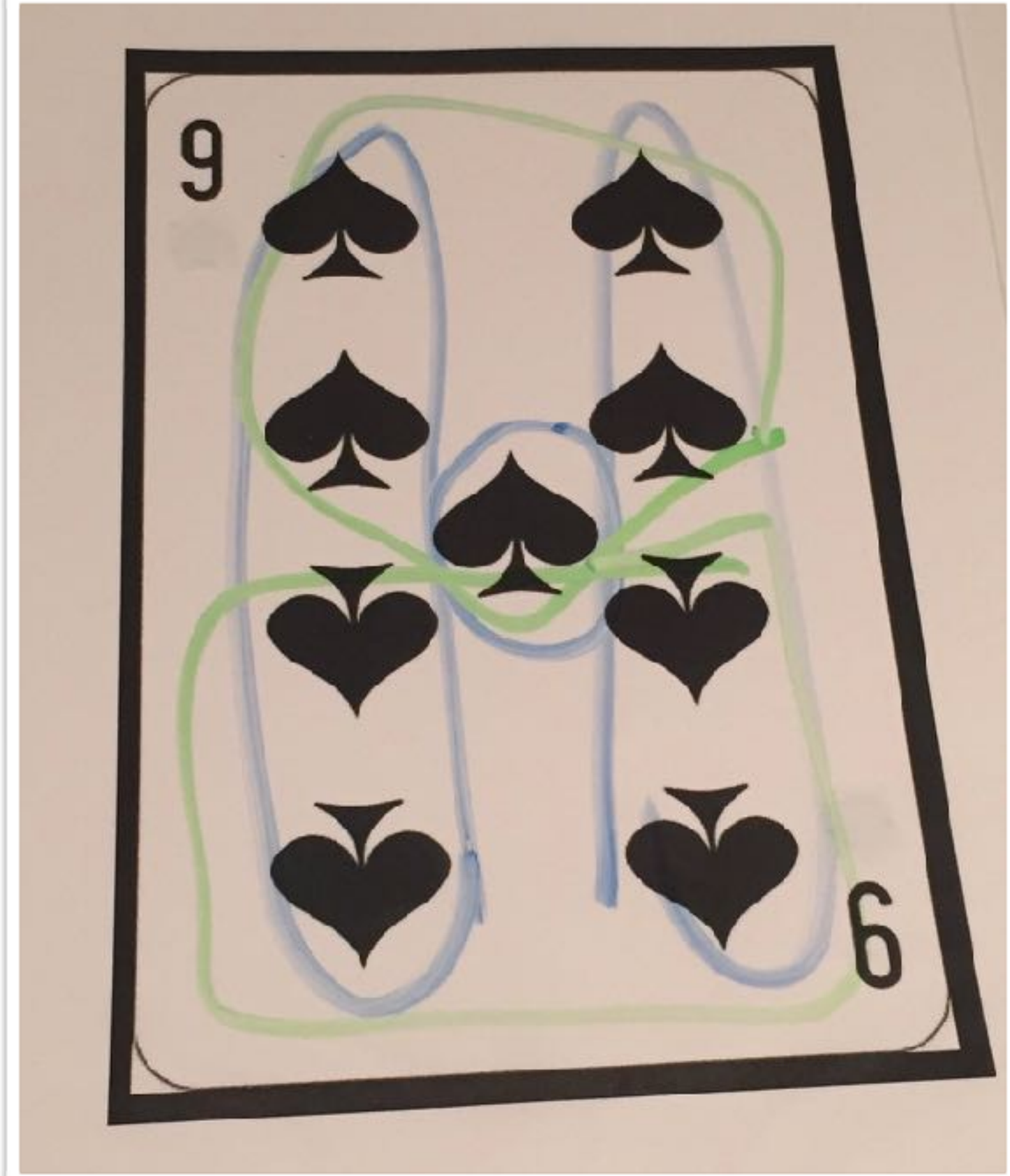
“How did you see them?”

Pie Plates/ Paper Plates

Chart Paper



Playing Cards


9
6

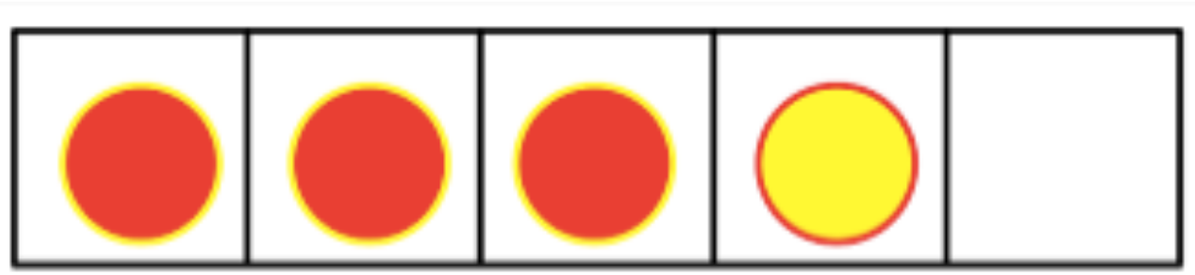
PLACE VALUE

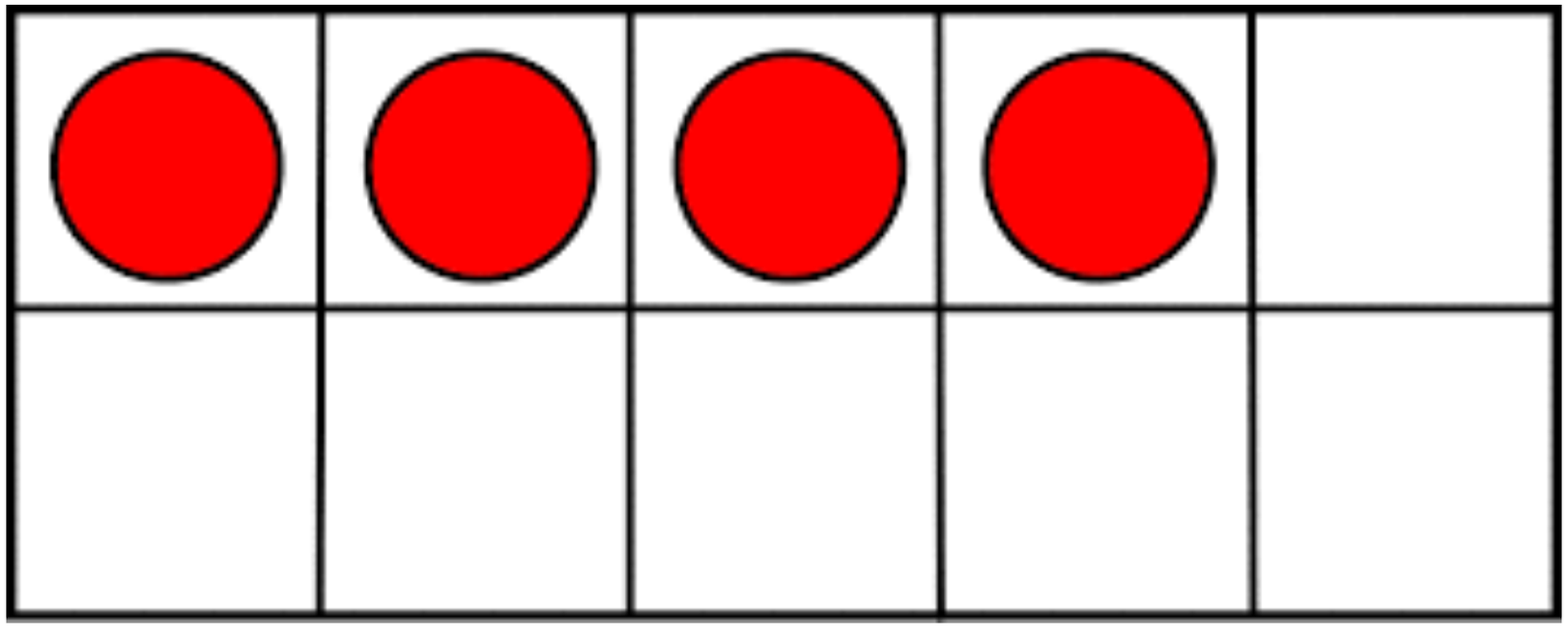
It is the ability to understand our base-ten system.

It is important because students need to develop:

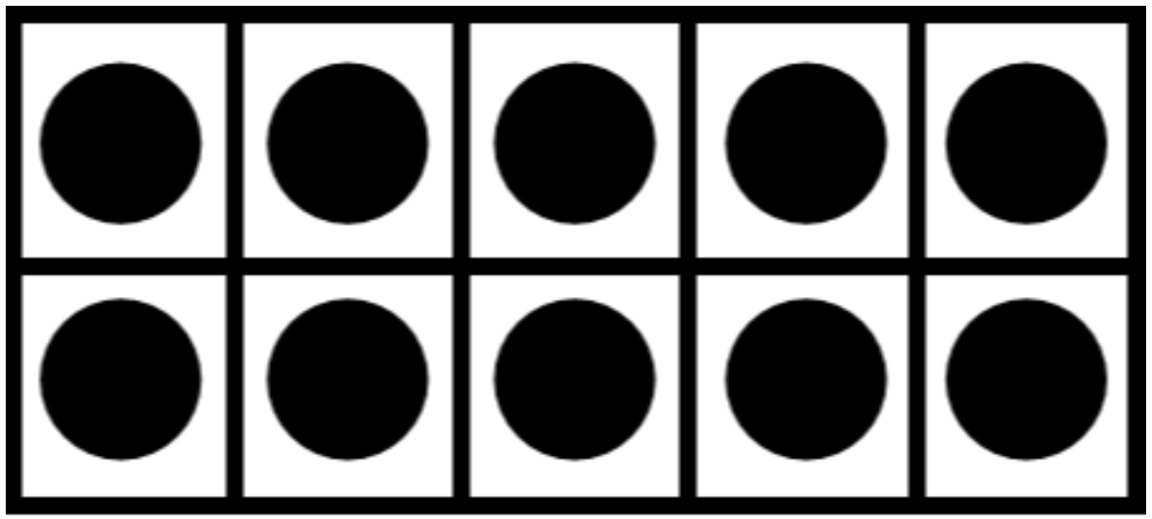
- ability to know the value a digit has based on its place
- the ability to work with larger numbers
- the ability to work with decimals

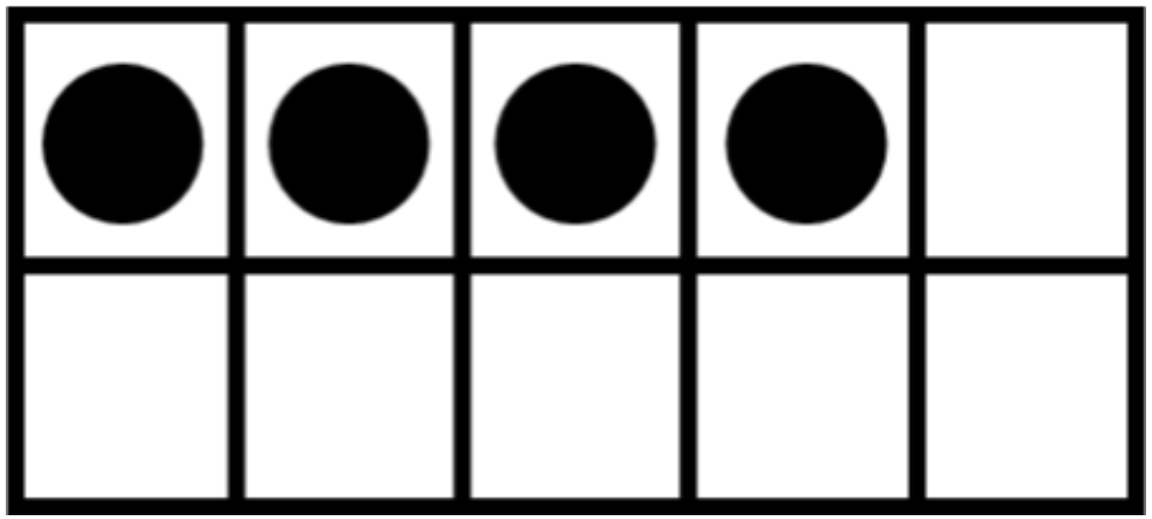
Five and Ten Frames





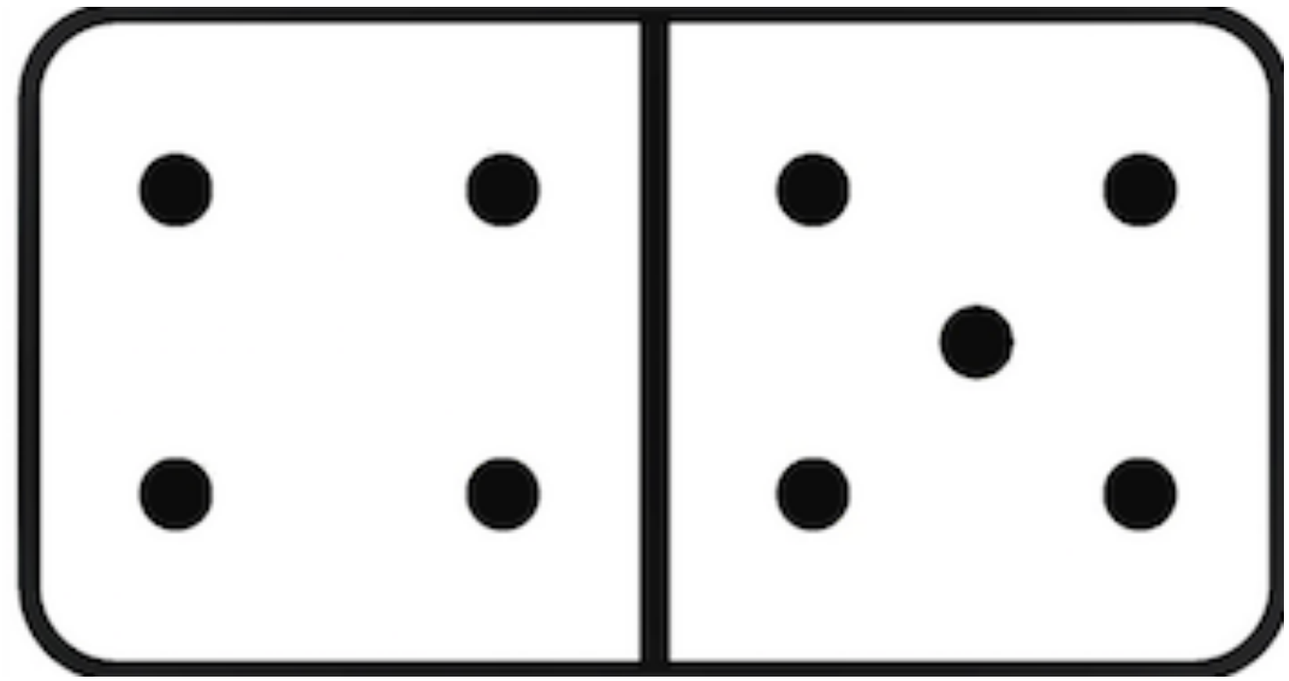
Double Ten Frames





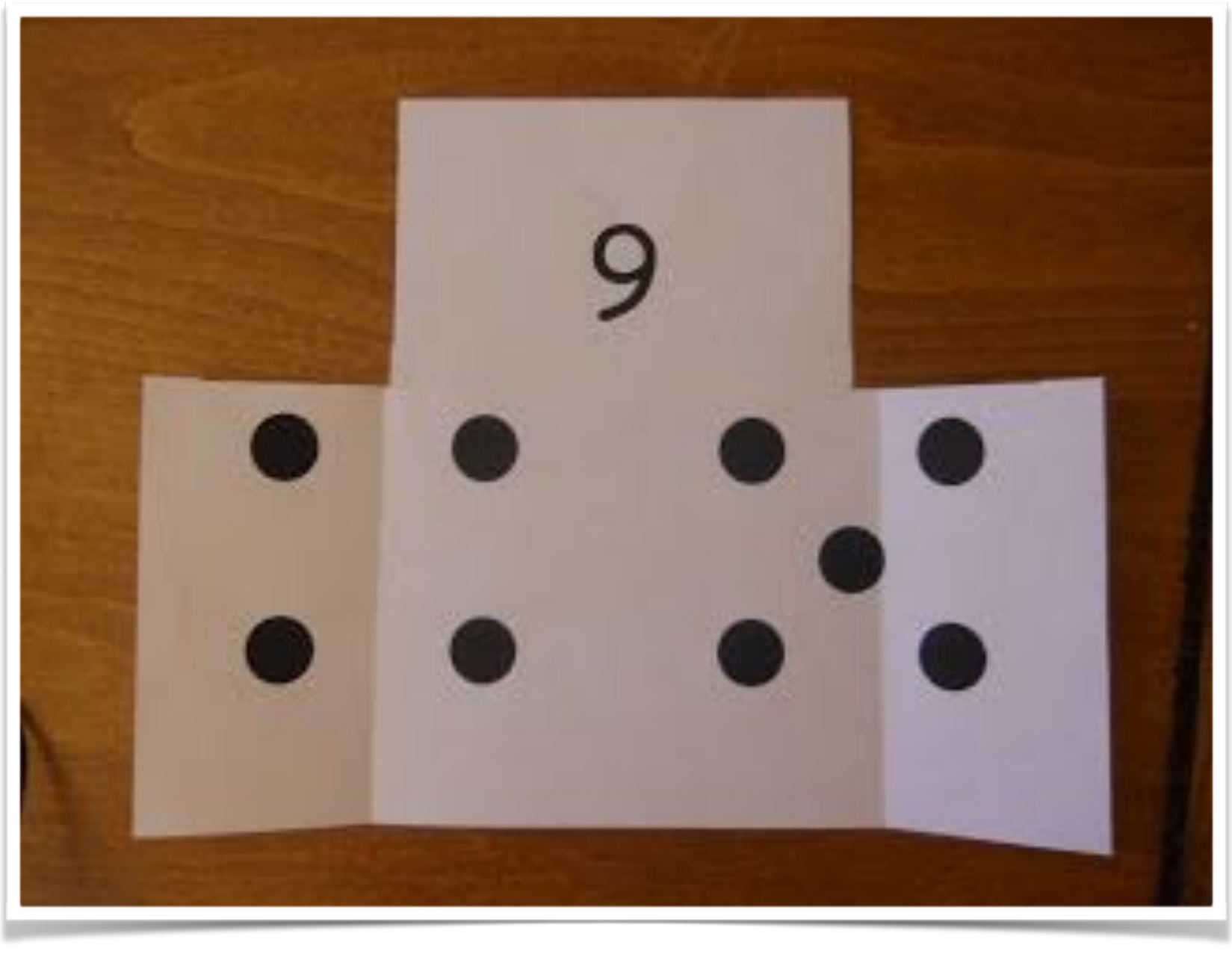
Rekenrek

Dominoes

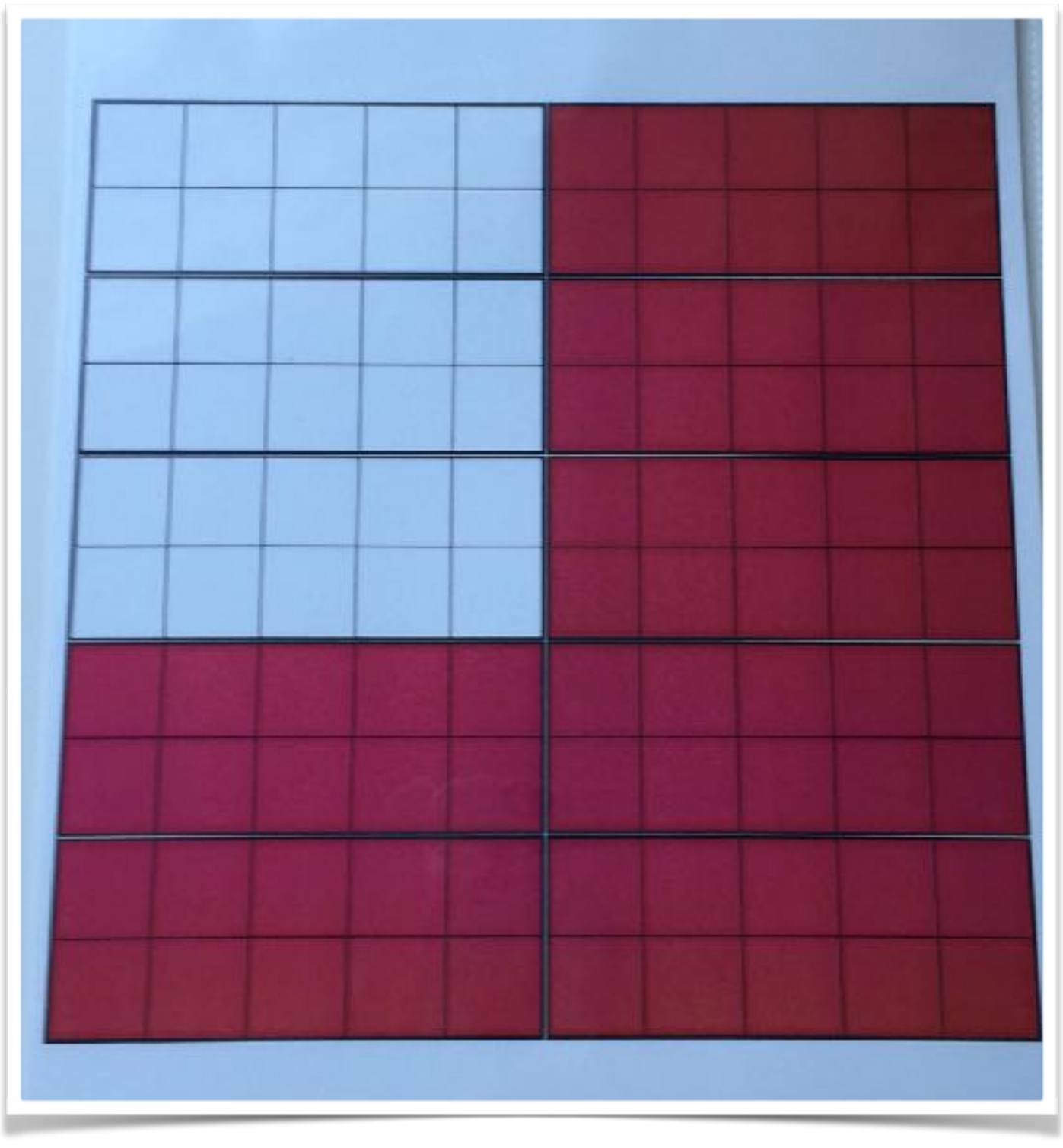


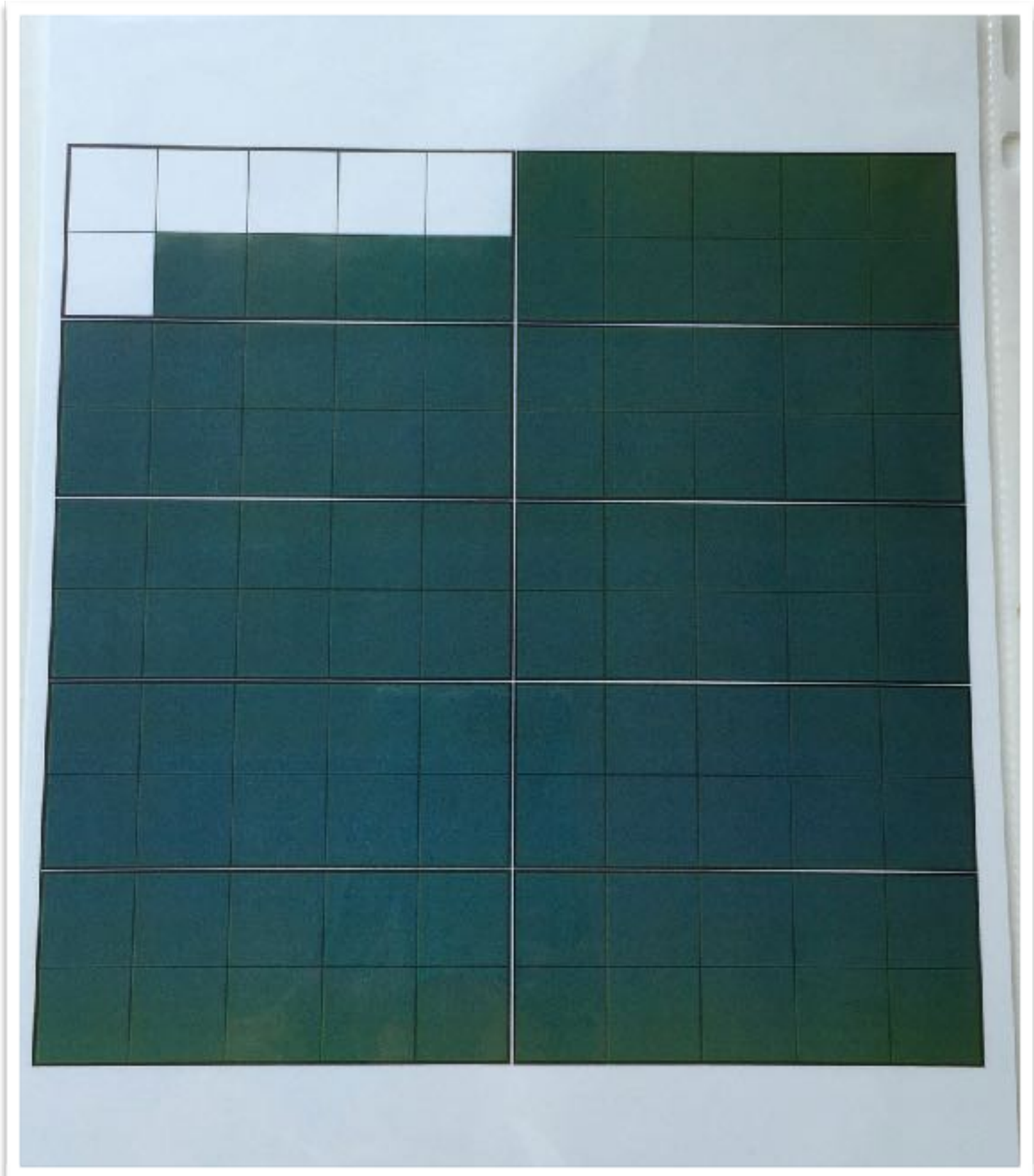
What mental math strategies could be reinforced?

Part Part Whole Cards



Hundreds Boards





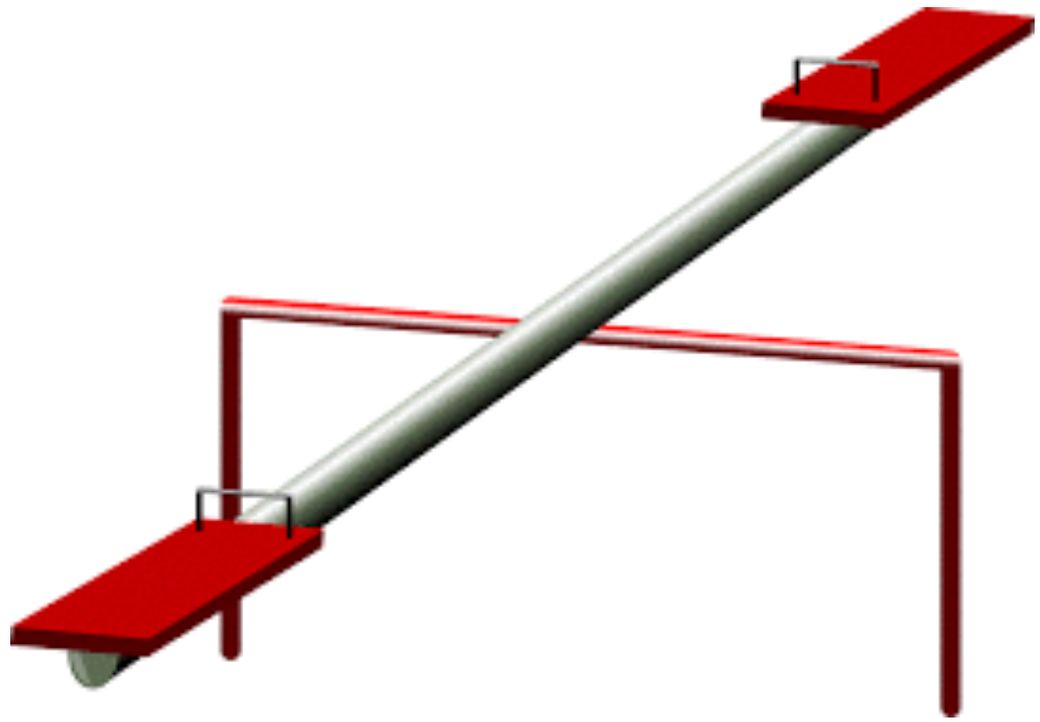
Teeter Totter

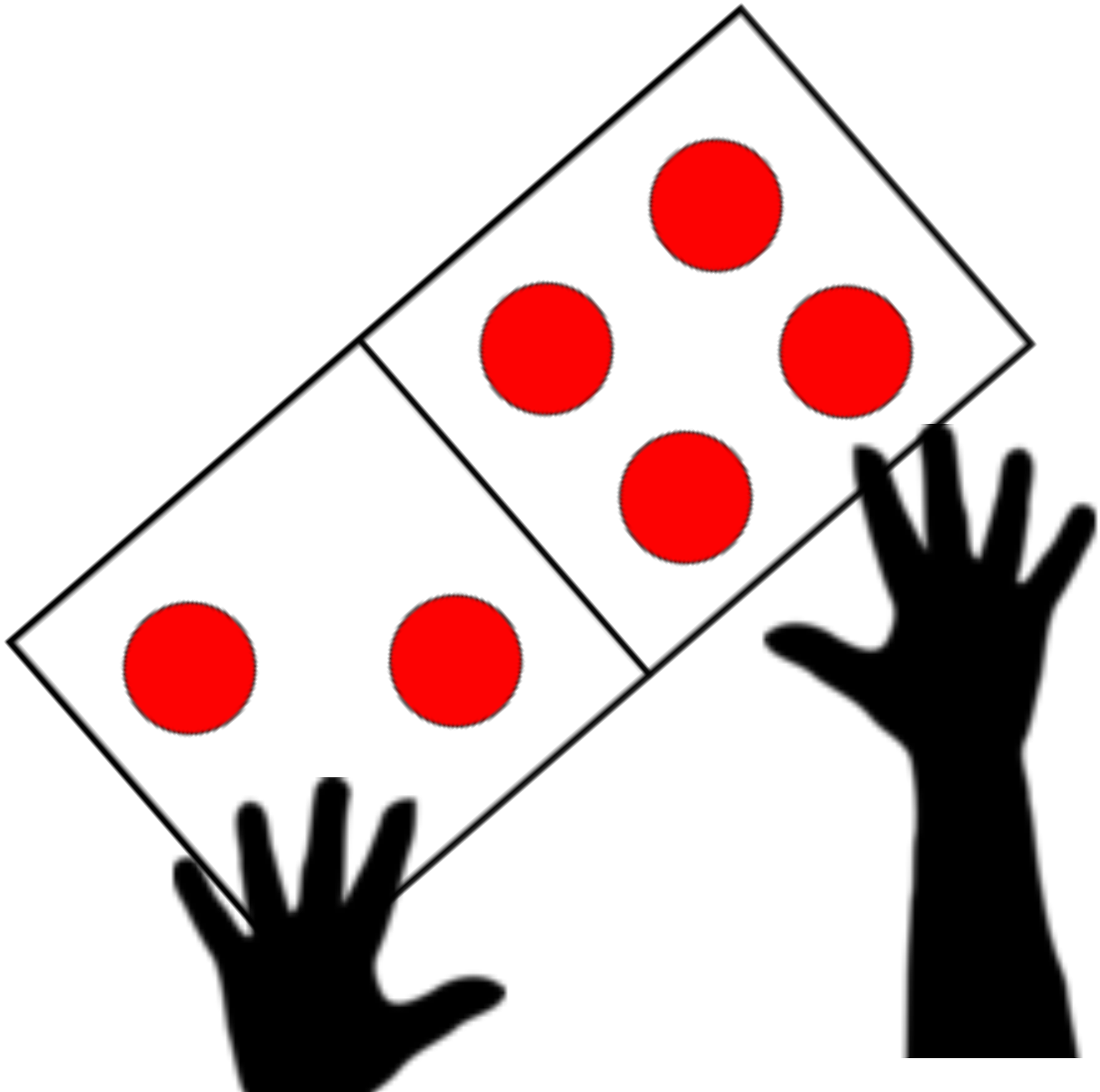
Learning Intentions:

- Subtilizing (Perceptual and Conceptual)
- Visualization
- Magnitude (more or less)

Items you could use:

- Any of the quick image items





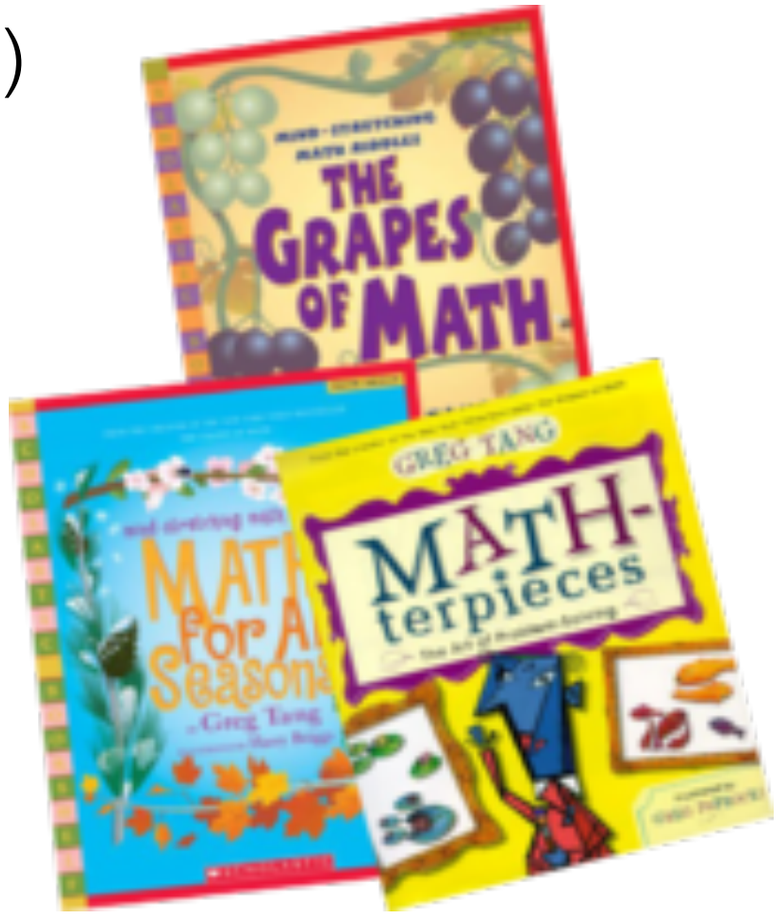
Guiding questions…

- How many do you see?
- How do you see them?
- Does anyone see them a different way?
- Explain your thinking.

Picture of the Day

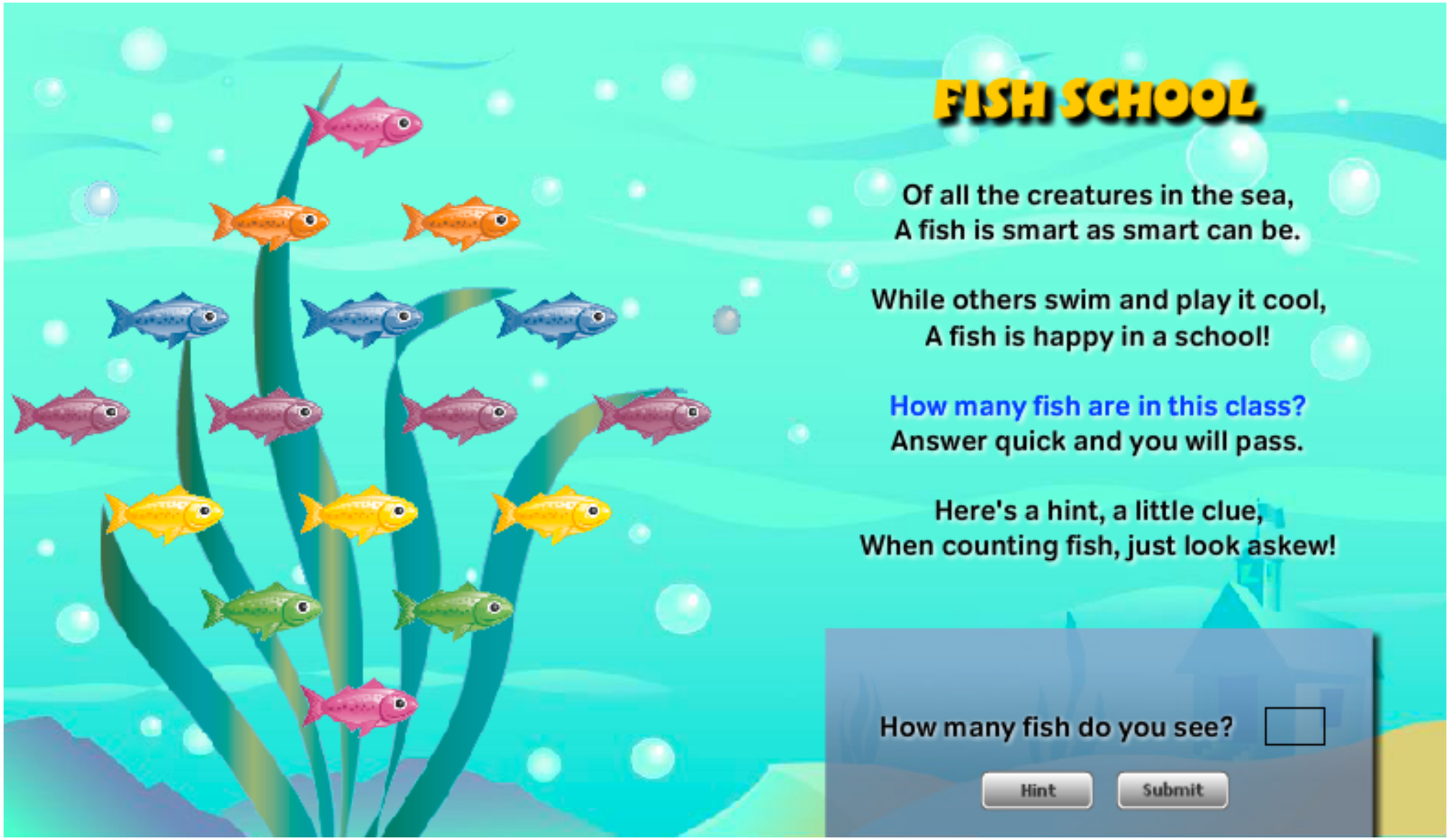
Learning Intentions:

- Subtilizing (Perceptual and Conceptual)
- Visualization
- Decomposing and Recomposing
- Mental Math Strategies



Items you could use:

- Greg Tang books
- Photos of real life items


FISH SCHOOL
Of all the creatures in the sea,
A fish is smart as smart can be.
While others swim and play it cool,
A fish is happy in a school!
How many fish are in this class?
Answer quick and you will pass.
Here's a hint, a little clue,
When counting fish, just look askew!
How many fish do you see?
Hint
Submit

“How many do you see?”

“How did you know so quickly?”

“How did you see them?”

“How many do you see?”

“How did you know so quickly?”

“How did you see them?”

COUNTING

It is the ability to find out how many!

It is important because students need to develop:

- Correct sequence of number names
- One-to-one correspondence
- Cardinality
- Relative size
- Counting forward and backwards, starting at any point
- Skip counting
- Place Value
- Estimation skills

Counting Collections

Learning Intentions:

- Subtilizing (Perceptual and Conceptual)
- One-to-one correspondence
- Cardinality
- Counting forward
- Skip counting
- Place Value

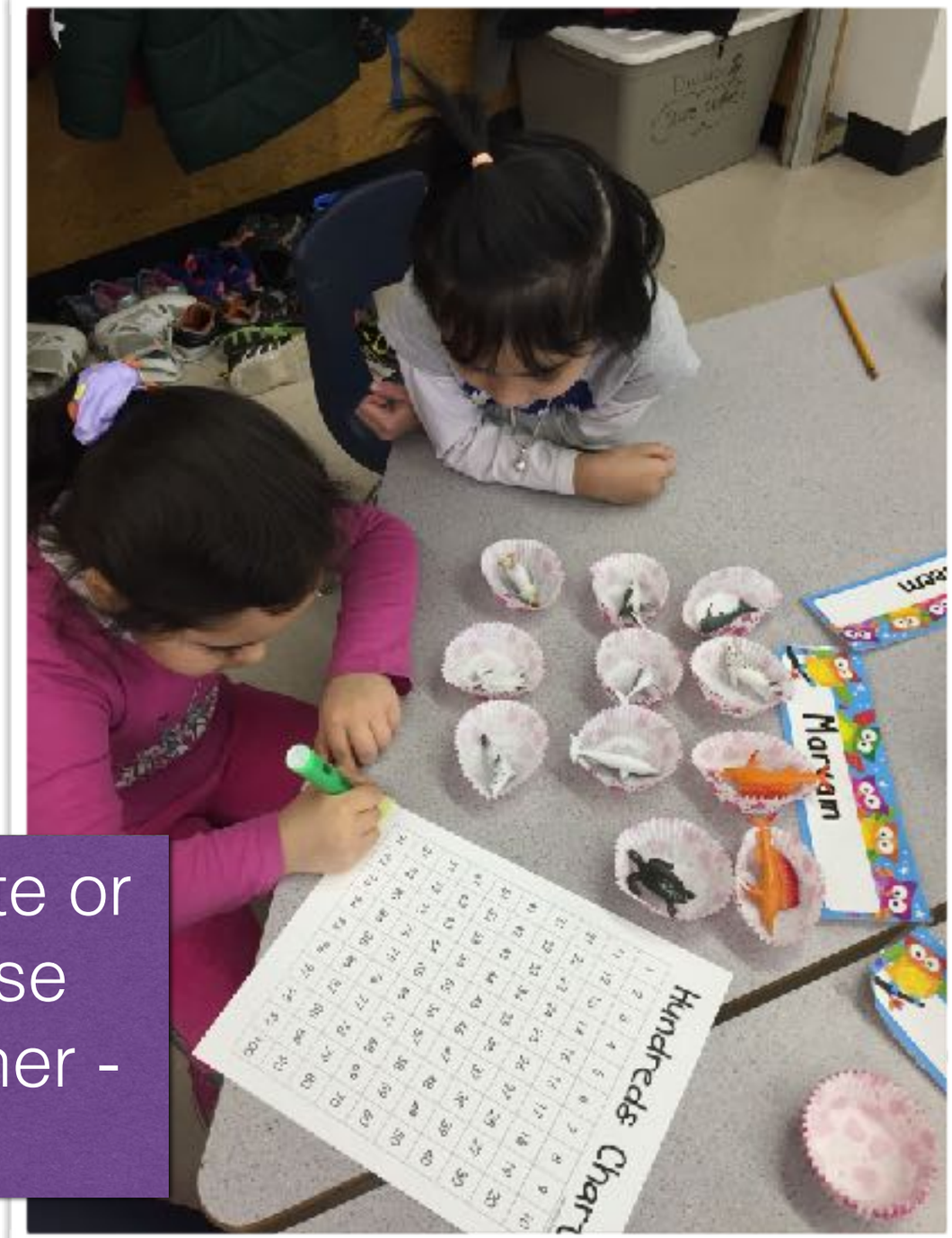
Items you could use:

- anything - straws, bottle caps, buttons, pompoms, craft sticks, beans, beads, toothpicks, mini-erasers, play cards, small animals

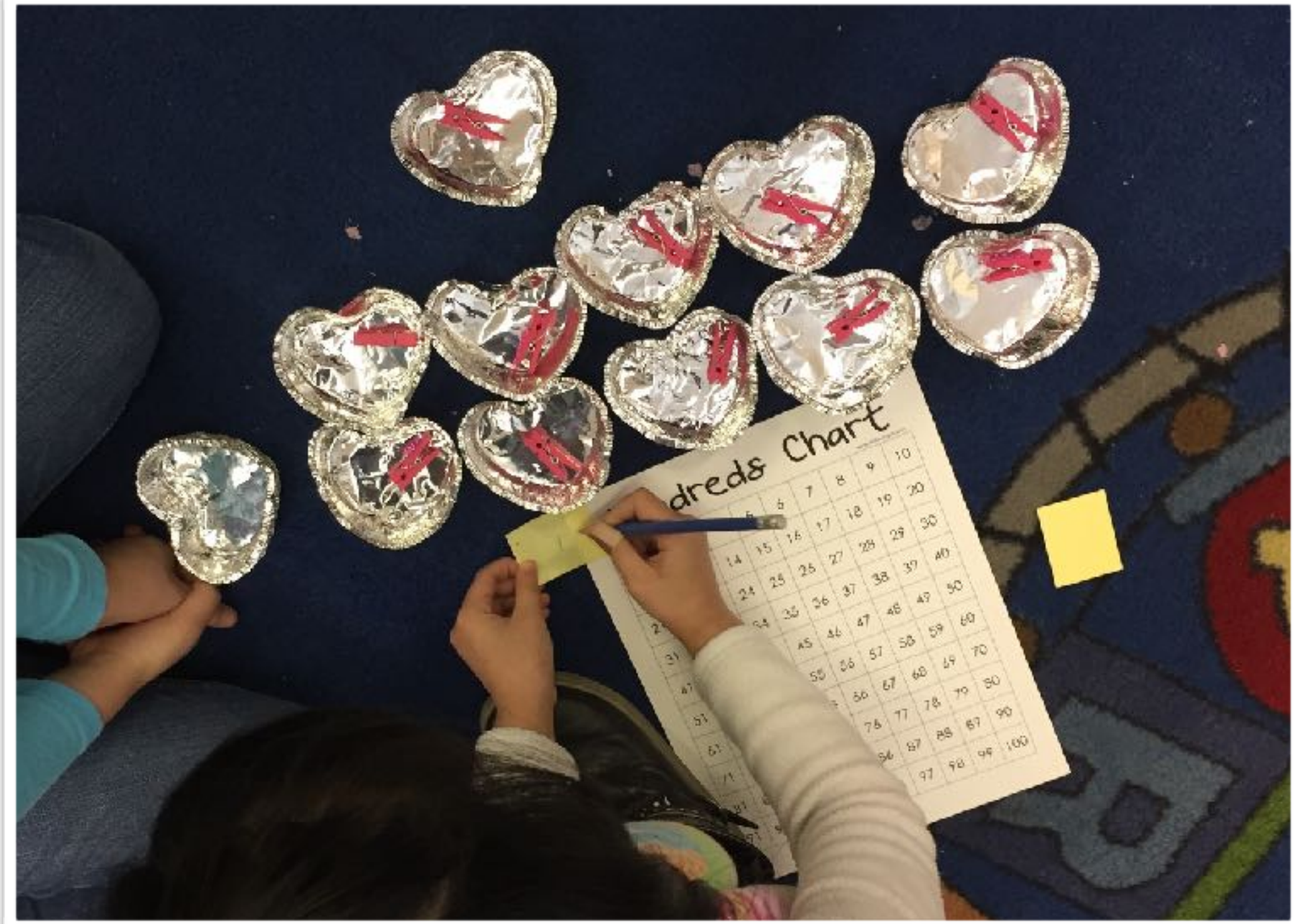
The 1 - 20 Kit

Our "Tools" that help us keep track.

Counting by ones
One-to-one using cupcake liners



Record numeral on sticky note or circle on chart with dry erase marker and check with teacher - then grab a new bag!


dreds Chart

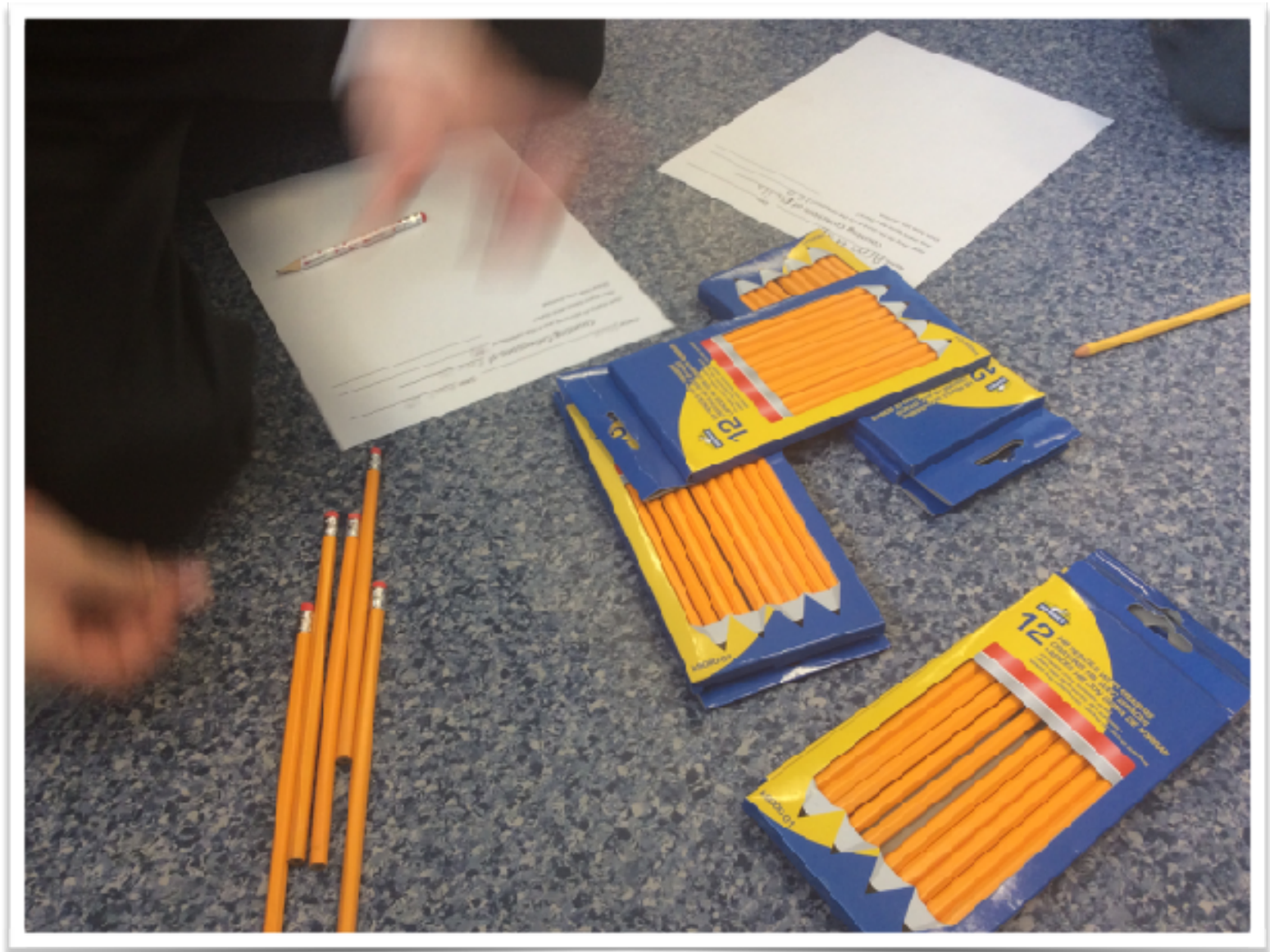
Count by tens using ten-frames

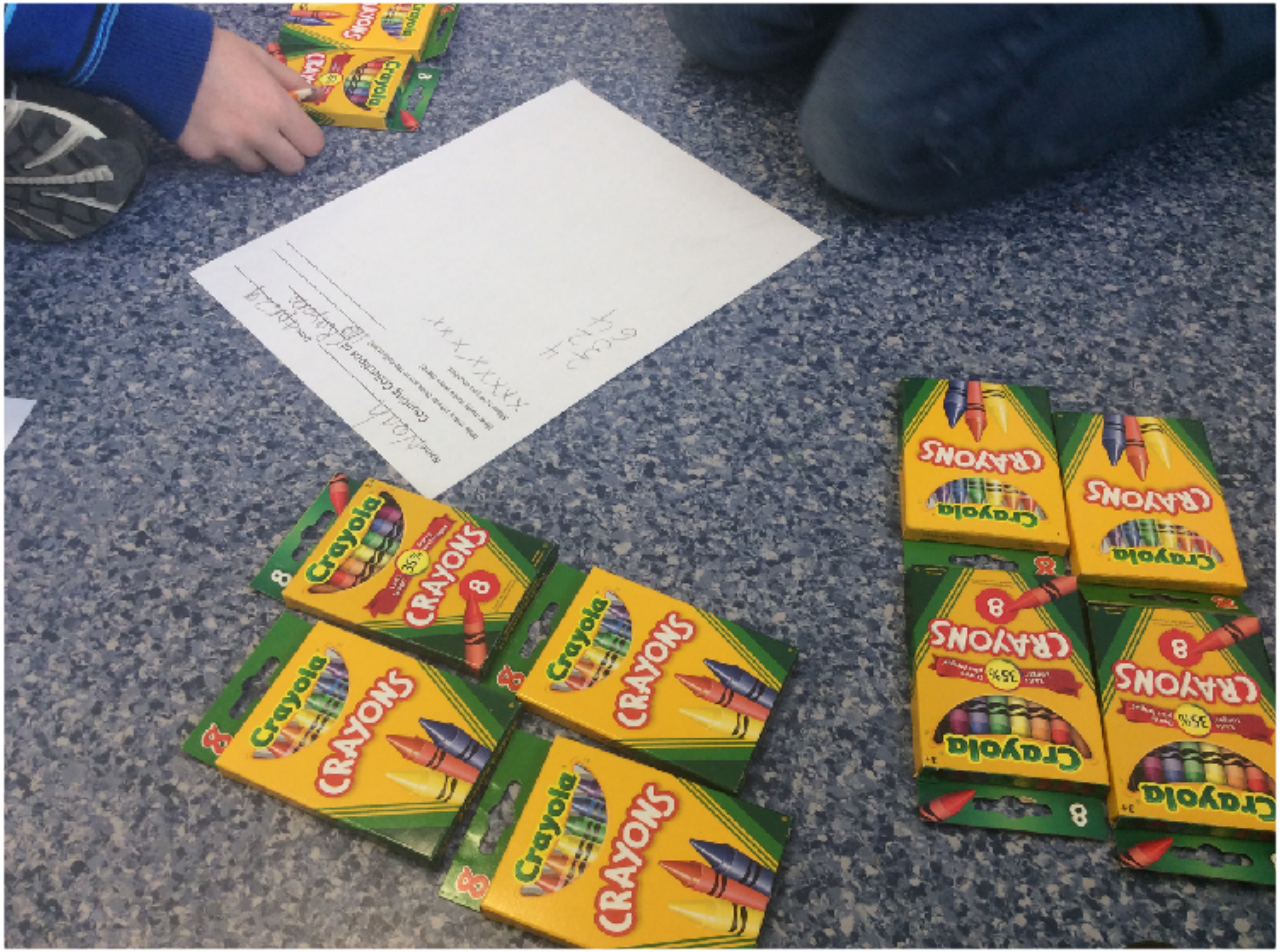
By fives using five-frames or a hand print

by twos using ice-cube trays

by fours using a circle mat

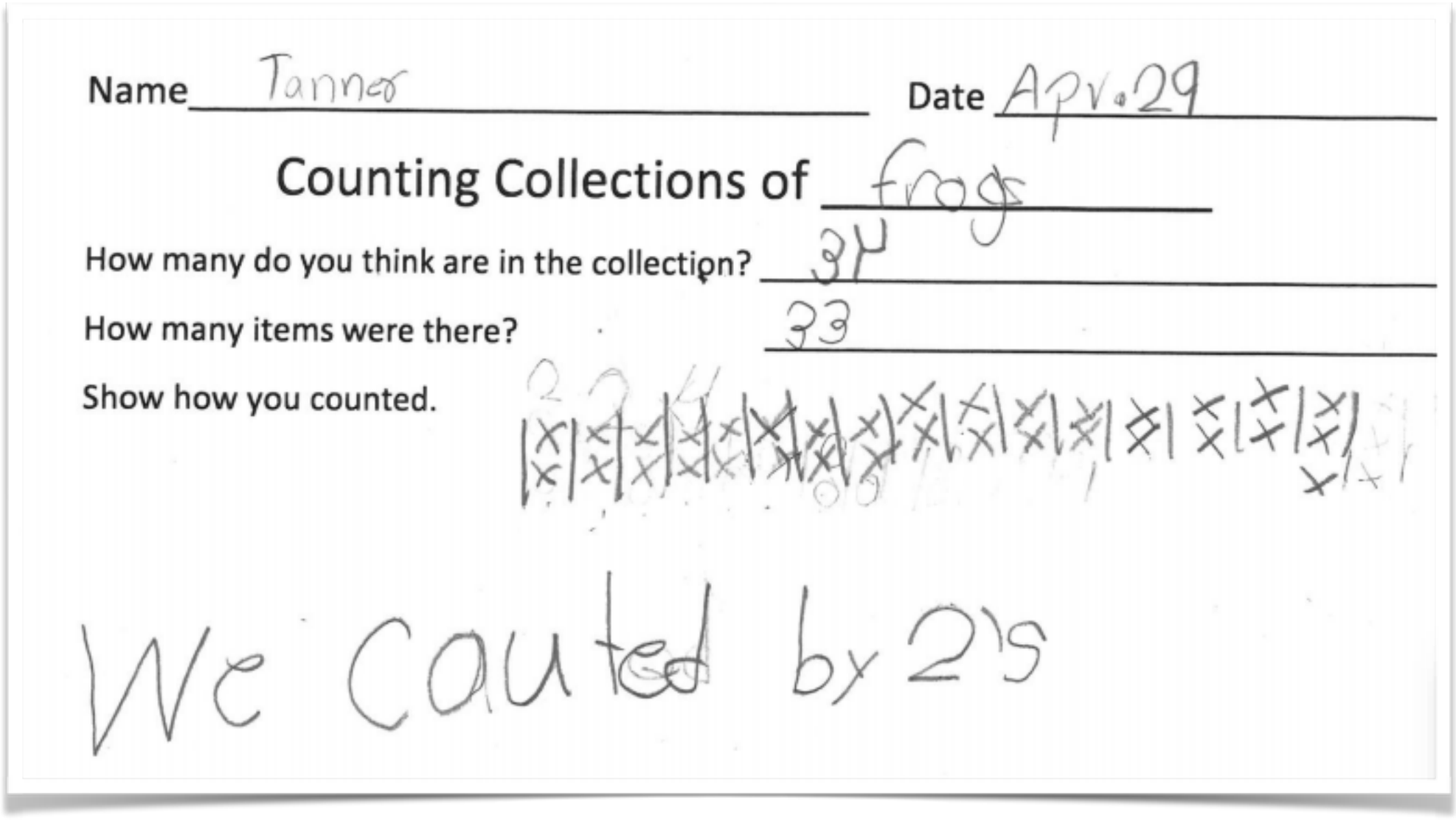
Counting by larger groups!




Crayola
CRAYONS
8
35%

We always circle how many we have.

Sometimes we record how we counted on paper.



Name Tanner Date Apr. 29

Counting Collections of frogs

How many do you think are in the collection? 34

How many items were there? 33

Show how you counted.

We couted by 2's

Guiding questions…

- How many items do you think you have?
- How many items do you have?
- How did you count them?
- Can you record how you counted?
- What other ways could you count?

Access this and other videos/key resources at tedd.org

Reflection Time

- Take 5 - 10 minutes at the end or during the block to have students share out how they counted.

- Students could do a gallery walk.

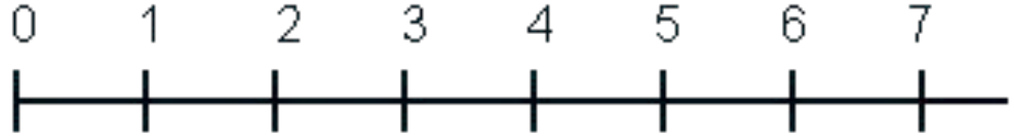
- While circulating take pictures with your iPad and highlight new strategies used - bring student to the front to explain what they did.

Choral Counting

Note: The main benefit of this routine is that children can hear and participate in a counting sequence without being put on the spot.

Learning Intentions:

- Counting forwards and backwards
- Skip counting
- Magnitude of numbers
- Make connections between number names, quantitates, and symbols
- one-to-one or one-to-many correspondence
- cardinality



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

Video from tedd.org

Guiding questions…

- Which three numbers do you think will come next?
- How do you know?
- What number goes here?
- If we continue, will we say the number _____?

Kinaesthetic Movement

- when counting by 1’s, have students move one cube into their pile each time they count. This reinforces 1-to-1

- when counting by 5’s have them show five fingers

- when counting by 10’s have them stretch out all ten fingers when they say the number, then make a fist before stretching fingers out to say the next numbers.

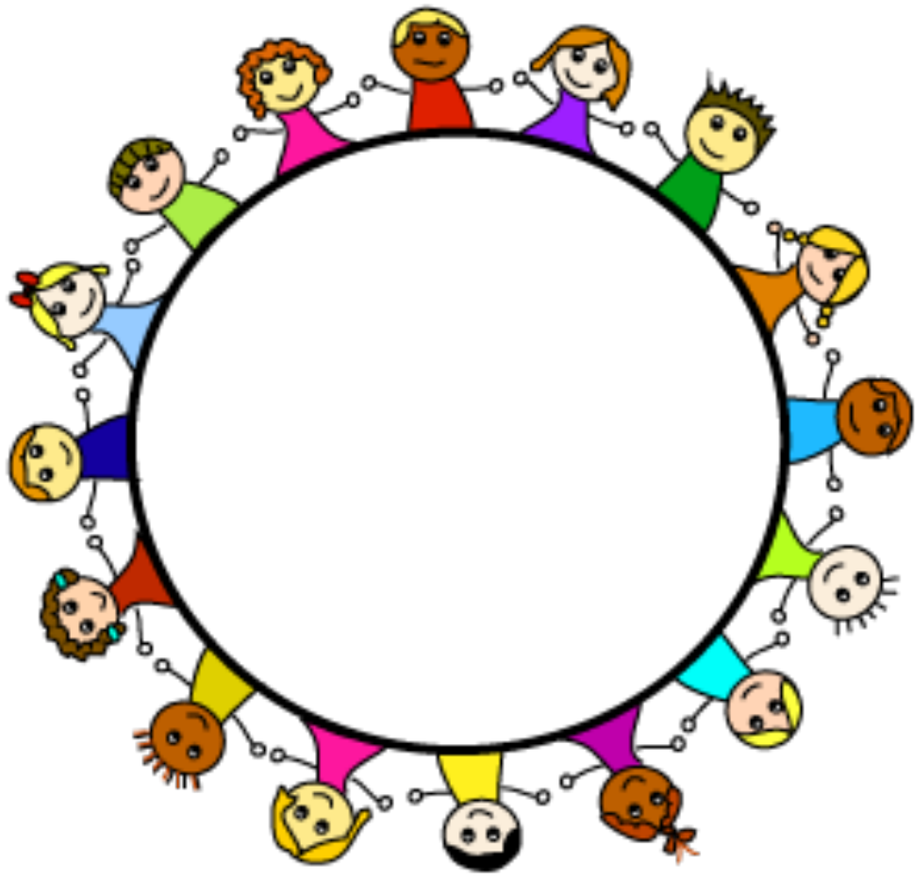
Start and Stop Counting

- Can be done chorally or in count around the circle
- Students start at a specified number and stop at another determined number
- Use number lines and/or number grids to assist students

Counting Around The Circle

Learning Intentions:

- Counting forwards and backwards
- Skip counting
- Magnitude of numbers
- Make connections between number names, quantitates, and symbols
- one-to-one or one-to-many correspondence
- cardinality



Reminders:

1. Everyone needs to listen to each person. We cannot be talking to each other. We need quiet to hear each person talking.
2. Give everyone time to think. Calling out the answer turns our friends' brains off.

To scaffold the activity, consider recording the numbers on the board while students count aloud.

And if it is too difficult - move to a choral count aloud.

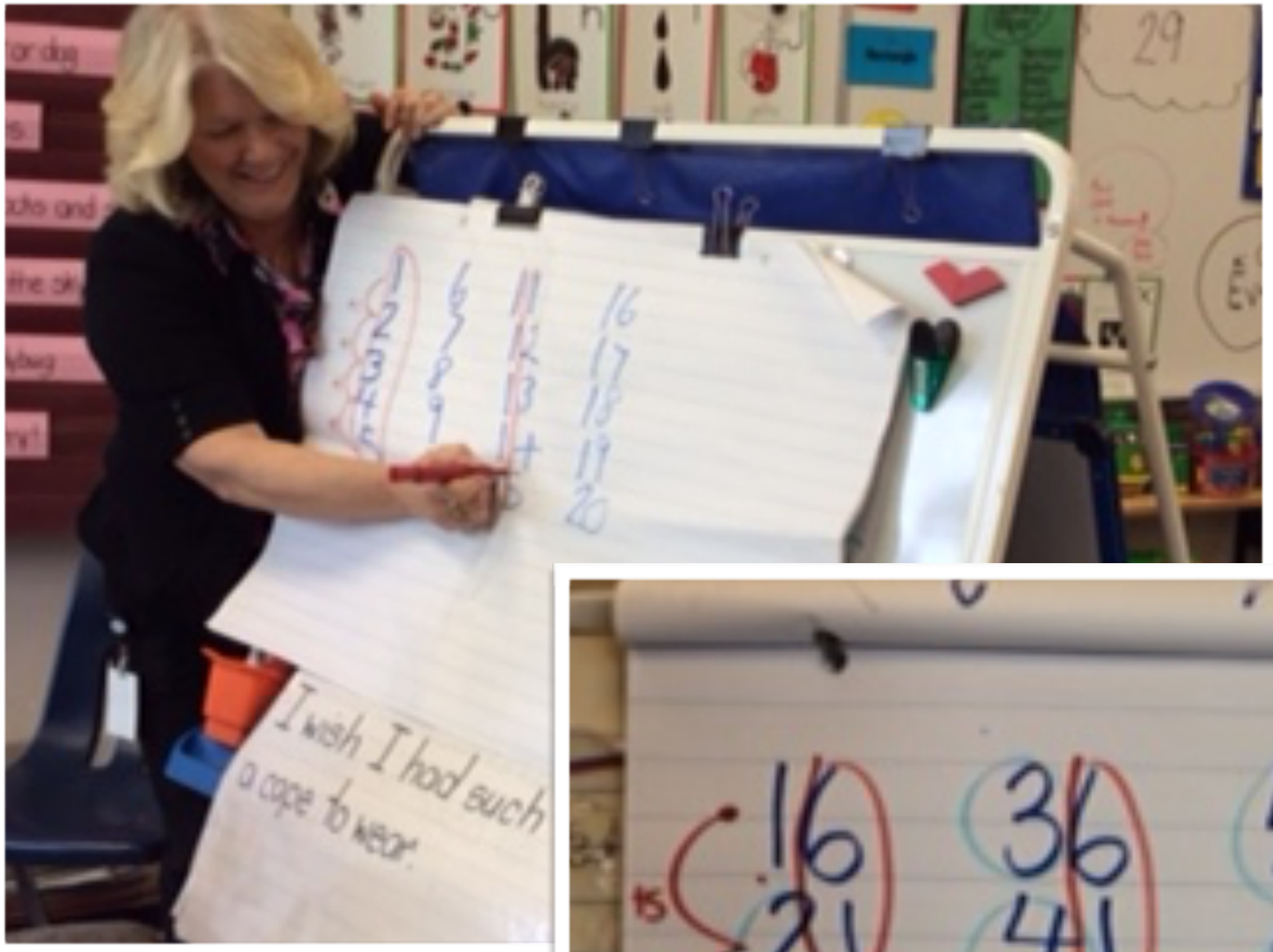
Differentiation:

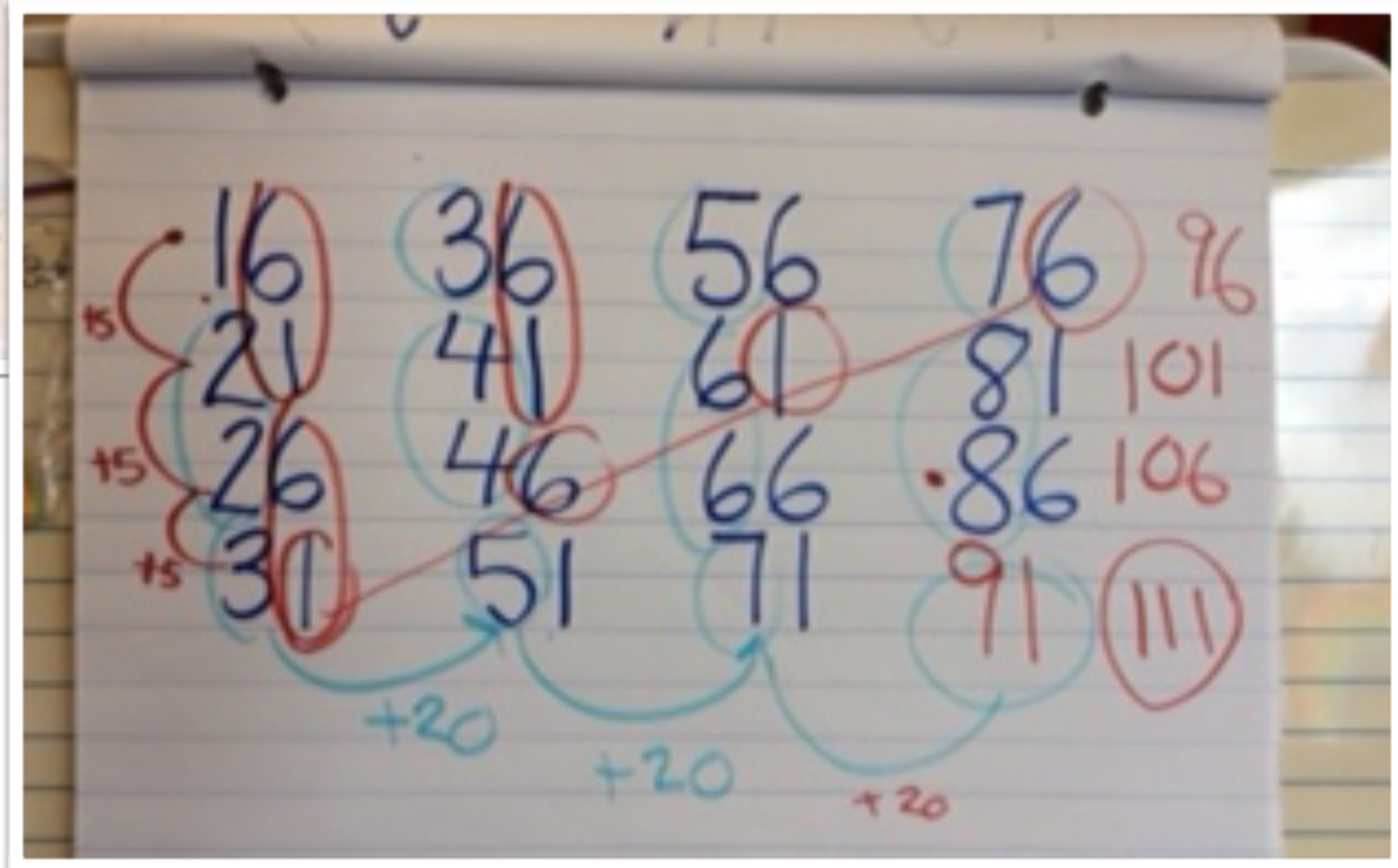
- Prior to counting ask some **ESTIMATION** questions

"If we count by one's starting at Megan, and go all the way around the circle, what number do you think Michael will say?"

"Why did you choose ___ as an estimation?"

"Why didn't anyone choose ____ as an estimation?"


I wish I had such a cape to wear.


16
21
26
31
36
41
46
51
56
61
66
71
76
81
86
91
96
101
106
111
15
15
15
+20
+20
+20

Count Around the Circle: Knock-down

Teacher picks a “Knock-Down” number (e.g.10)

Everyone in the circle stand ups. The first student says “1”, next one says “2”, continuing until someone says “10”

The student who says “10” turns to the person beside them and uses pretend fists to “Knock-Down” them down. Play keeps going until only one person is standing!

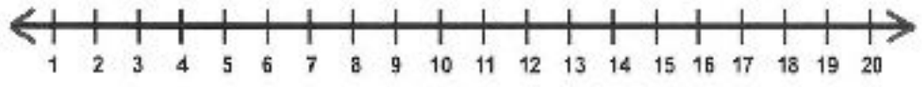
Number Lines

Learning Intentions:

- Visualization
- Spatial Sense of Quantities and Magnitude
- Relationships Among Numbers
- Computational Fluency
- Mental Math Strategies

Items you could use:

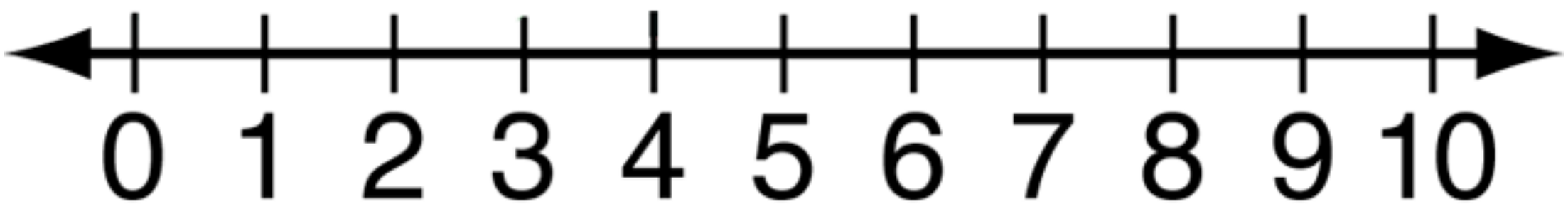
- White boards
- Class Calendars
- Calendar numbers and Edging at Home Depot



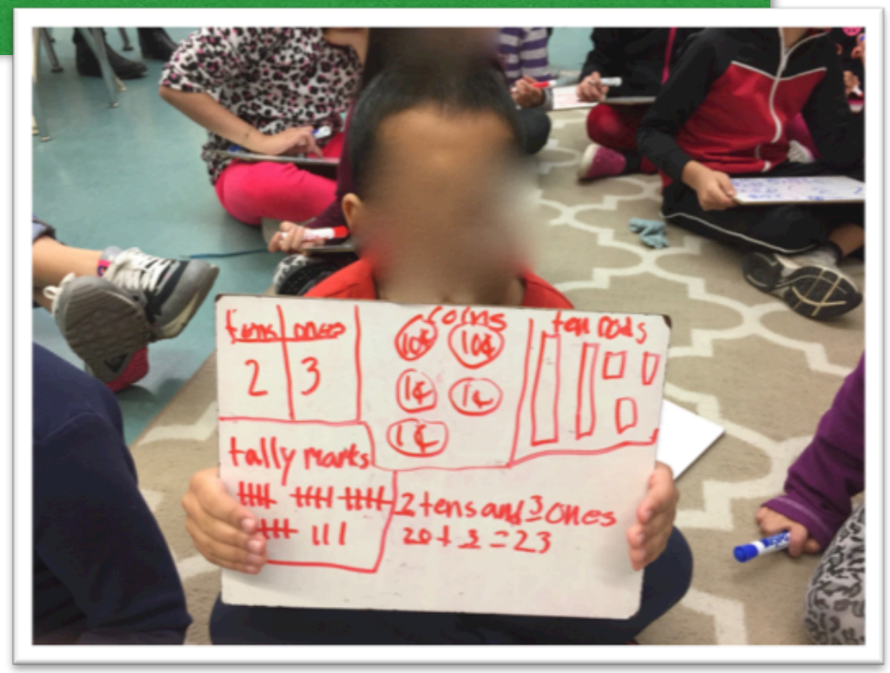
Where would 13 be located?

Explain your thinking!

Guess My Number!



Today's Number

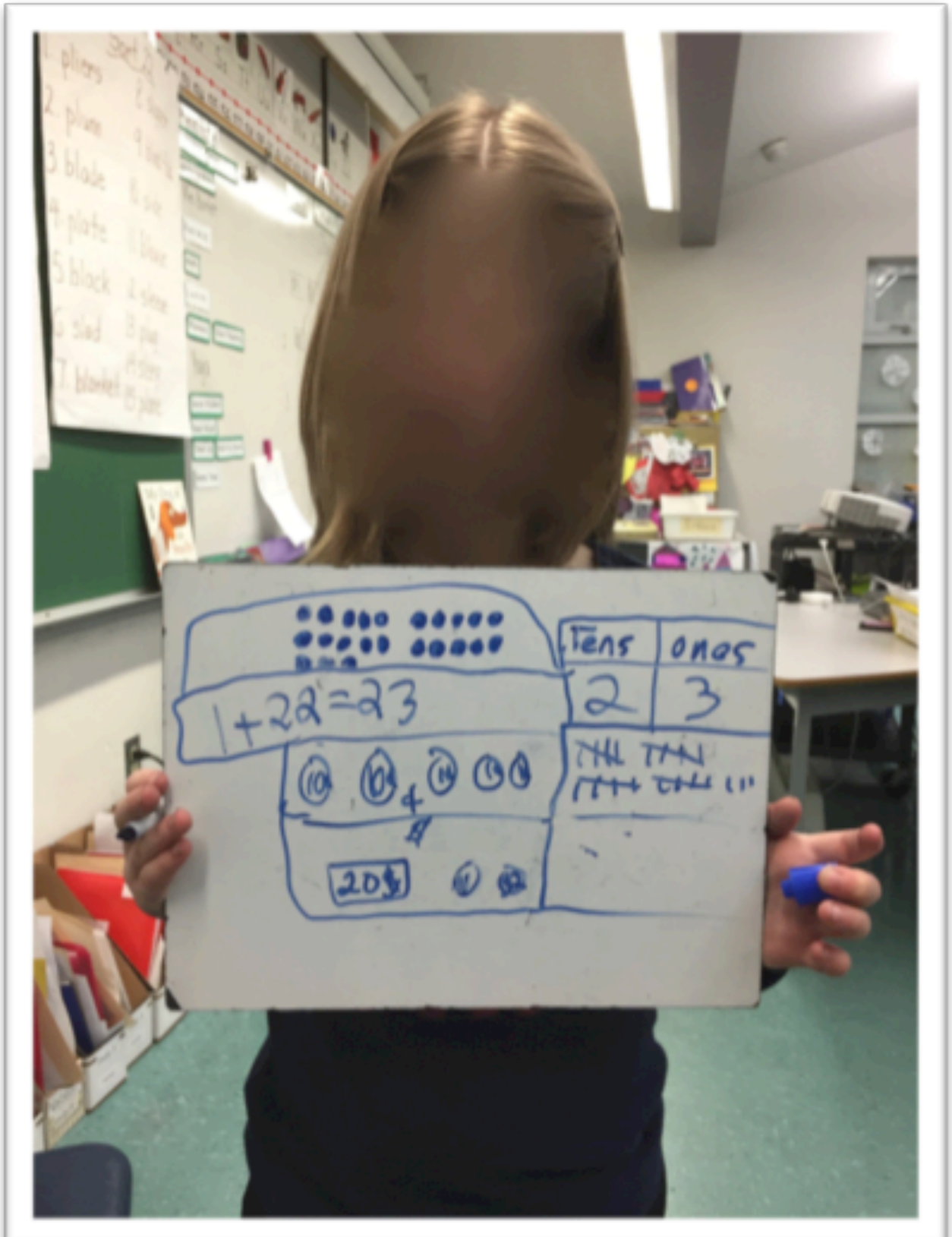


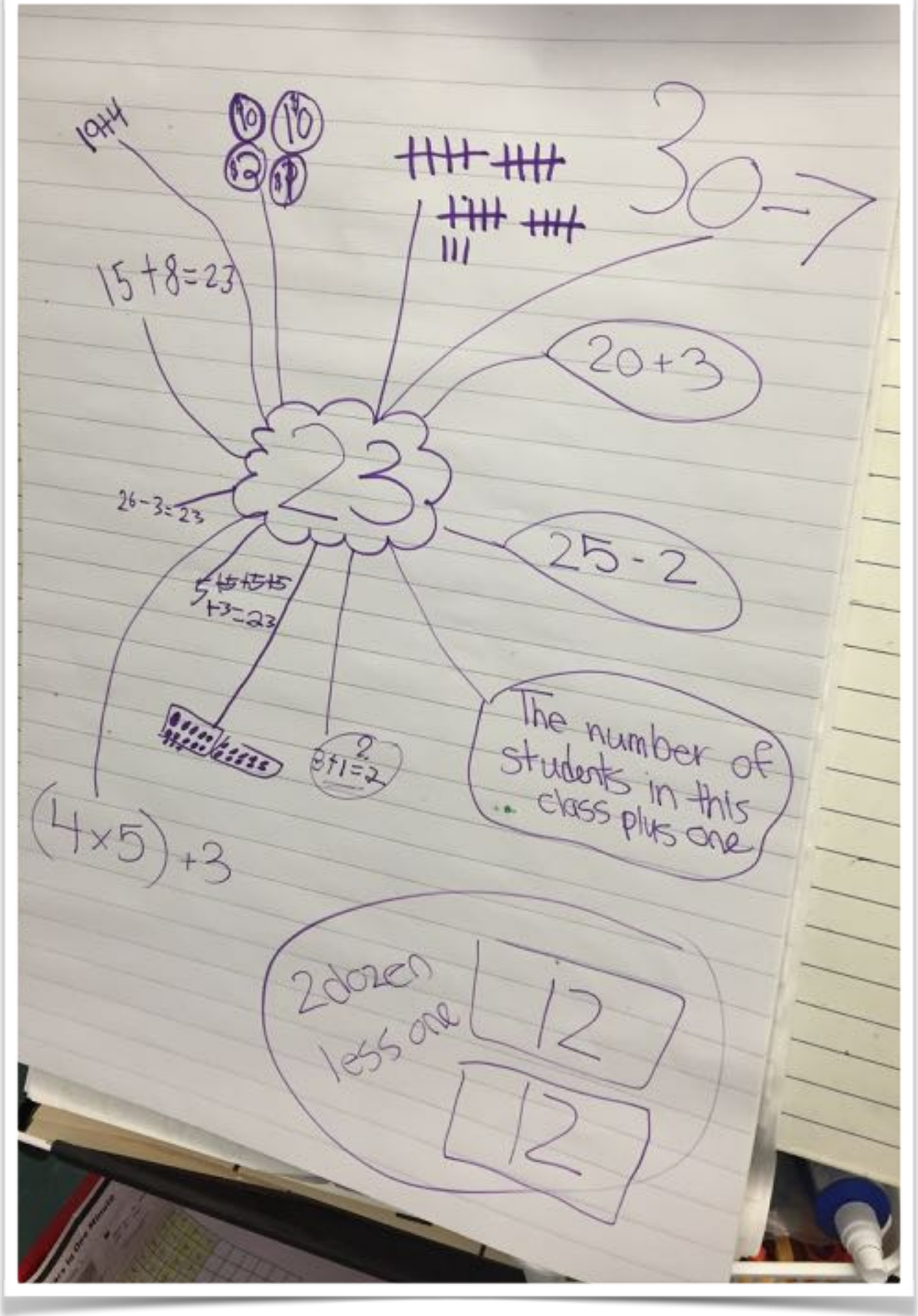
Learning Intentions:

- Subtilizing (Perceptual and Conceptual)
- Visualization
- Decomposing and Recomposing
- Mental Math Strategies

Highlight important math concepts, such as:

- breaking numbers apart into tens and ones
- using patterns
- using the Commutative Property
- using two or more addends
- using repeated groups


Tens
Ones
1+22=23
2
3
20


1944
10
13
12
15+8=23
30-7
20+3
23
26-3=23
25-2
5+5+5+5
+3=23
(4×5)+3
8+1=2
The number of students in this class plus one
2dozen less one
12
12

Questions and Statements for Today's Number

- When is ____ big?
- When is ____ small?
- When is ___ a lot?
- When is ___ very little?

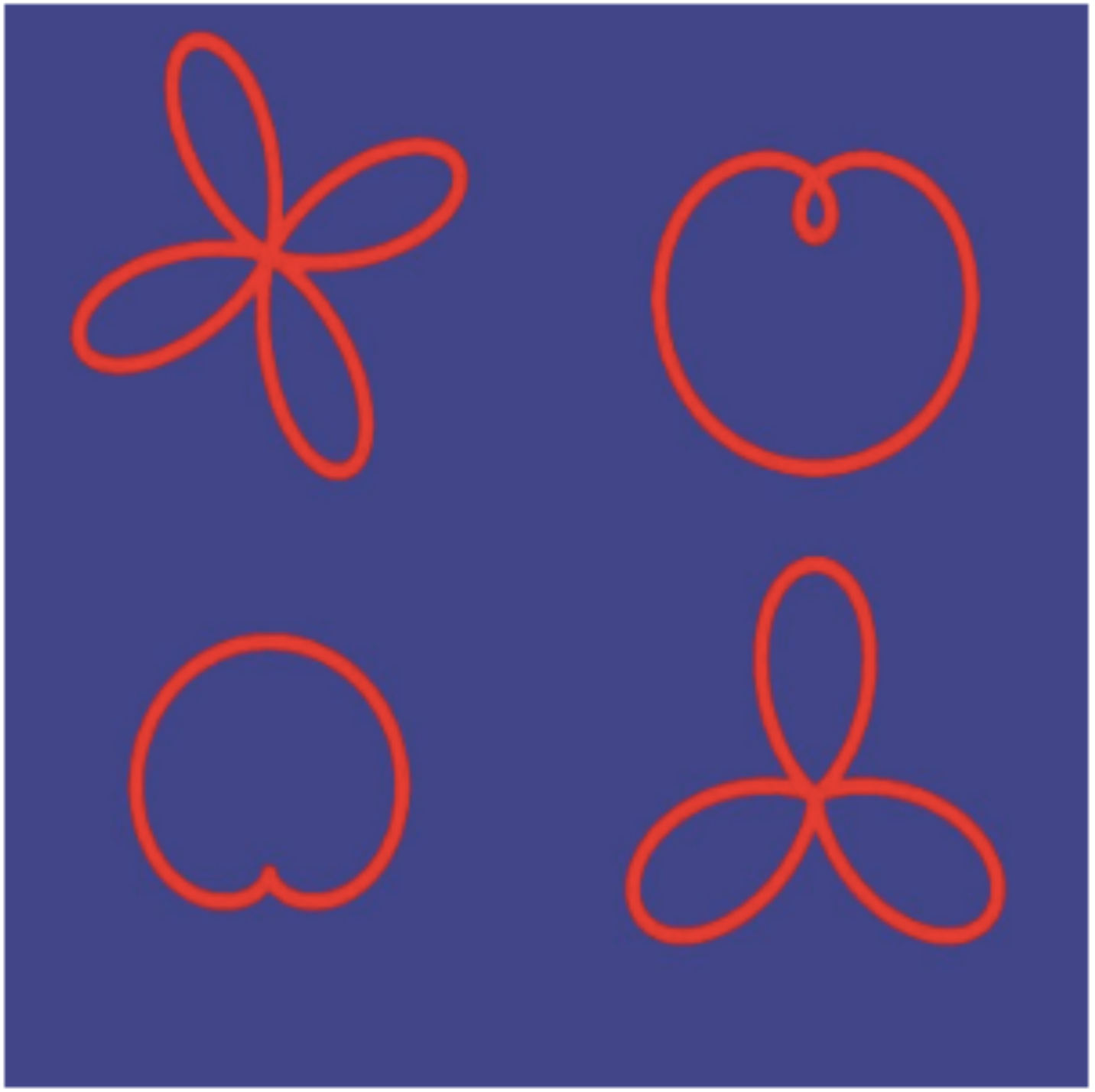
Which One Doesn't Belong?

Learning Intentions:

- Understanding attributes
- Encourages Mathematical language
- Spatial Awareness
- Reasoning
- Explain and Justify

Items you could use:

- Letters
- Numbers
- Money
- Graphs



Guiding questions…

- What do you notice?
- What makes all the the items alike?
- What makes them different?
- Which one doesn’t belong?
- Can you share your reasoning to justify your answer?

DECOMPOSING

It is the ability to “break” quantities into parts.

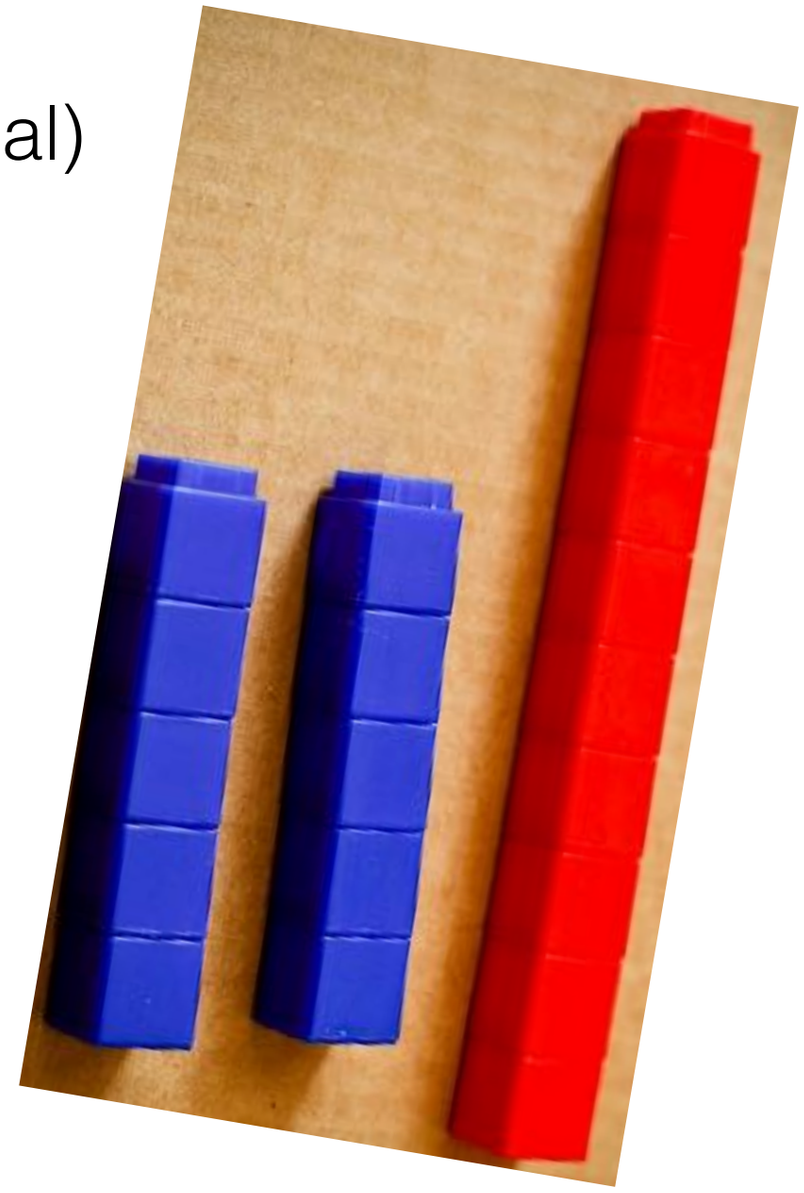
It is important because students need to develop:

- a strong sense of both five and ten and the relationship between these quantities
- flexibility with numbers
- mental math strategies to add, subtract, multiply and divide such as making a friendly ten, adding tens and adding ones.

Snap or 10 Wands

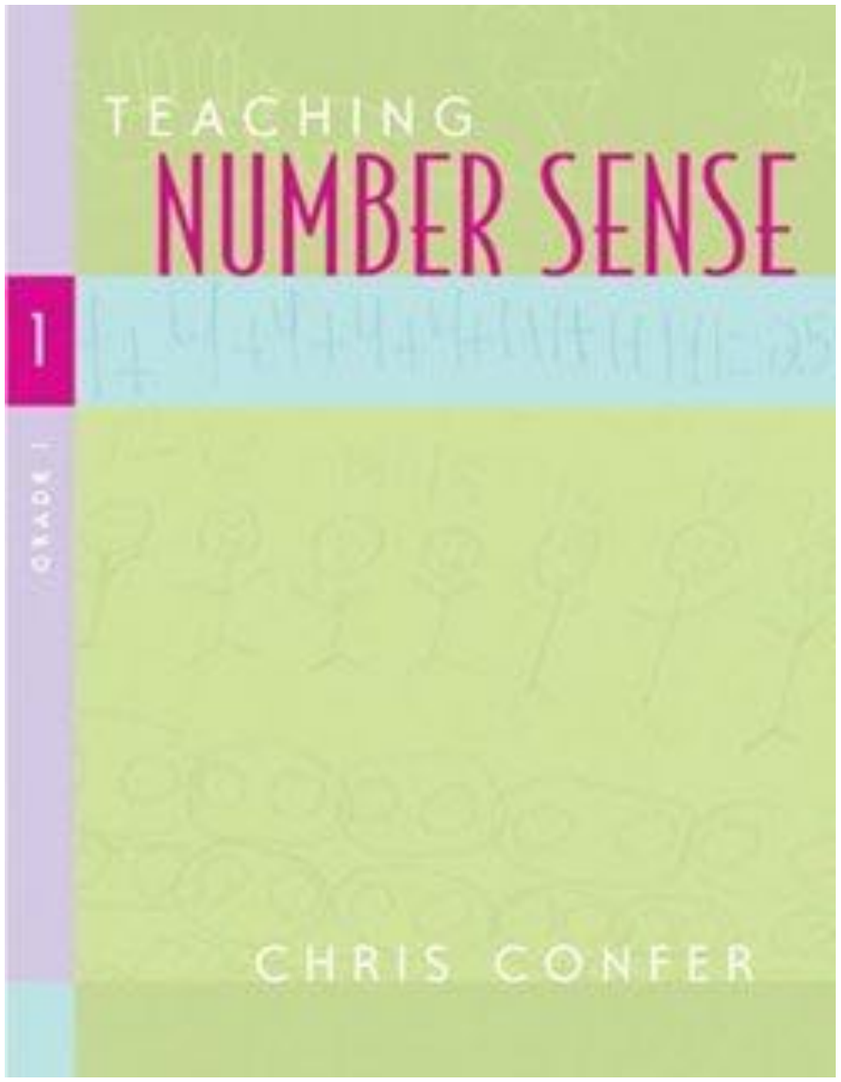
Learning Intentions:

- Subtilizing (Perceptual and Conceptual)
- Decomposing and Recomposing
- Combinations to 10
- Commutative Property
- Place Value



Items you could use:

- Towers of 10 unifix cubes or any number



Hold the train behind your back

"1, 2, 3, Snap" and break train in two

Keep one part hidden

Show the other part to the class

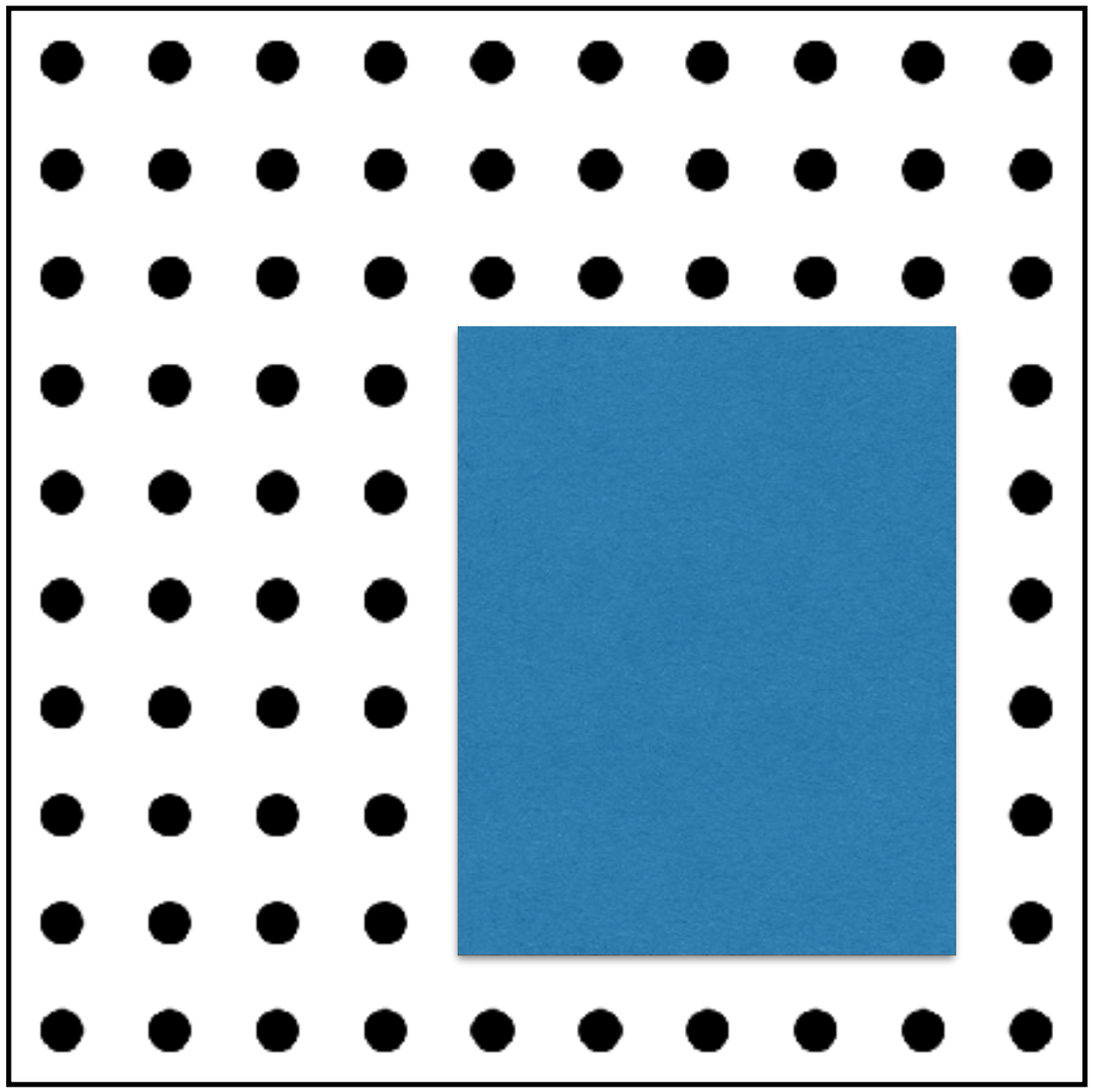
"How many am I hiding?"

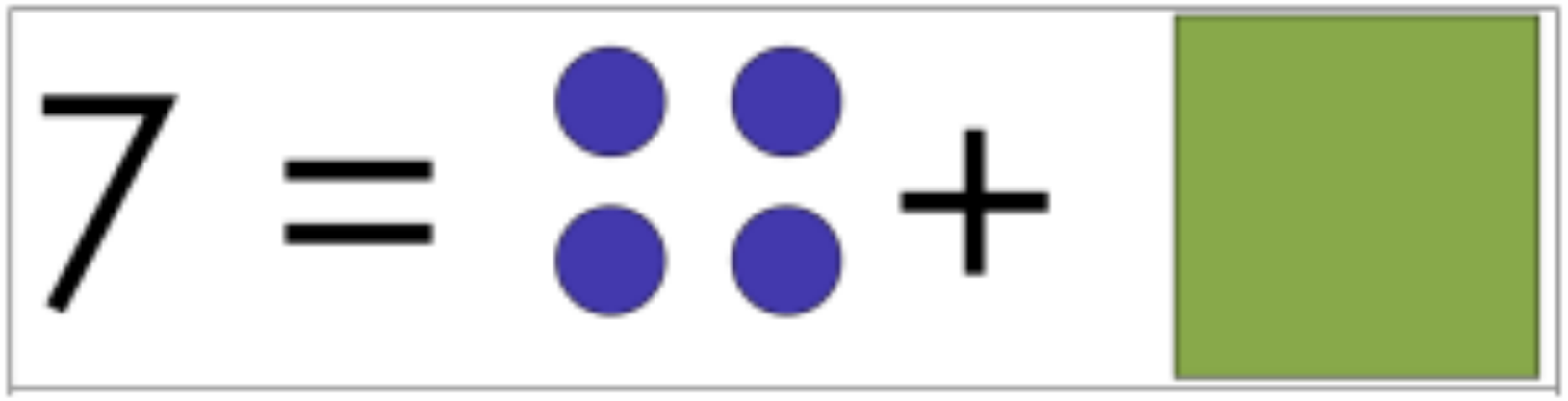
"How do you know?"

Missing Part Cards

Learning Intentions:

- Subtilizing
- Decomposing Numbers
- Computational Fluency
- Commutative Property
- Place Value
- Mental Math
- Introduction to Algebraic thinking





- This idea comes from Carole Fullerton and can be downloaded from her website.

- Show the card and read it aloud with the students
- “Seven is the same as 4 and _____”
- “What do you think is missing?”
- “How do you know?”

Number Talks

Learning Intentions:

- develop multiple strategies for Decomposing (Mental Math)
- developing flexibility through use of multiple strategies
- Computational Fluency
- Place Value

10 - 15 minutes focussed on one question or a "string" of questions

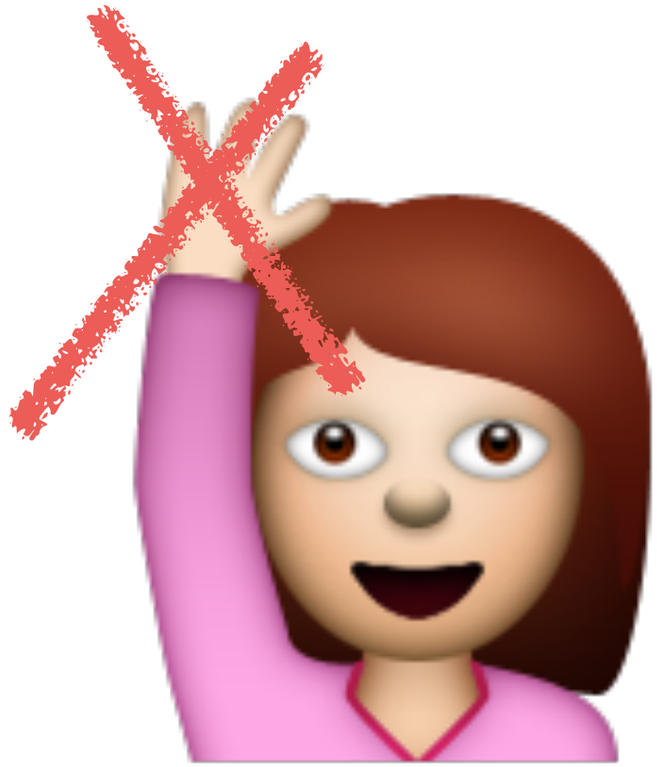
18 + 10
18 + 13
18 + 20
18 + 23

Math Solutions.

Ideas for Number Talks:

- Dot cards
- Dominoes
- Unifix trains - two different colours
- Five frames
- Ten frames
- Double Ten Frames
- Rekenreks
- Hundred's Frames
- Single digit addition and subtraction
- Two digit plus one-digit addition and subtraction
- Addition of two-digits
- Subtract two-digits numbers from two-digits numbers
- Subtract numbers from 100

Thinking time is needed



NO HANDS UP

SECRET SIGNALS

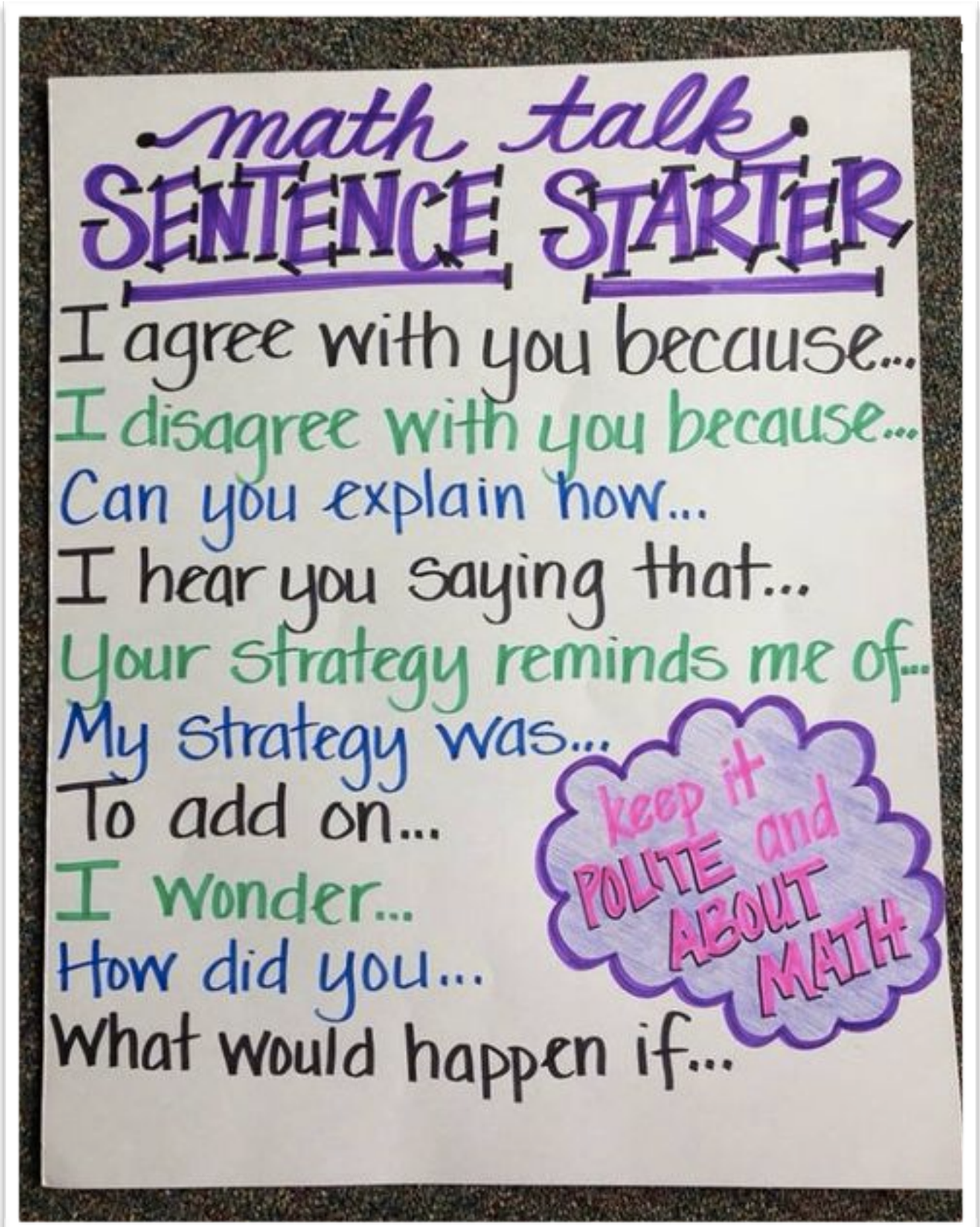
Hold up one thumb if you have one way to find the answer.

Hold up another finger if you another way…

Sample Discussion Prompts

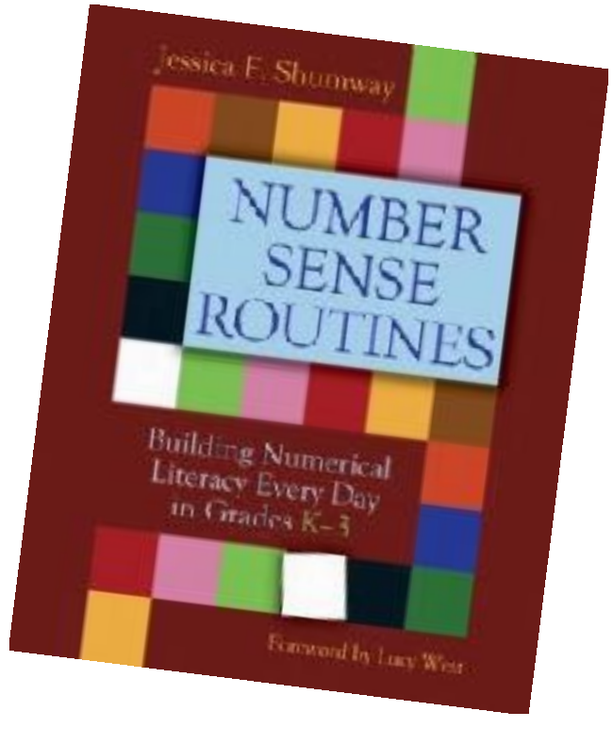
- I agree with _____ because _____.
- I do not understand _____. Can you explain this again?
- I disagree with _____ because _____.
- How did you decide to _____?

Anchor Charts



"These number sense routines are not 'auto pilot' activities, but opportunities for meaningful practice. You'll learn when to use a particular routine, how to differentiate, and how to use routines as formative assessment tools."

–Jessica Shumway (p.g.14)



Resources - Websites

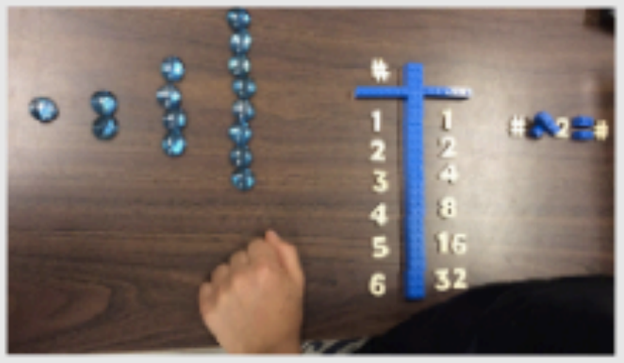
- Which One Doesn't Belong - wodb.ca
- Various Number Routines - http://visiblethinking.weebly.com/daily-routines.html
- Teacher Education by Design tedd.org
- Sandra Ball - https://startingwiththebeginning.wordpress.com/big-results-in-a-small-amount-of-time/
- Janice Novakowski - http://blogs.sd38.bc.ca/sd38mathandscience/ and http://janicenovkam.typepad.com/reggioinspired_mathematic/instructional-resources.html

BCAMT

NEW TEACHERS MATH CONFERENCE

Keynote: Selina Millar

Learning is Doing the Math!



Registration Includes:

- BCAMT membership
- Practical sessions for all grade spans. K-2, 3-5, 6-8, and 9-12
- Lesson and assessment ideas and activities
- Prepping for your interview with Surrey's HR District Principal, Kevin Fadum
- Lunch

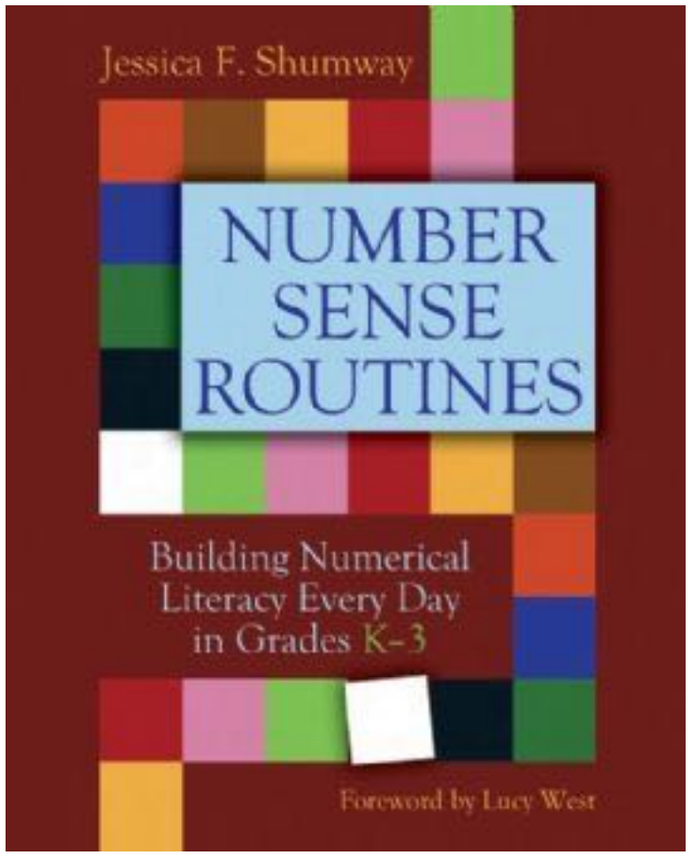
Saturday, November 21st, 2015
Queen Elizabeth Secondary
8 a.m. - 2 p.m.

Registration Fees:

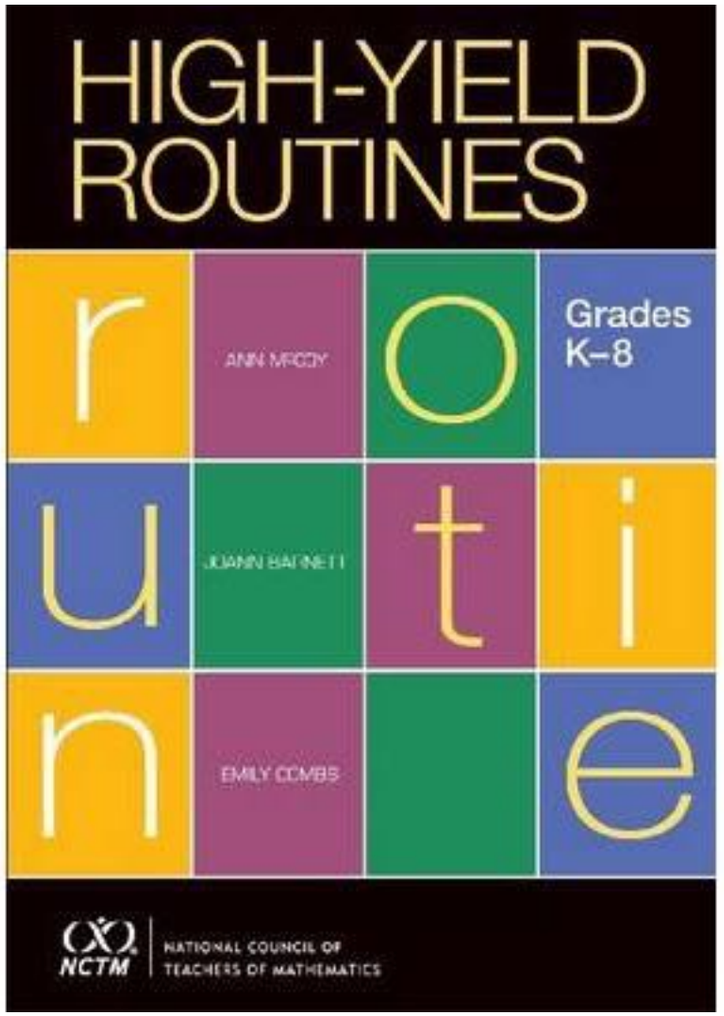
Before Nov. 19th		Onsite	
Pre-Service Teachers	$40	Pre-Service Teachers	$50
Teachers/TOC	$65	Teachers/TOC	$75

Register online: https://register.bcamt.ca/newteachers_math_conference

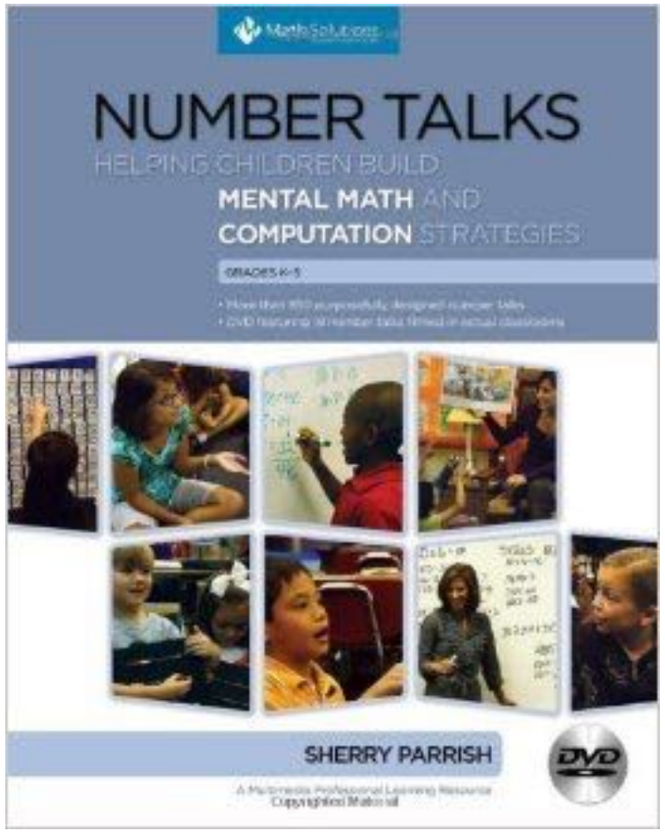
Books



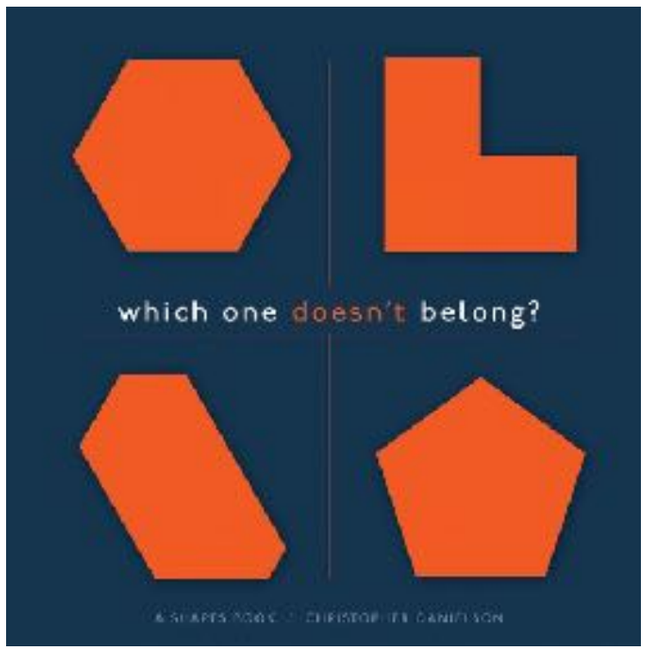
Jessica Shumway



Ann McCoy, Joann Barnett
Emily Combs



Sherry Parrish



Christopher Danielson

Thanks so much for sharing your time with me!

MATHEMATICS
is not about
numbers, equations,
computations, or
algorithms:
it is about
UNDERSTANDING.

William Paul Thurston