Daily Math Investigations K - 2

Presented by Hjorth Primary Team

STA Convention
May 5th, 2017

Learning Intentions

- I understand what Numeracy Centres are and how they fit in Balanced Numeracy.

- I understand how I can use Numeracy Centres to meet the diverse needs of my students and nudge their learning forward.

- I understand how Numeracy Centres foster the core/curricular competencies in a way that is connected to the content.

- With regard to formative assessment, I understand what I should be looking for and the questions to ask.

- I am knowledgeable of some resources I can access to assist me with Numeracy Centres.

Where can you find PPT, learning intentions, and more ideas?

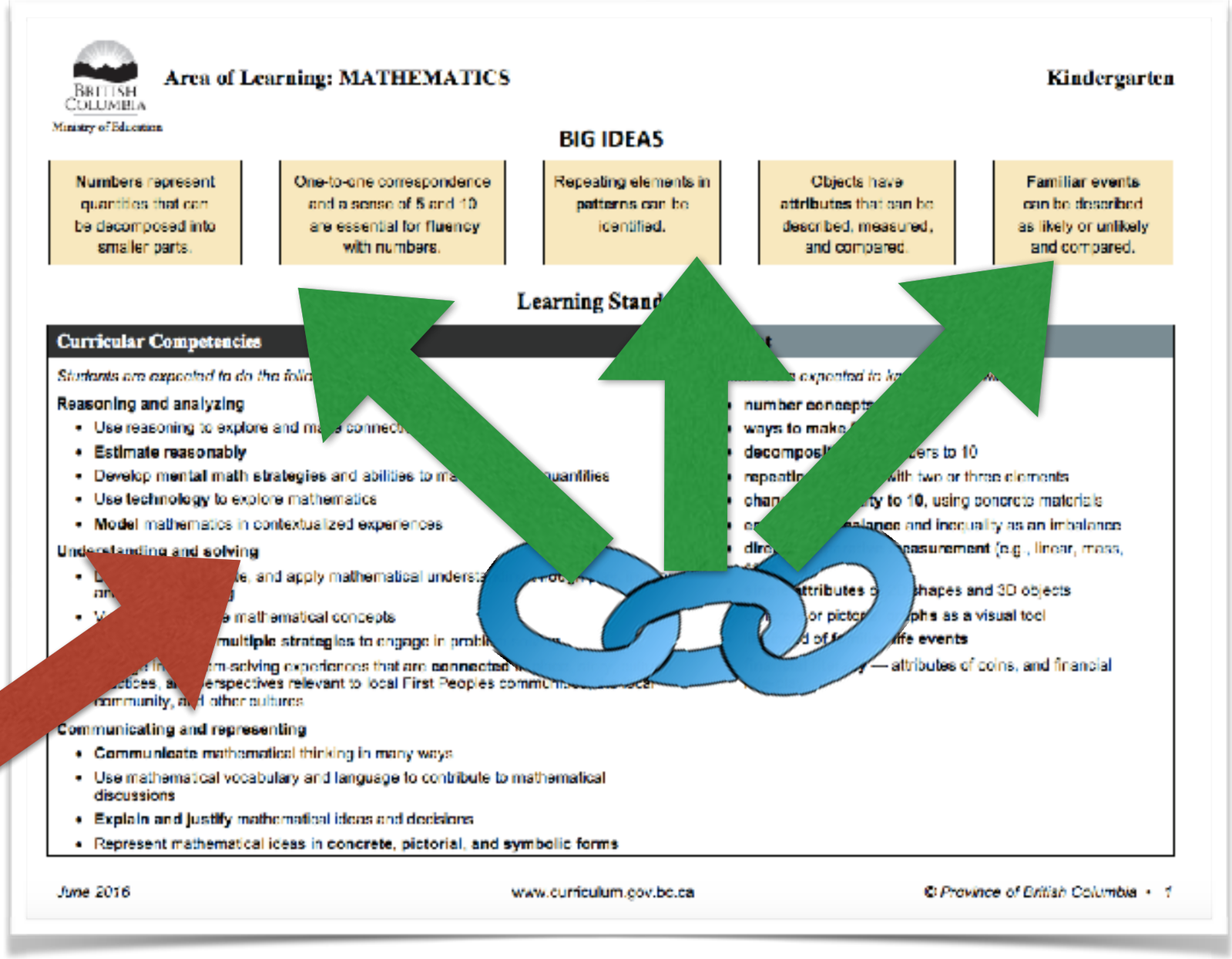
www.meaningfulmathmoments.com

Click the Ideas tab and nested under here is Numeracy Centres

How does this relate to the Curriculum?

The “doing” of the mathematics embedded in the Numeracy Centres foster the curricular competencies in relation to the content.

We are NO longer solely focussed on content!!!



What are the Mathematical curricular competencies?

Thinking

Understanding

Communicating

Reasoning and analyzing

- Estimate reasonably
- Develop mental math strategies and abilities to make sense of quantities
- Use reasoning and logic to explore and make connections

Understanding and solving

- Use multiple strategies to engage in problem solving (e.g., visual, oral, role-play, experimental, written, symbolic)
- Develop, construct, and apply mathematical understanding through role-play, inquiry, and problem solving
- Engage in problem-solving experiences that are connected to place, story, and cultural practices relevant to the local community

Communicating and representing

- Communicate in many ways (concretely, pictorially, symbolically, and by using spoken or written language to express, describe, explain, and apply mathematical ideas)
- Describe, create, and interpret relationships through concrete, pictorial, and symbolic representations
- Use technology appropriately to explore mathematics, solve problems, record, communicate, and represent thinking

Connect and Reflect

Connecting and reflecting

- Visualize and describe mathematical concepts
- Connect mathematical concepts to each other and make mathematical connections to the real world (e.g., in daily activities, local and traditional practices, the environment, popular media and news events, cross-curricular integration)
- Share and reflect upon mathematical thinking
- Draw upon local First Peoples knowledge and/or expertise of local Elders to make connections to mathematical topics and concepts

And they foster a

Attitude

Personal and Social - Personal and social competency is the set of abilities that relate to students' identity in the world, both as individuals and as members of their community and society. Personal and social competency encompasses the abilities students need to thrive as individuals, to understand and care about themselves and others, and to find and achieve their purposes in the world.

REPLACE Calendar With Numeracy Centres

ALL students are **DOING** the math.

Numeracy centres provide multiple opportunities for students to think, understand, connect, and communicate their thinking!

It can be a centre! Order the days and numbers

How does this fit in BALANCED NUMERACY?

NUMERACY CENTRES PROVIDE:

WHOLE CLASS

Number Routines
Inquiry based
Differentiated instruction: Parallel and open-ended questions
Explicit instruction
Collaboration and Communication
Reflection time

SMALL GROUP

Guided math that is responsive, targeted
Explicit instruction
Collaboration and Communication
Reflection time

PARTNER AND/OR INDIVIDUAL TIME

Time to practice
Guided math that is responsive, targeted
Connected to whole class instruction
Collaboration and Communication
Reflection Time

Balanced Numeracy

Mathematics Overview: Kindergarten and Grade One

Below is our Balanced Numeracy Program at Hjorth!

Number Routines

These daily 5 – 10 min routines will provide opportunities for our students to develop thinking and reasoning in Mathematics, as well as foster the curricular competencies. They also develop students' number sense, computational fluency, and spatial sense. Counting collections is another Number Routine, and will take place once or twice/week activity.

Numeracy Centres/Daily Math Investigations

This half hour will provide a soft start three mornings a week where students can play with Math ideas in meaningful, authentic, engaging ways. All activities will be designed to be o learners. The activities also will span all mathematical areas, al mathematical connections. Each Monday new "centres" will be i learning intentions will be framed in student friendly "I can" st content associated with the task. Through these explorations w ideas in Mathematics.

Guided Math – Individual teachers will work with flexible group minutes during several different times during the day (e.g., Dail

Whole Class – Although we will begin this "Whole" class time a individual as well as whole class inquiries. Socio-constructivist l

Big Ideas:

Number represents and describes quantity.
Developing computational fluency comes from a strong sense of number.

Content:	Numeracy Centres (DMI)	Number Routines	Corresponding Children's Lit	Whole Class w/ENT support
Number K – to 10 Grade 1 – 20 **COUNTING** • one-to-one correspondence • conservation • cardinality • stable order counting • sequencing 1 – 10 • linking sets to numerals • recognizing and forming numerals • subitizing **DECOMPOSING** • benchmark of 5 and 10 • making 10 • part-part-whole thinking • using concrete materials to show ways to make 10	**COUNTING**: - Recognize numeral and build set (birds with feathers, cookies and chocolate chips, fish bowls and gold fish, pipe-cleaners and beads, flowers with beads, cups and straws, roll ten frame dice and bingo daub on 5 , 10, or 20 frames & write numeral, Monsters eyes, Clothespin Match, rocks with numerals) • Roll regular 1 – 6 dice and build that quantity (Towers, Build a City, Ladybugs with spots, Sharks's teeth) • Race to Fill the Cup • Count and clip cards	**COUNTING**: Counting Collections Counting Around the Circle – teacher holds up the numeral card so students can connect to the visual of the numeral. Choral Counting by 1's to 10 with a student pointing to the number on the hundreds chart and students use pipe cleaners with beads or rekenreks to reinforce one-to-one correspondence. Then count backwards. Next start at numbers other than 1. Be sure to chose numbers that have the students bridge over tens.	**NUMBERS IN NATURE:** - *1 Cookie, 2 Chairs, 3 Pears: Number's Everywhere* by Jane Brocket - *The Amazing Numbers in Animal Lives: Lifetime* by Lola M. Schaefer - *Numbers: Counting in the Natural World* by Play Bac Publishing **COUNTING**: - *How Many Snails* by Paul Giganti, Jr. - *One Horse Waiting for Me* by Patricia Mullins - *Chicka Chicka 1, 2, 3* by Bill Marin Jr, Michael Sampson, and Lois Ehlert - *One Frog Sang* by Shirley Parenteau	Formal introduction as a class of the DMI activities. Formal introduction to Counting Collections. **NUMBERS IN THE WORLD**: Read aloud a counting book and have the students build a class number line. Have partners illustrate Read aloud *Used Any Numbers Lately* by Susan Allen and Jane Lindaman – Great book to combine Literacy and Numeracy – create an alphabet of numbers. Walk and see numbers in the community. Read aloud *Knuffle Bunny* – Mathematizing our stuffed animals. How many eyes, feet? Sorting by type. Concrete graph.

Small group and/or One-on-one Guided Math

Teachers meet with small groups of students or one-on-one with students for:

- explicit instruction
- guided math
- conferencing

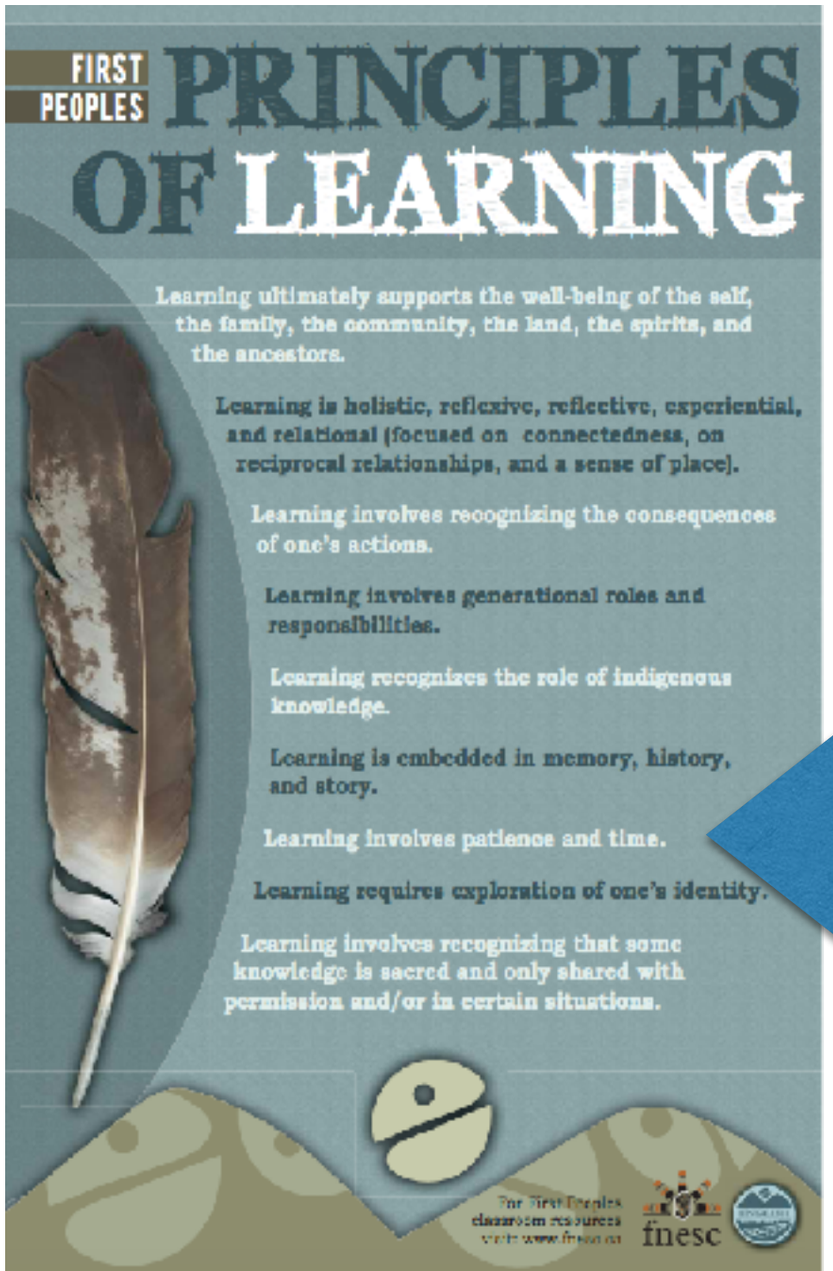
What is the Math?

The FIVE themes are the same K - 3:

1. **Number** represents and describes quantity.
2. Development of **computational fluency** requires a strong sense of number.
3. We use **patterns** to represent identified regularities and to form generalizations.
4. We can **describe, measure, and compare spatial relationships**.
5. **Analyzing data** and chance enables us to compare and interpret.

Numeracy Centres allow us to revisit concepts!

NO more “We’ve done Patterning!”



Learning requires
patience and time!

CHOICE is key!

- Students chose their centres
- Every **5 minutes or so** a bell is rung. Students **chose** to **stay at the centre** they are at, or clean up and **move to a new centre**.
- Introduce new stations gradually.

Organizational Set-up

- When do you we do them?
- Where do we do them?
- For how long?
- How often?

How to begin?

- Teach/Model everything! Dice rolling, care of materials, taking turn, winning and losing, making choices, self-regulation, and cleaning up.
- Start slowly… one centre whole class. Two centres - whole class. Whole class activity becomes a centre
- Teach your signal and how to transition.
- Begin after breaks. Have materials set-up.

Storage:

- Magazine holders
- Dollar store containers
- A Large bin for each class
- Dropbox

Things you will need:

- dry erase markers with erasers
- sheet protectors
- Ziploc bags
- bowls or cups
- card stock
- different dice
- ten frames

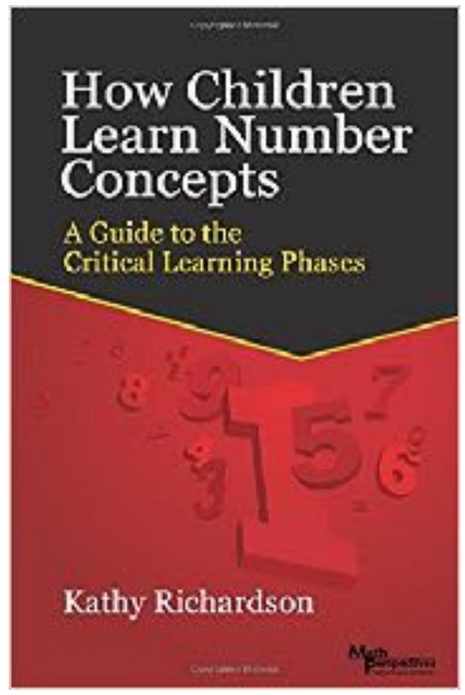
Meeting Diverse Needs

What is the developmental progression of how children learn various concepts? Where are my students in this progression?

How can I create inviting, open-ended centres that can meet diverse needs?

What questions do I need to ask to nudge my students' learning forward?

How will I keep track of what I observe and use this information in a responsive way?



Designing open-ended learning opportunities for exploration and Mathematical Thinking

- Are the materials inviting? Interesting? Engaging?
- Is there an entry point for all students?
- Can everyone reach a ‘productive struggle’?

Our Guiding Questions

Skip Counting:

How can you count these items?

Can you count your items a different way?

If you could count these items a different way, how many will you have?

Spatial Tasks - Creating:

What shapes can you create?

Can you identify your shape?

How are your shapes alike and different?

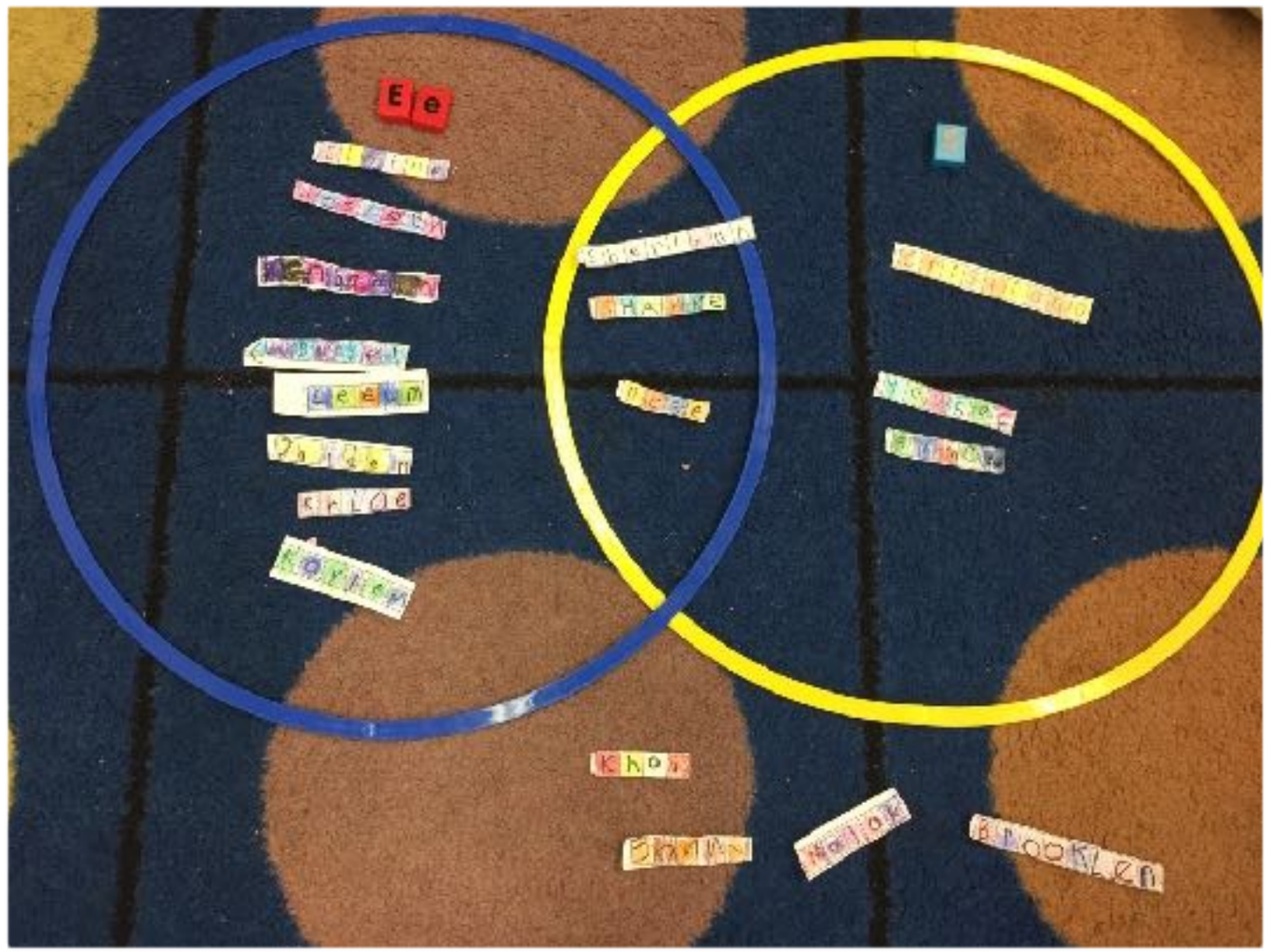
Can you sort your shapes?

We must know what we are looking for!
Which curricular competencies are the students using?
What is the Mathematical understanding?

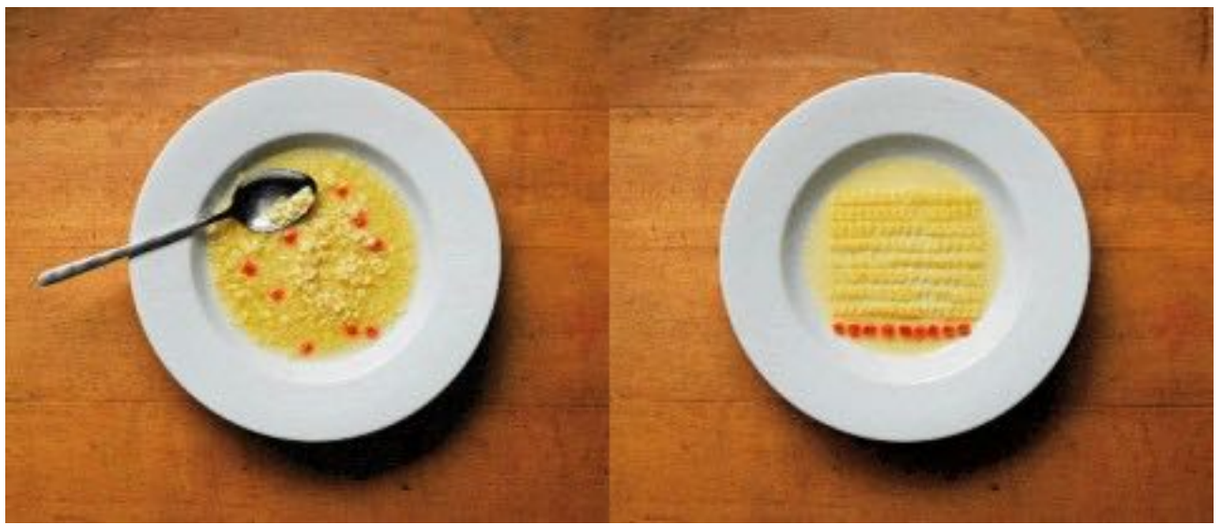
Student Self-Reflection

We take photos with our iPads and as a whole class, students can reflect and share their learning with each other.

PATTERNING: Sorting



“How did you sort your items?”
“What is your sorting rule?”



Place pages in sleeves!
“How did the author sort these items?”
“How many ways could you sort this bin of items?”

“Can you sort the same items a different way?”

PATTERNING:

Real world objects build connections and can spark inspiration!

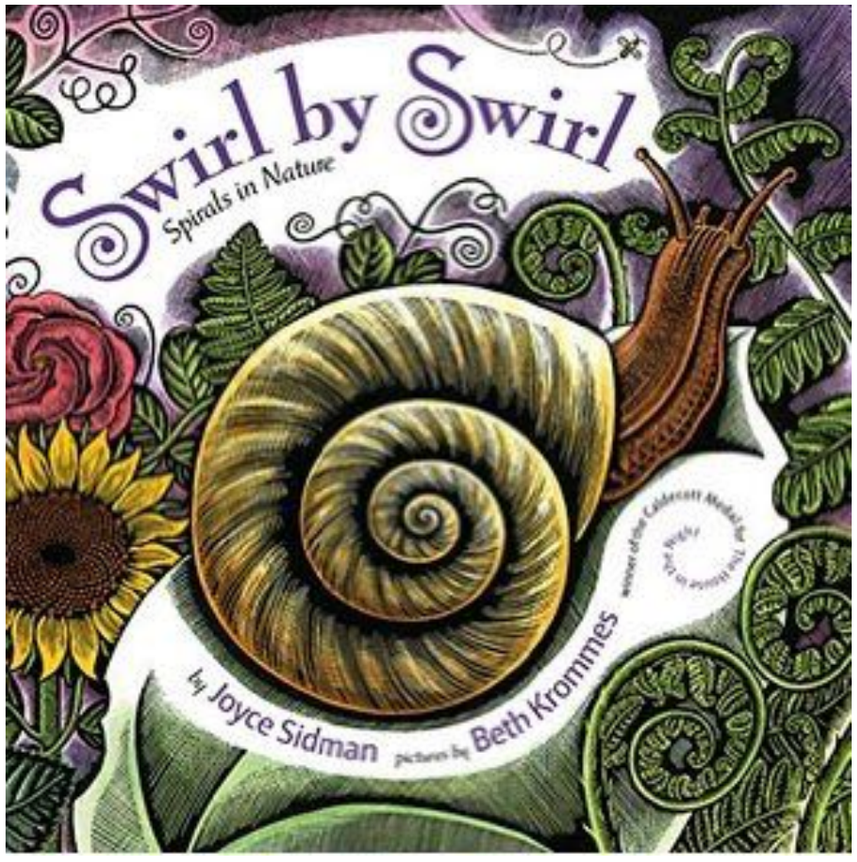
“Can you describe your pattern to me?”

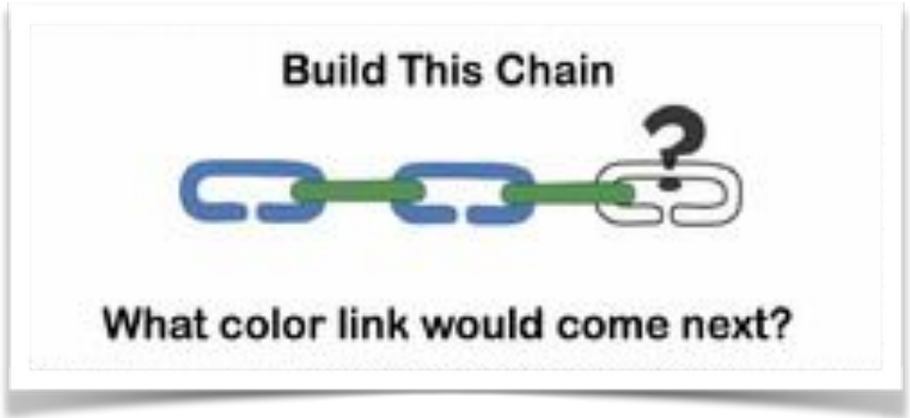
“Can you label your pattern?”

Provide socks with various patterns.
“Which patterns are the same?”
“Which patterns are similar but a bit different?”

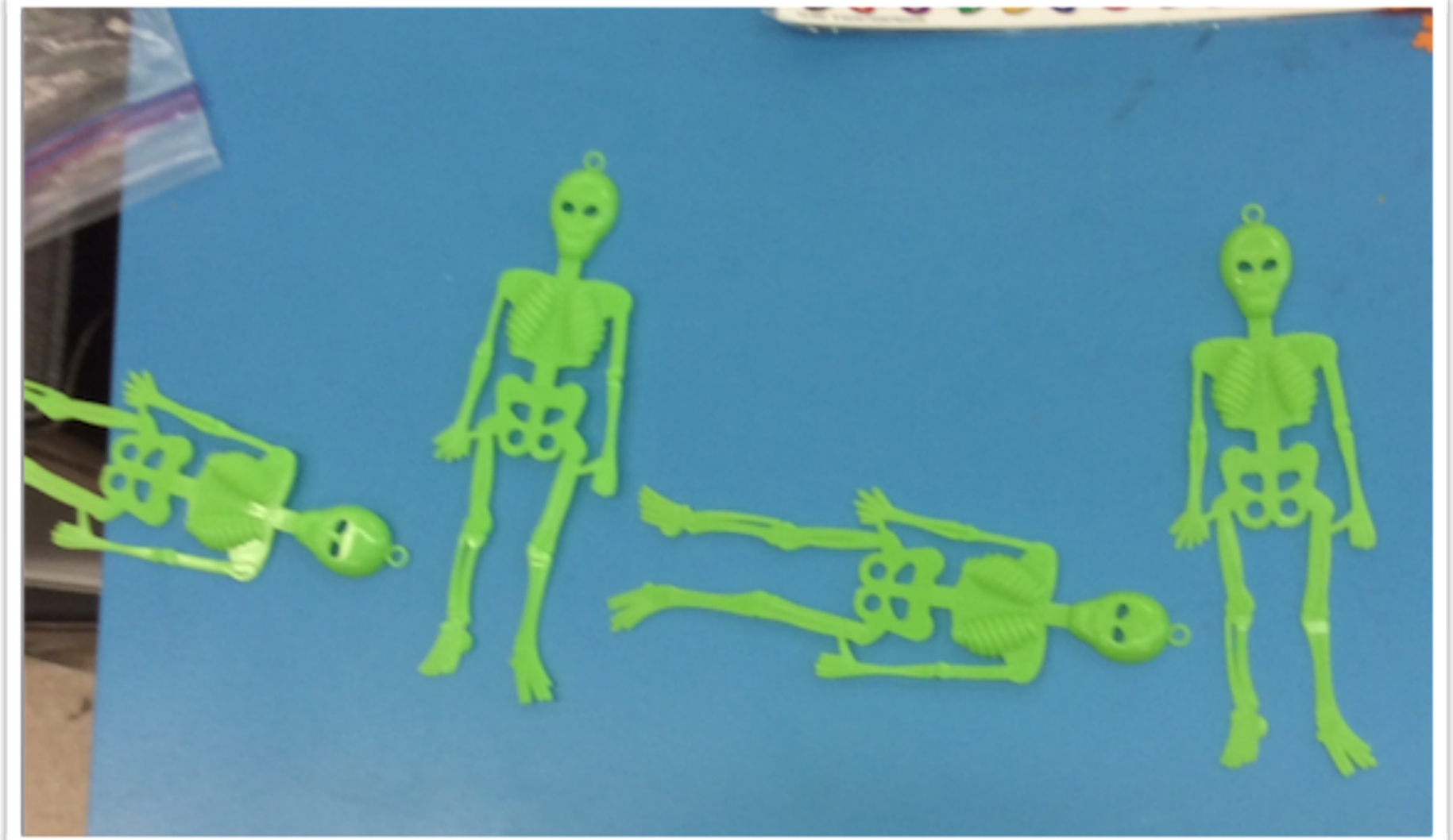
Children's books can also provide invitations to learning!

"Tell me about your pattern"
"Is it similar to something you saw
in the book(s)?"





“How would you extend this pattern?”
“What goes here?” - pointing to both ends



“Can you make a pattern with only one item?”

“Describe your pattern”

“Is this pattern correct?”

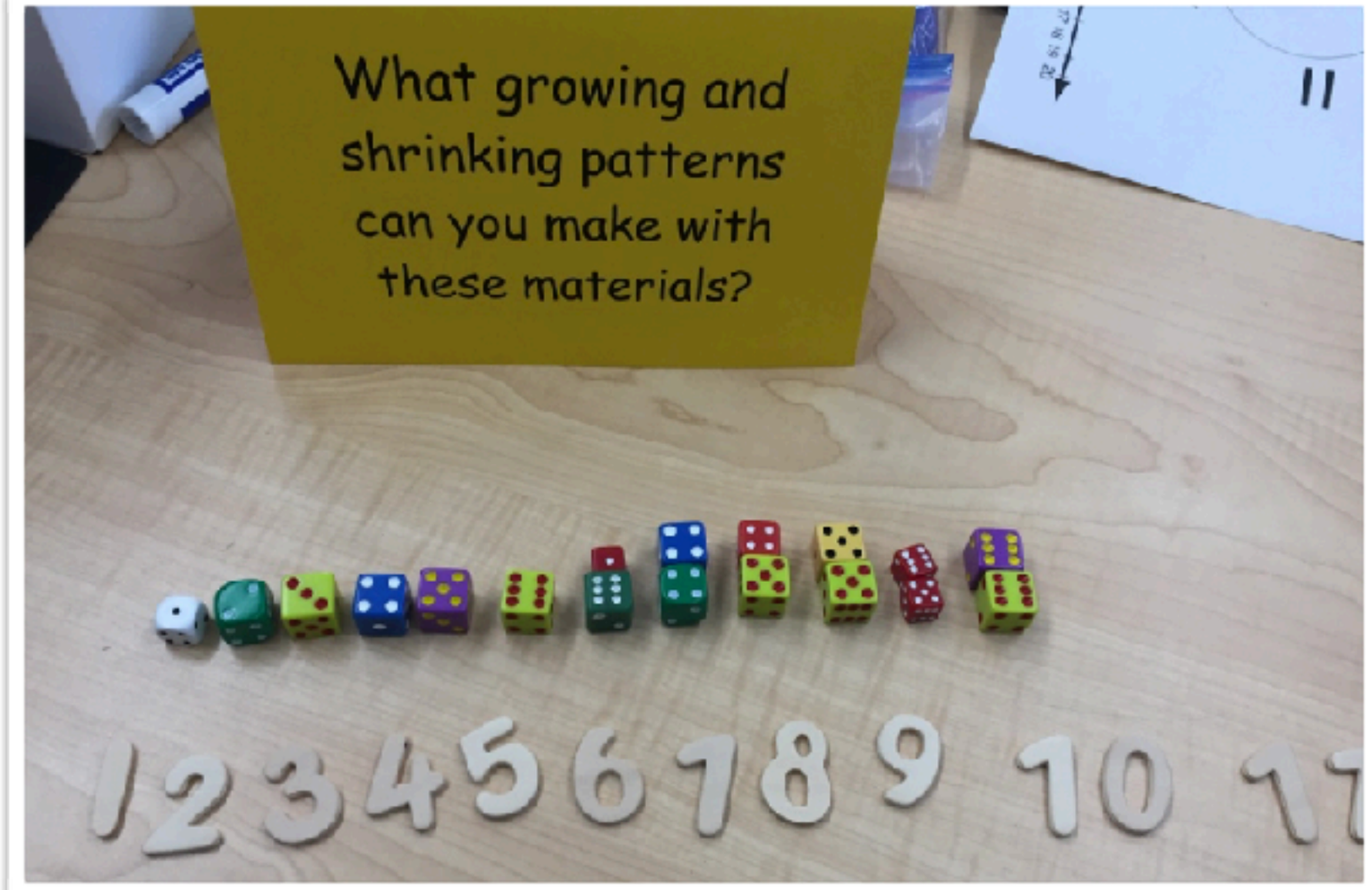
“Can you spot the mistake?”

“How would you fix-it?”

“Can you extend this pattern?”

“Can you make the same pattern another way?”

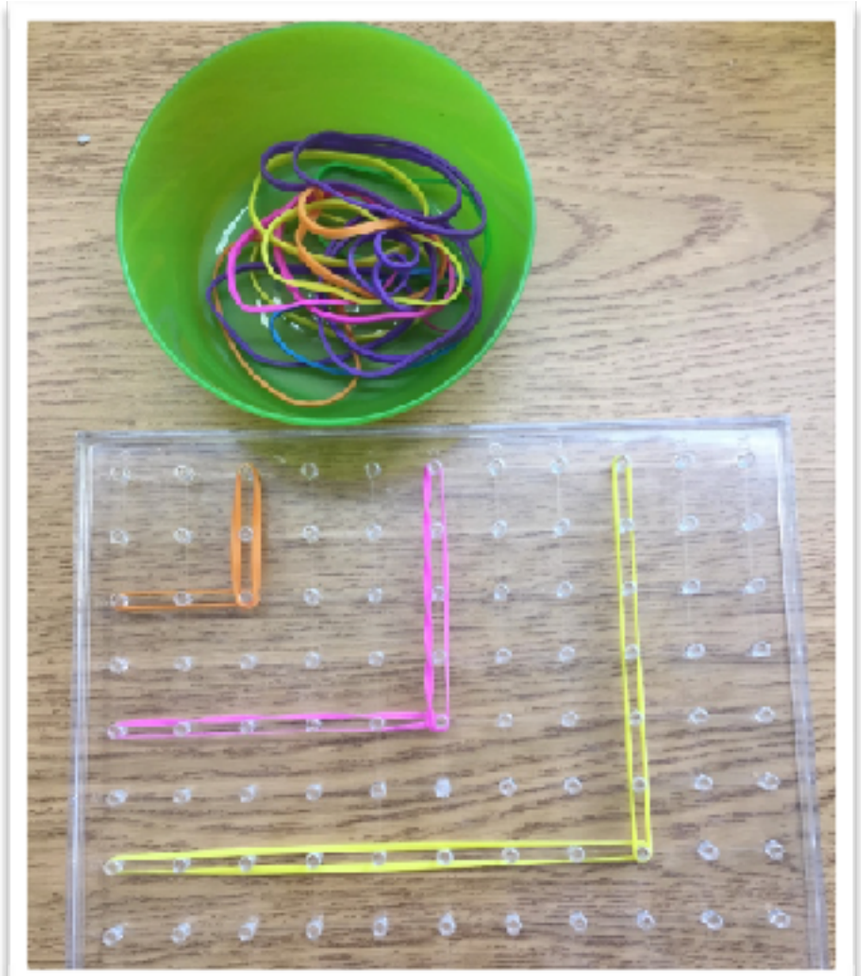
Fix-its on Sandra Ball’s website www.startingwiththebeginning



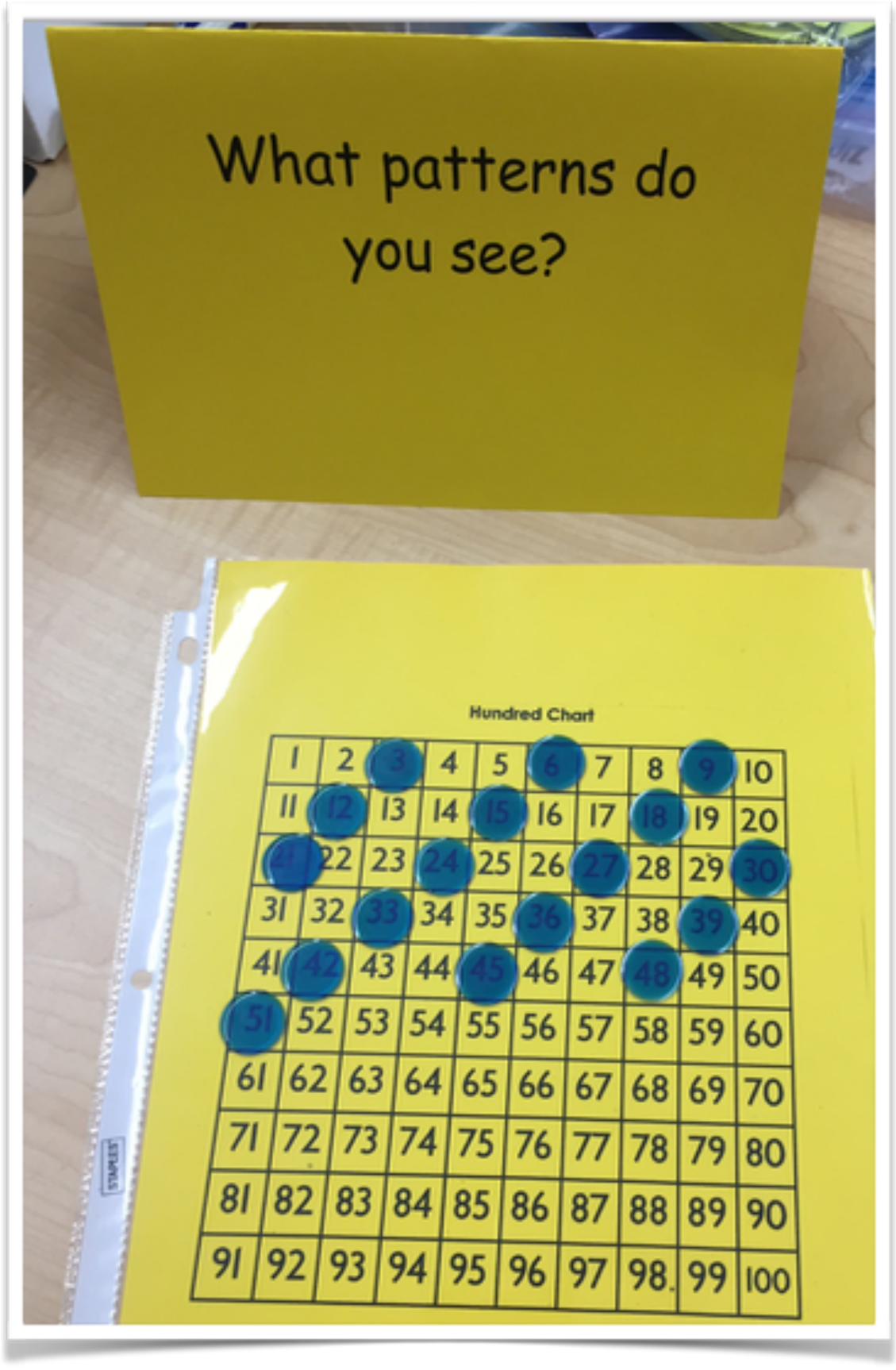
“What shrinking and growing patterns can you make with these materials?”

“Can you describe your pattern?”

What is your pattern rule?”

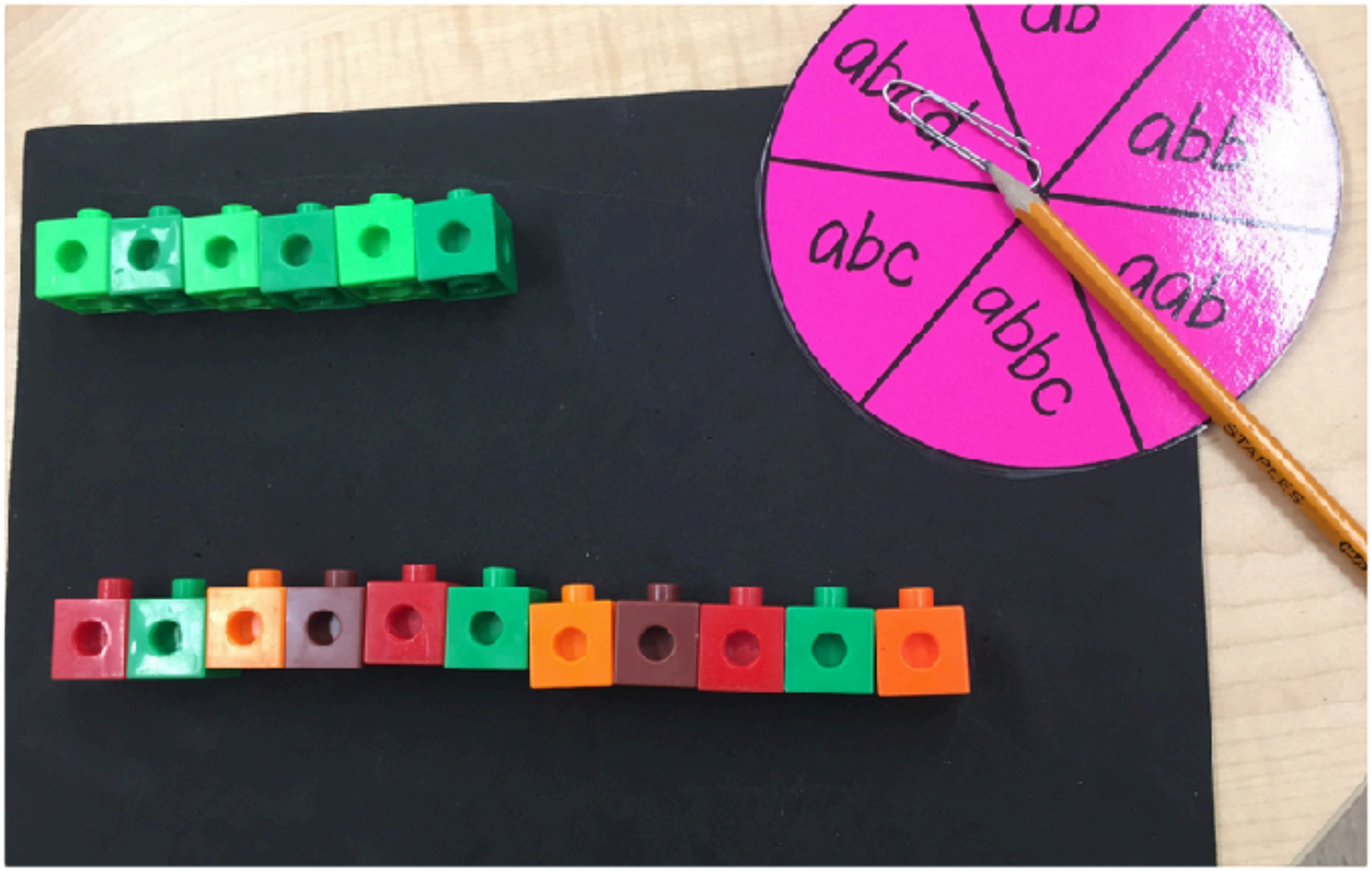


“Can you describe your pattern?”
How are yours and your friend’s patterns alike and different?”



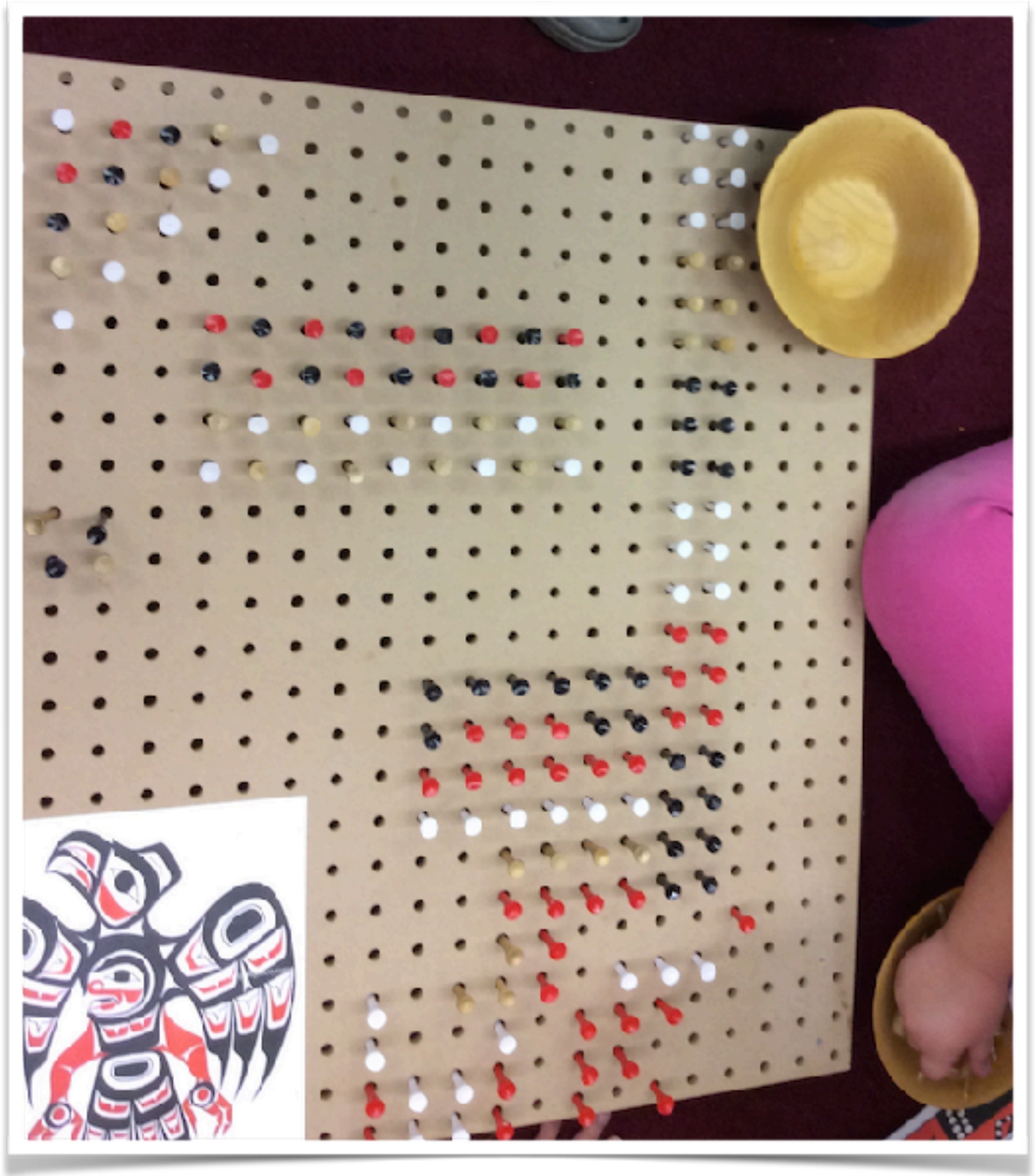
"What patterns do you see?"

What is your pattern rule?"



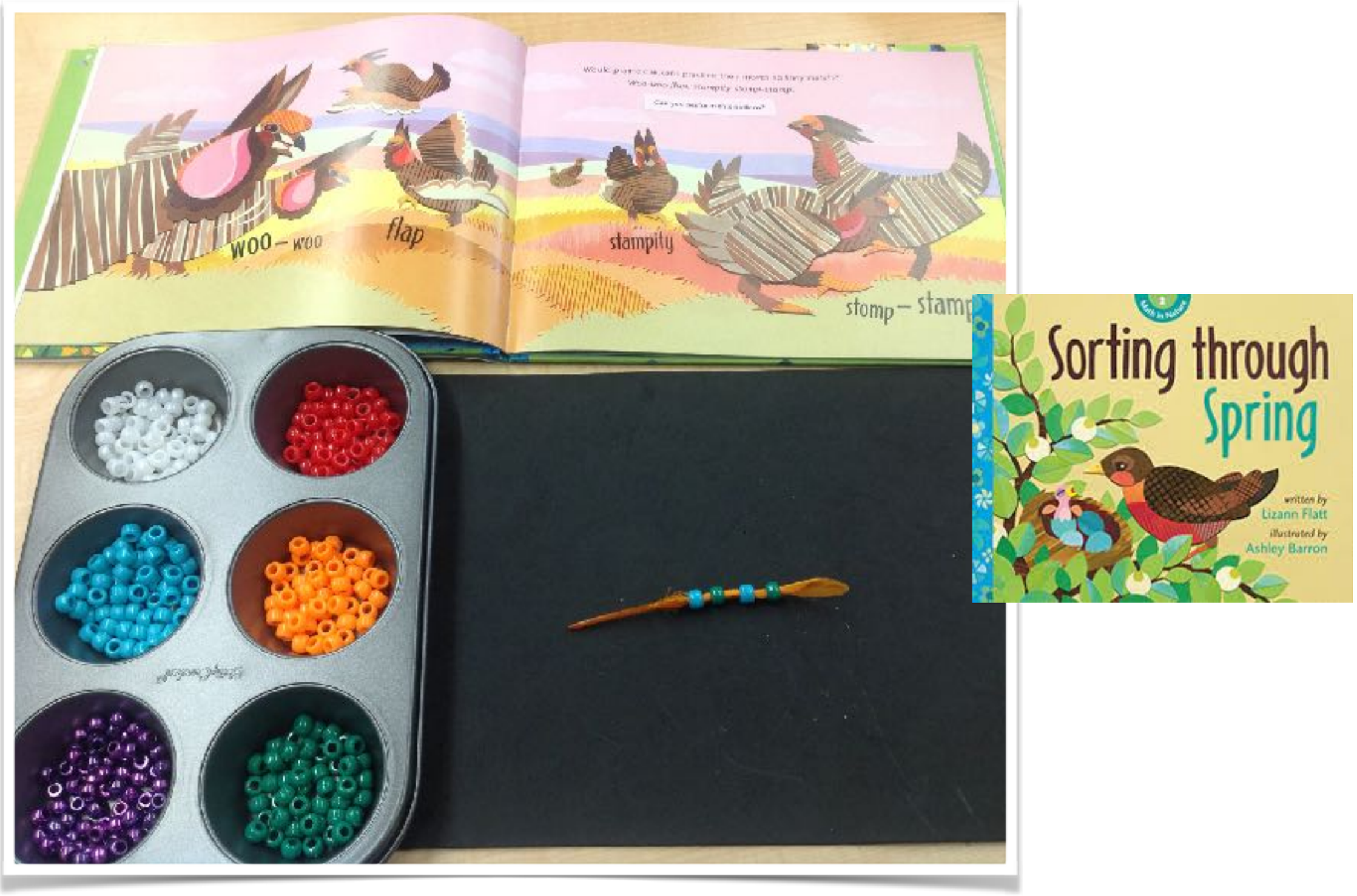
“Can you make the same pattern another way?”

Using images to inspire and invite!

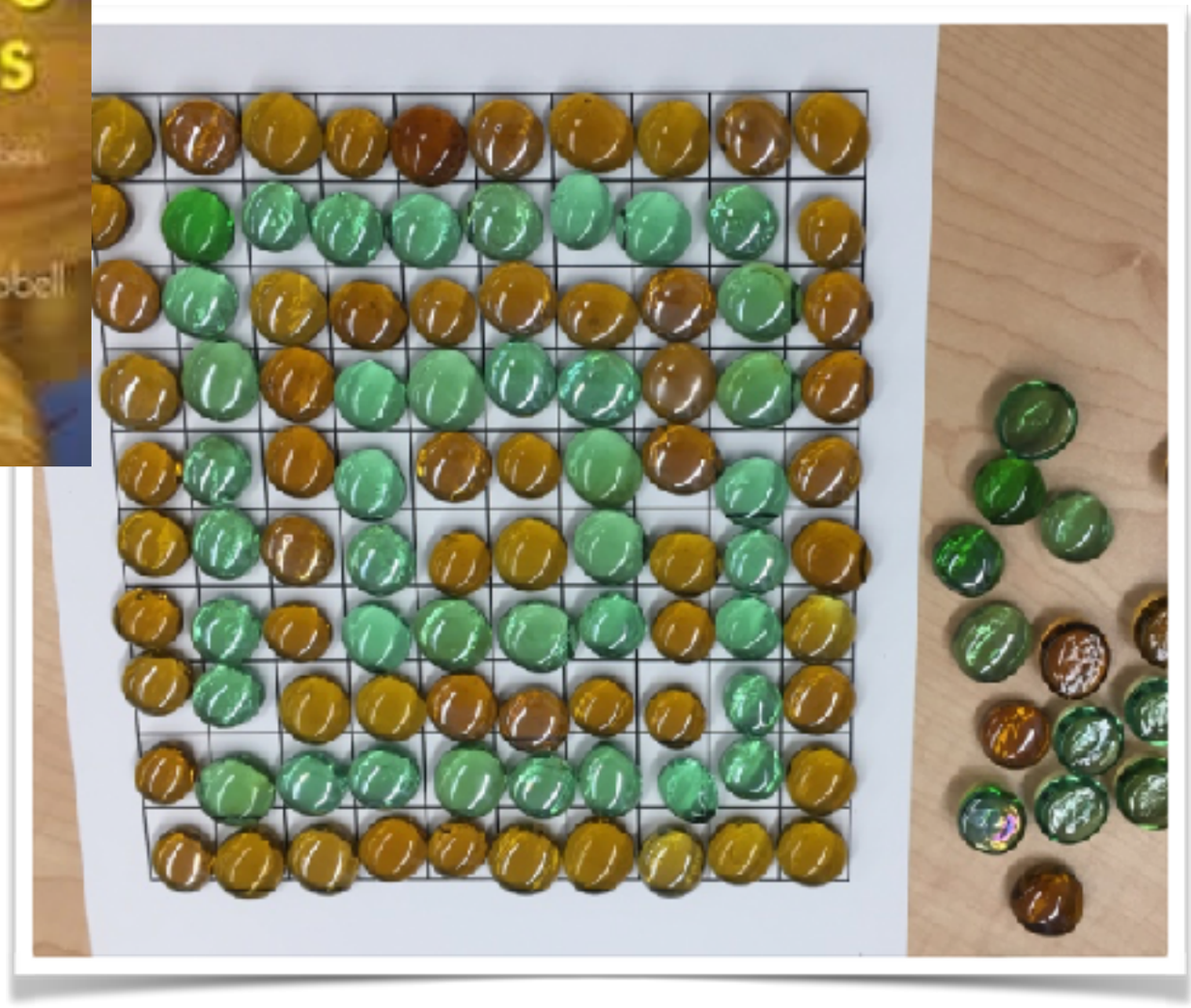


The pegboard and idea came from Sandra Ball

More children's books!

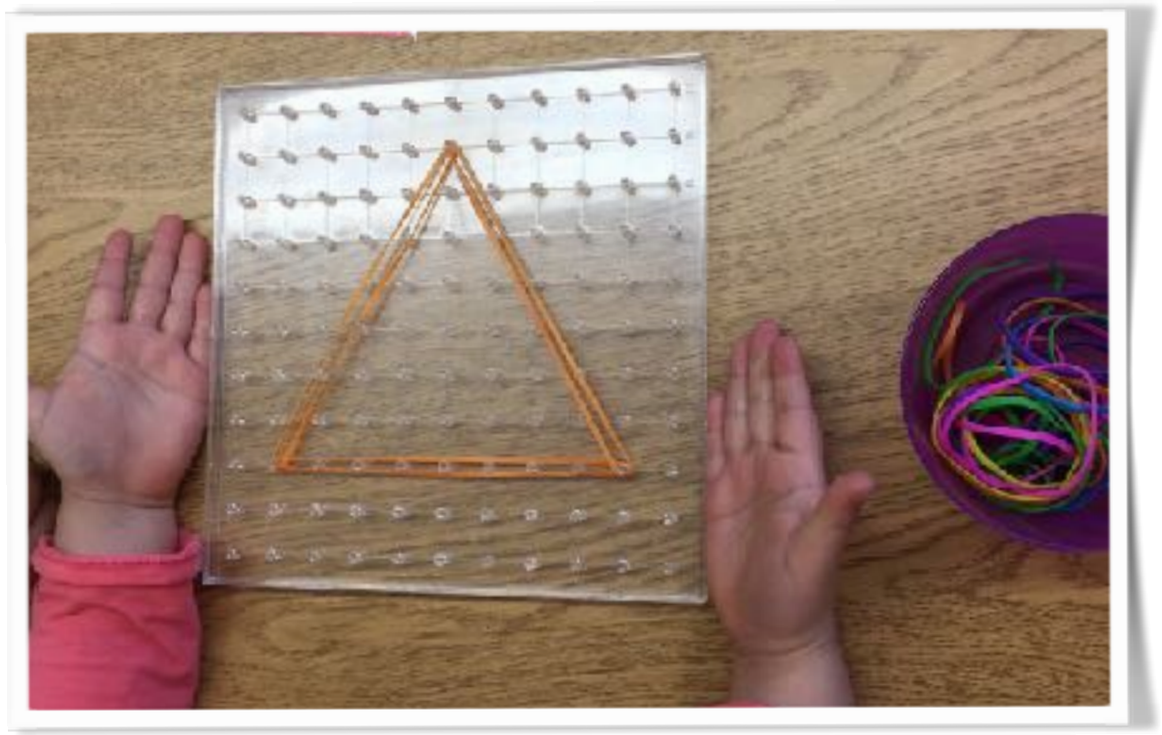


"What patterns can you create?"



“What growing patterns can you create?”
“Describe your pattern.”

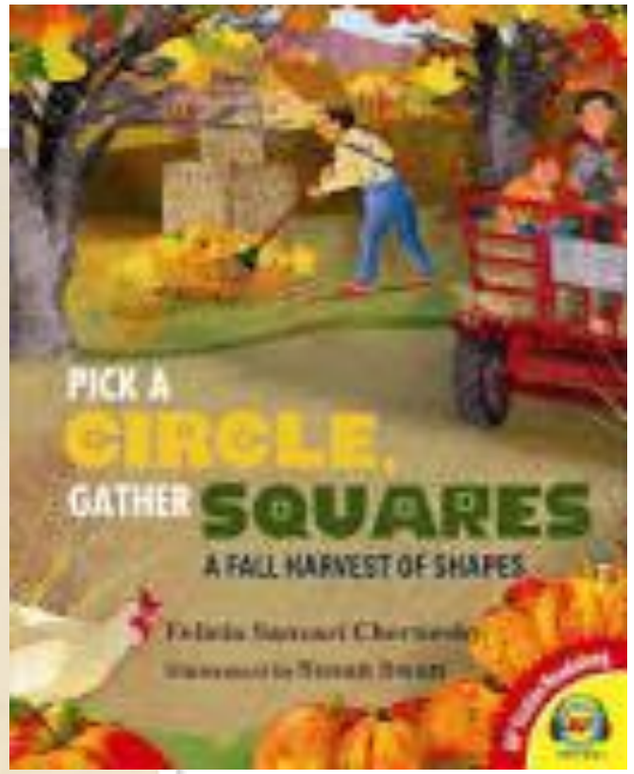
SPATIAL TASKS: 2D shapes and 3D objects:

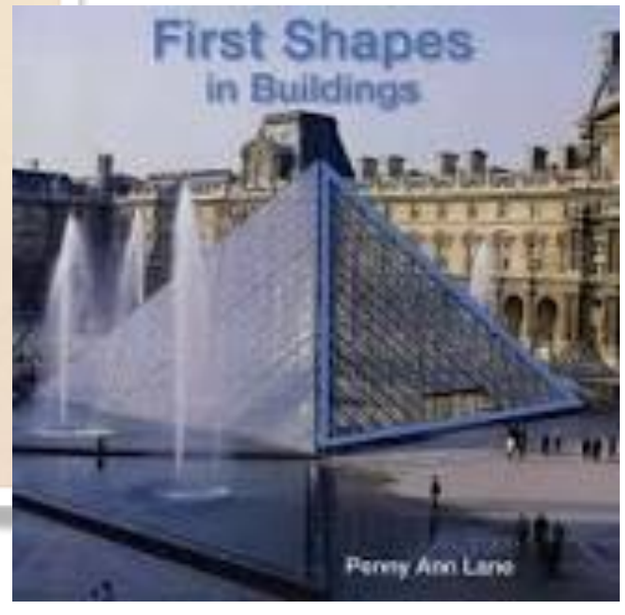


“What shapes can you build?”
“Can you build these shapes?”

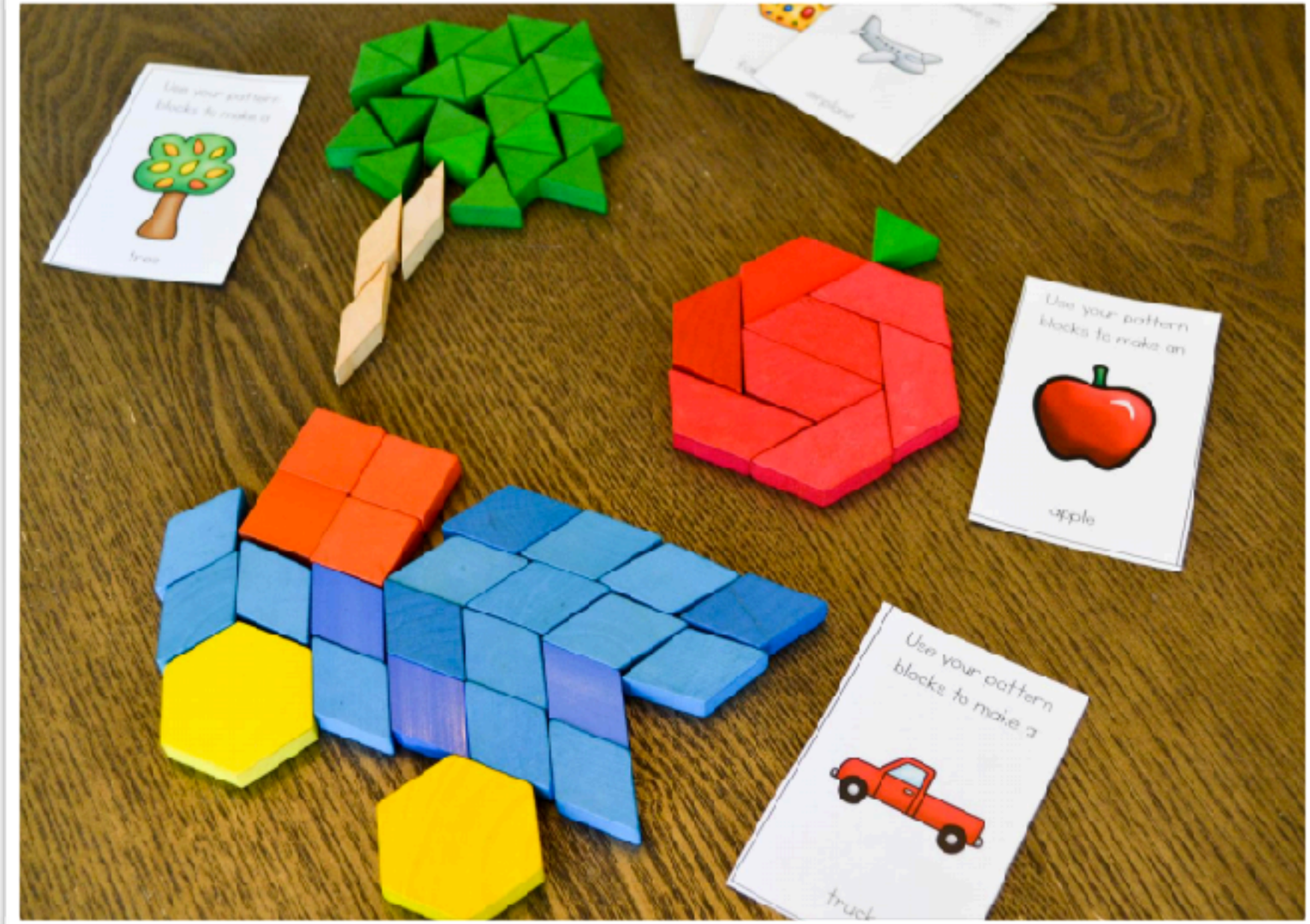
Which shapes are similar?

"What shapes can you make with these materials?"
"Can you identify the shape you made?"
"Can you sort your shapes?"
"How are _____ and _____ alike and different?"

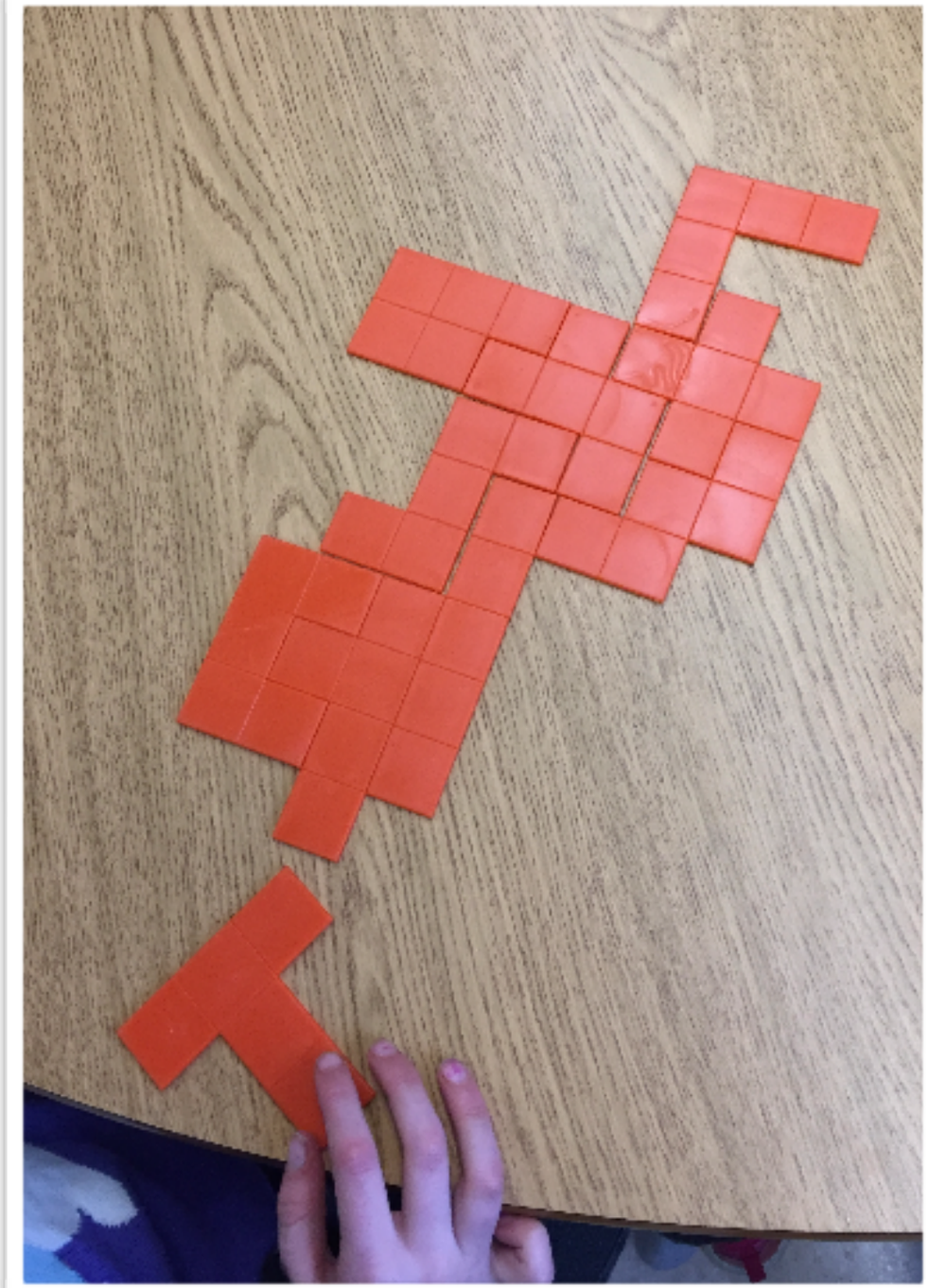




"What shapes do you see on this page?"
Have clipboards at this centre with a blank piece of paper and a question "What shapes do you see in your environment?"



“Can you combine shapes to make an object?”
“Can you make the same object using different shapes than the ones you used?”
“How many shapes did you use to make your object?”



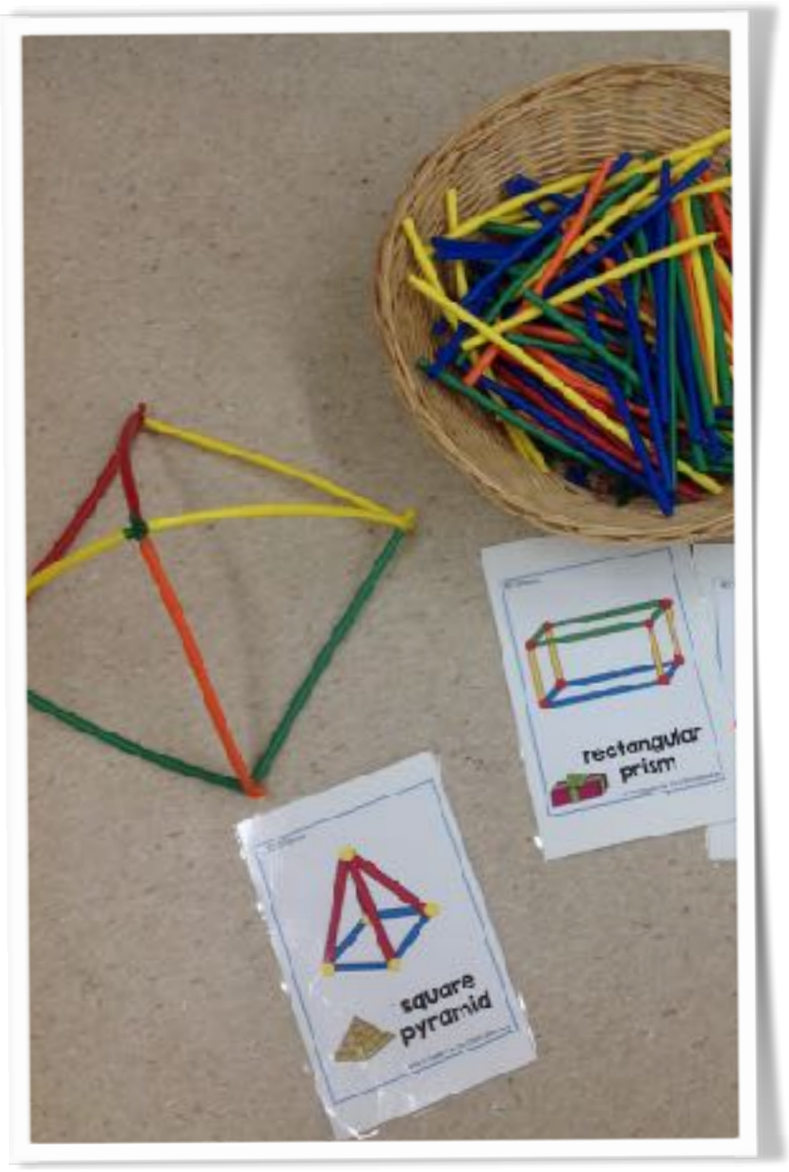
“What objects can you make with pentominoes?”
“Can you make a square, a rectangle, or a triangle with your pentominoes?

SPATIAL TASKS: 3D shapes

“How many edges or vertices do you feel?”
“What faces do you feel?”
“What does this shape remind you of?”
“Can you identify this 3D shape?”
“Where do you see this shape in your environment?”

“What are the faces of this shape?”
“How many faces does it have?”

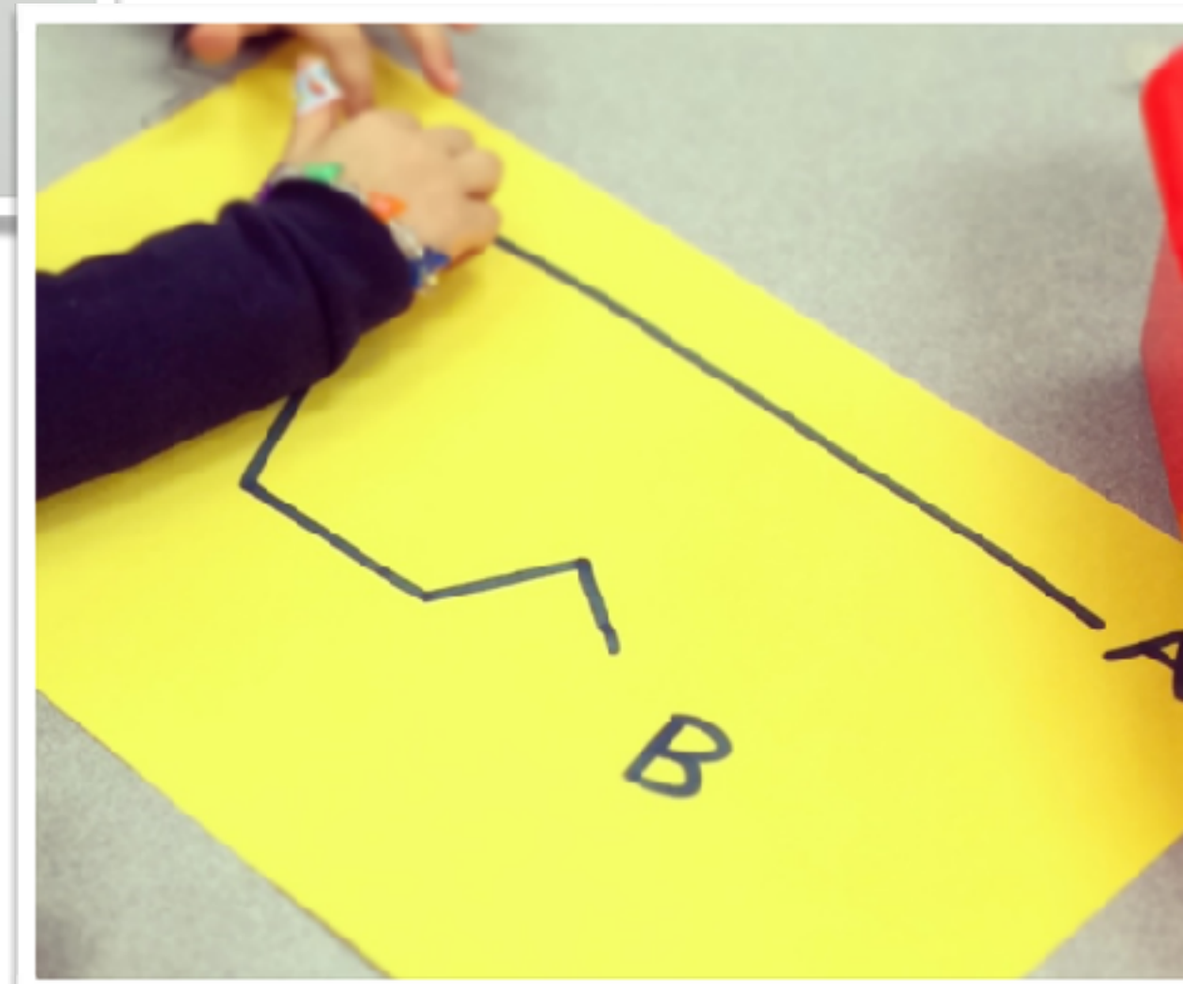
“Can you use the straws and connectors to help you determine how many vertices and edges this shape has?”



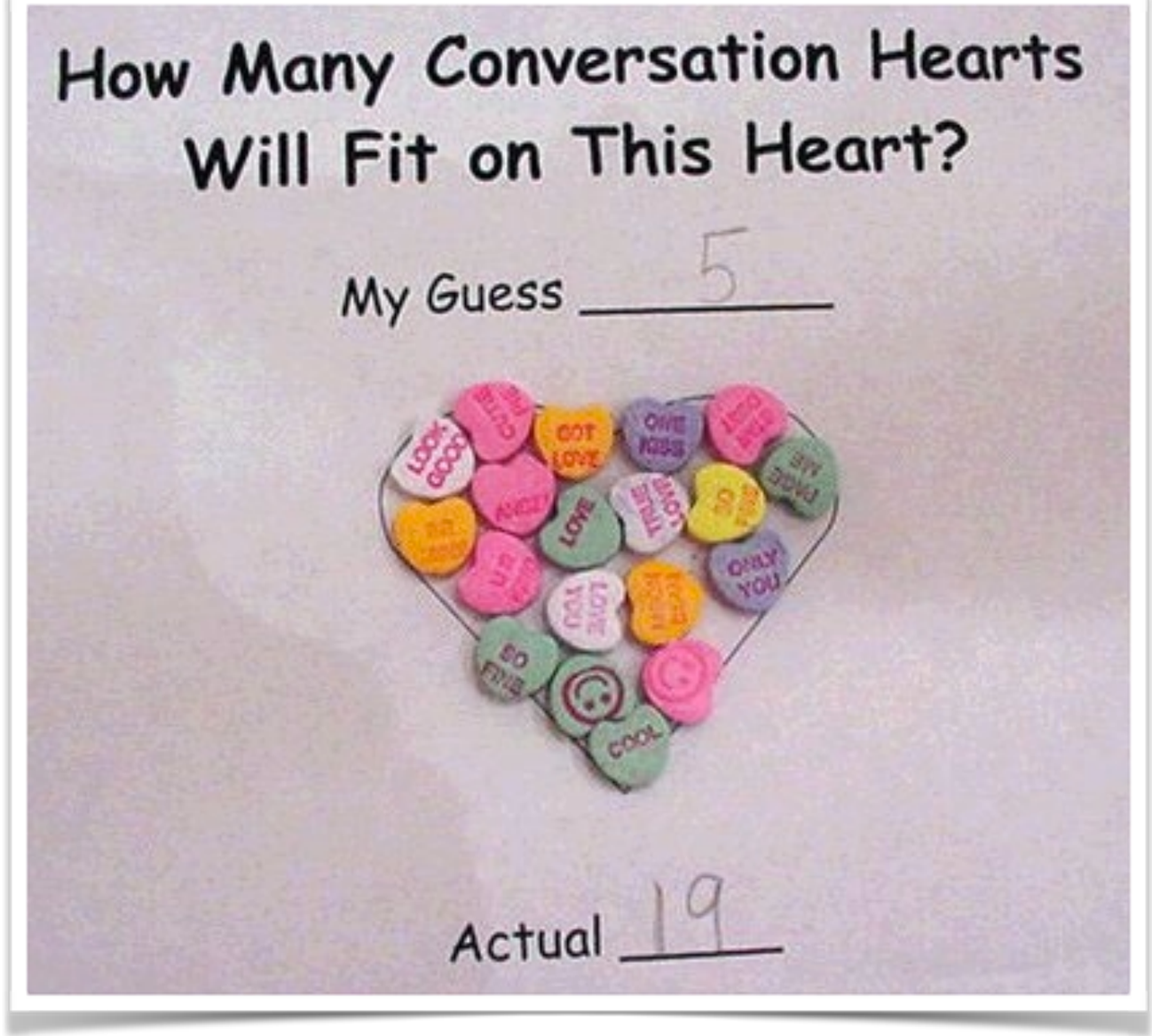
Measurement: Non-standard

"Can we use cubes and paperclips at the same time to measure?"

"Which line do you think is longer?" Explain your thinking.
"How might we find out?"



"Tell me about how you ordered these items?"



“Was your guess reasonable? Why or why not?”
“Can you draw a heart that might hold 50 hearts?”

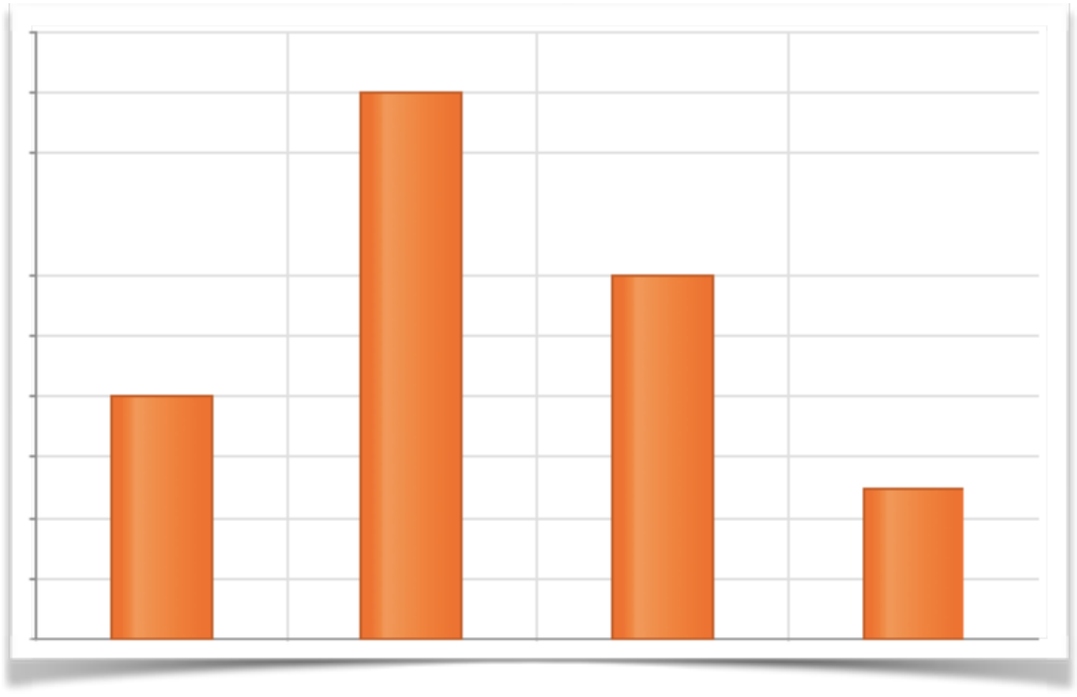
More inspiration and invitation from children's books!

"How tall is the gorilla's hand?"
"How much taller is the gorilla's hand than yours?

"What wonders do you have?"
"What would you like to explore?"

Data Analysis:

"Which do you predict you will roll the most?"
"Tell me about your graph."



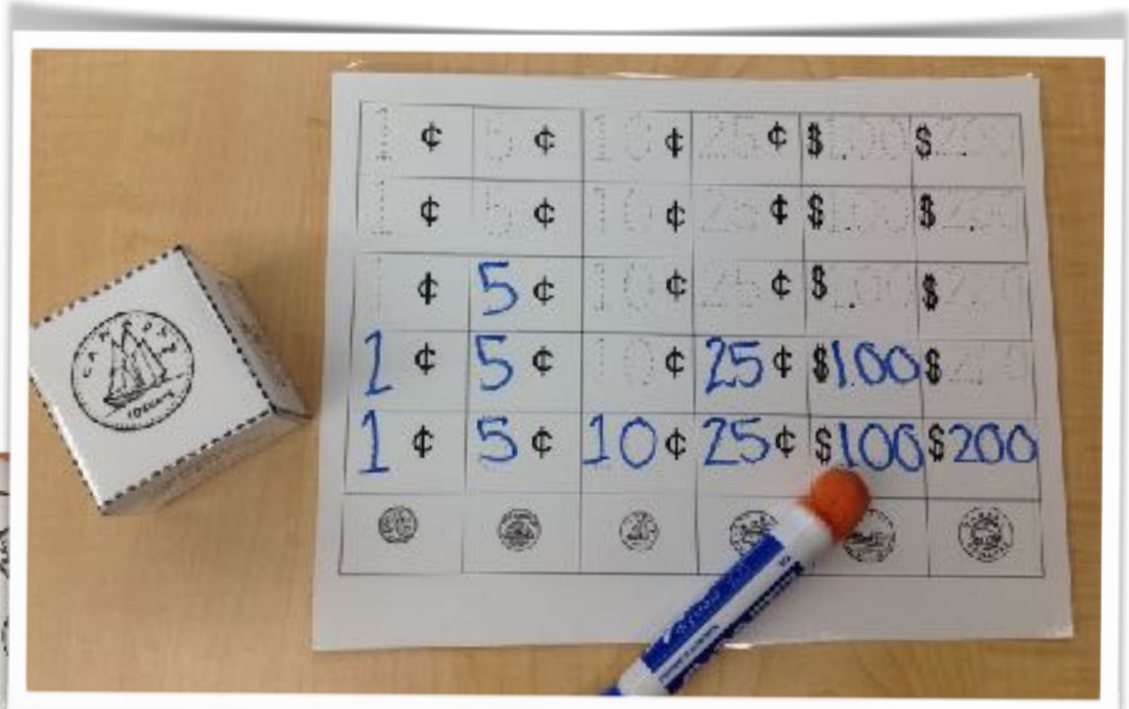
Place a graph on chart paper.
Ask “What story might this tell?”

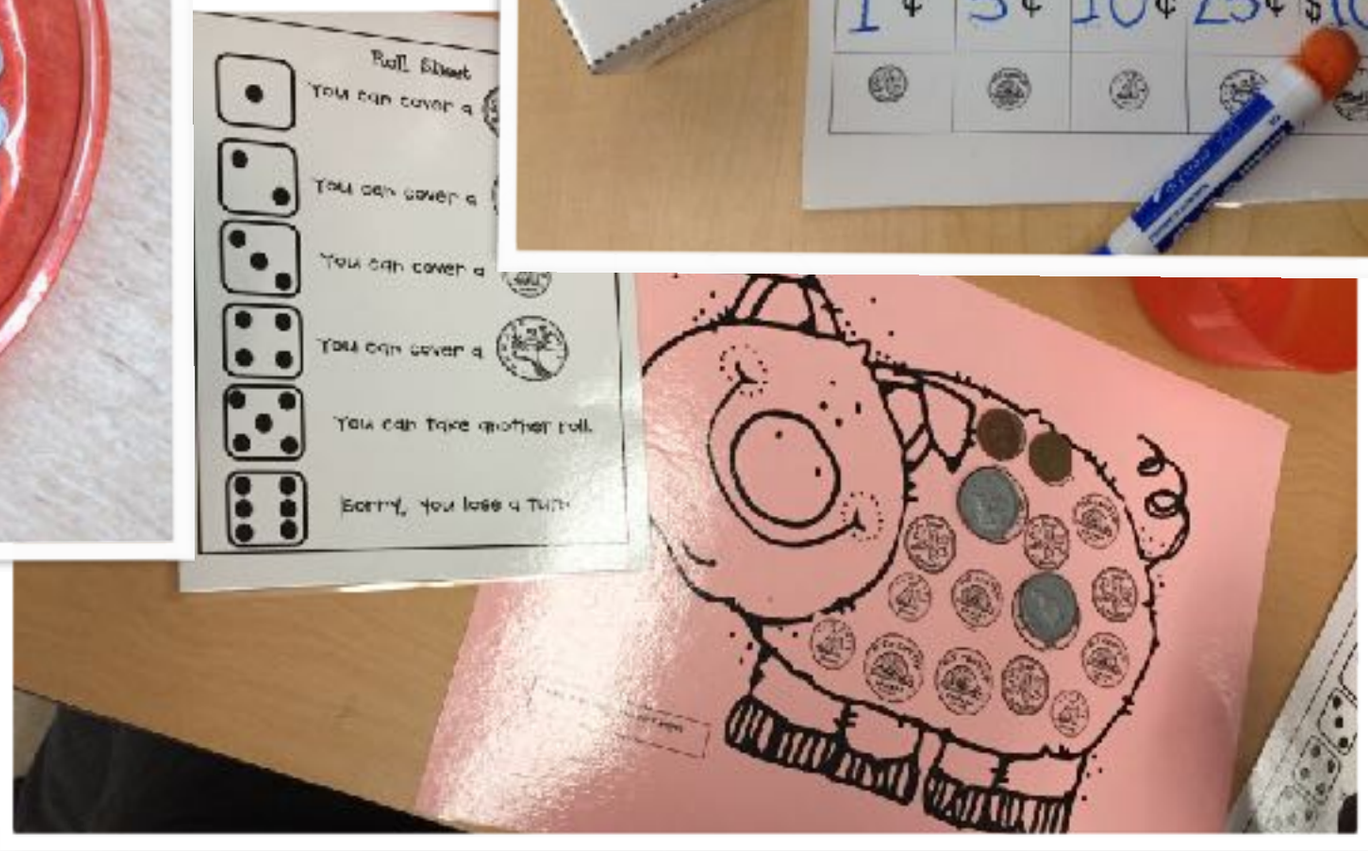
Or what information can be learned from our Question of the Day?
Leave chart paper out for students to record their ideas!

Image from www.daughtersandkinders.blogspot.ca

Financial Literacy

"What do you notice about the coins?"
"How are they similar? How are they different?"





A store centre is a great way to have student engage in role-playing to explore money as a medium of exchange!

Provide blank shopping lists
Pretend credit cards
Coins and bills
Flyers

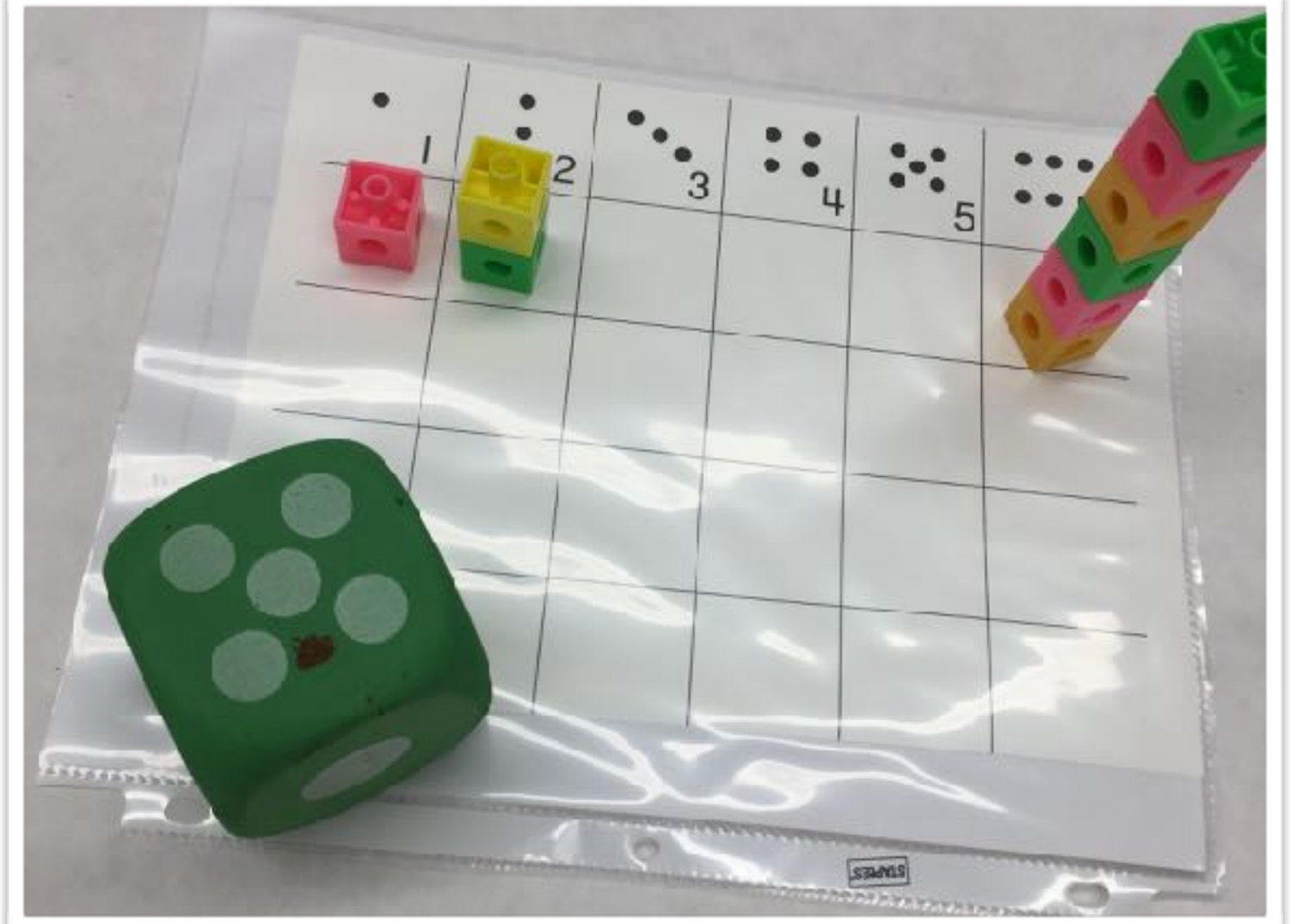
“How many different ways can you make _____ cents?”
“How can you make _____ using the fewest coins? Most coins?”

NUMBER: Subitizing

"How many dots do you see?"
"How do you see them?"

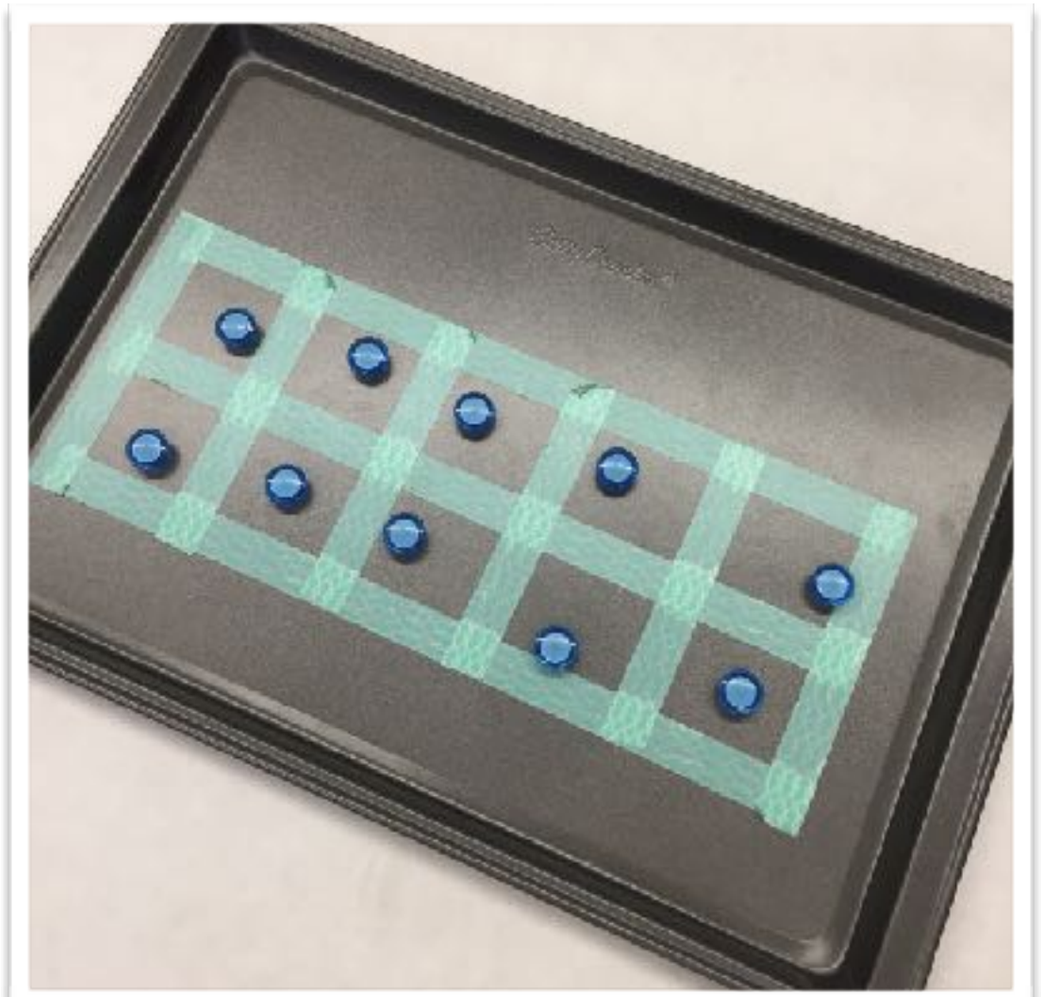
Draw with a
q-tip

“How many dots do you see?”
“What number matches that quantity?”
“What does the corresponding numeral look like? Can you use a q-tip to write it?”

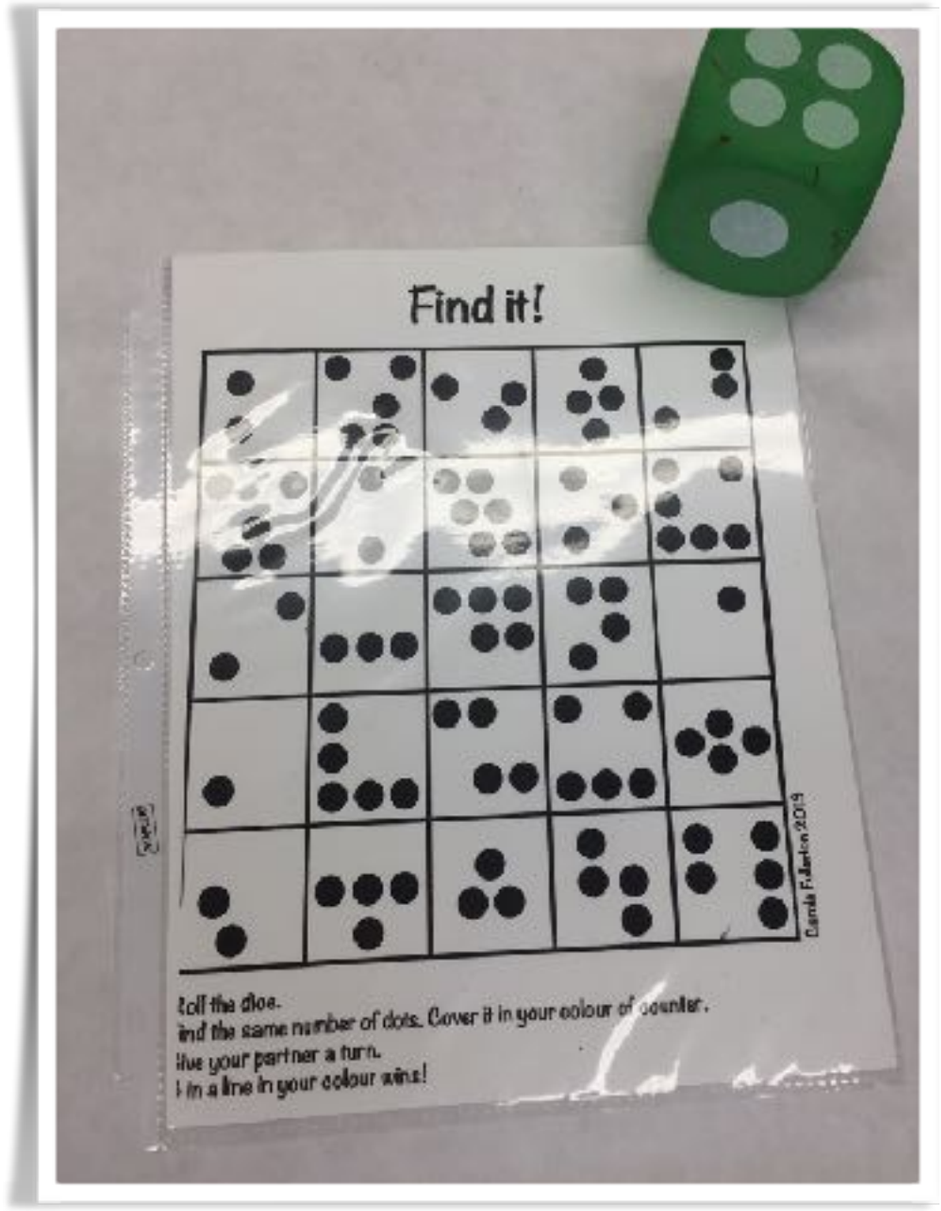


“How many dots do you see?”
“Can you build that quantity?”
“What number do you think you will roll the most? The least?”

Adapted from Carole Fullerton’s Number Sense for K/1

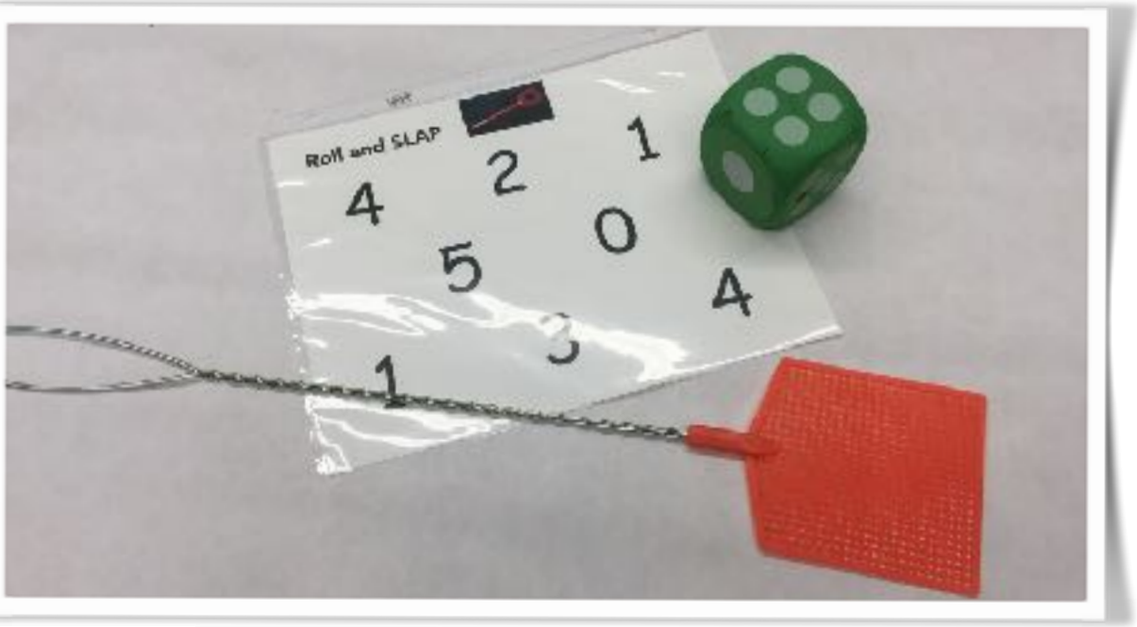


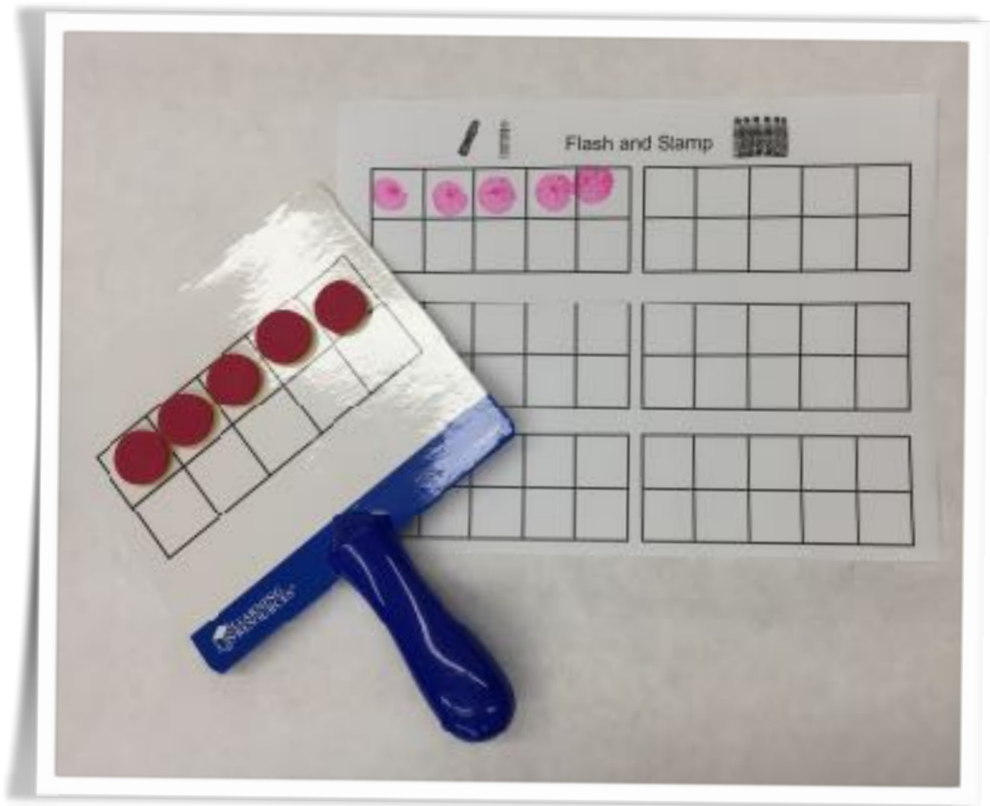
“How many do you see?”
“Can you build the amount you see?”
“Can you show me on your fingers how many more are needed to get to 10?”
“How might you record this as a number sentence?”
“Can you see it a different way?”

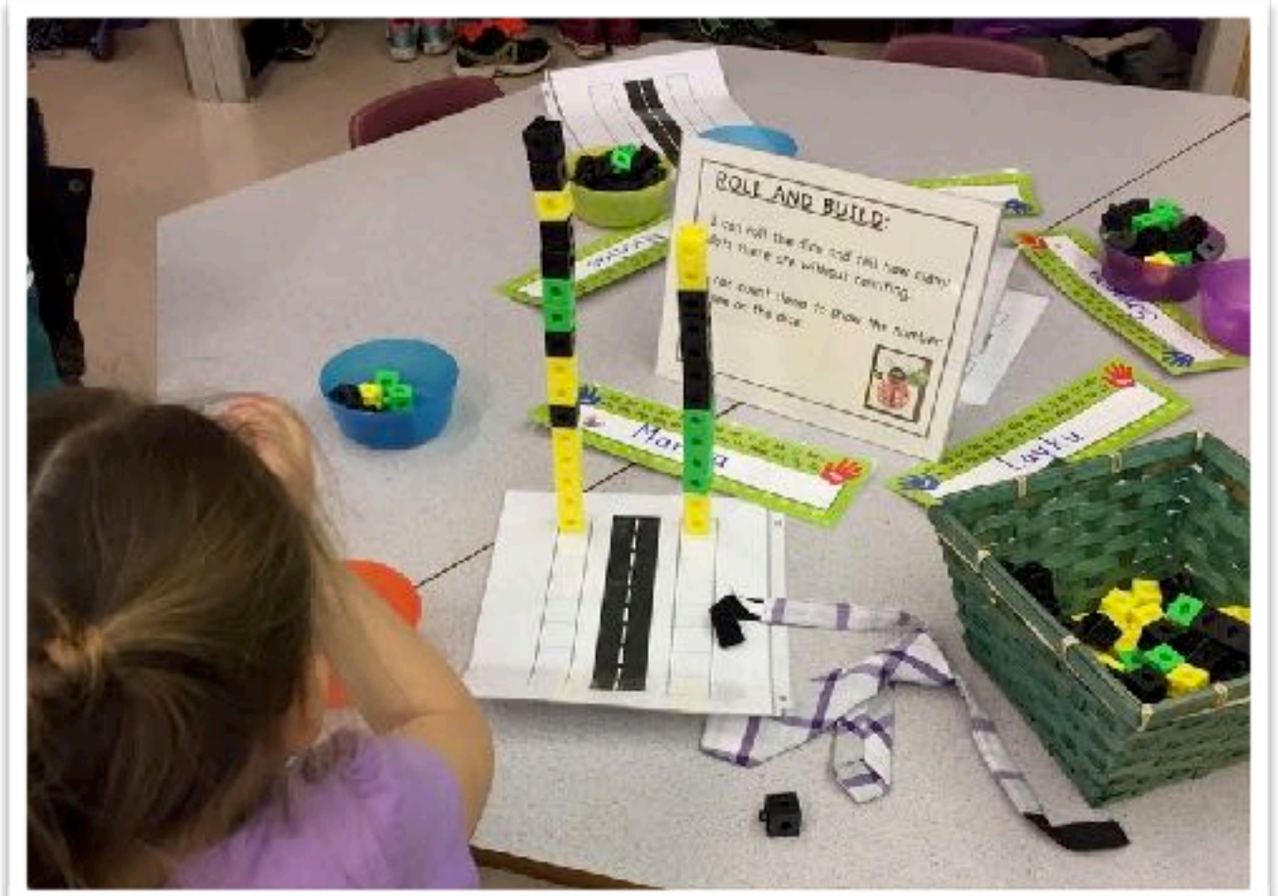


“How many dots do you see?”
“Can you build that many?”

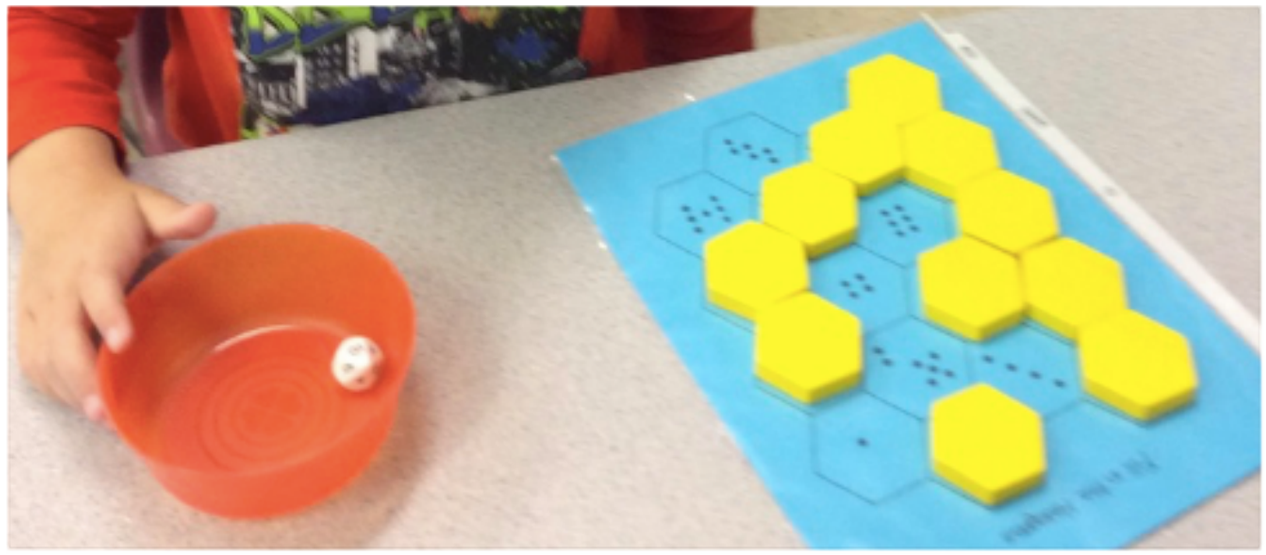
“What did you roll?”
“Can you spot the same quantity?”
Also, provide numeral dice.



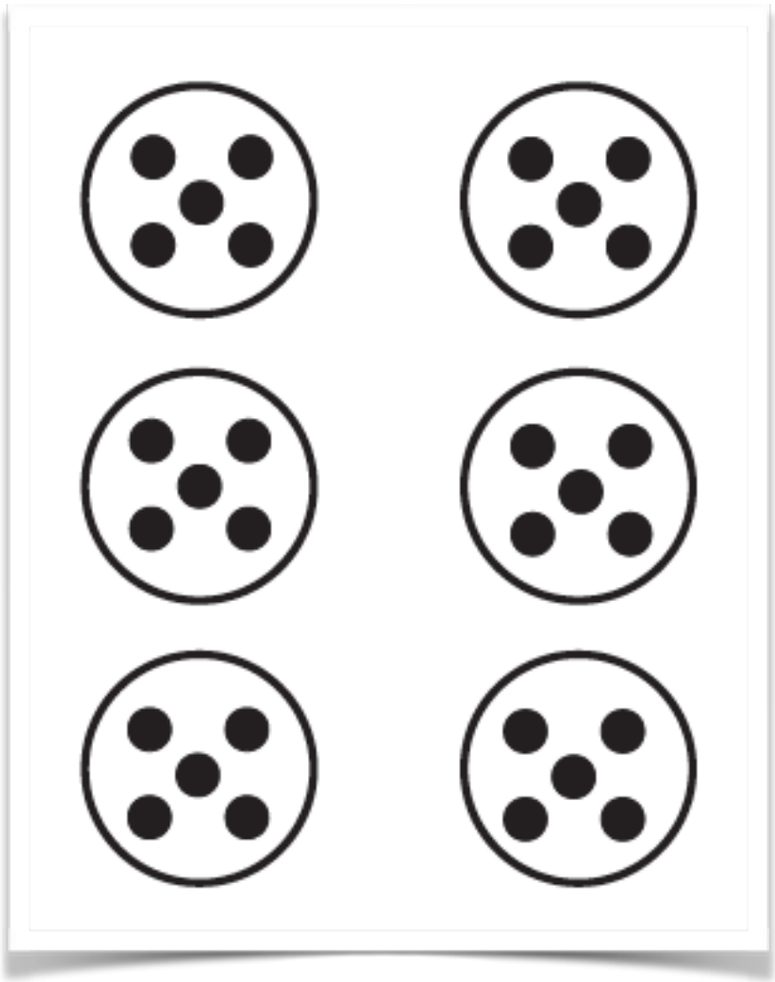


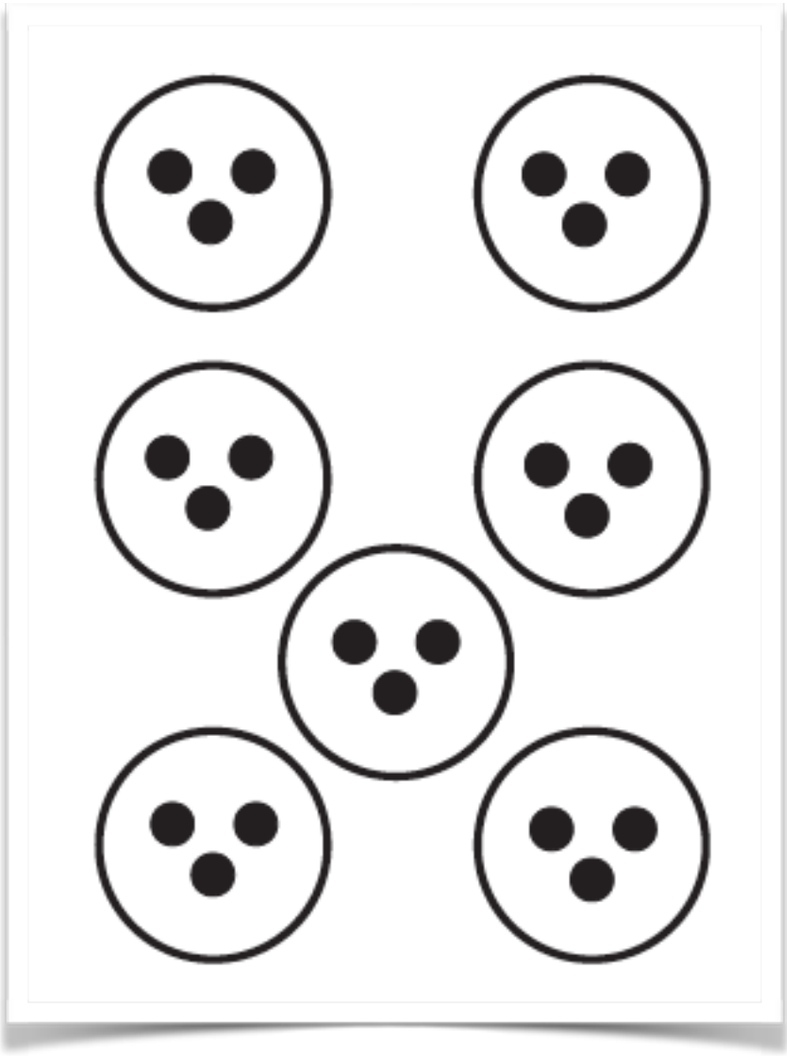


"Build a City" is from
Building Number Sense K -2
"Counting Activities" -
Leaders Across Oregon
Link on website



Hexagons activity from Sandra Ball
www.startingwiththebeginning.com

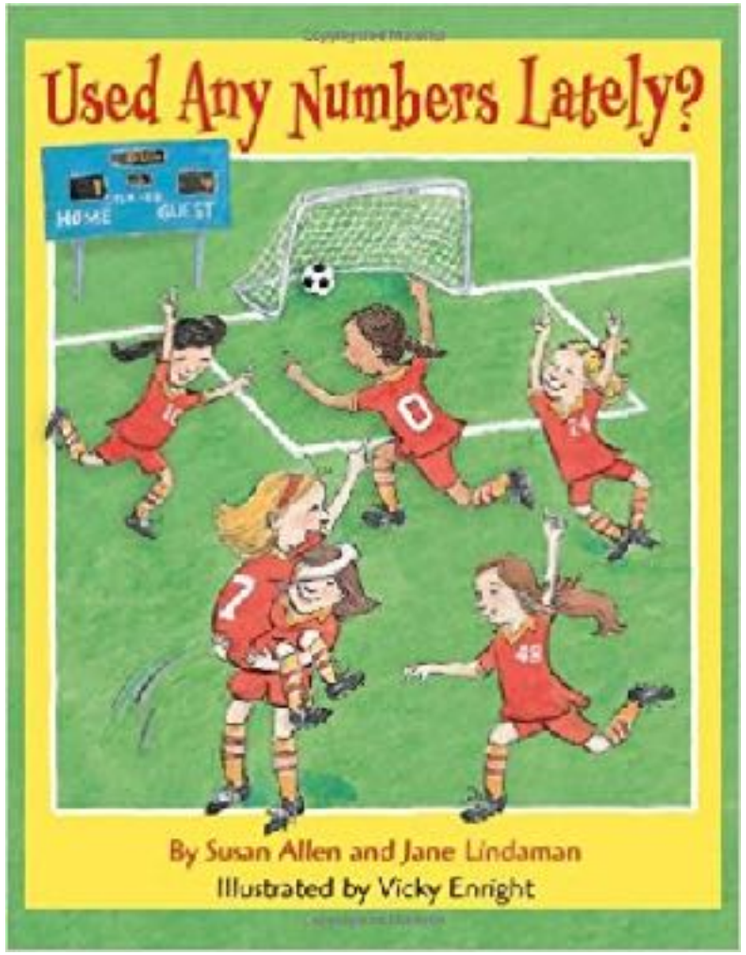




Multiplication Subitizing

“How many do you see?”
“How do you see them?”
“How could you record this?”

NUMBER: Awareness



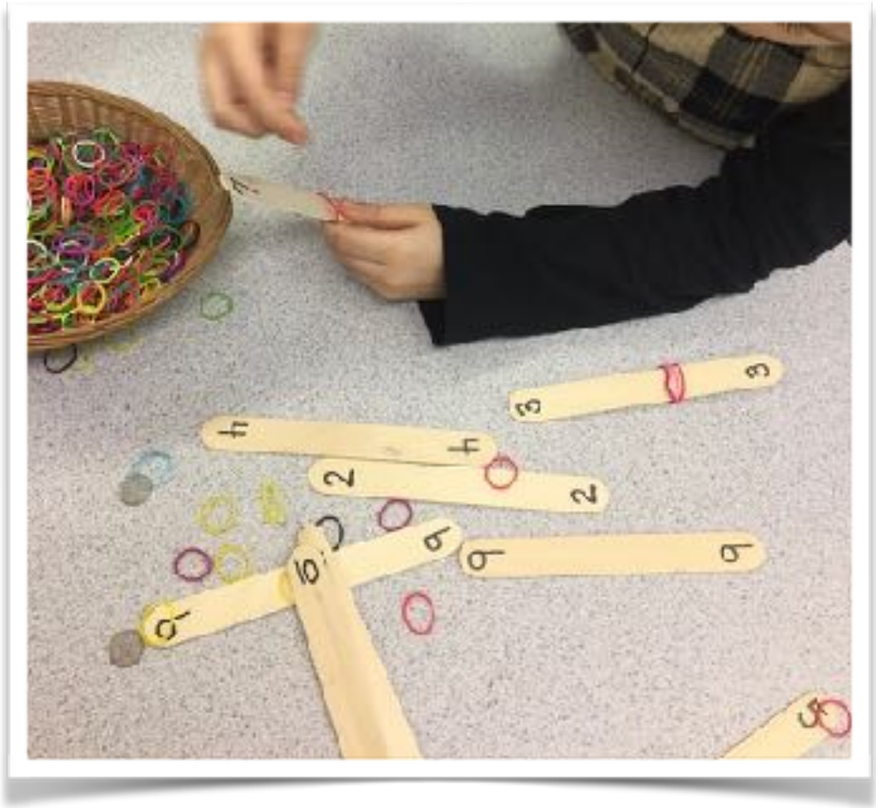
"What numbers do you see in your world?"

NUMBER: Counting

These can be found on many of the homeschooler blogs/websites.

"Can you put your birds in order?"
"Which number is the largest? Smallest?"

Note: Being able to count a quantity of items is easier than counting out a specific number, as students must hold that number in their heads as they count.



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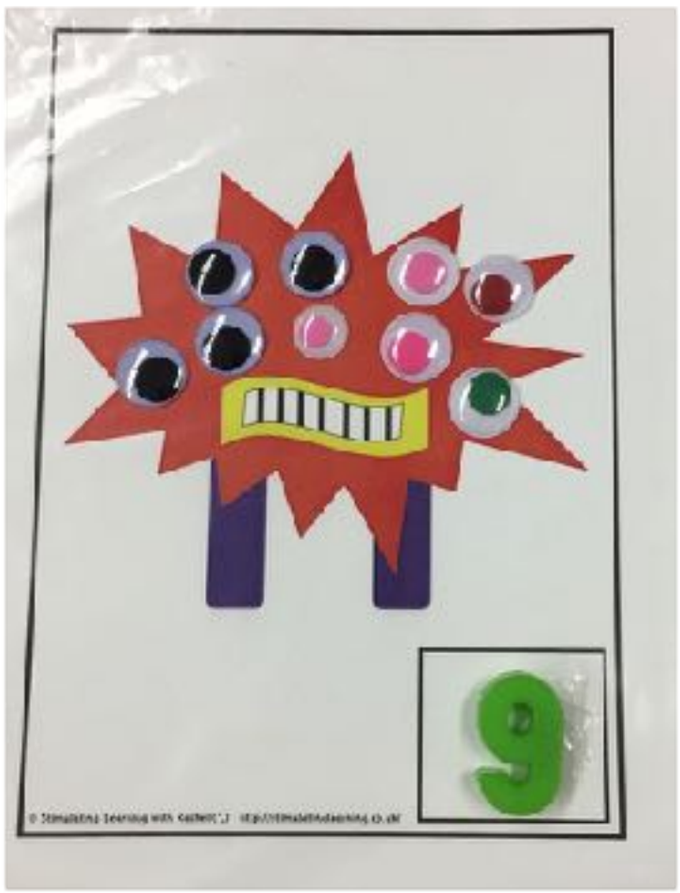
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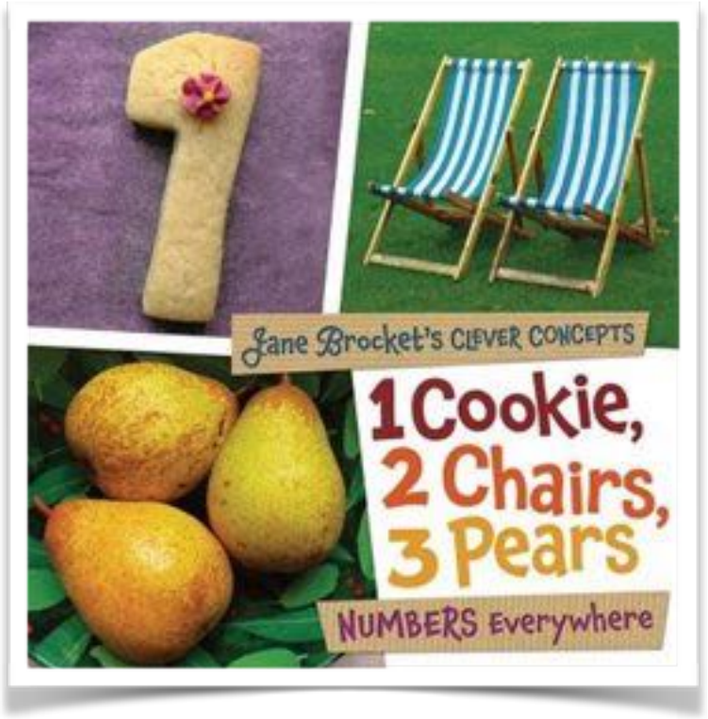
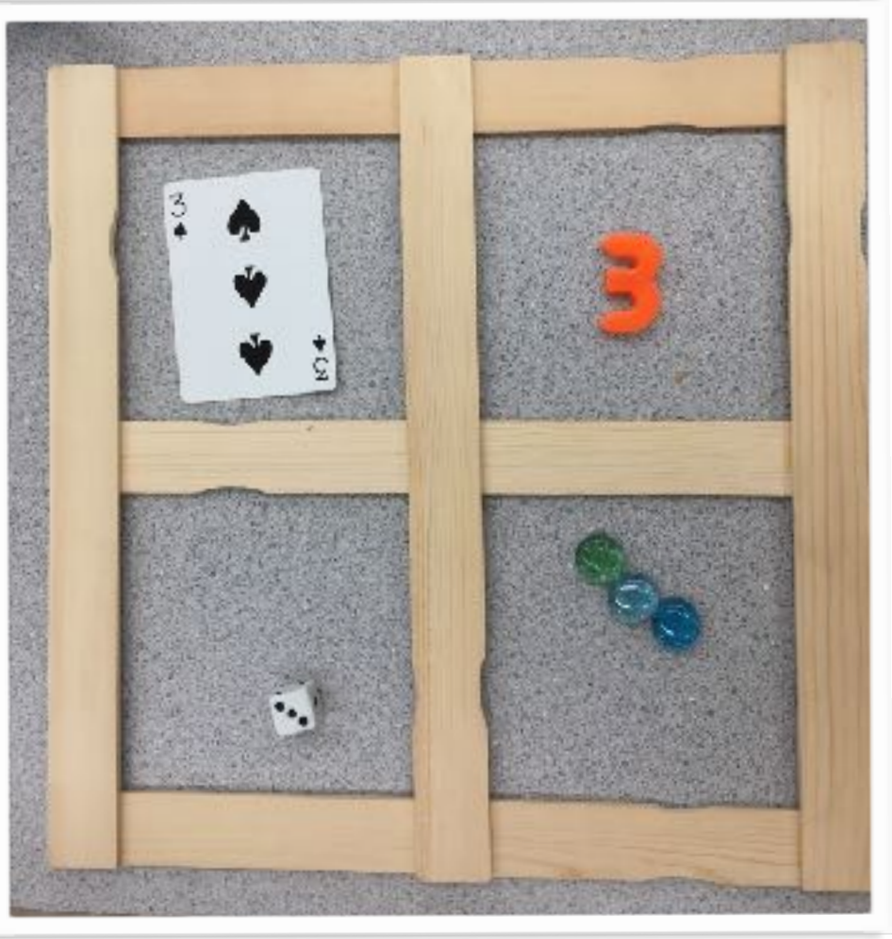
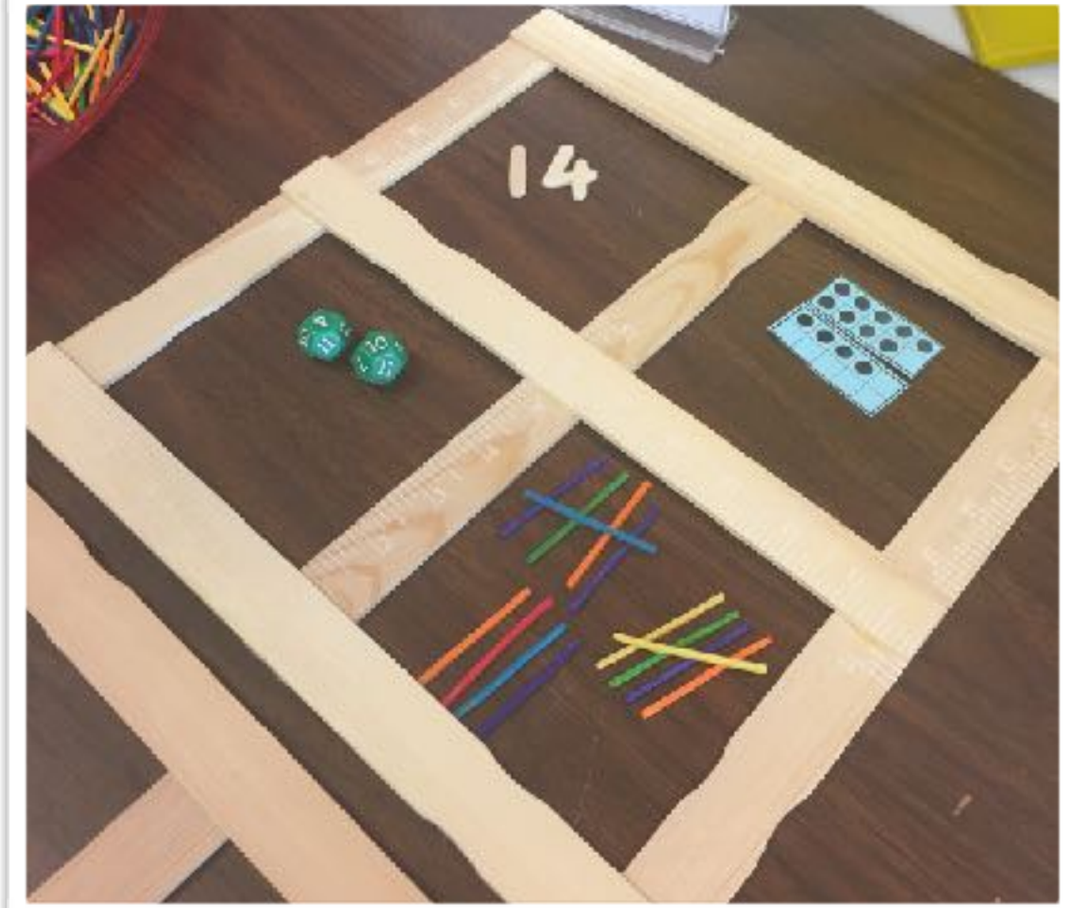


"How many different ways can you make _____?"





“How many more cubes do you think you will need to fill the cup?”

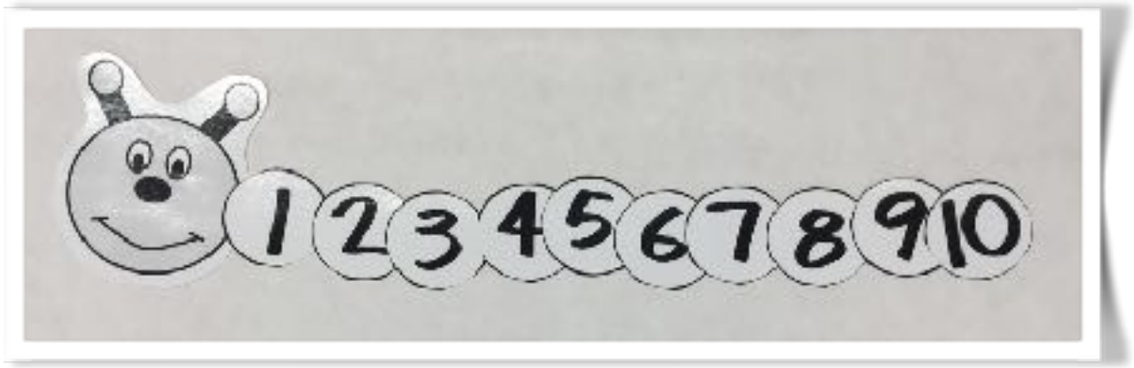
“How many more rolls do you think you will need to fill the cup?”

“How many more dots do you need to make 5 or 10?”

“Can you order your beaded rings? Or cupcake sprinkles?”

"Which is more 11 or 3? How much longer? How do you know?"

NUMBER: Stable Order

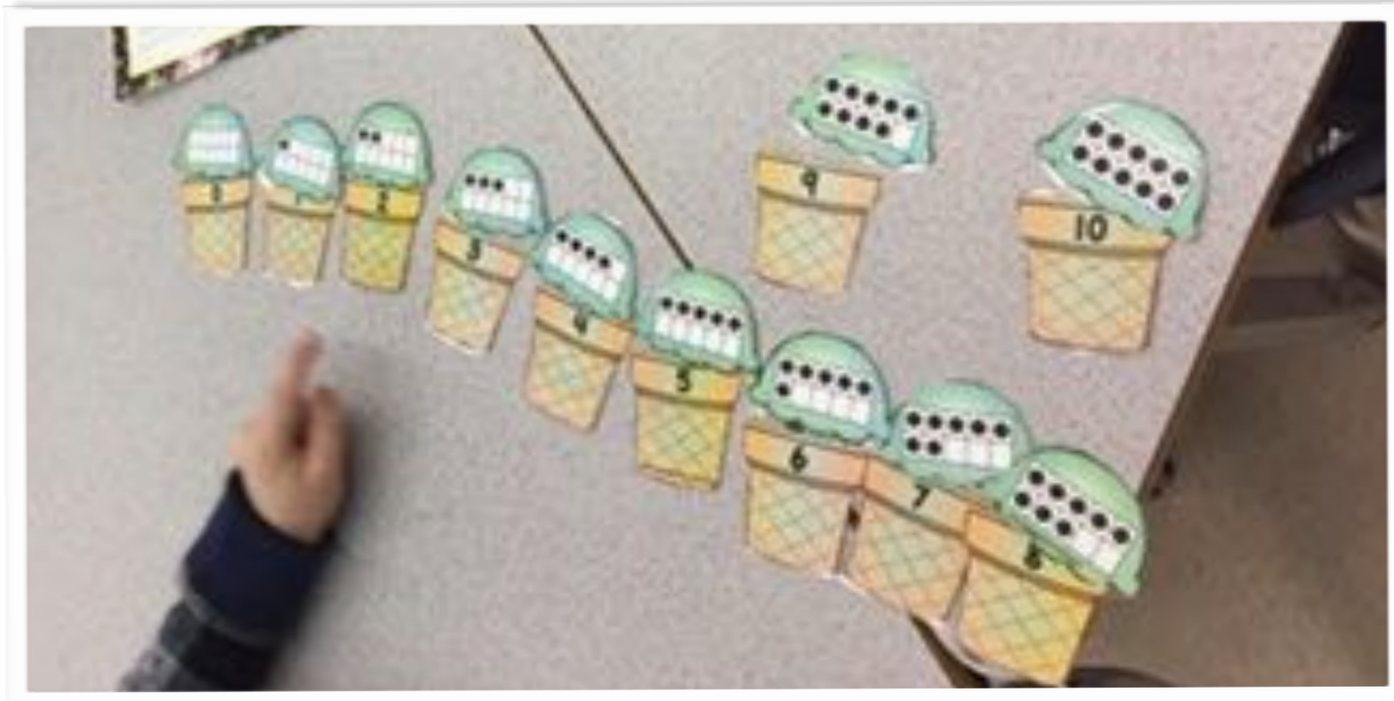


"What numbers comes next?"

"What are the next three numbers?"

From Sandra Ball's website

“What did you roll?”
“Can you find that number?”
“What number comes next?”
“And next?”

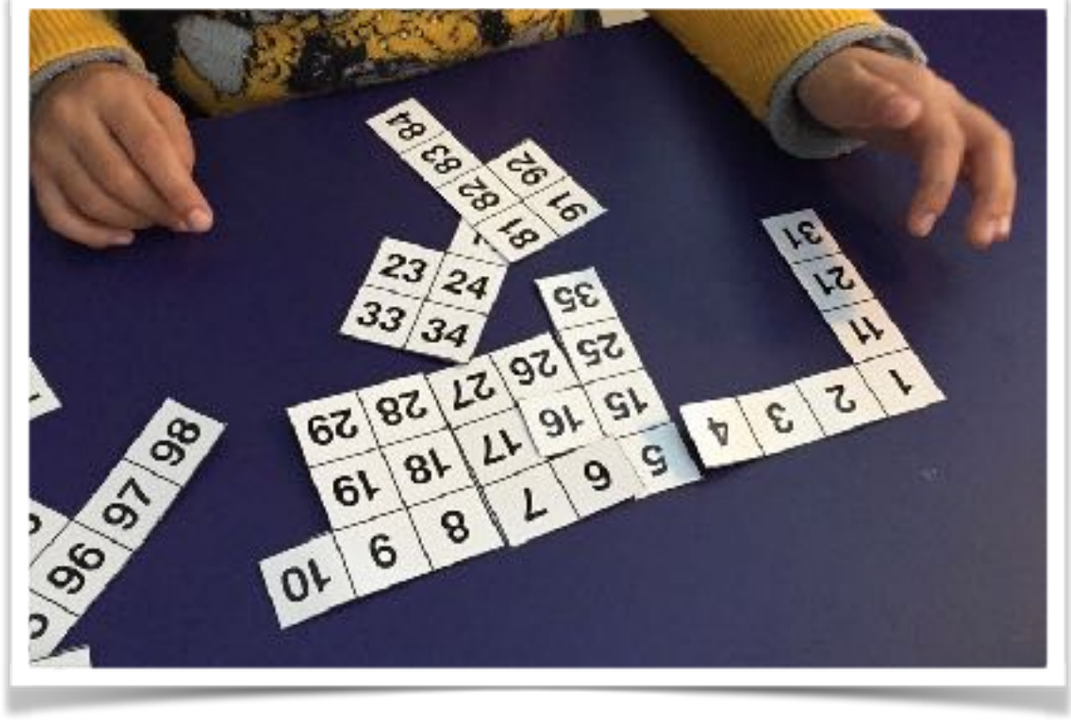


“How can you order these quantities?”

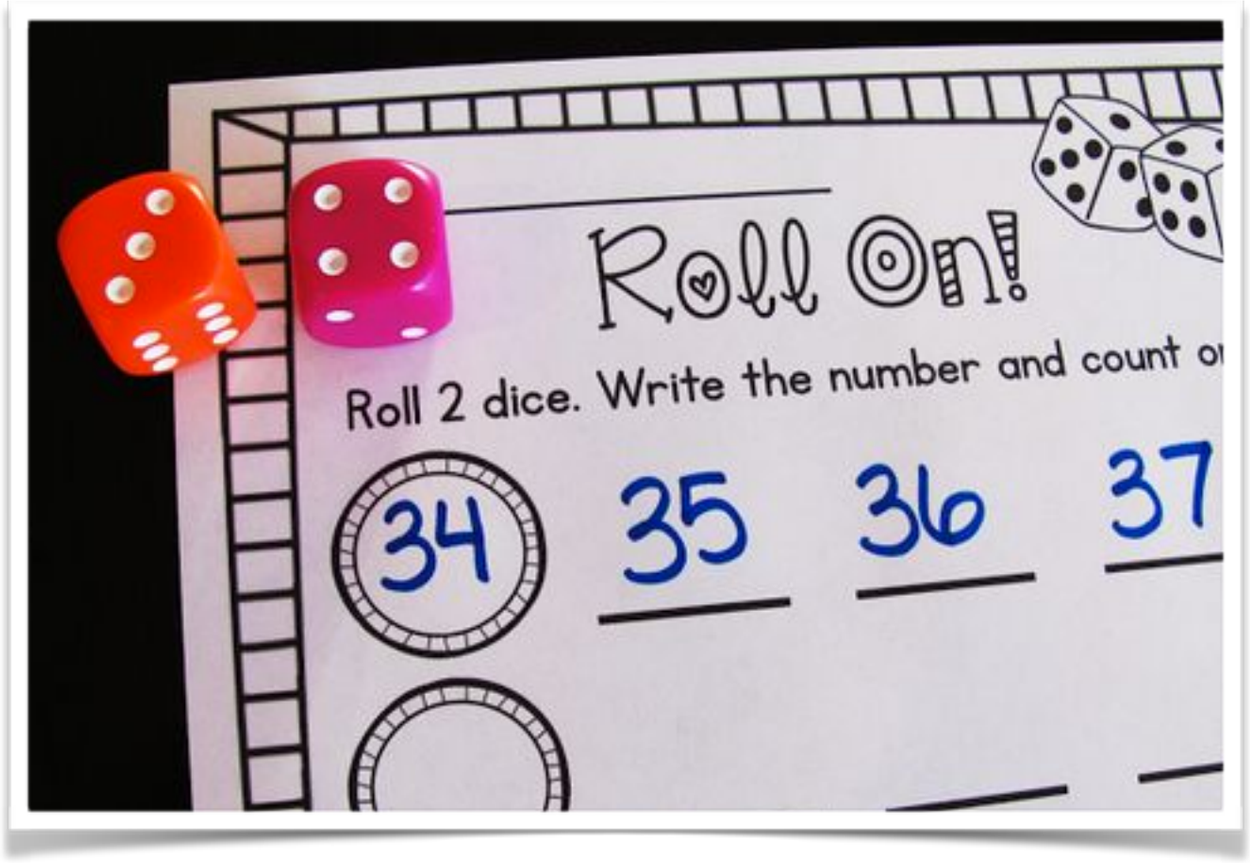
“What is the smallest number? The biggest? Where should those go? What number comes before this one? After? Do you notice any patterns?

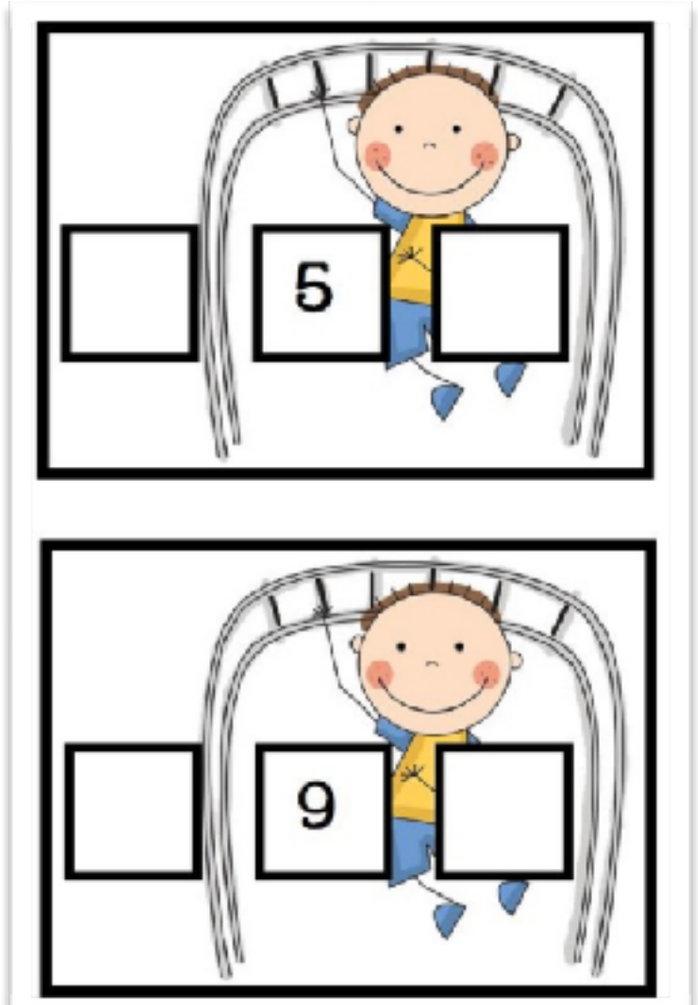
Working in a small group

Independently



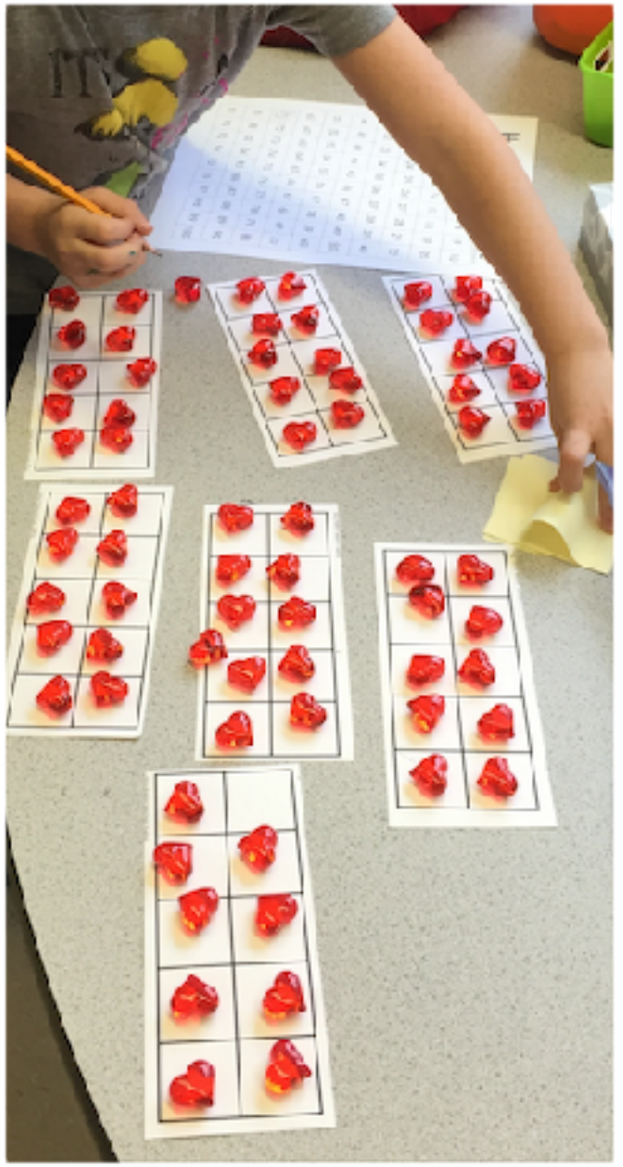
“Why did you start with those numbers?”
“Are there any patterns that you use to help you decide where the numbers go?”





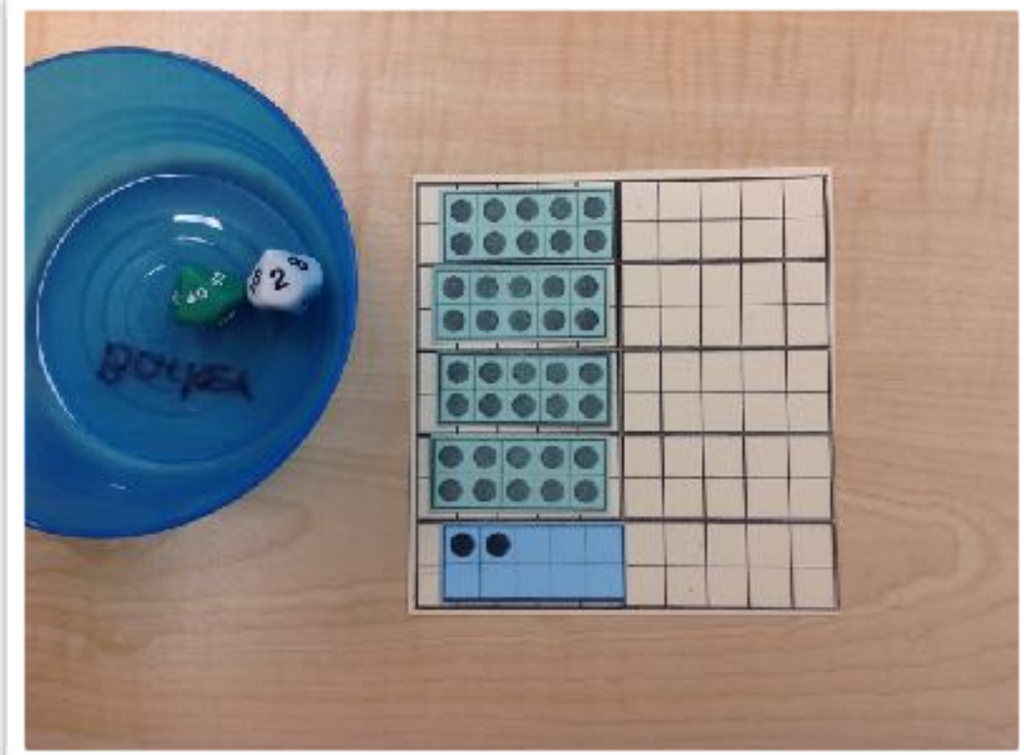
"What number comes before?"
"What number comes after?"
"What are the next two numbers?

NUMBER: Skip Counting



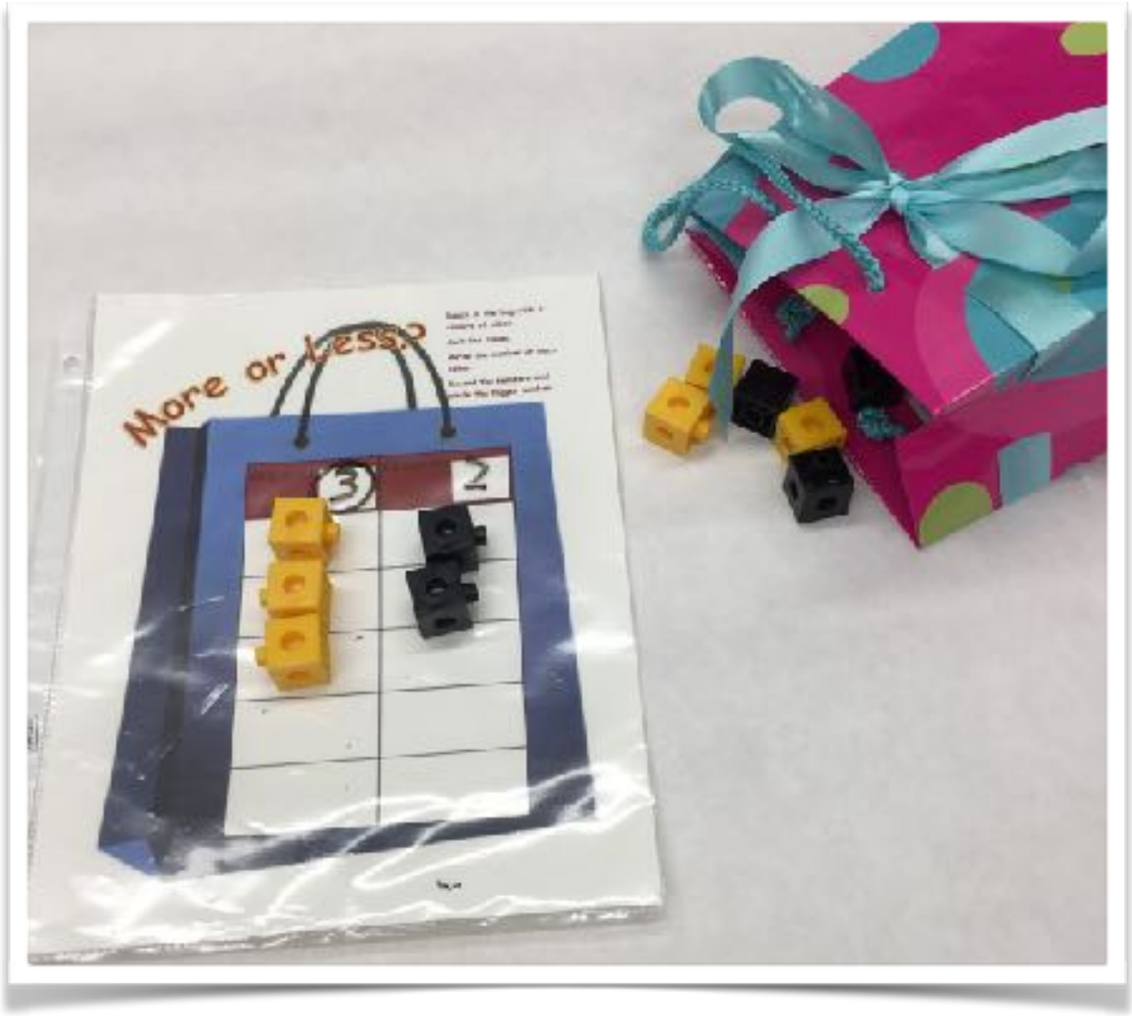
"How did you count?"
"If you count these items a different way,
how many will you have?"

NUMBER RELATIONSHIPS: Changing One Number to Another

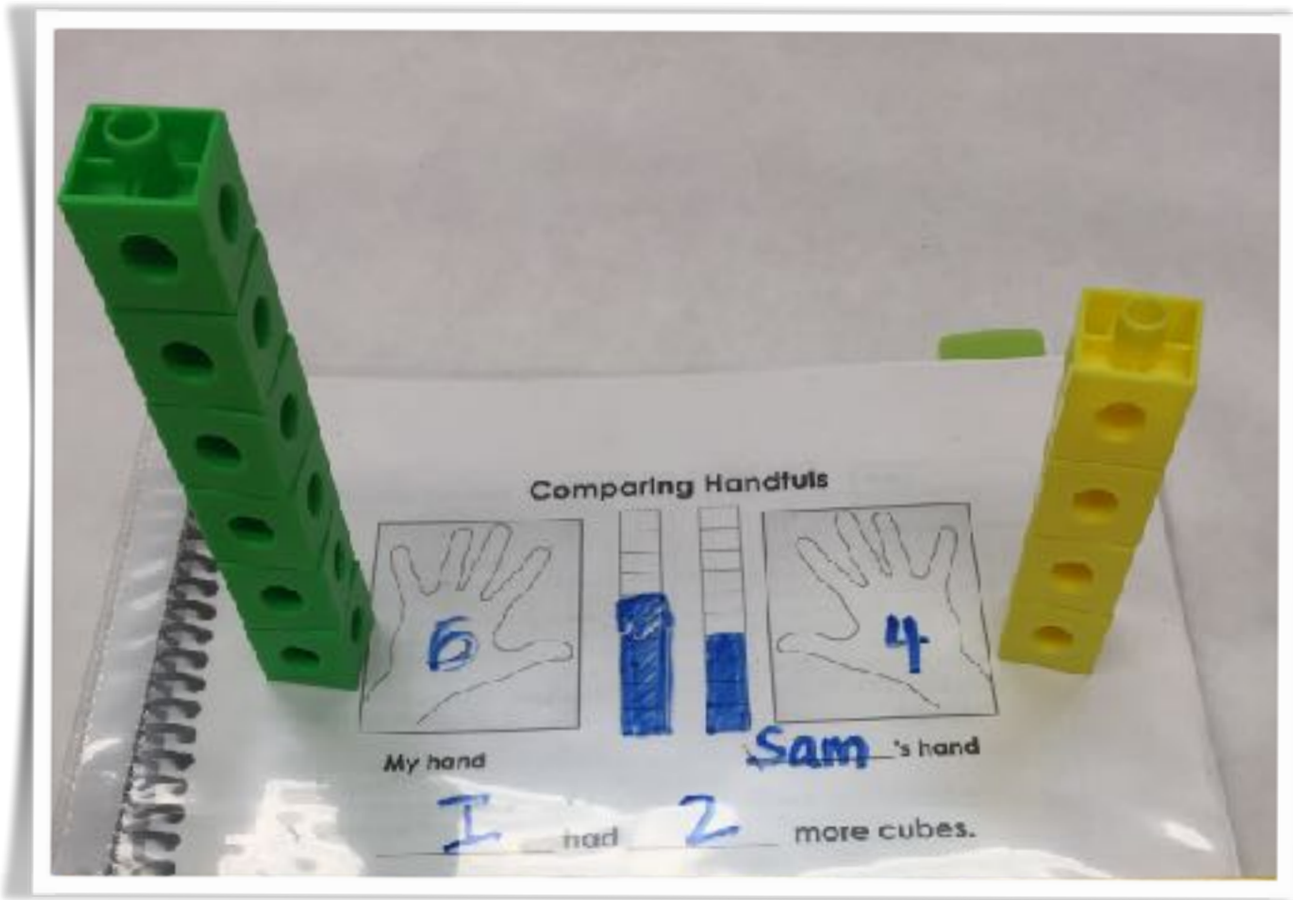


"We had 5 and now we rolled 10. Are we going to shrink or grow?" "How do you know?" "Do you need to clear off your ten frame?"

NUMBER RELATIONSHIPS: More/Less

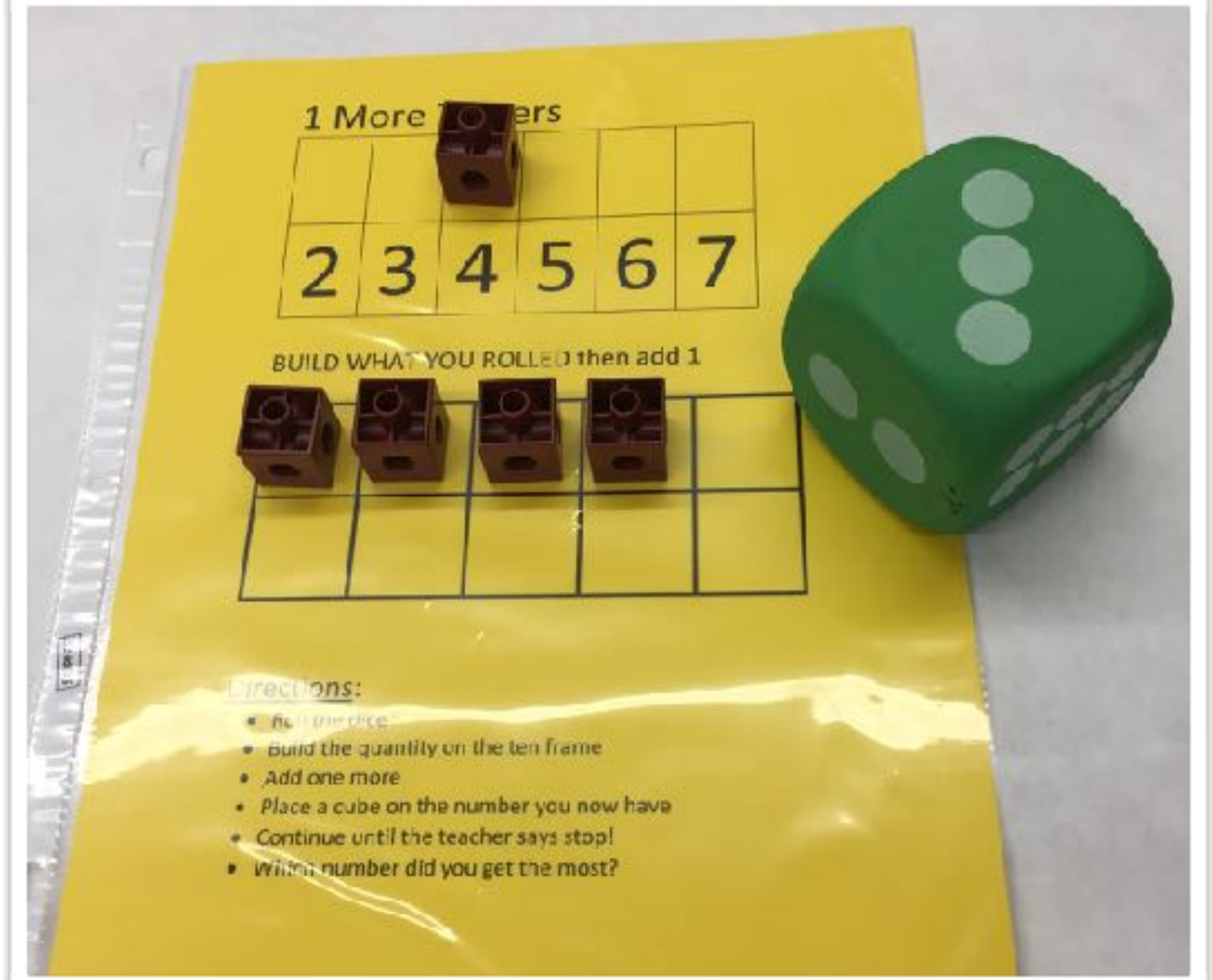


Sandra Ball's website
www.startingwiththebeginning



Carole Fullerton's Number Sense K/1

"How many more green do you have?"



“What did you roll?”

“Can you build it?”

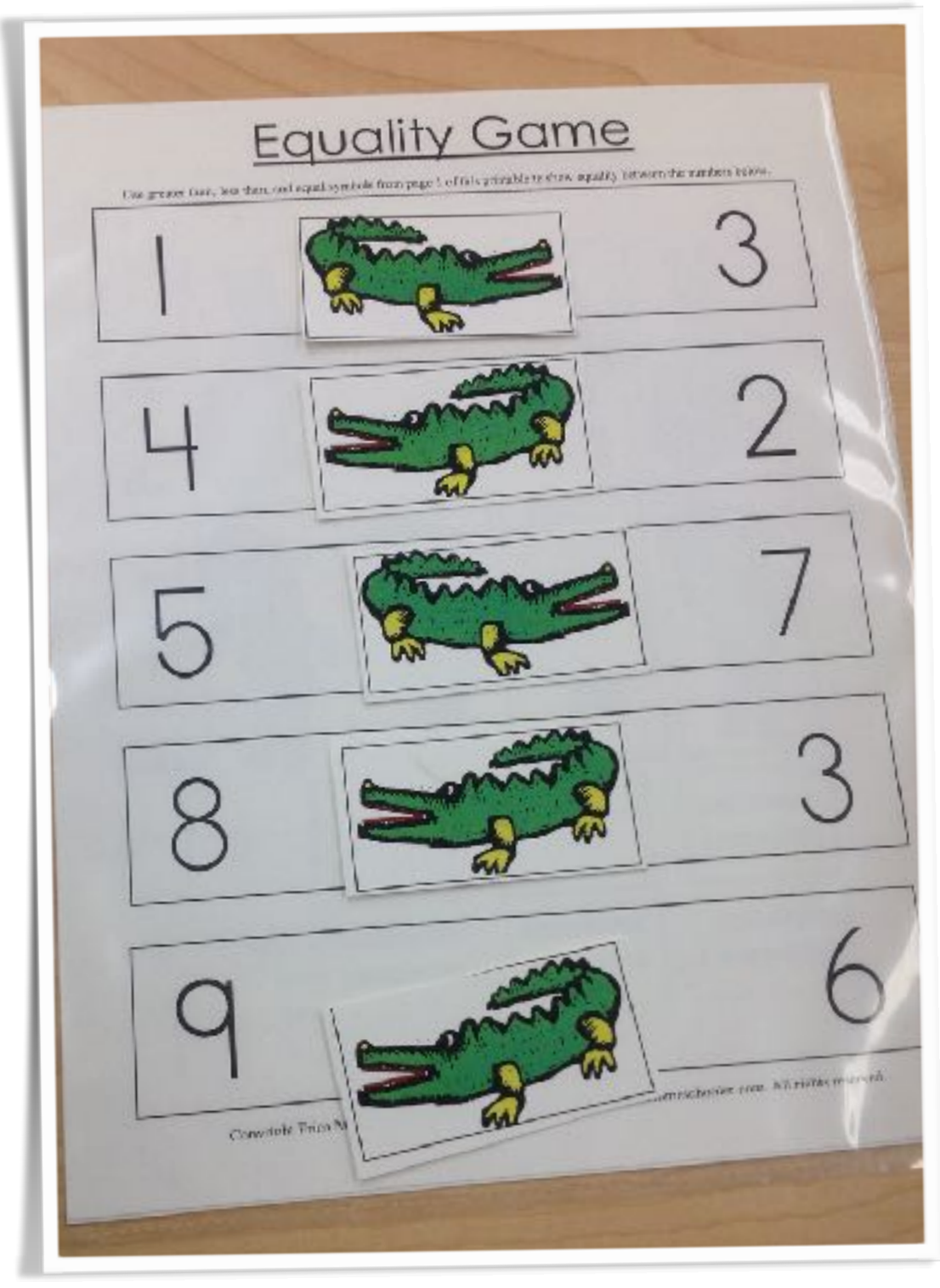
“What would be one more?”

“Can you show me?”

"What did you roll?"
"Can you show me what would be 2 more or 2 less?"

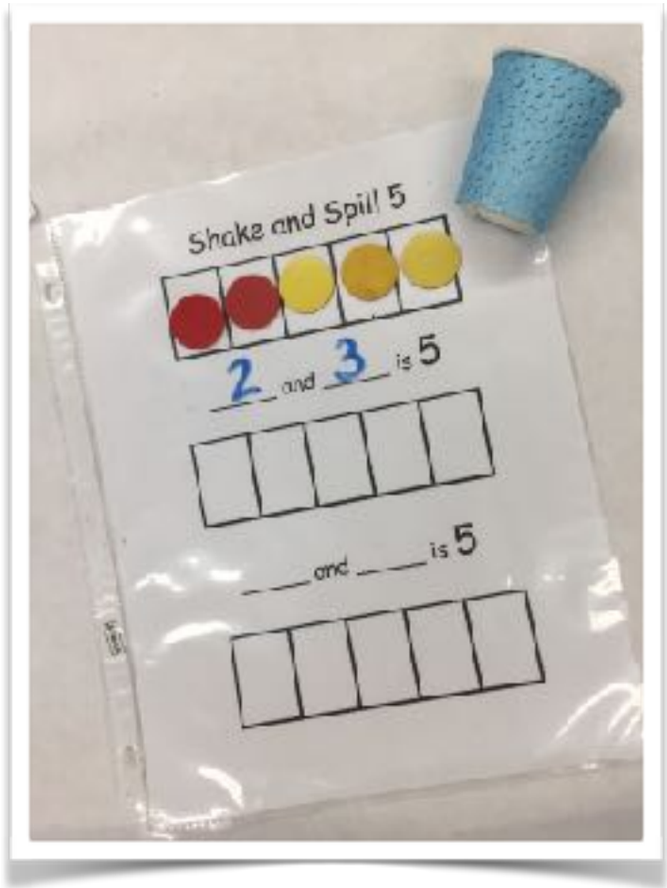
"Do you have a strategy for winning "Four in a Row"?

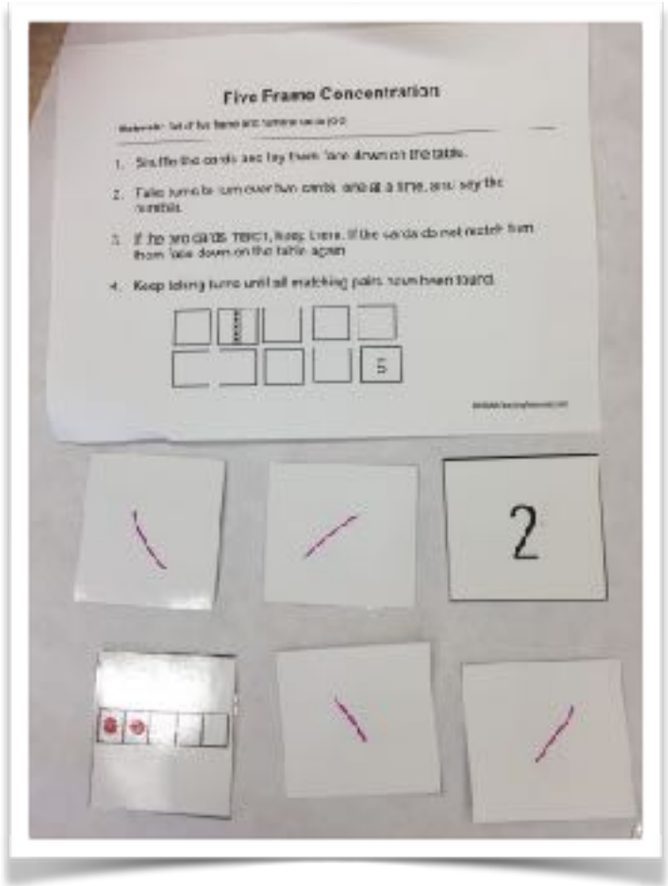
Many of these are from Sandra Ball's website www.startingwiththebeginning

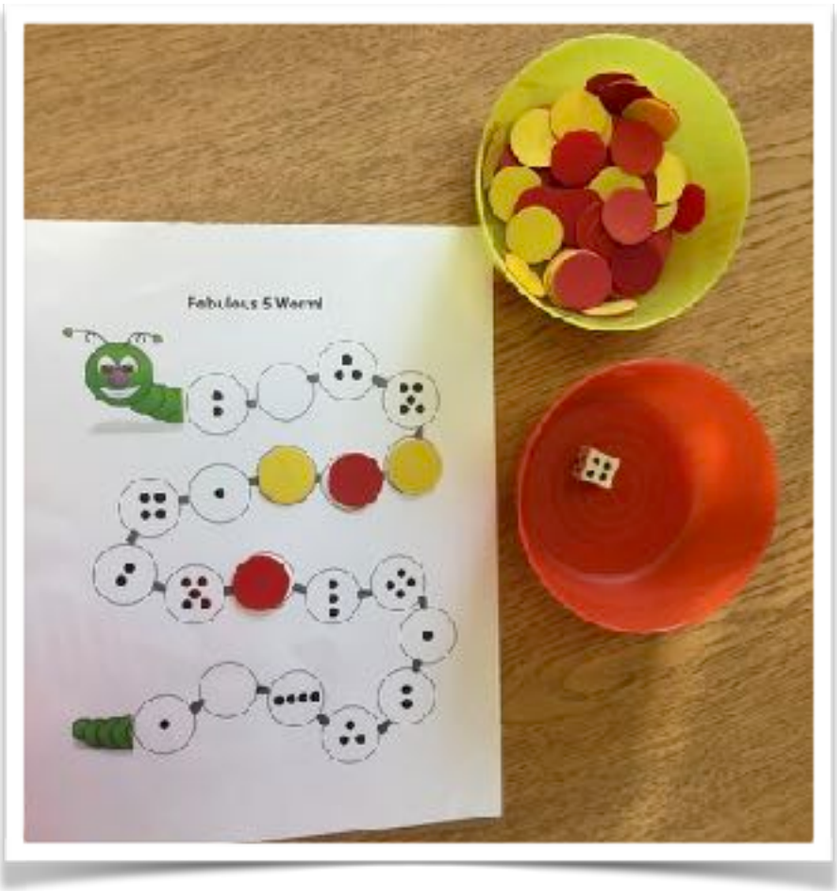


“How many more is 9 than 6?”

NUMBER: Decomposing Five-Ness

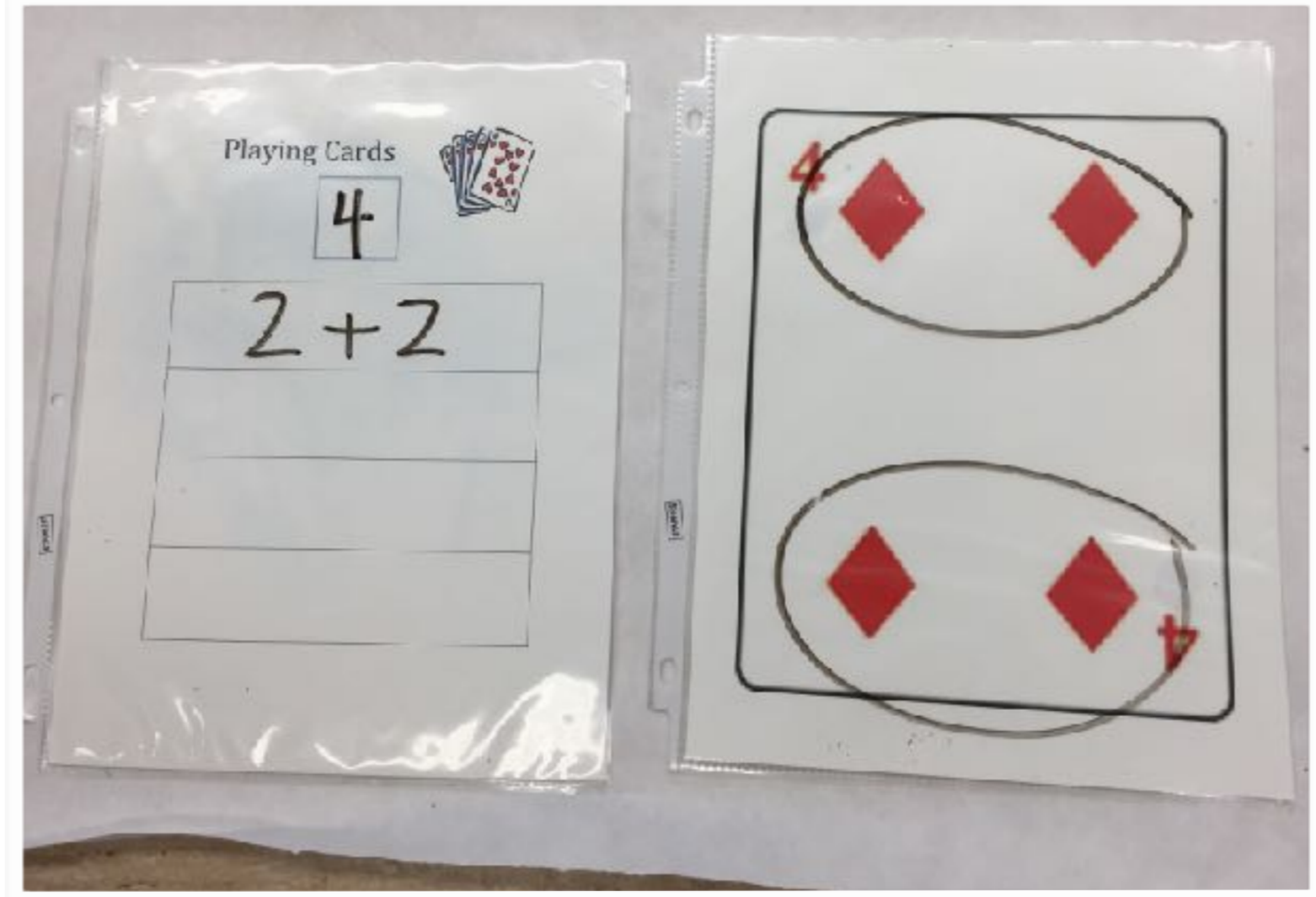






"What are the partners for 5?"

From Carole Fullerton - on Sandra Ball's website



Idea adapted from Chris Confer's Teaching Number Sense K

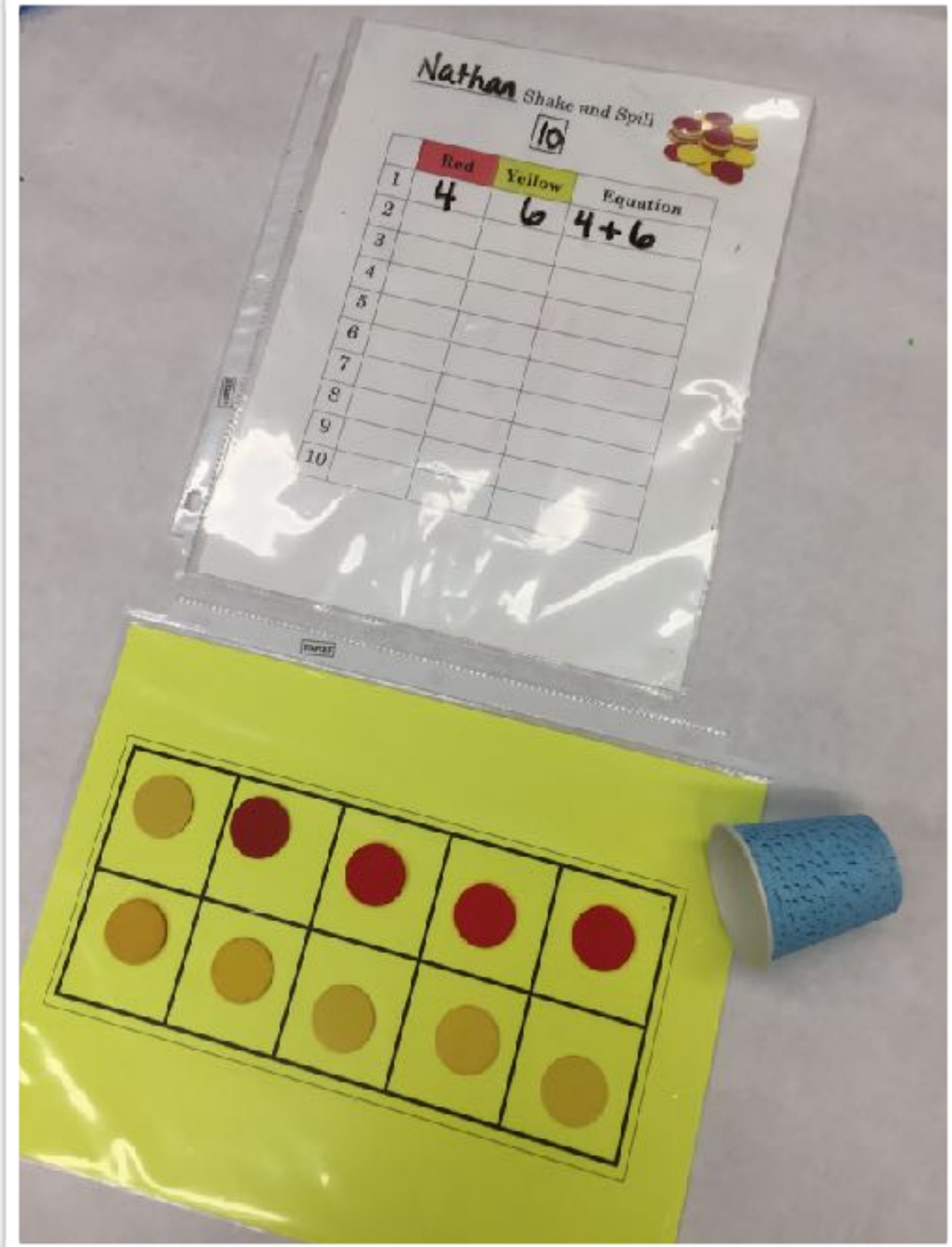
"How many do you see?"

"How do you see them?"

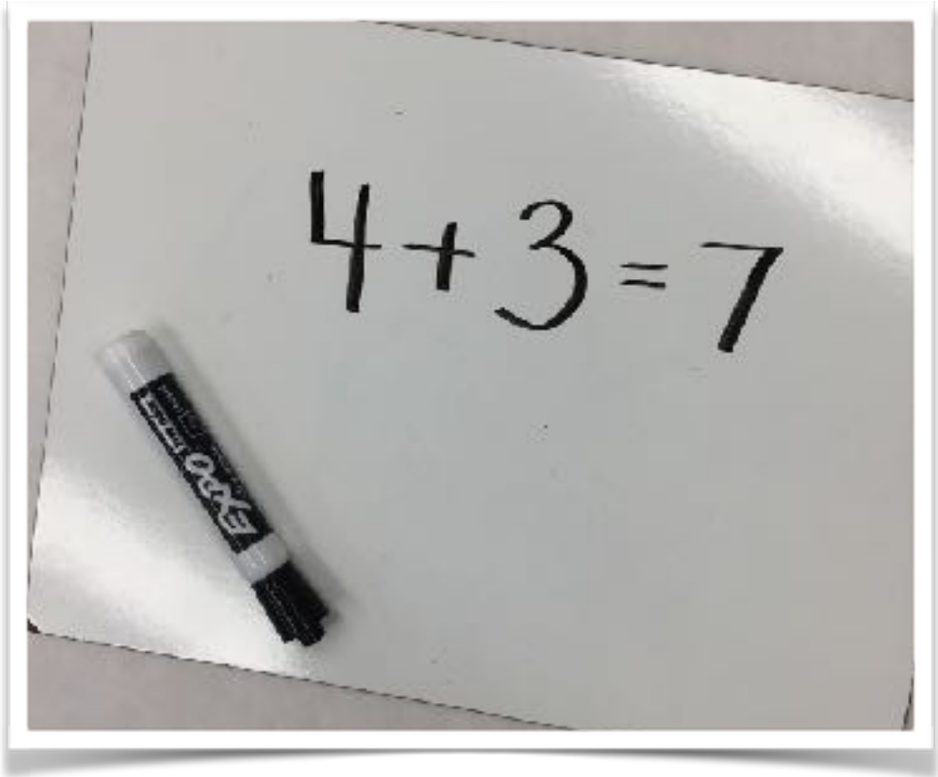
"Can you write an equation/number sentence for this?"

"Do you see it a different way?"

“How many ways do you think you can make _____?”

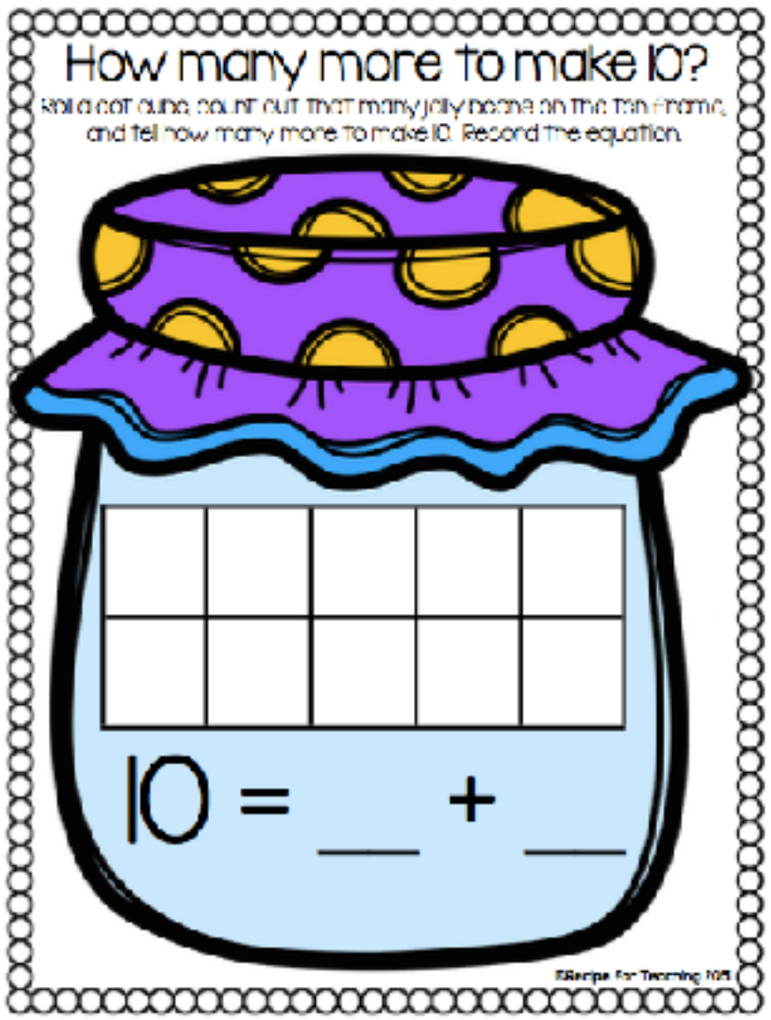


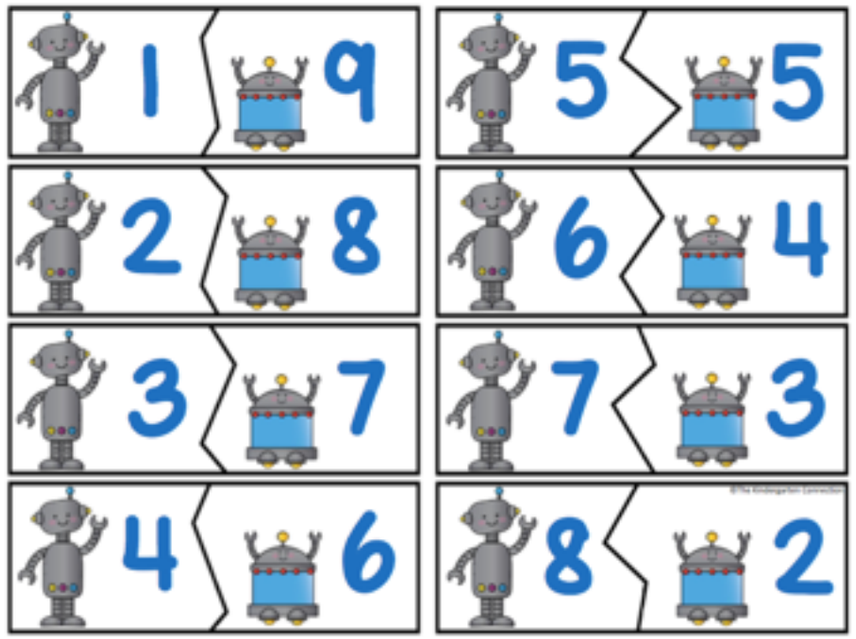
"How many red?"
"How many yellow"
"How many altogether?"
"Can you record this as an equation/number sentence?"
"How many more yellow do you have than red?"
"How do you know?"

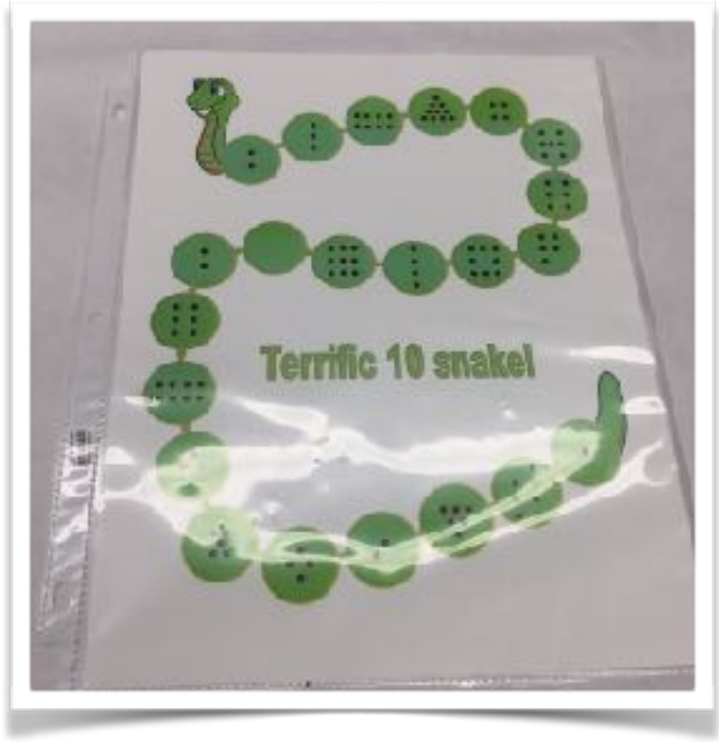


“What did you roll?” and “Can you build it?”
“How many do you have now?”
“Can you record this as an equation/number sentence?”

NUMBER:
Decomposing Ten-ness



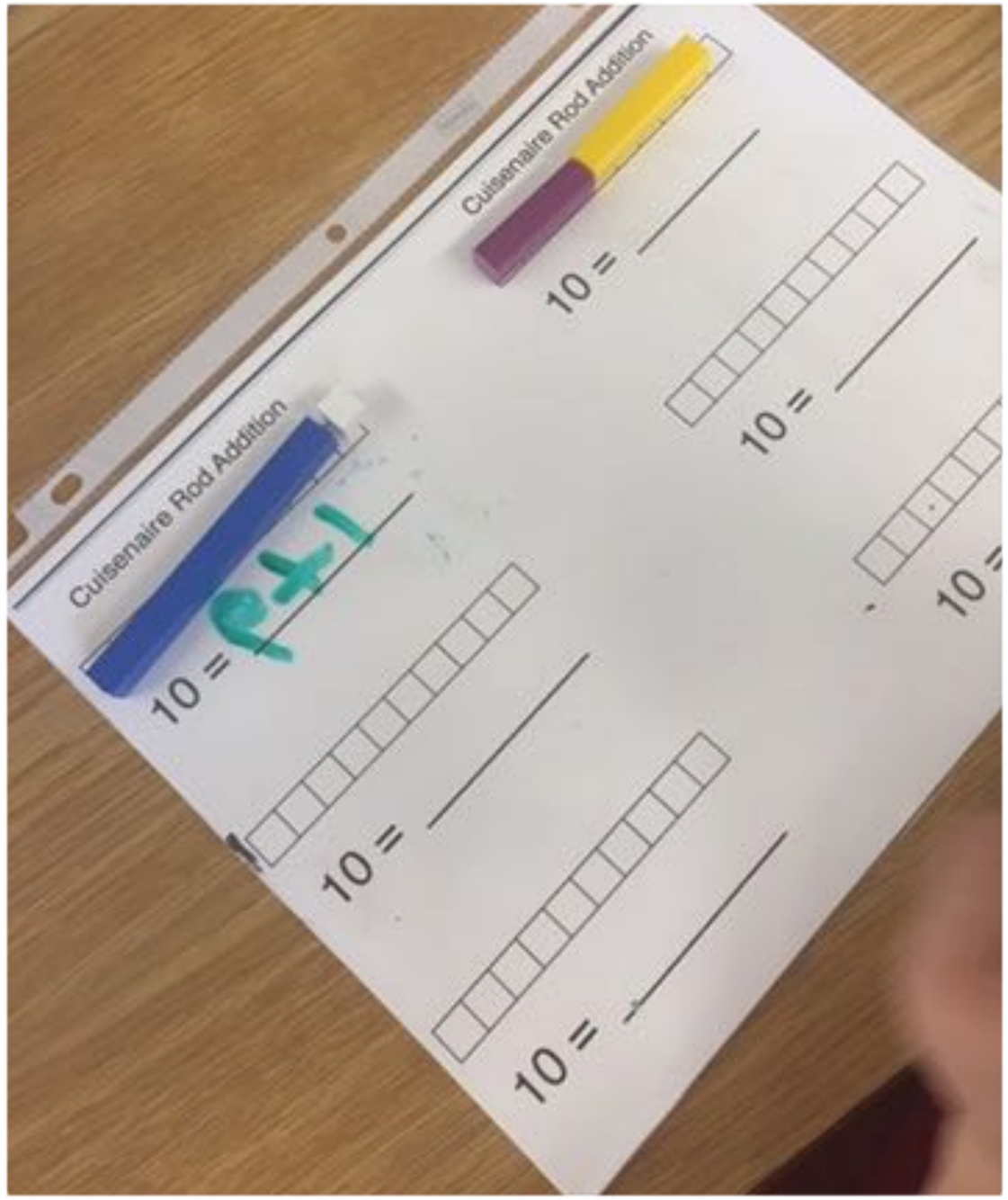




Carole Fullerton's idea

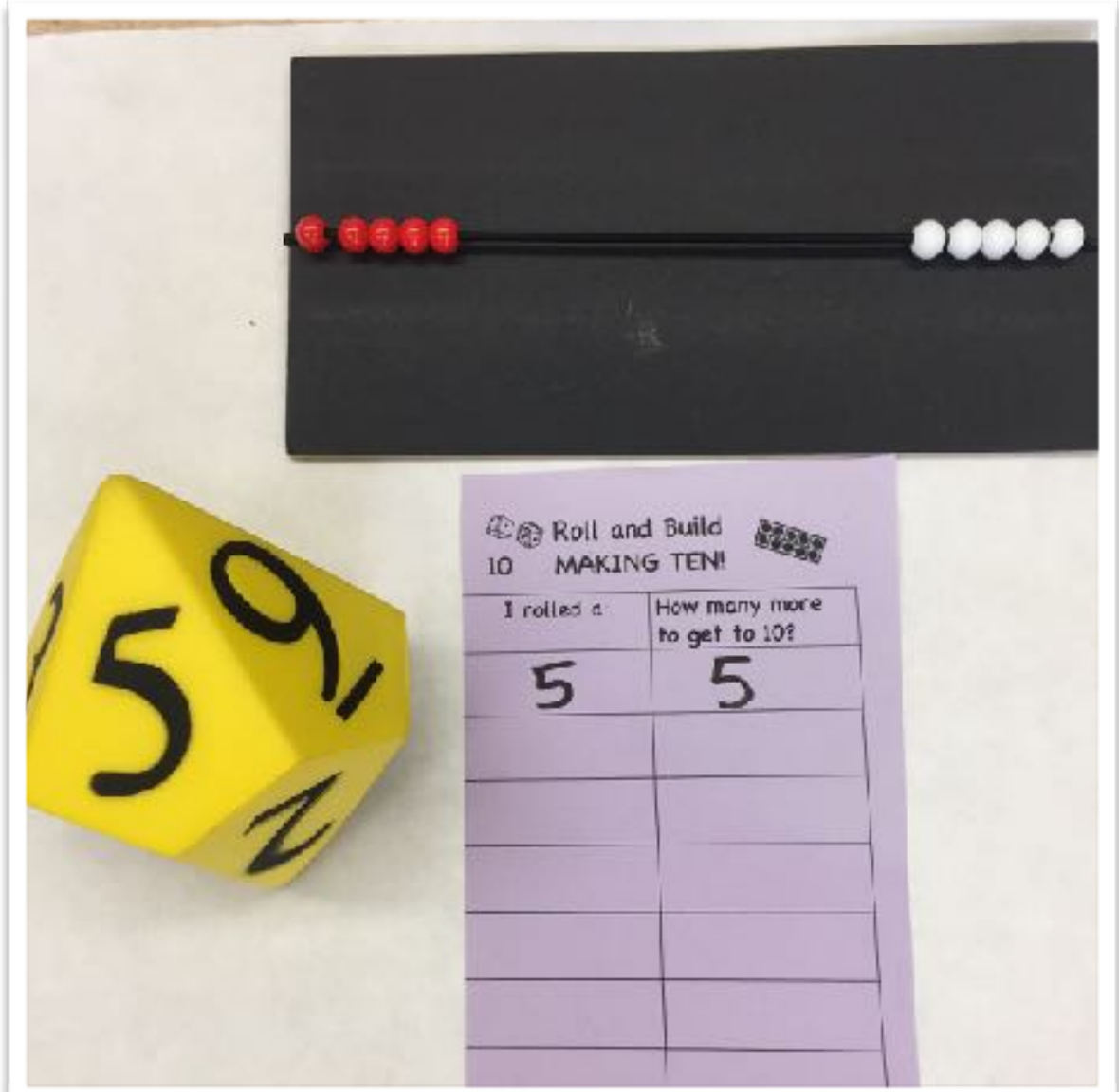
"What are the partners for 10?"

“Can you find all the partners for ten?”
“When you look at this card, how many more do you need to have 10?”

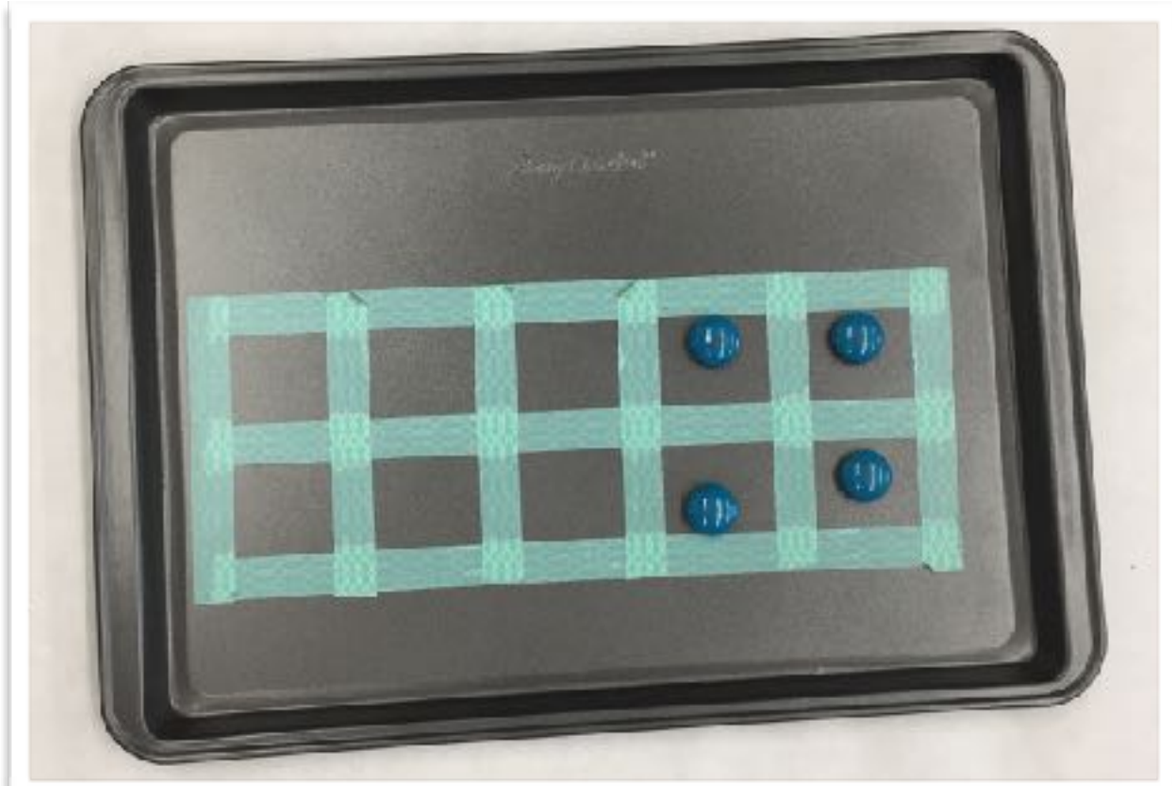


“Can you make 10 another way?”
“How many ways do think there are to make 10?”

Carole Fullerton’s Cuisenaire Rods

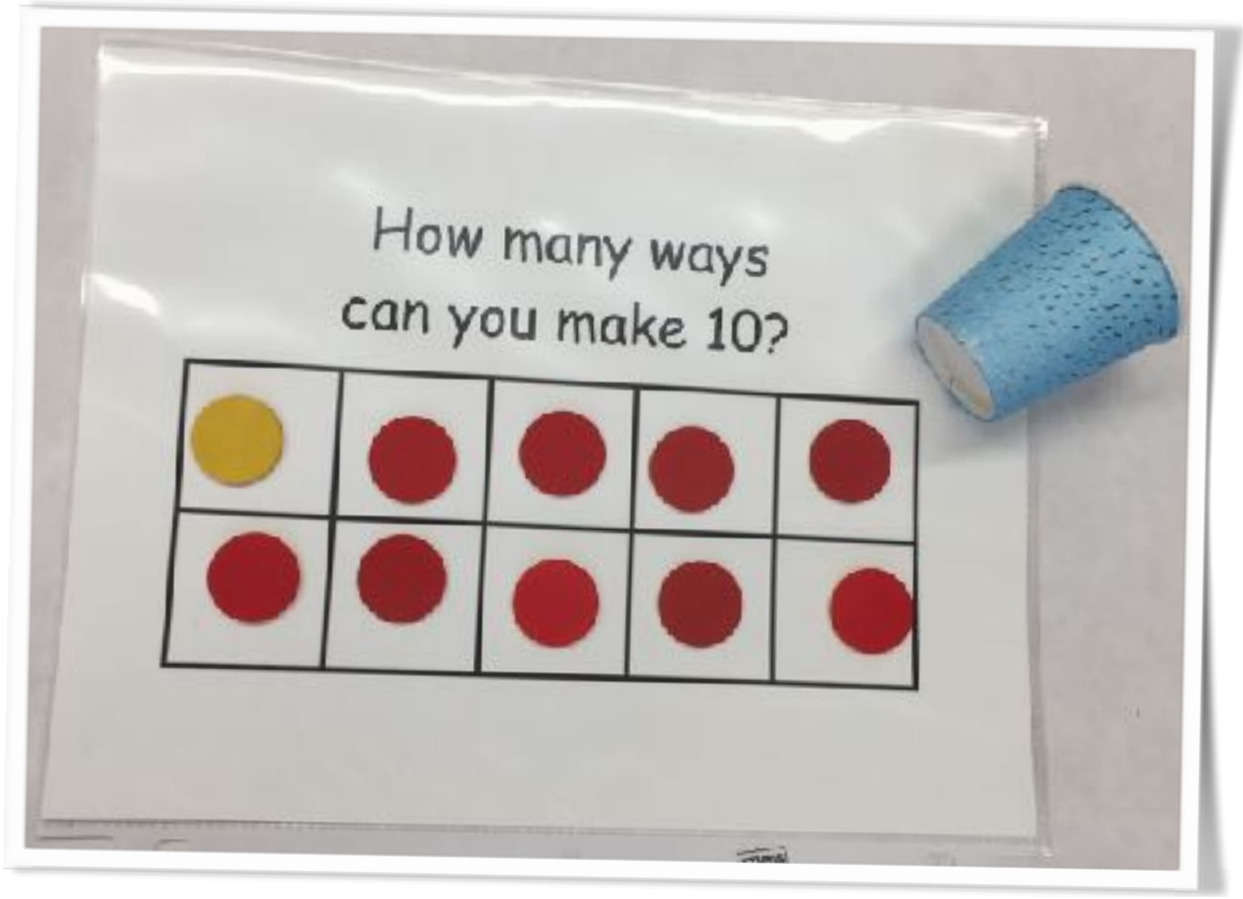


Note: Rekenreks come with 2 strands of 10 beads. To focus on 10, take one strand off.



“What did you roll?”
“Can you show it on the rekenrek?”
“How many more do you need to have 10?’

We began with 10 magnets!
“How many do you see?”
“How many are hiding?”



You could also use wooden ten frames, so the students could build all the different ways and look and compare them.

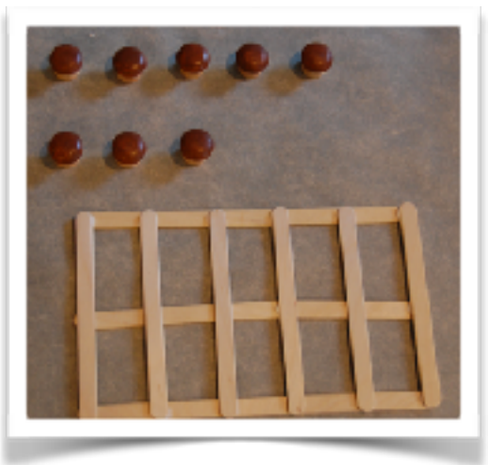
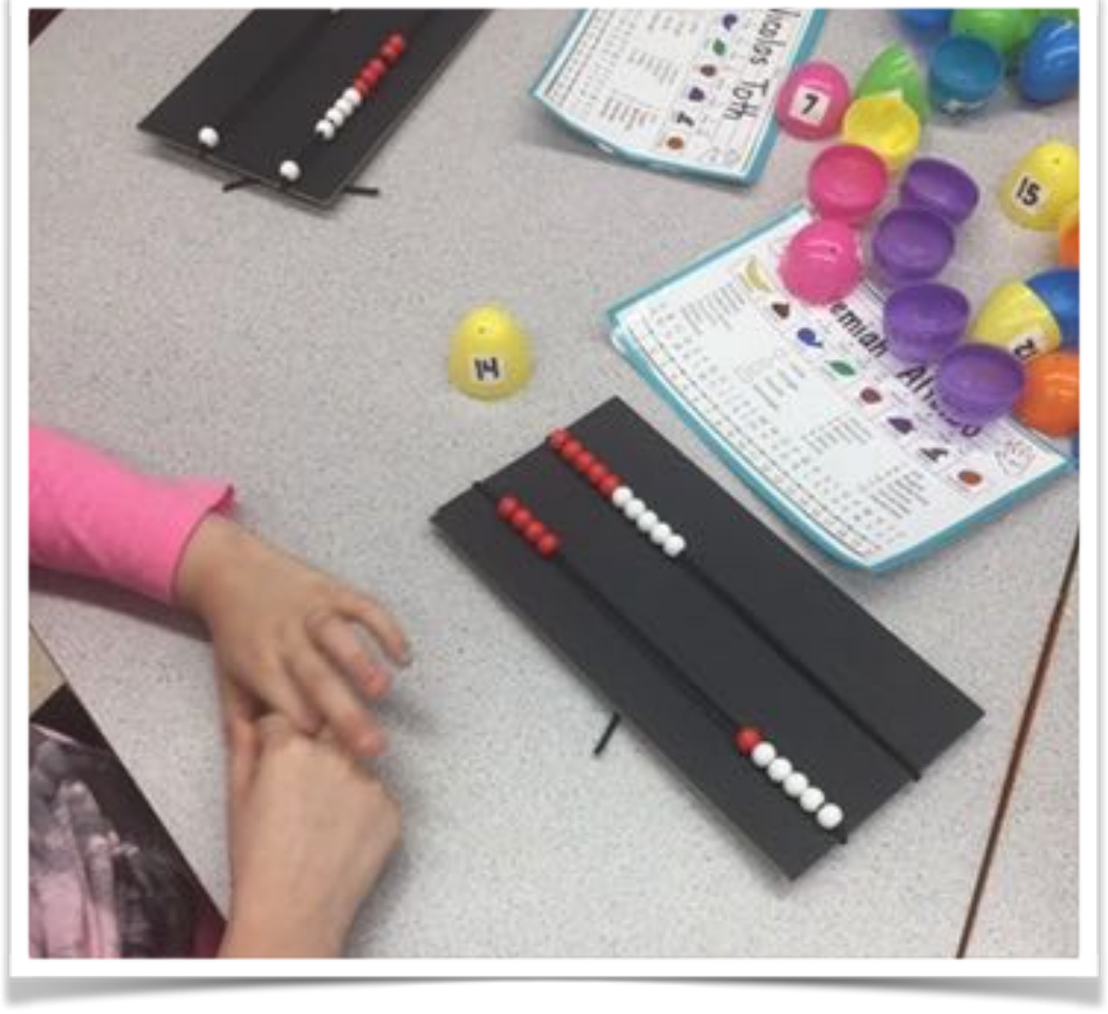


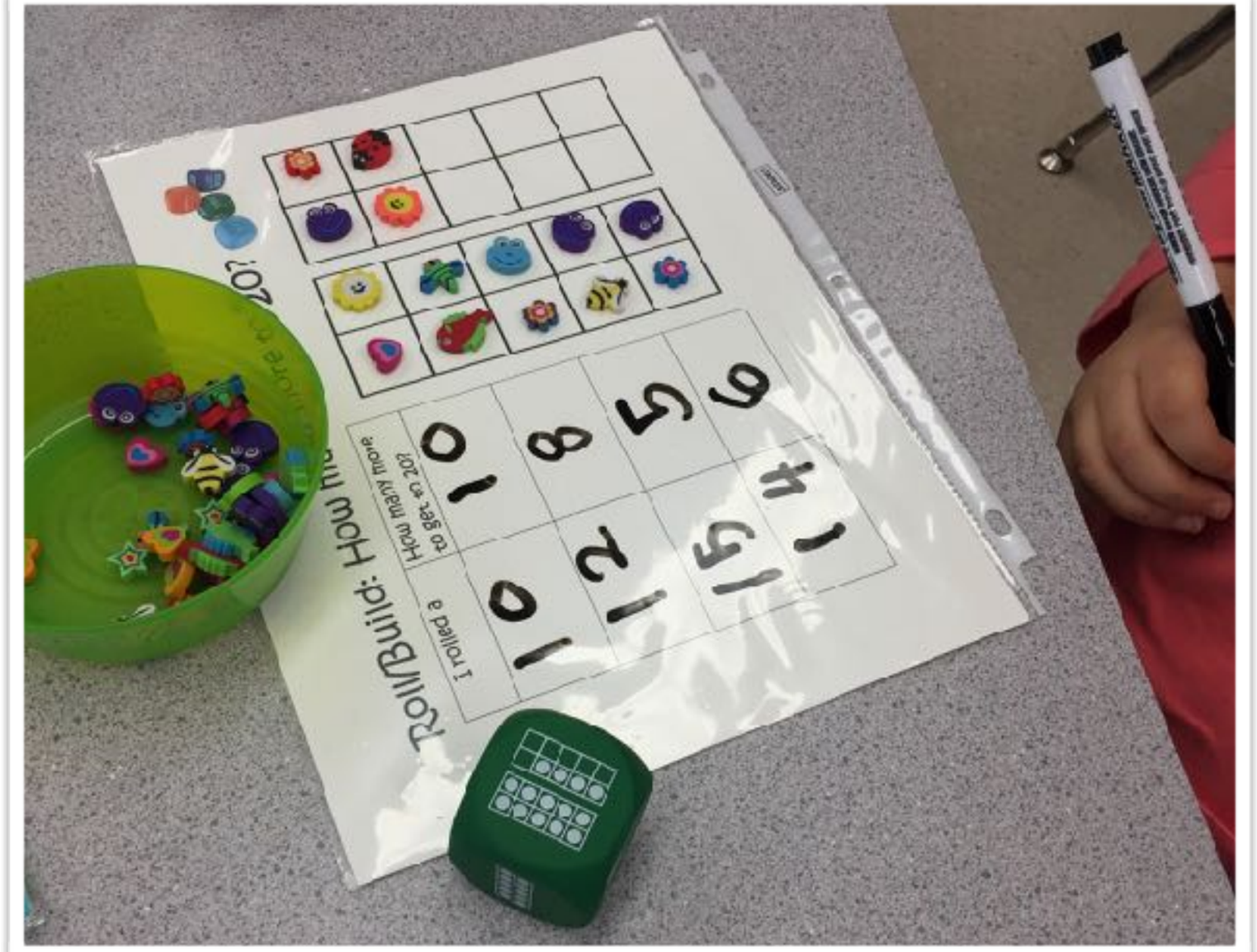
Image from
Janice Novakowski

“What did you roll?”
“Can you build it?”
“How many more to have 10?”
“How might you record this?”

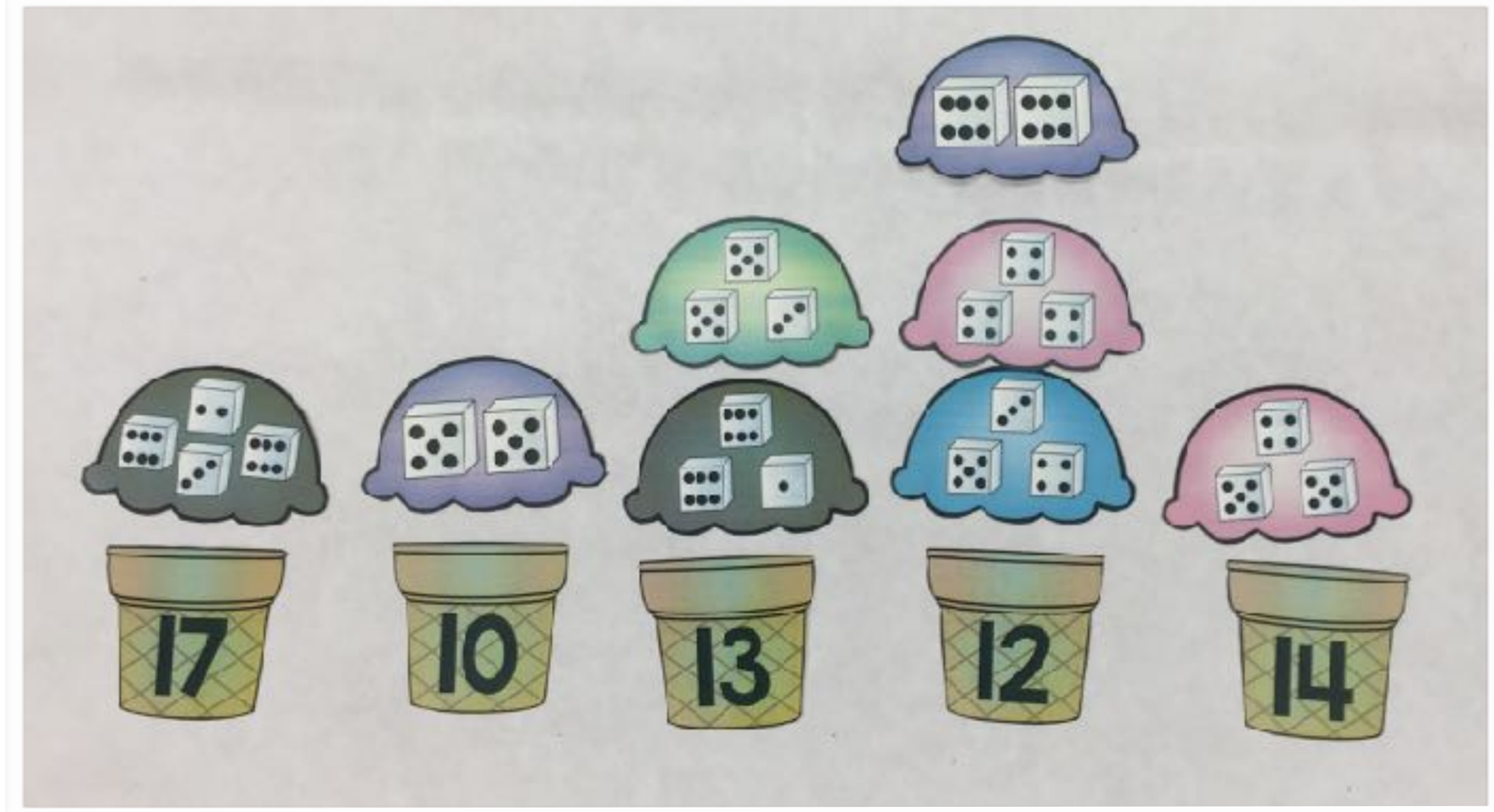
Numbers to 20



“How can you show the numbers?”
“How does seeing the beads in groups of 5 and 10 help you to make a number?”

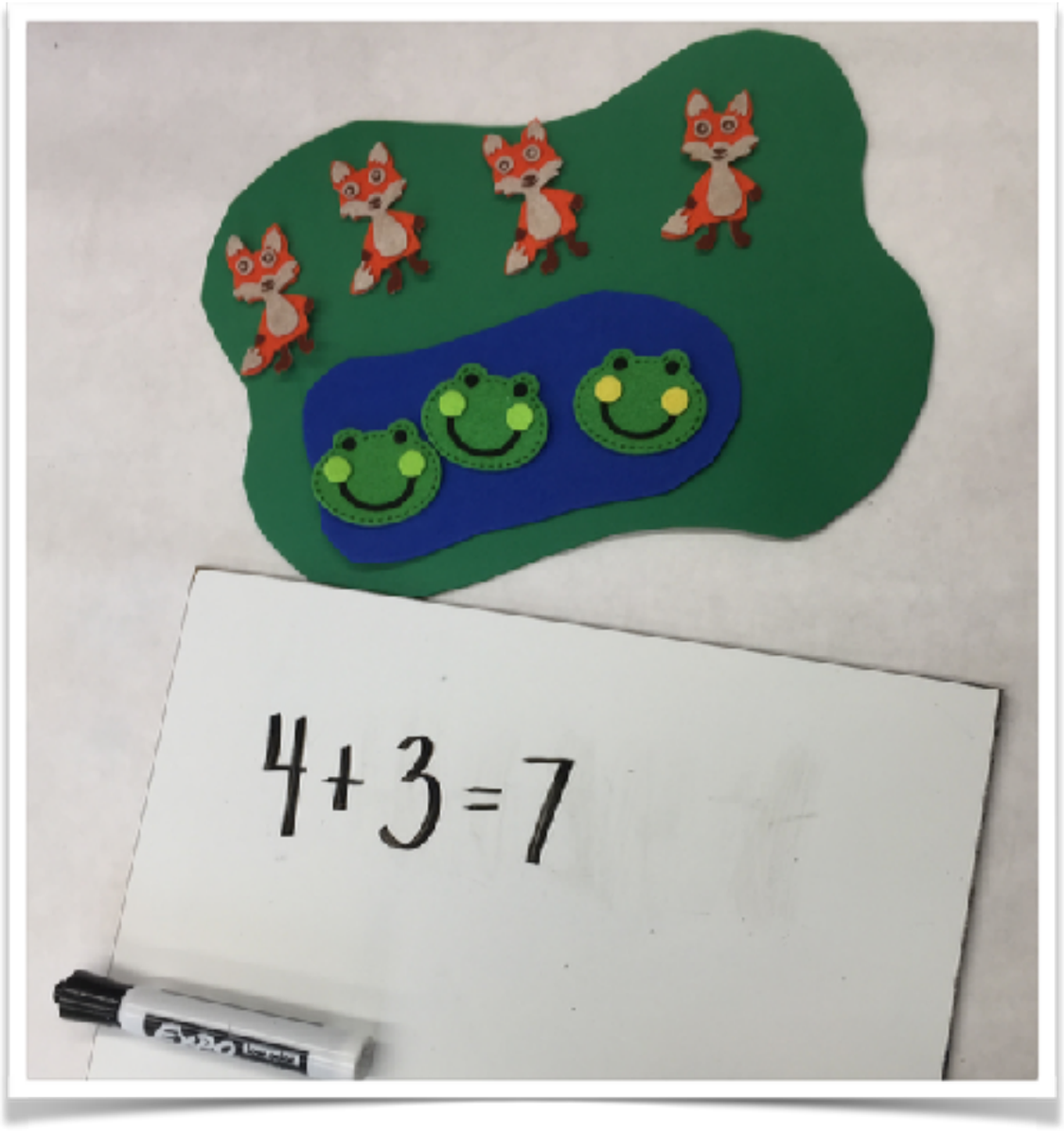


“What did you roll?”
“Can you build it?”
“How many more do you need to make 20?”

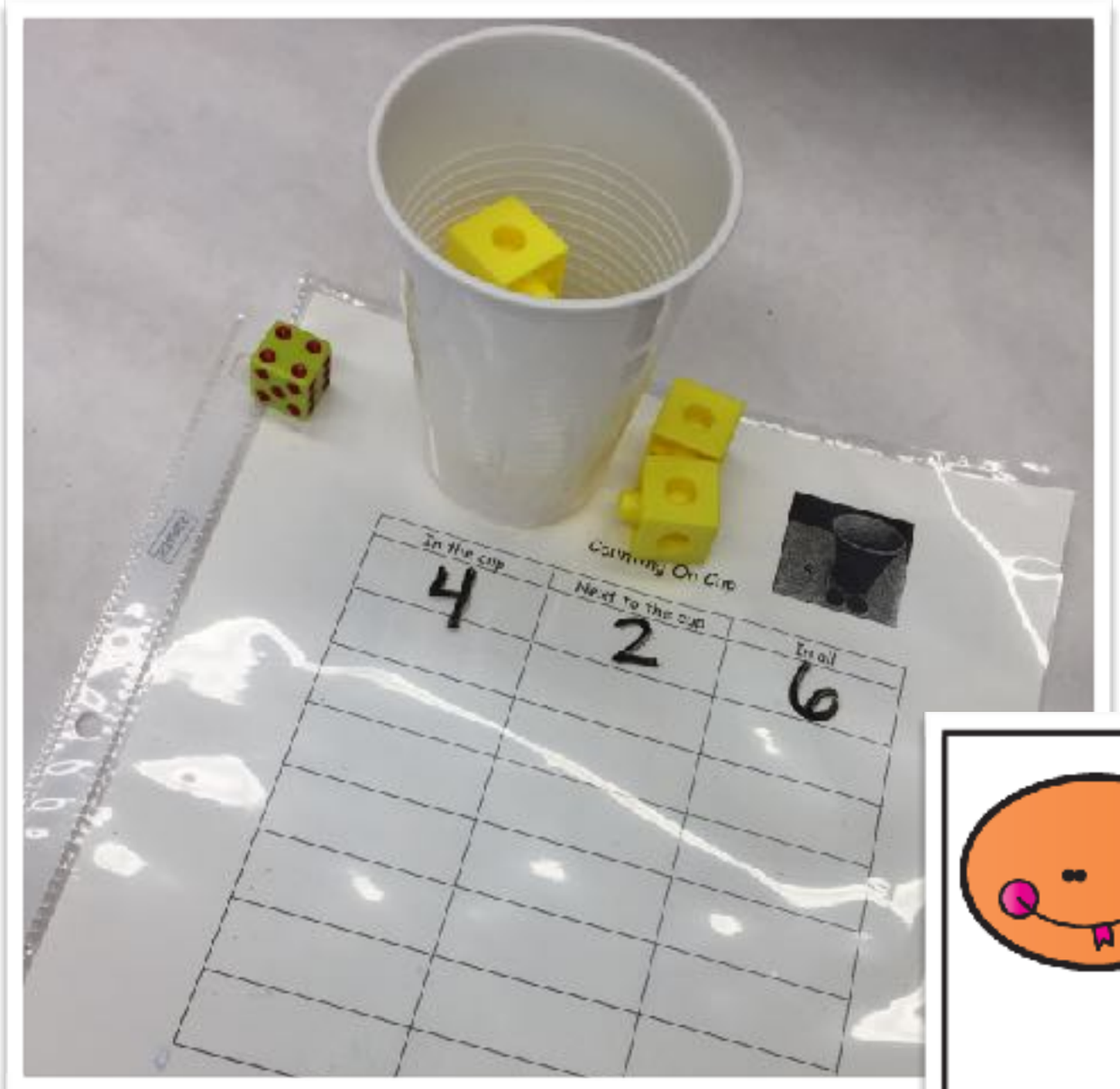


“Can you think of another way to make 13?”
“Can you record other ways to make these numbers on your white board?”

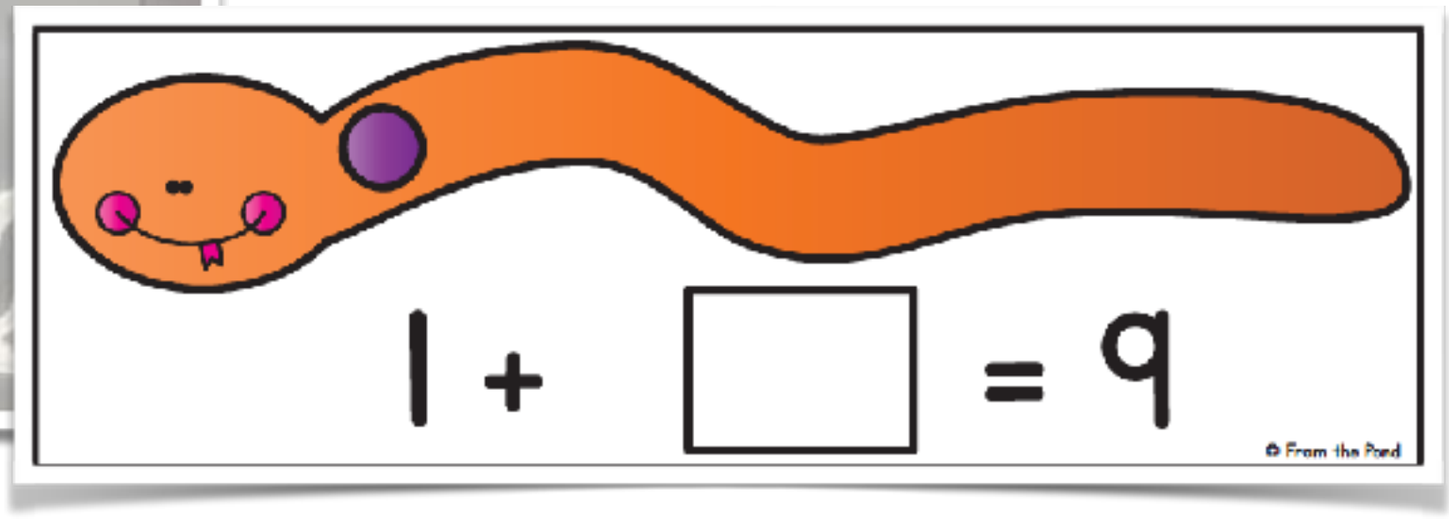
NUMBER: Decomposing (Concept of Addition)



“Can you use the materials to make a ‘joining’ story?”
“How could you record this using numbers and symbols?”
“Is there another way to tell this story?”

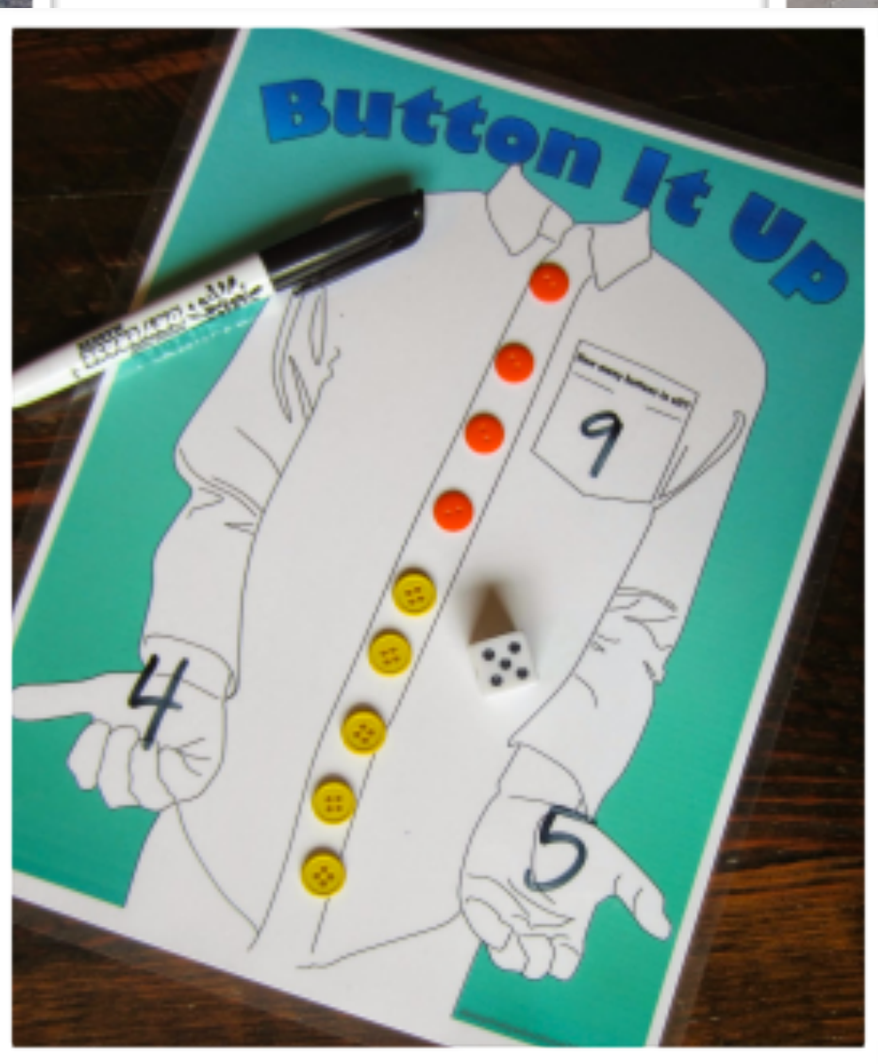


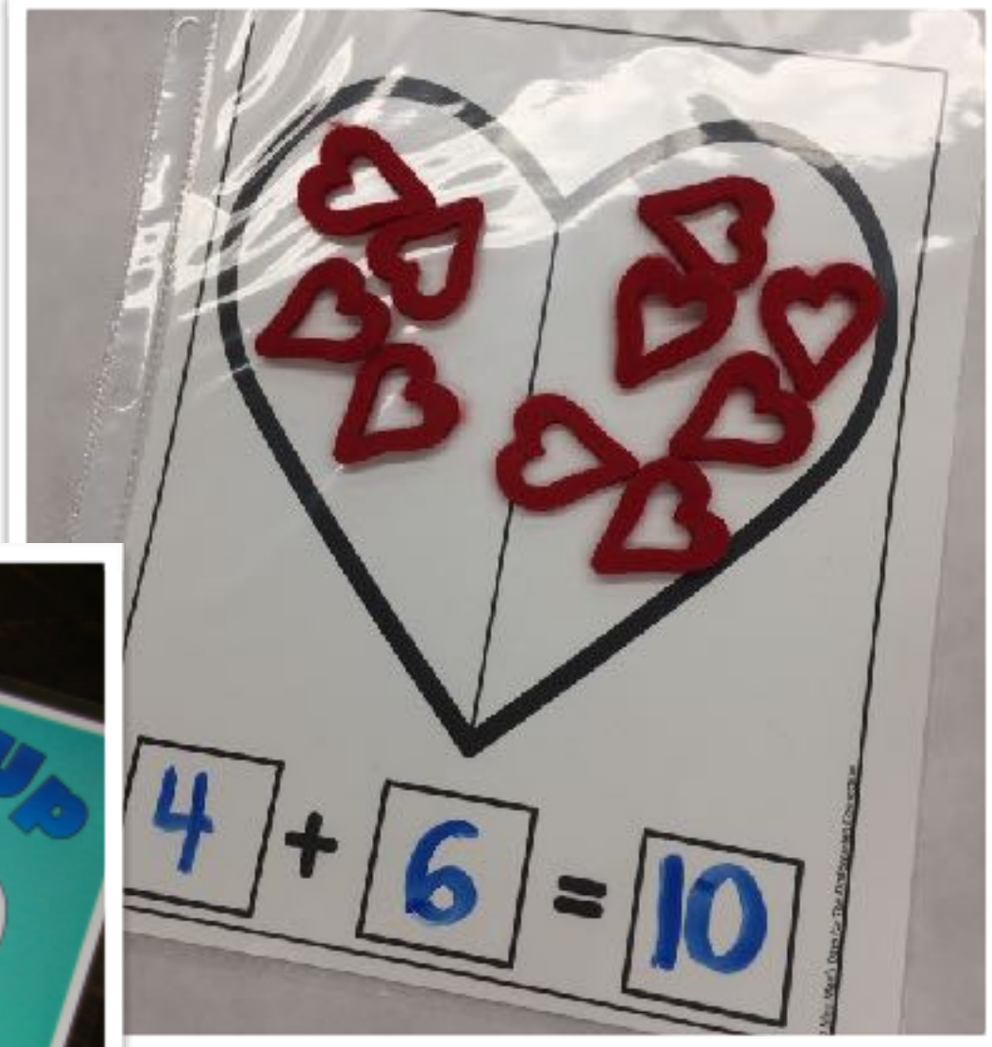
"What strategy could you use other than counting all the cubes to find out how many?"



"Is it easier to count on from the smaller or bigger addend? Explain your thinking?"

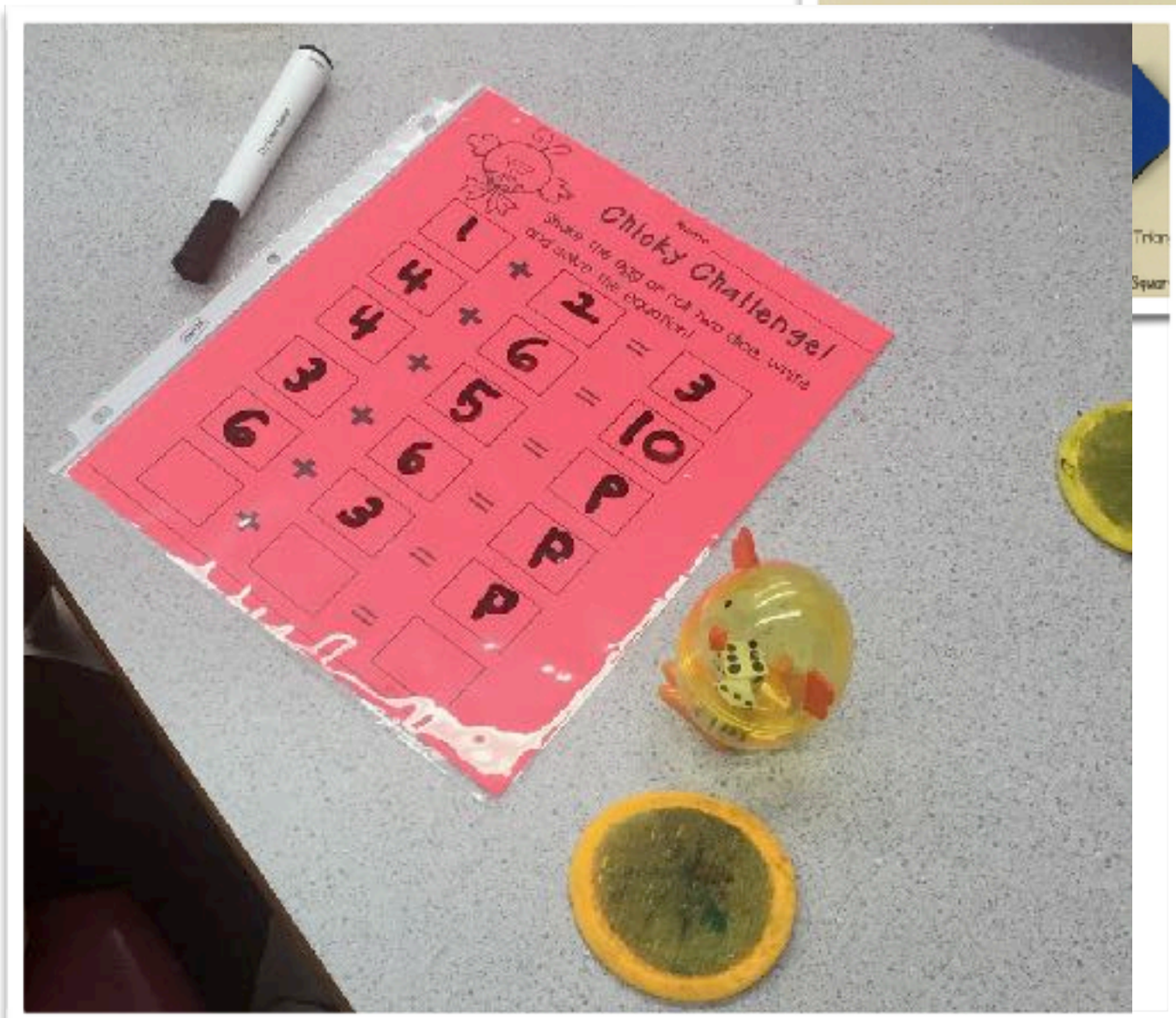
"Do you need to count all the buttons/ cubes?"

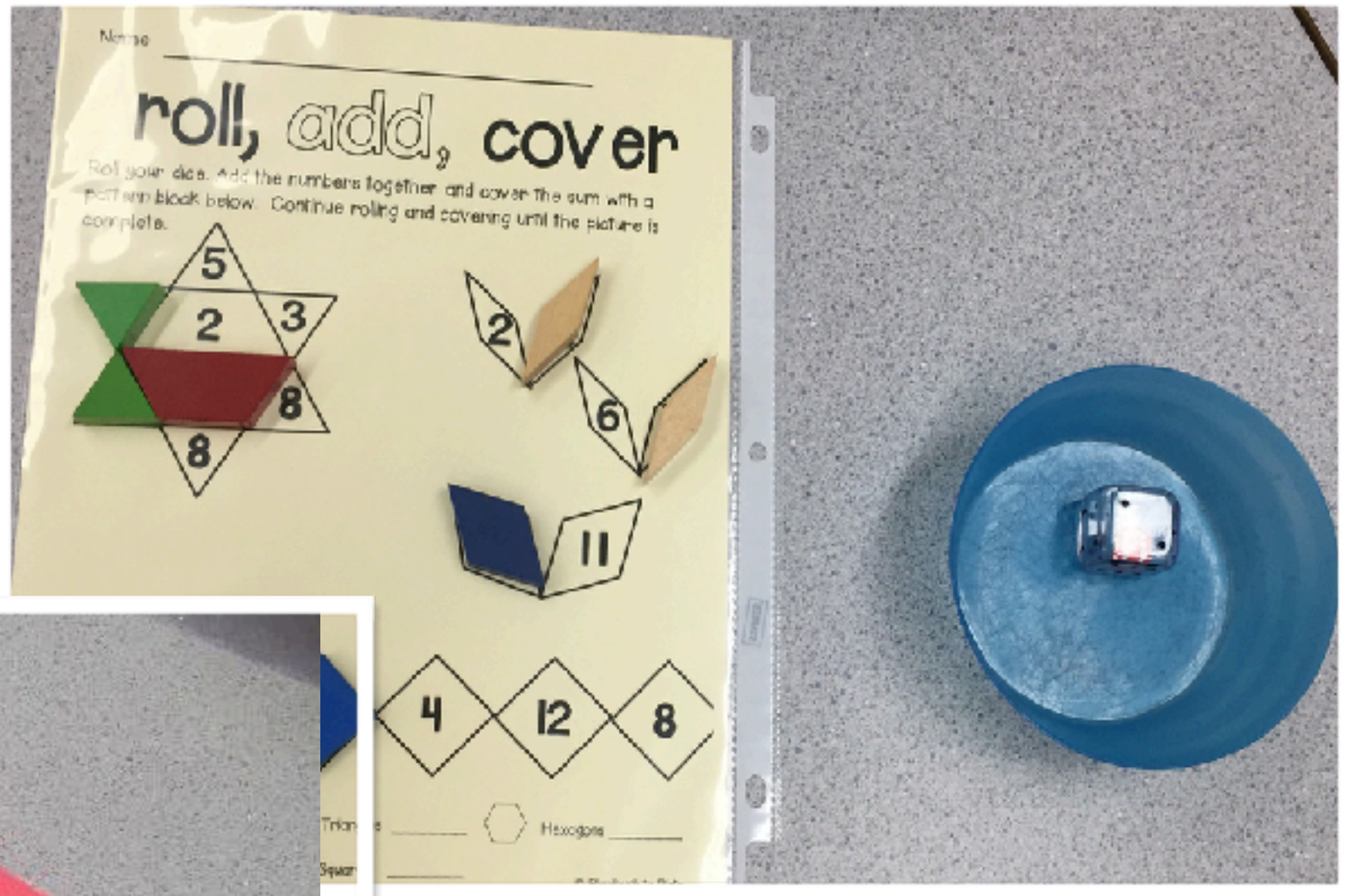


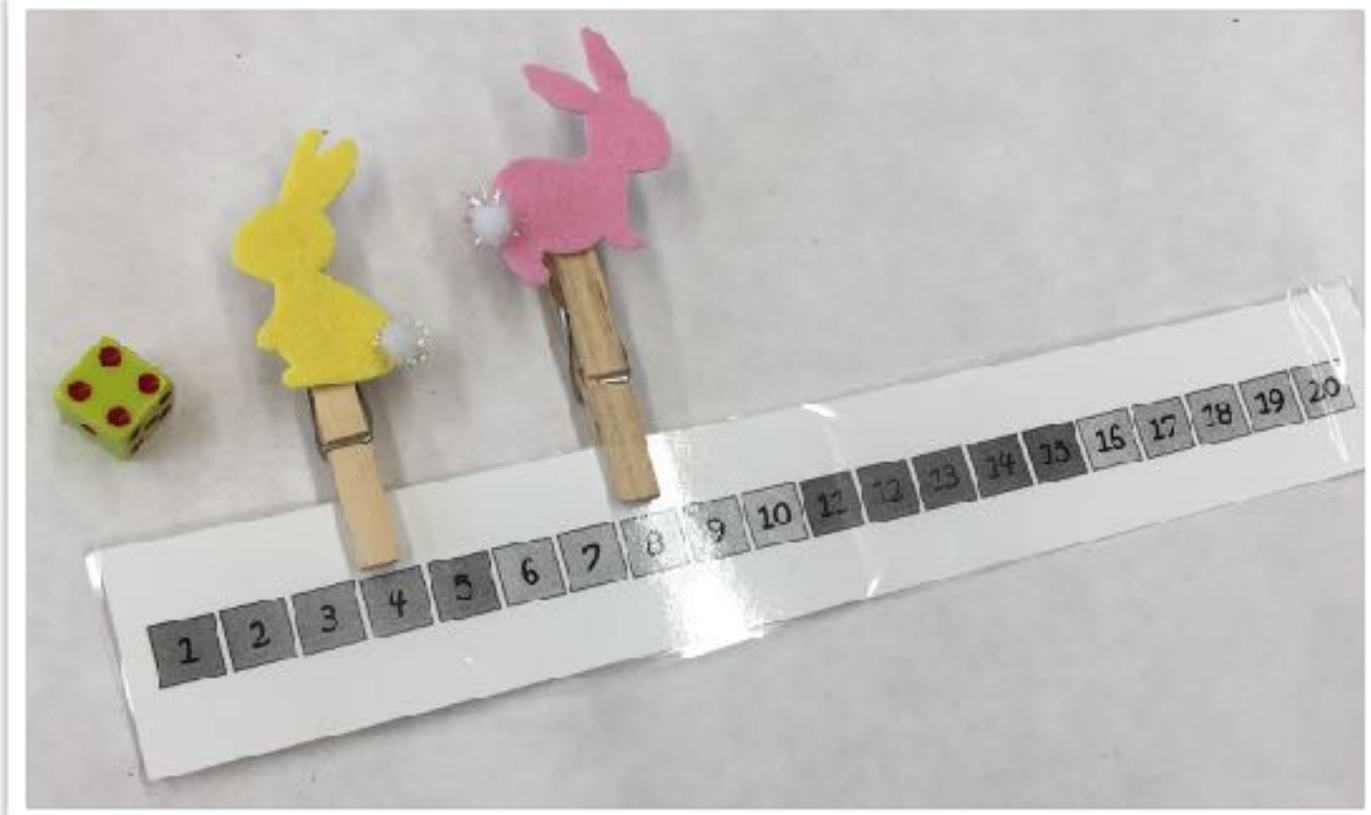


"What strategies can you use to solve this question? (e.g., doubles plus one)

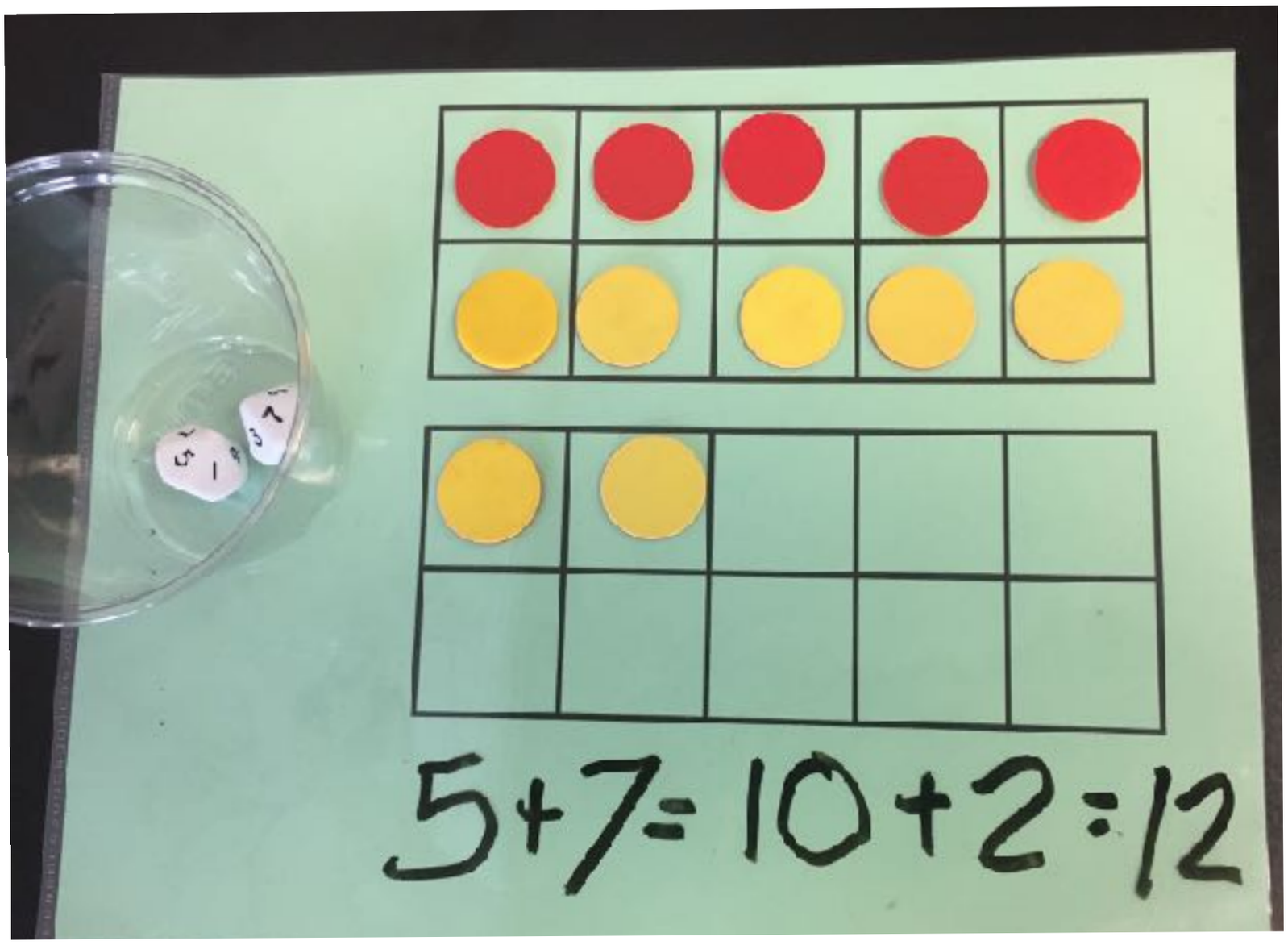
Change the shape with the season!


Chicky Challenge!
Shake the egg or roll two dice. Write
and solve the equation!
1 + 2 = 3
4 + 6 = 10
3 + 5 = P
6 + 6 = P
3 + P = P

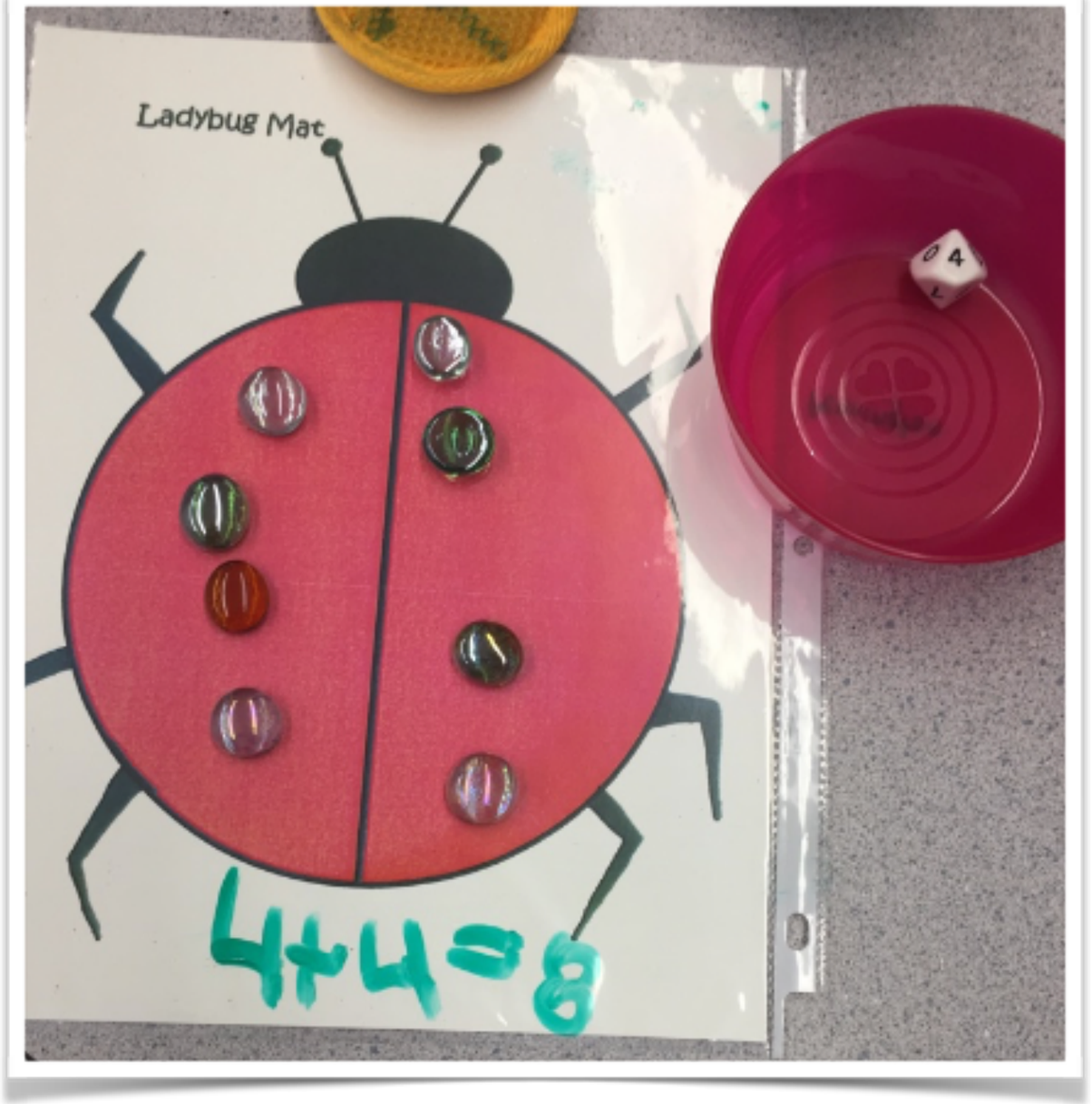

Name
roll, add, cover
Roll your dice. Add the numbers together and cover the sum with a pattern block below. Continue rolling and covering until the picture is complete.
5
2
3
8
8
2
6
11
4
12
8
Triangles
Hexagons
Squares



"How can you use a number line to help you add?"



“What strategies could you use to find out how many?”



“What did you roll?”
“Can you build it?”
“What is double that number?”

COVER UP!

Doubles!

12	6	10	12	4	8
14	18	8	16	8	6
6	10	14	12	10	14
12	4	8	18	16	10
14	16	18	14	4	14
2	8	4	10	16	18

Roll the die. Double the number.
Find it on the grid and cover it in your counter.
Give you partner a turn.
First one to have 4 in a row wins!

Chips Ahoy!

3	7	5
19	15	13
11	17	9

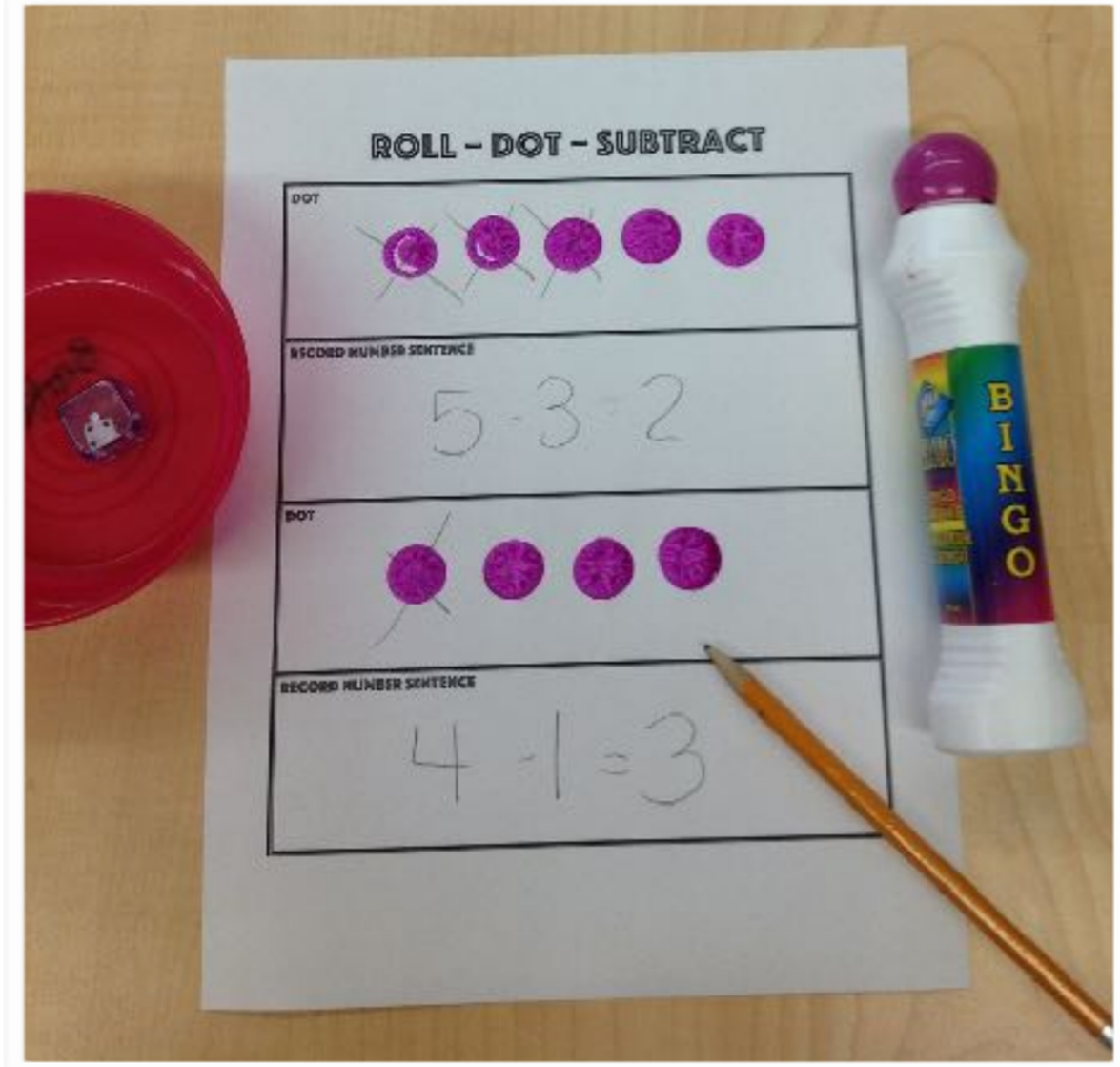
- Place 15 chips on the game board. Chips can be placed anywhere, and doubles on a space are OK.
- Roll a 10 sided die (0-9).
- Double and add 1 to the number rolled, then remove a chip from the space that shows the sum.

  For example: Player A rolls a 2, say the near double fact (2 + 2 +1 is 5 or 2 + 3 = 5) and takes a chip off the 5 space.
- Roll a zero and take a chip from any space!
- Players take turns until one player has collected 8 chips. This person is the winner!

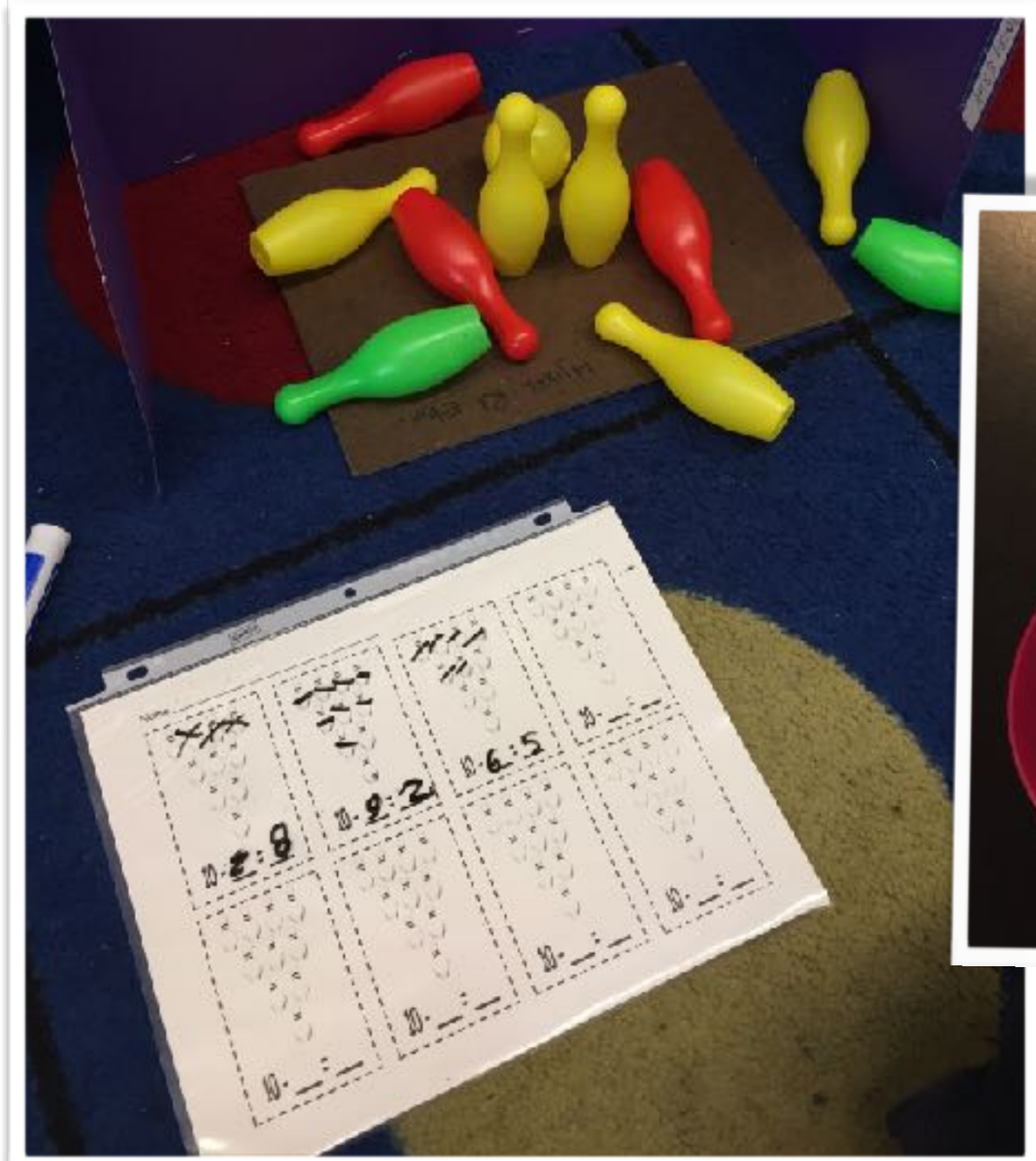
Available on Sandra Ball's website

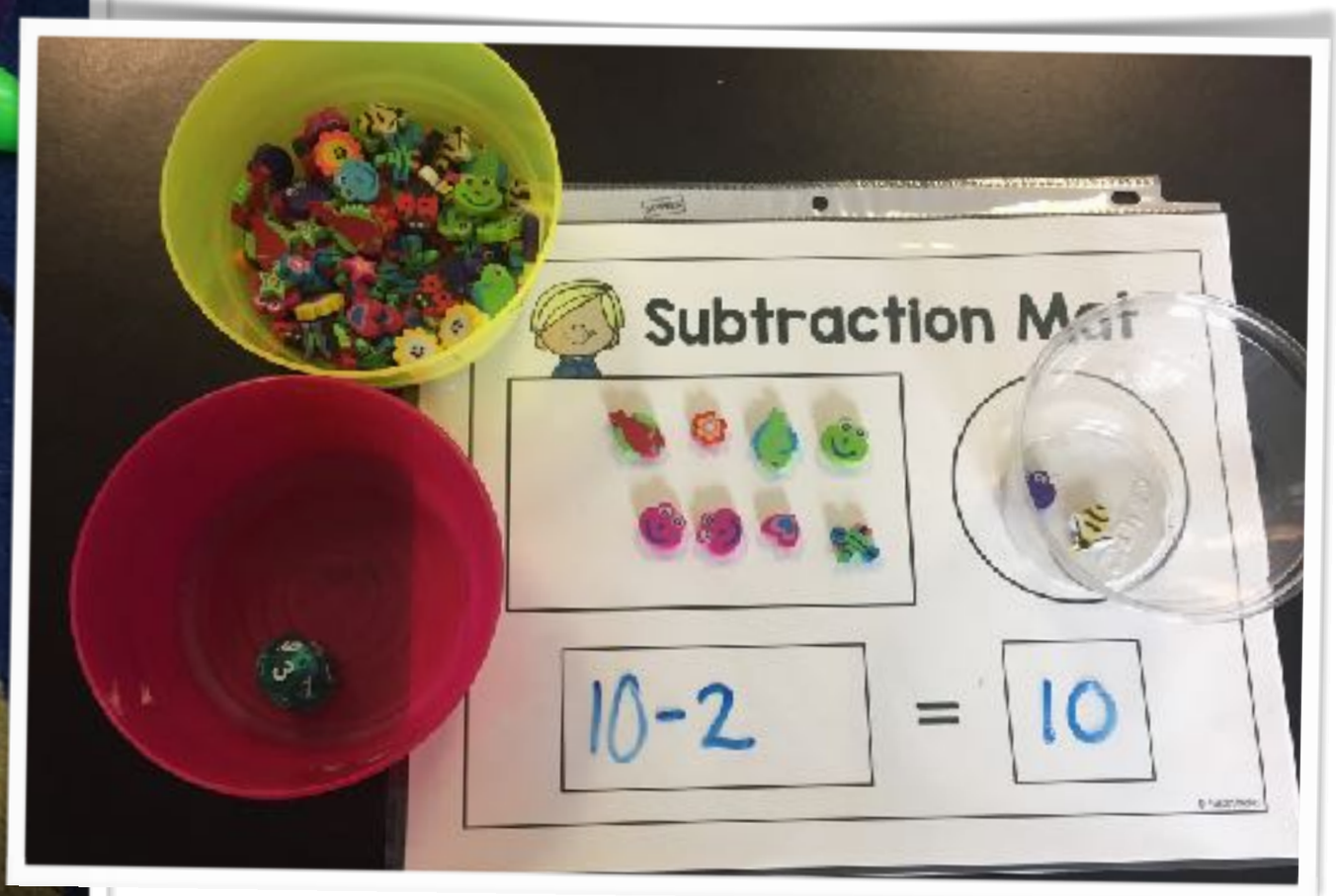
"How can thinking about 'doubles' help you solve 6 + 7 = "

NUMBER: Decomposing (Concept of Subtraction)



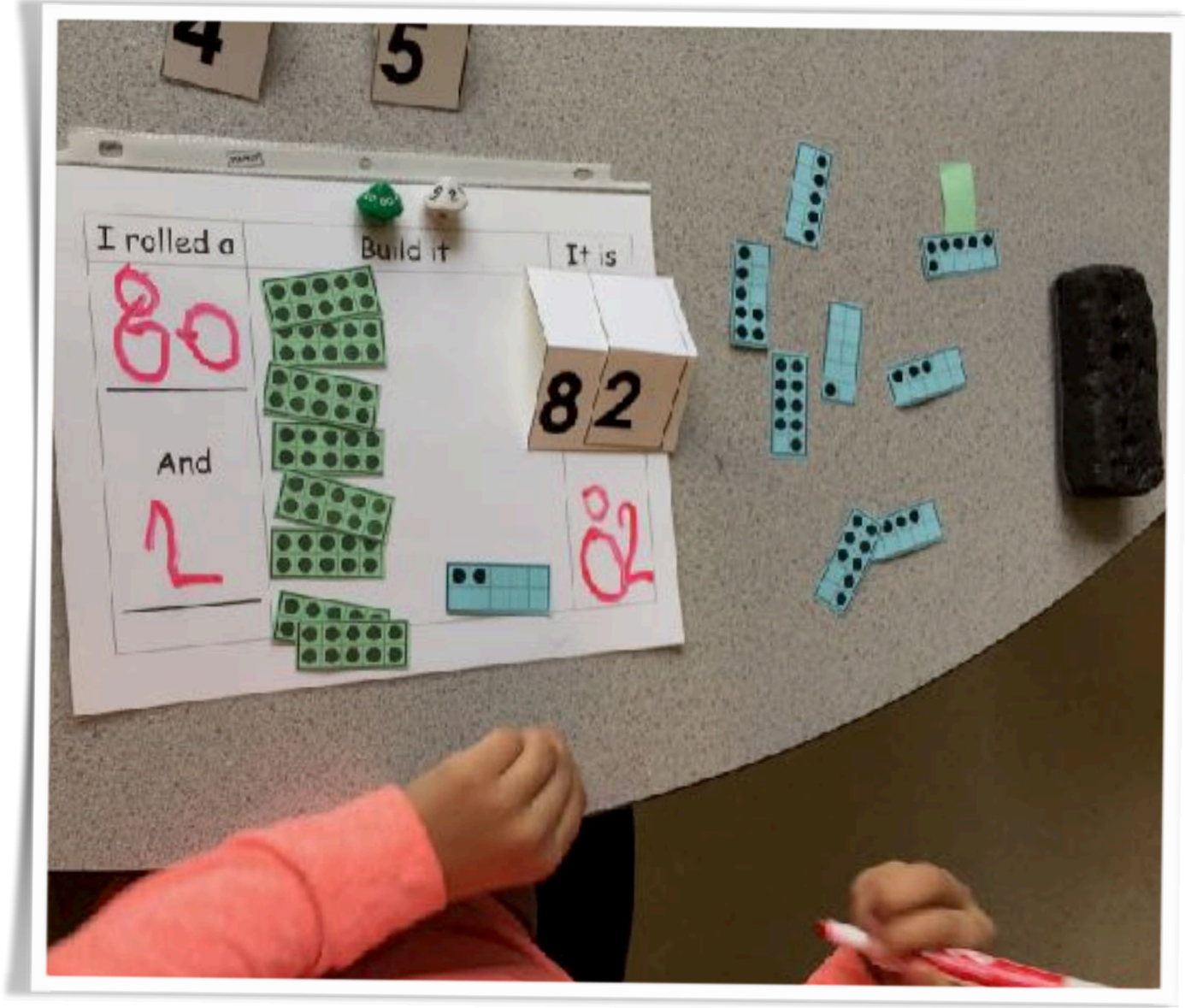
"When you look at your two numbers,
which is larger or smaller?"
"Can you show that quantity?"
"What was the smaller number you rolled?"
"What strategy can you use to solve the question?"
"How could you record this?"



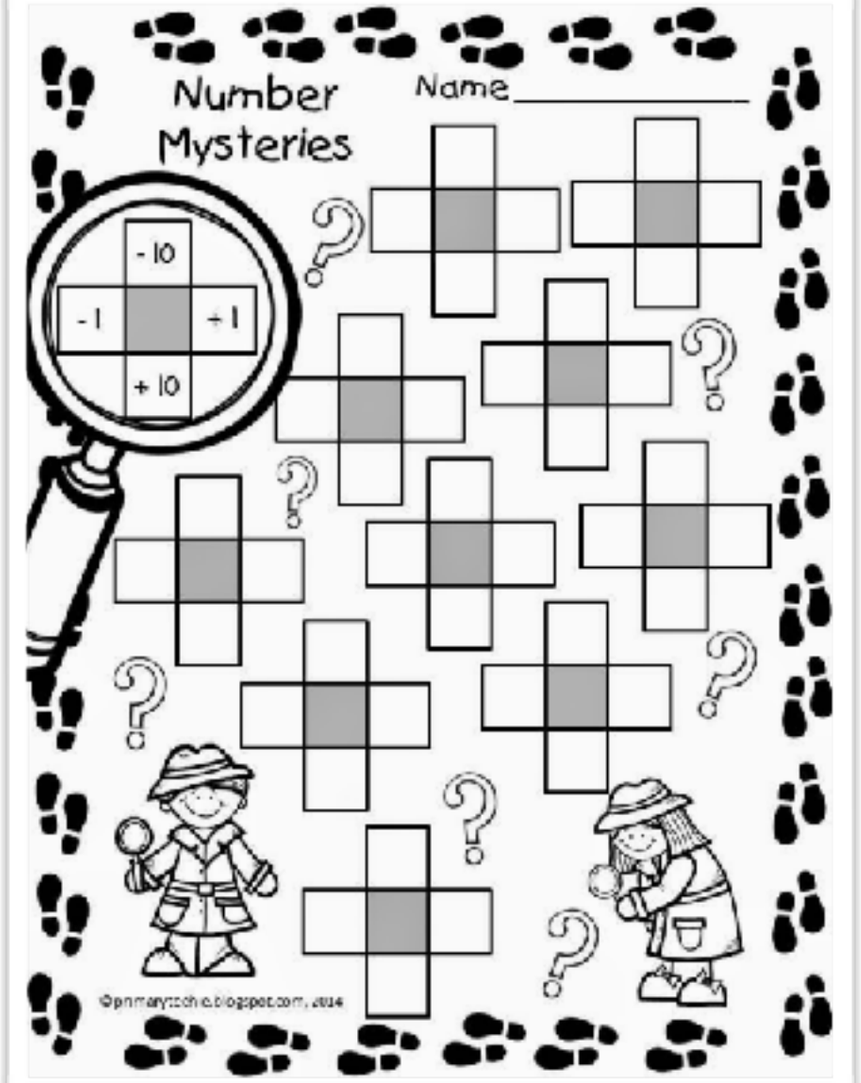

Subtraction Mat
10-2
=
10

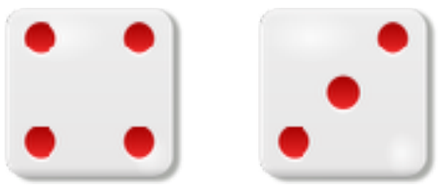
NUMBER: Place Value

"How does organizing your items into groups of ten help you to count?"

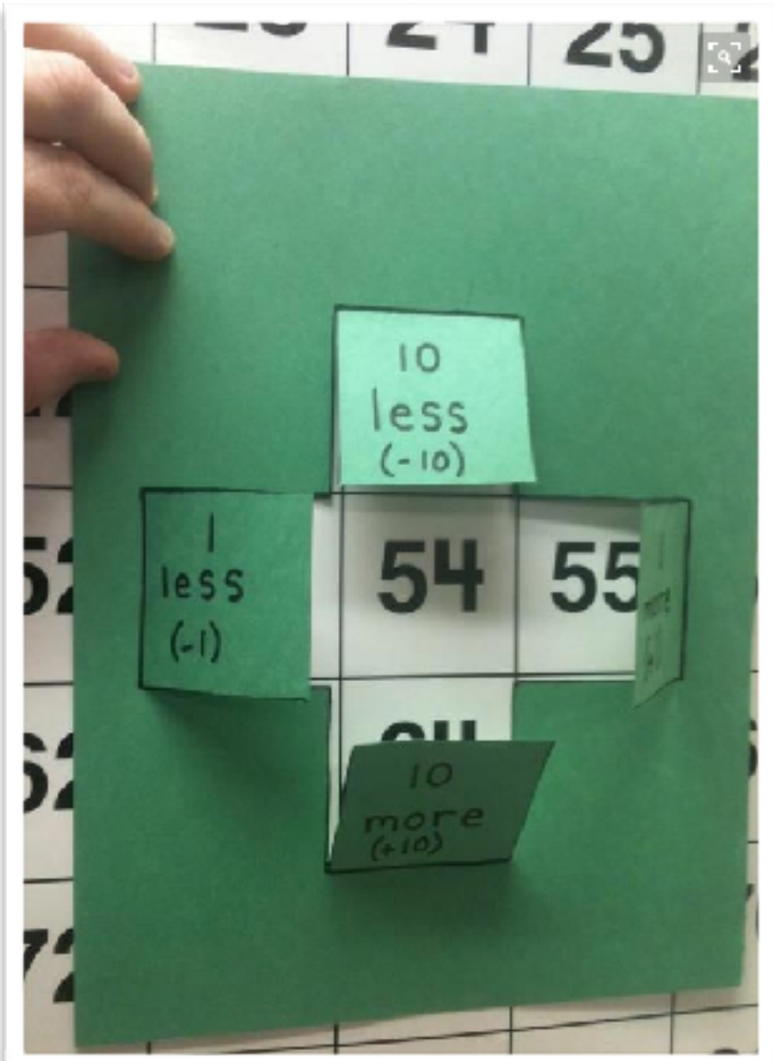


“What did you roll?”
“Can you build your number using ten frames?”
“How would you write your number?”
“If you added ten to your number, what number would you have?”



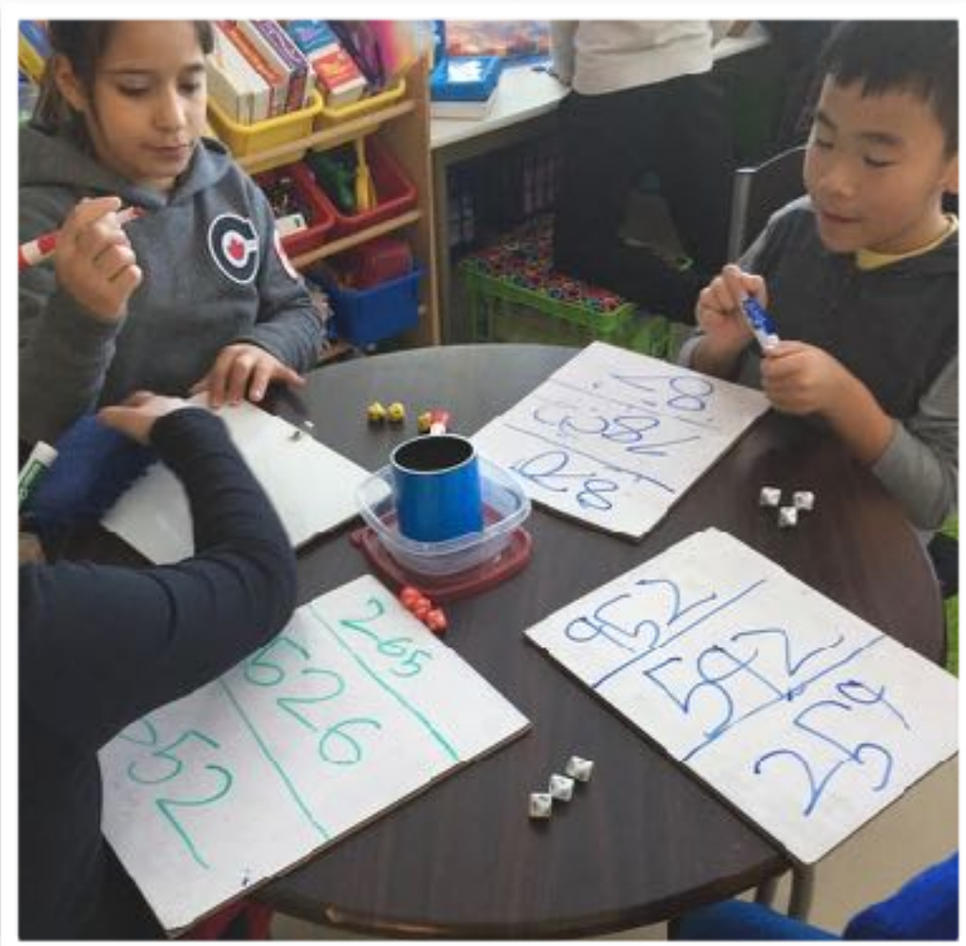


Roll 2 die to make a 2-digit number



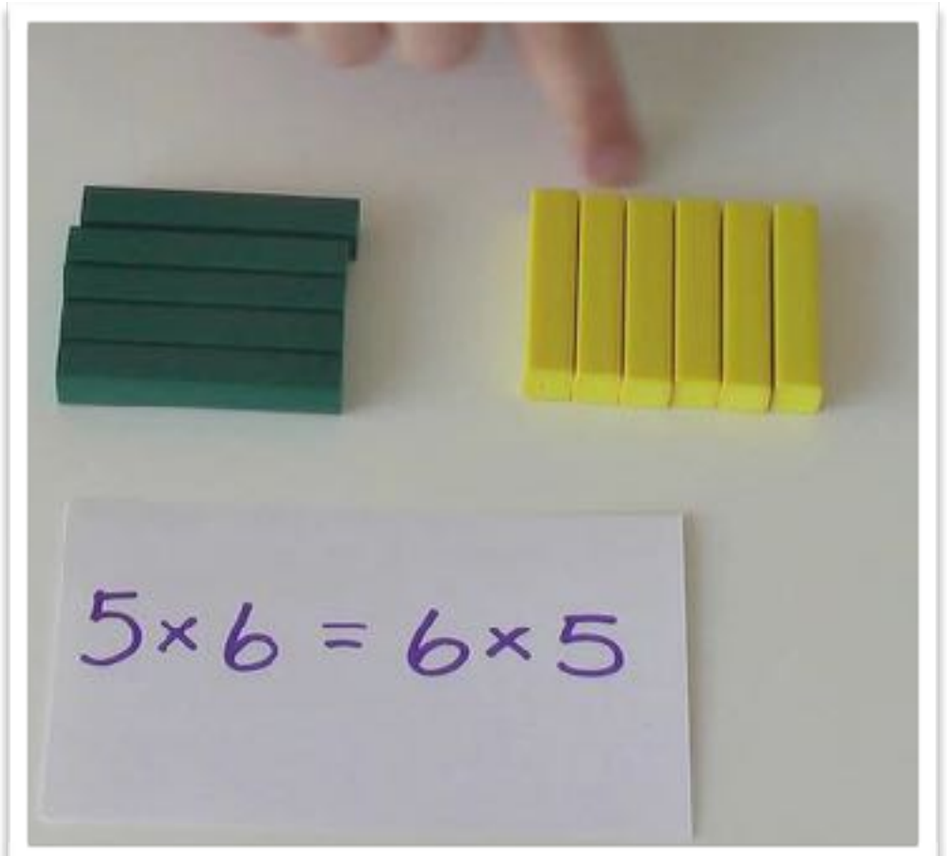
“What is your number?”
“What is ten more, ten less, one more, or one less than your number?”

Image from Janice Novakowski

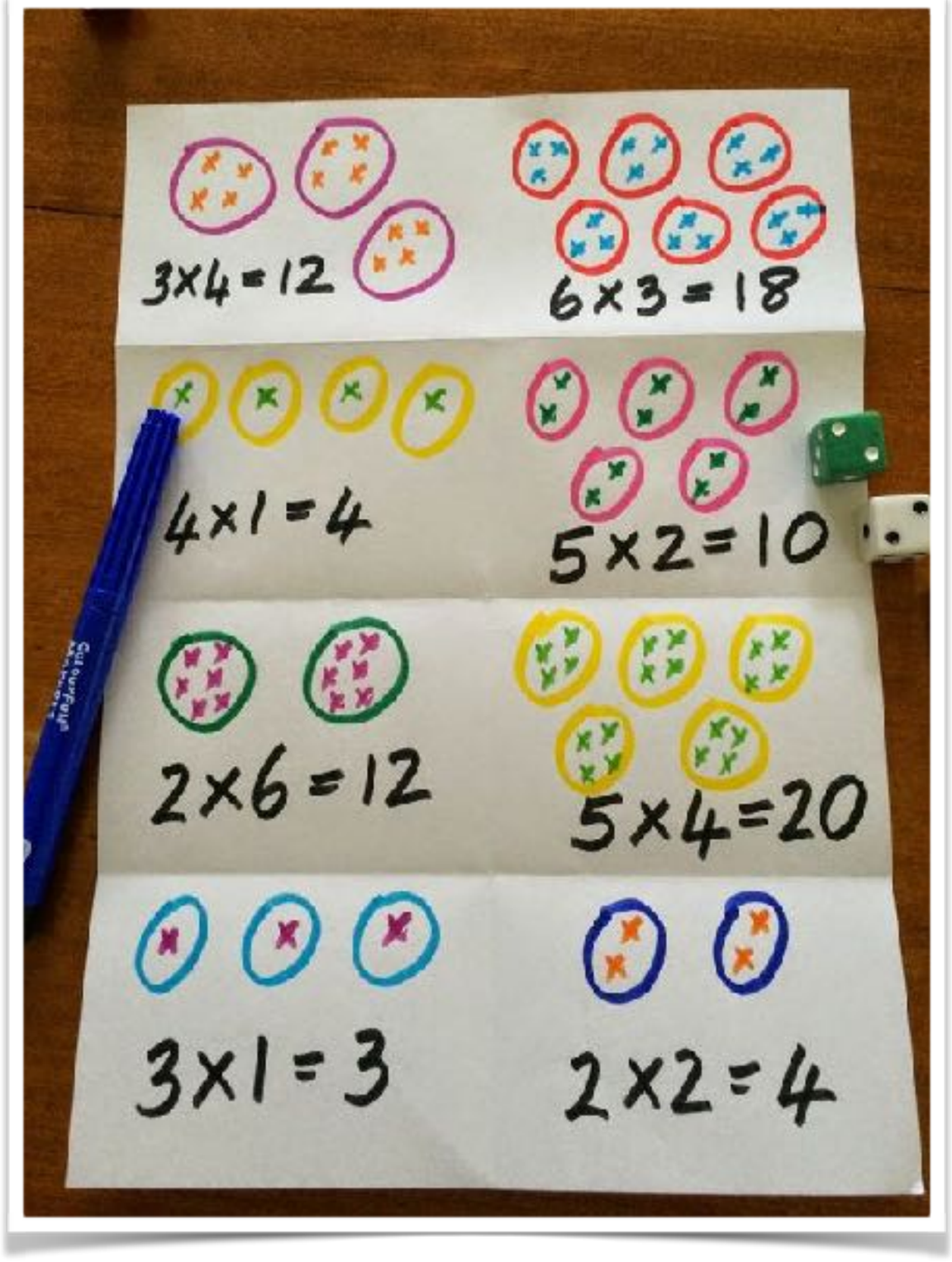


"What numbers can you make with your three digits?"
"Can you make the smallest, largest, or in-between number?"

NUMBER: Multiplication



"How does building arrays help you think in groups?"
"How are repeated addition and multiplication related?"
"What pieces are connected. Explain your thinking."



Roll 2 die.

One represents how many circles.

Another represent how many stars

“What multiplication equation could you record?”

You can also find us on Pinterest

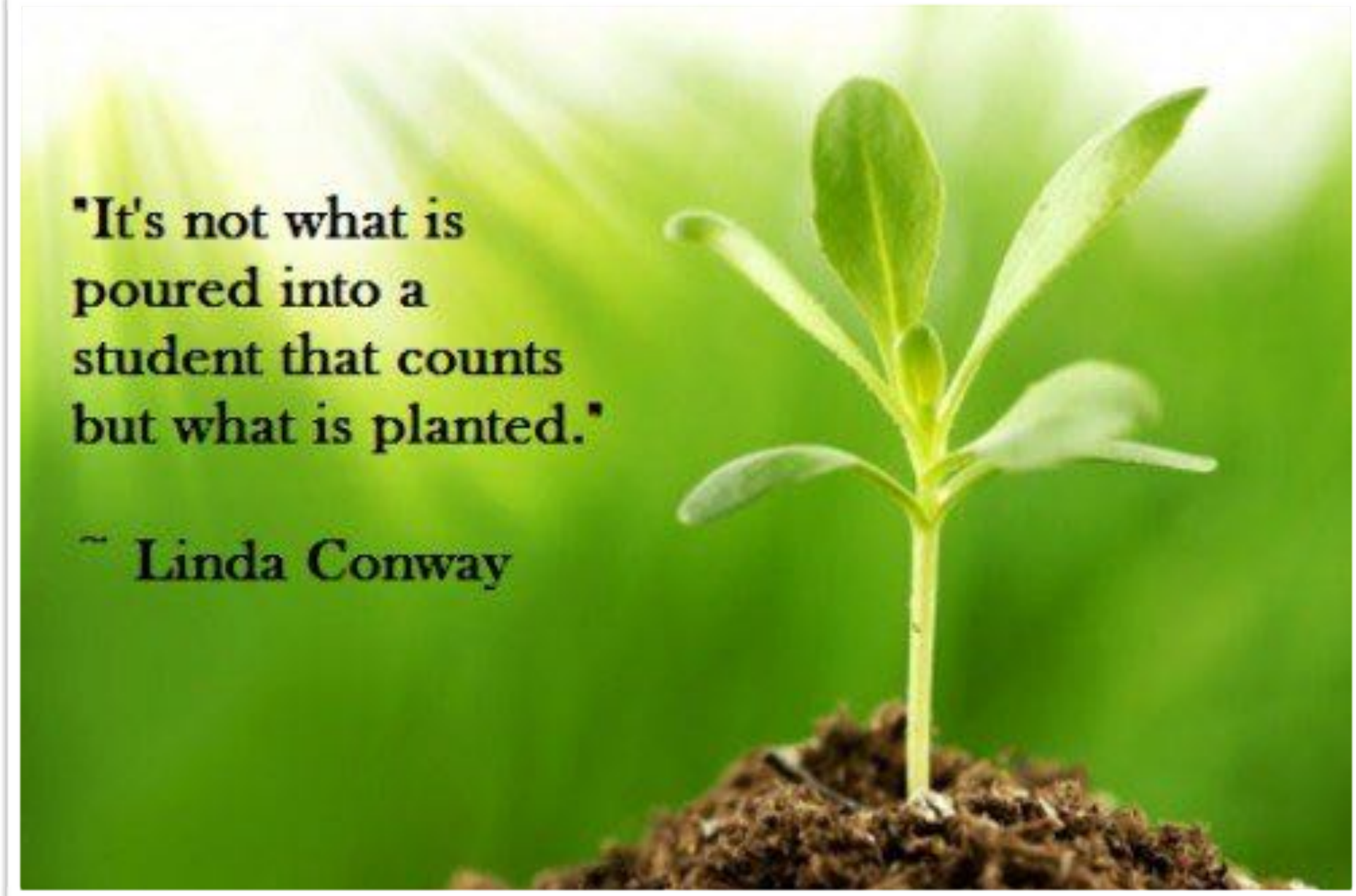
Look beyond the ‘cute factor’
Ask yourself “Where’s the Math?
“Is this activity open-ended?
“Is it invitational?”

Jennifer
Barker
@Barkerjbarker

Barb
Matson
@B_Matson36

Kristen
Pennington

Jennifer
Tammen



Thank you for spending time with us today and pondering how to plant a love of Mathematics in your students!