Unpacking the New Kindergarten Math

November 23, 2022

Chris Zarski

Land Acknowledgment

We respectfully acknowledges that we are situated on Treaty 6 territory, traditional lands of First Nations, including the Cree, Blackfoot, Métis, Nakota Sioux, Saulteaux, Inuit, and many others whose histories, languages, and cultures continue to influence our vibrant community.

Agenda for Today!

- identifying key skills and concepts in the part of our curriculum
- revisiting what research tells us about “counting” and effective **strategies** for teaching counting
- extending **strategies** for KN1 as students begin to move towards 10.
- providing resources that can help support ongoing **pedagogy** in teaching counting to 10
- games that support learning outcomes with acknowledgement to Dr. Nicki Newton (Counting is More Than 1 2 3, 2022)
-

November	December	January
	Number: Quantity is measured with numbers that enable counting, labelling, comparing	
KN1.2a. Children investigate quantities to 10...(to 5 • A quantity is always counted using the same sequence of words (counting principle: stable order) KN1.1 Children investigate quantities to 10...(to 5 • Quantity can be the number of objects in a set. KN1.4 Children investigate quantities to 10....(to 5 • A quantity can be described relative to another quantity. • A quantity can be described in relation to a purpose or need.	KN1.2a. Children investigate quantities to 10...(to 5) perhaps 6 to use dice • A quantity is always counted using the same sequence of words (counting principle: stable order) KN1.1 Children investigate quantities to 10.(to 5) perhaps 6 to use dice • Quantity can be the number of objects in a set. KN1.4 Children investigate quantities to 10.(to 5) perhaps 6 to use dice • A quantity can be described relative to another quantity. • A quantity can be described in relation to a purpose or need.	KN1.1 Children investigate quantities to 10. • Quantity can be the number of objects in a set. KN1.4 Children investigate quantities to 10. • A quantity can be described relative to another quantity. • A quantity can be described in relation to a purpose or need. KN1.2 Children investigate quantities to 10. • A quantity is always counted using the same sequence of words (counting principle: stable order) • A quantity remains the same no matter the order in which the objects are counted (counting principle: order irrelevance). • A quantity can be determined by counting each object in a set once and only once (counting principle: one-to-one correspondence). • The last number used to count represents the quantity (counting principle: cardinality)..
Patterns: Awareness of patterns supports problem solving in various situations.		
KP1. Children identify and create repeating patterns. • Pattern is characterized by how the elements change or remain the same. **copy - extending - creating**		
KT1. Children interpret time as a sequence of events. • Time can be perceived as a sequence. **Agenda's & Calendars right from day 1!**		
KG 1. Children investigate shape. • Shape is structured two-dimensional or three-dimensional space. (2D & 3D)(focus on 2D		• Any quantity of like or unlike objects can be counted as a set (counting principle: abstraction)

December	January
Patterns: Awareness of patterns supports problem solving in various situations.	
KP1. Children identify and create repeating patterns. • Pattern is characterized by how the elements change or remain the same.	KP1. Children identify and create repeating patterns. • Pattern is characterized by how the elements change or remain the same.
	Geometry: Shapes are defined and related by geometric attributes.
	KG 1. Children investigate shape. • Shape is structured two-dimensional or three-dimensional space. (2D & 3D)

KN1.2 Children investigate quantities to 10.			1N1.2 Students interpre
Knowledge	Understanding	Skills & Procedures	Knowledge
Quantity can be determined by counting.	a. A quantity is always counted using the same sequence of words (counting principle: stable order). b. A quantity remains the same no matter the order in which the objects are counted (counting principle: order irrelevance). c. A quantity can be determined by counting each object in a set once and only once (counting principle: one-to-one correspondence). d. The last number used to count represents the quantity (counting principle: cardinality). e. Any quantity of like or unlike objects can be counted as a set (counting principle: abstraction).	Count within 10, forward and backward, starting at any number, according to the counting principles.	Counting can begin at any number. Counting more than one object at a time is called skip counting.

KN1.3 Children investigate quantity to 10		
Knowledge	Understanding	Skills & Procedures
A small quantity can be recognized at a glance (subitized).	Quantity can be determined without counting.	Subitize quantities to 5.

KN1.4 Children investigate quantity to 10		
Knowledge	Understanding	Skills & Procedures
Comparisons of quantity can be described by using words such as • more • less • same • enough • not enough	A quantity can be described relative to another quantity. A quantity can be described in relation to a purpose or need.	Compare the size of two sets using one-to- one correspondence. Describe quantities relative to each other using comparative language. Describe a quantity in relation to a purpose or need using comparative language. Solve problems in familiar situations by counting.

Patterns: Awareness of patterns supports problem solving in various situ

How can patterns be recognized?

KP1 Children identify and create repeating patterns.

Knowledge	Understanding	Skills & Procedures
Patterns exist everywhere. A pattern can involve elements such as • sounds • objects • pictures • symbols • actions Repeating patterns have one or more elements that repeat.	A pattern is characterized by how the elements change or remain constant.	Recognize repeating patterns encountered in daily routines and play, including songs or dances. Recognize change or constancy between elements in a repeating pattern. Predict the next elements in a repeating pattern. Create a repeating pattern with up to three repeating elements.

Geometry: Shapes are defined and related by geometric attributes.

How can shape bring meaning to the space in an environment?

Children investigate shape.

Knowledge	Understanding	Skills & Procedures
A shape can be represented using objects, pictures, or words. Familiar two- and three-dimensional shapes can be found in nature, such as • circles • triangles • cubes • cylinders First Nations, Métis, and Inuit relate specific shapes to those found in nature.	Shape is structured two-dimensional or three-dimensional space.	Relate shapes in nature to various two-dimensional and three-dimensional shapes. Identify familiar two- and three-dimensional shapes. Investigate three-dimensional shapes by rolling, stacking, or sliding. Describe a shape using words such as flat, curved, straight, or round.

Kindergarten Skills and Concepts December - January

Recognize a number of familiar objects as a quantity.

Represent a quantity in different ways.

Relate a numeral to a specific quantity.

Count within 10, forward and backward, starting at any number, according to the counting principles.

1.3 Subitize quantities to 5.

Compare the size of two sets using one-to-one correspondence.

Describe quantities relative to each other using comparative language.

Describe a quantity in relation to a purpose or need using comparative language.

Solve problems in familiar situations by counting.

Relate shapes in nature to various two dimensional and three-dimensional shapes.

Identify familiar 2D and 3D shapes.

Investigate 3D shapes by rolling, stacking or sliding.

Describe a shape using words such as flat, curved, straight or round.

Recognize repeating patterns encountered in daily routines and play, including songs or dances.

Recognize change between elements in a repeating pattern.

Predict the next element in a repeating pattern.

Create a repeating pattern with up to three repeating elements.

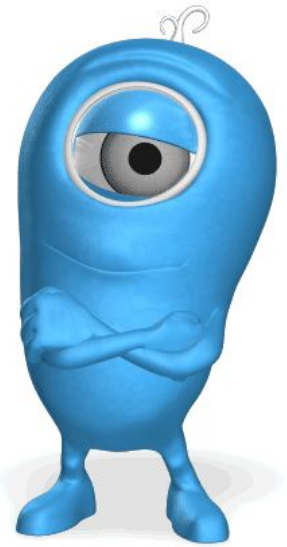
Recognize
Describe
Relate
Count
Identify/Represent/Create/Predict

What are the Skills?

Learning to Count is repetitive:

necessary -yes!

But we need to keep it engaging, active and targeted.



Using all our pedagogical approaches for varied strategies and choice!

So what does the research tell us?

Playful Learning or Guided Play

Researchers have found that

"playful learning or guided play actively engages children in pleasurable and seemingly spontaneous activities that encourage academic exploration and learning....Teachers using guided play have a set of learning goals in mind" (Hirsh-Pasek et al. 2009).

Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

There are 20 levels of Counting!

First Five Levels

Level 1: Number Sayer

Level 2: Chanter

Level 3: Reciter

Level 4: Reciter to 10

Level 5: Corresponder

Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

Using Manipulatives

"Manipulatives can be important tools in helping students to think and reason in more meaningful ways" (Stein & Bovalino, 2001). When working with young children at first the manipulatives should match the story (Fuson, 2009).

Pictures of the actual thing being counted.	More Abstract Representation of the thing being counted.	Symbolic Representation
		3

Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

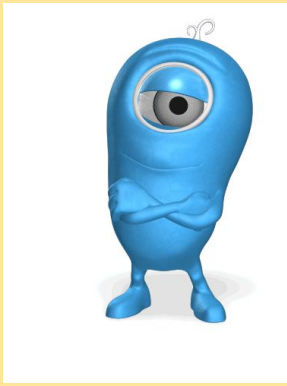
Pictures of the actual thing being counted.	More Abstract Representation of the thing being counted.	Symbolic Representation
		

Pictures of the actual thing being counted.	More Abstract Representation of the thing being counted.	Symbolic Representation
		

Make Chocolate 10 frames!!!!

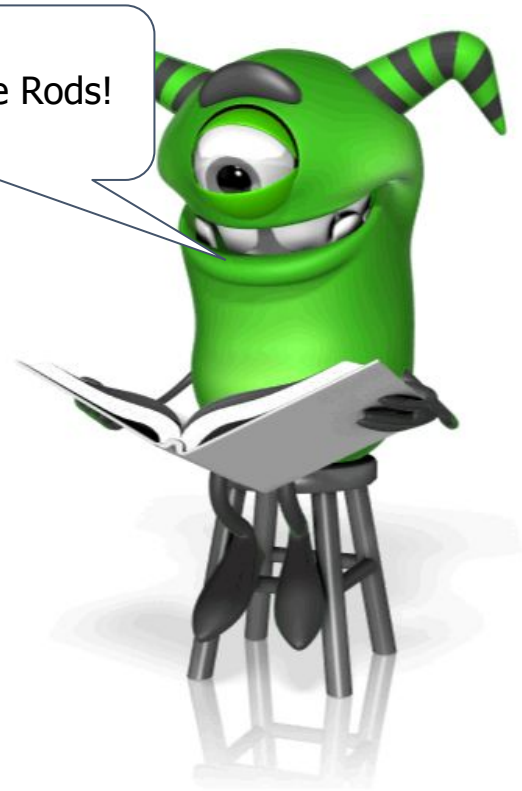
Pictures of the actual thing being counted.	More Abstract Representation of the thing being counted.	Symbolic Representation
		

Pictures of the actual thing being counted.	More Abstract Representation of the thing being counted.	Symbolic Representation
		



Names of coins, quantity, attributes …

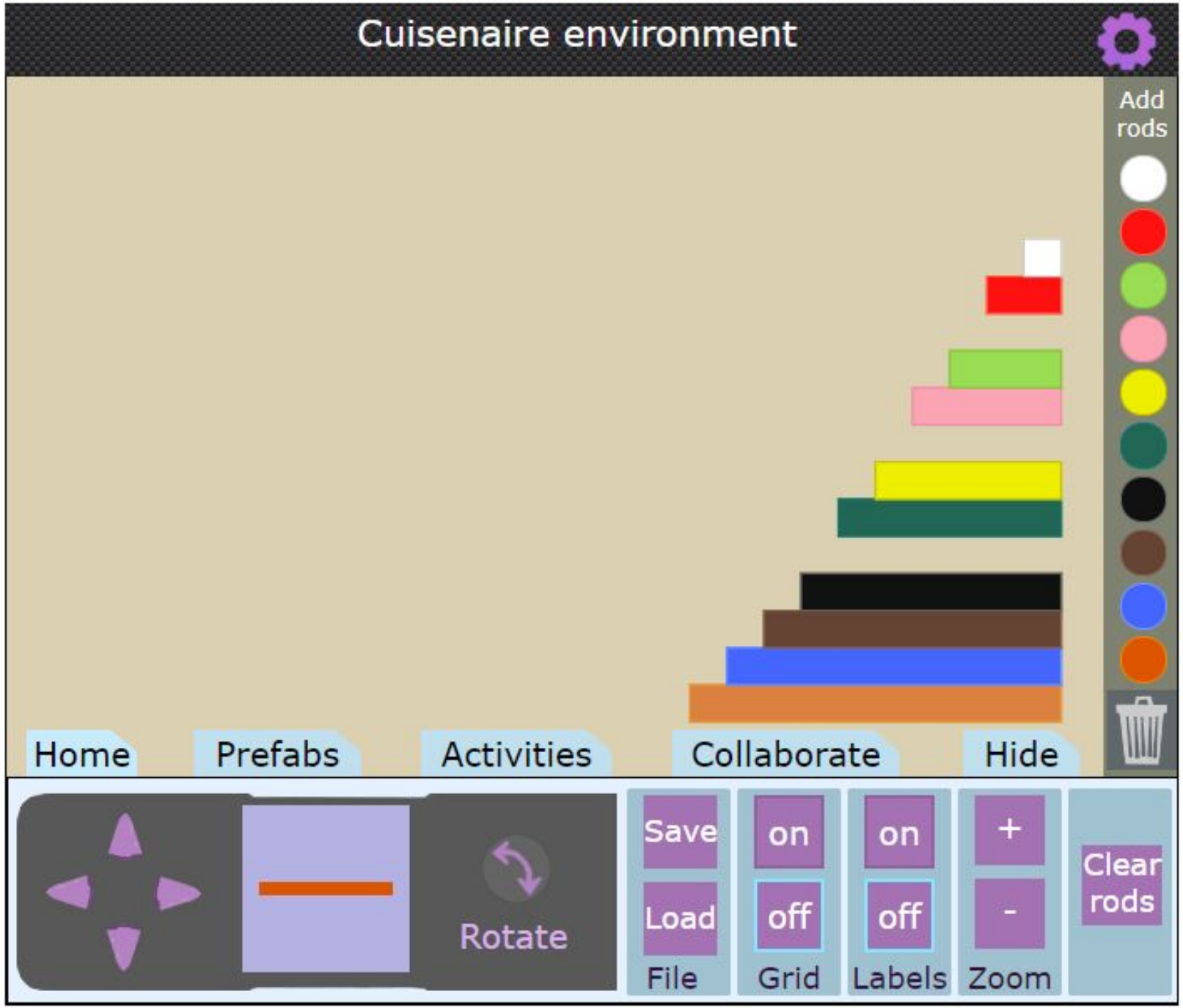
Adapted from Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

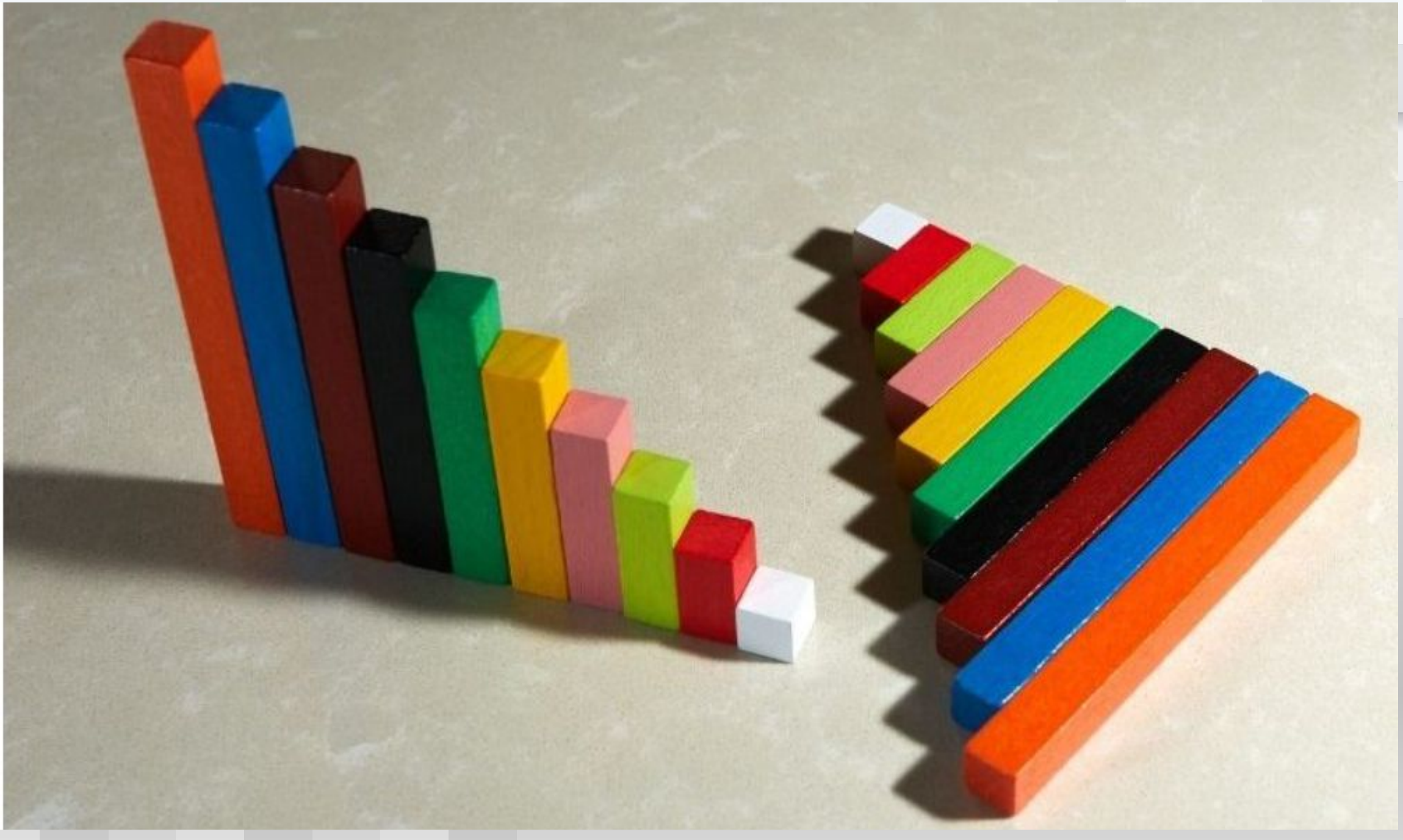


Cuisenaire Rods

Virtual Manip

Using Cuisenaire Rods



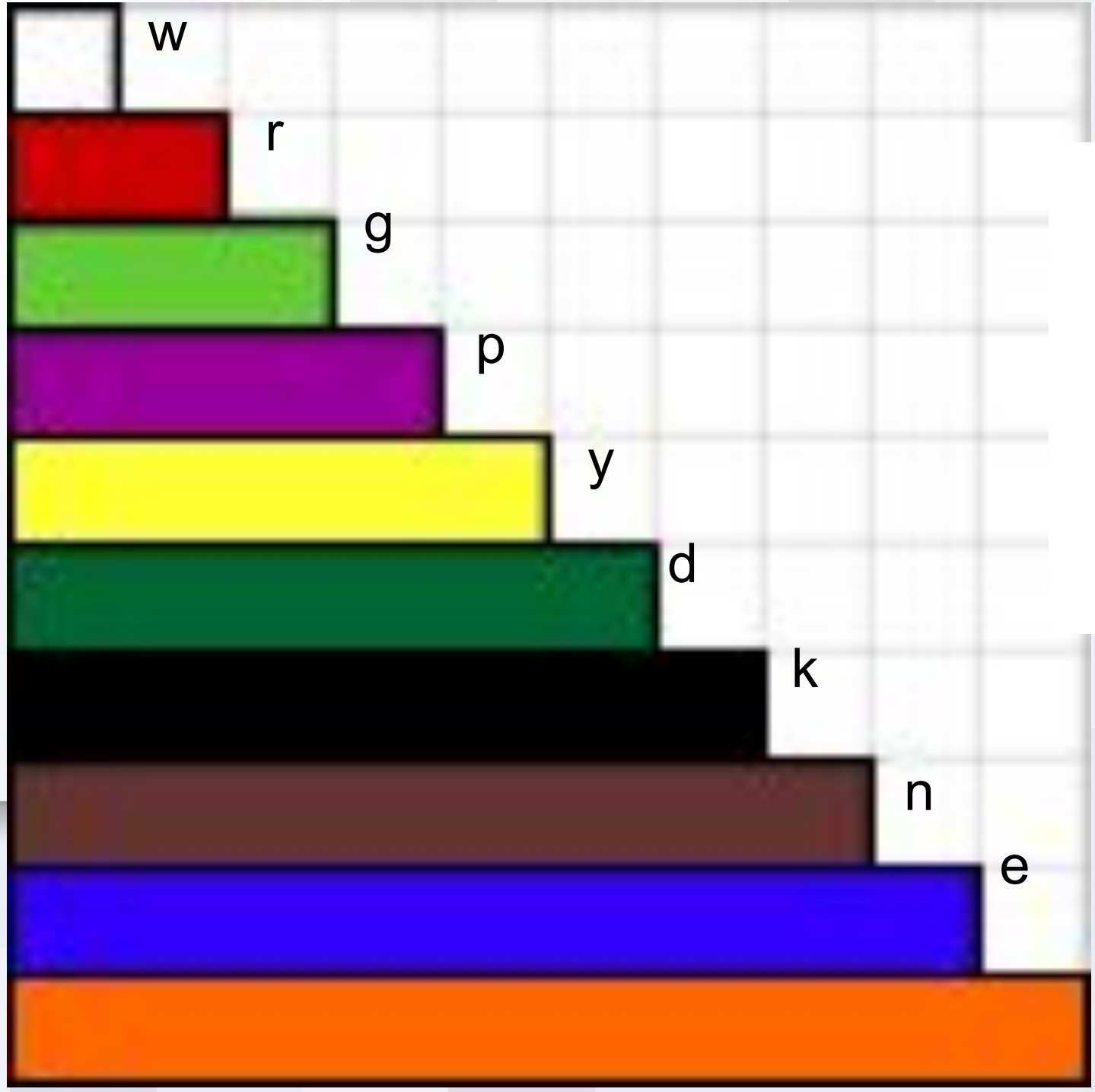


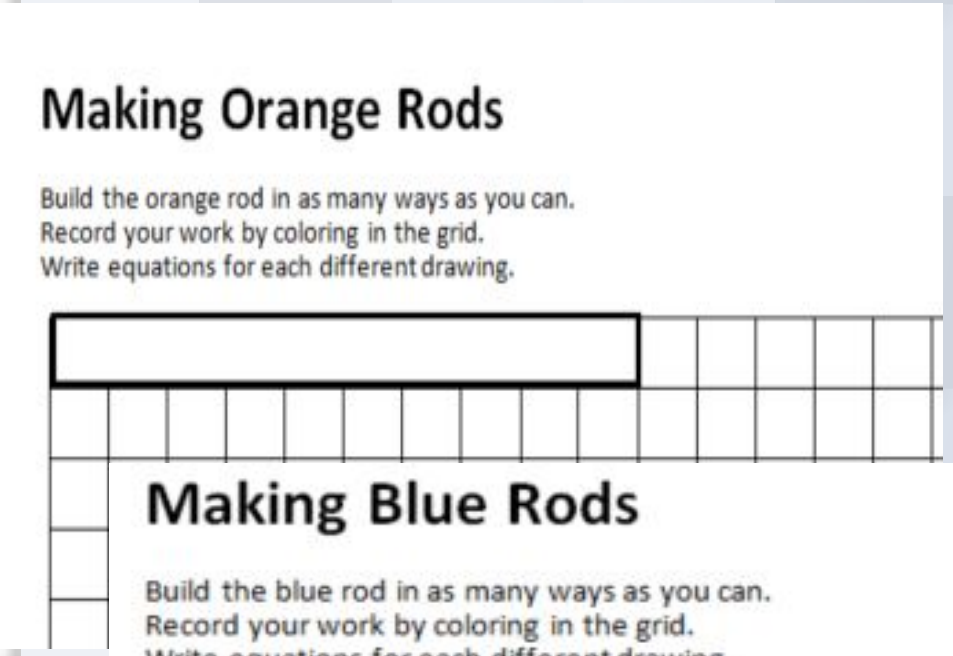
Giving quantity (number) to Cuisenaire Rods

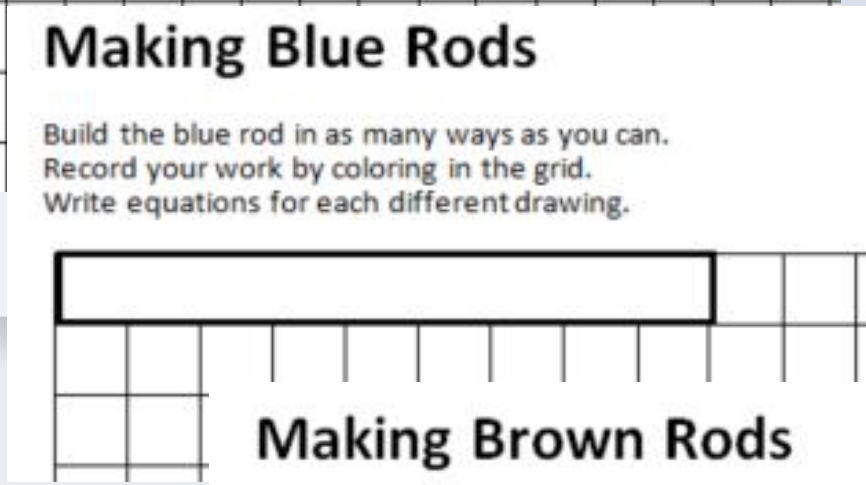
First step is to just play. What can you create with these blocks?

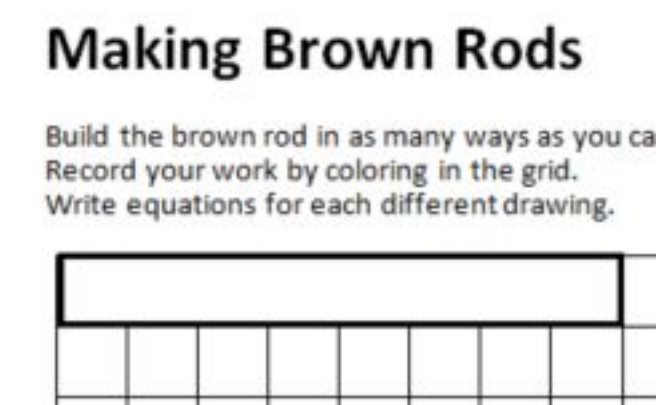
Build a staircase and wonder. What do you see?What do you wonder?

Non- readers


w
r
g
p
y
d
k
n
e
o


Making Orange Rods
Build the orange rod in as many ways as you can.
Record your work by coloring in the grid.
Write equations for each different drawing.


Making Blue Rods
Build the blue rod in as many ways as you can.
Record your work by coloring in the grid.
Write equations for each different drawing.

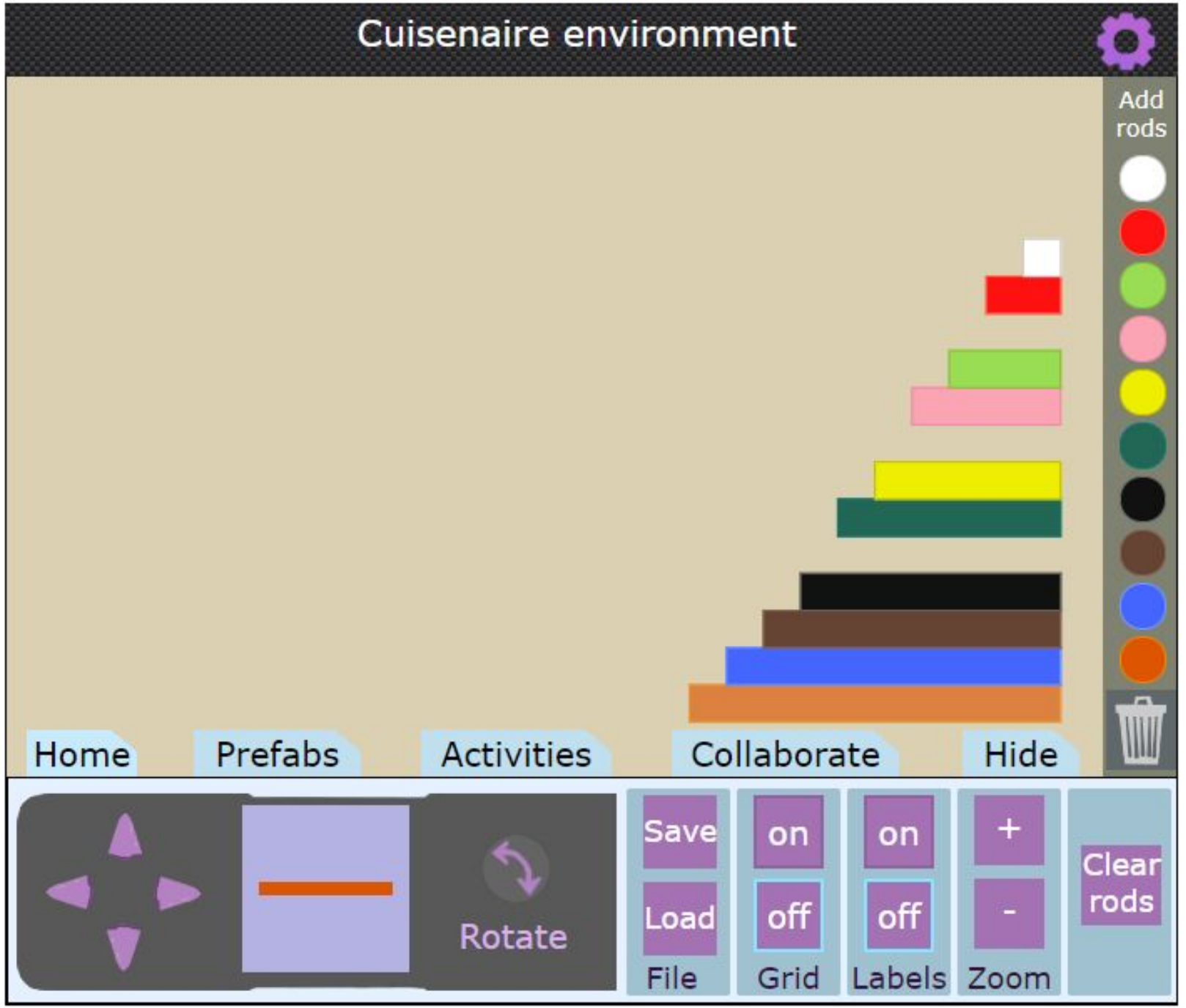

Making Brown Rods
Build the brown rod in as many ways as you ca
Record your work by coloring in the grid.
Write equations for each different drawing.

Using Comparative Language

Quantity in
- objects
- pictures
- words (colours)
- numbers

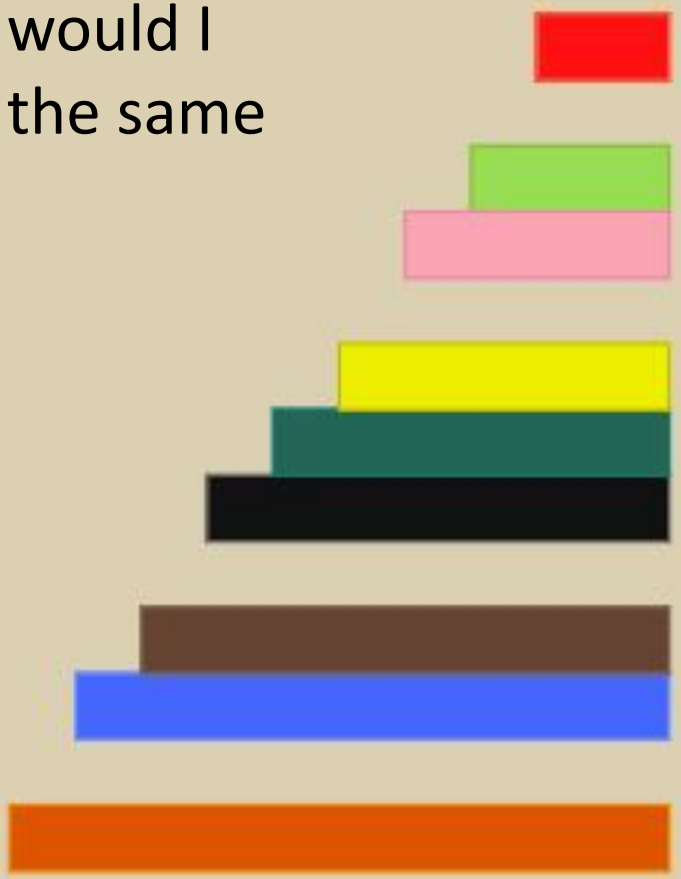
Comparative Language
- more
- same
- less
- enough
- not enough

Can quickly involve measurement and patterns.



Cuisenaire environment

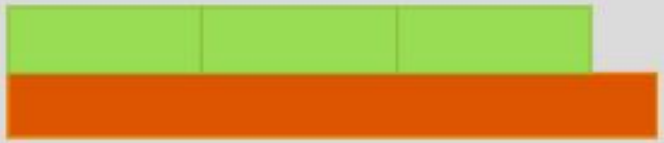
Does the white cover more or less of the pink rod than the red? How many white would I need for the red and white to cover the same amount on the pink?



Add rods

Home Prefabs Activities Collaborate Hide

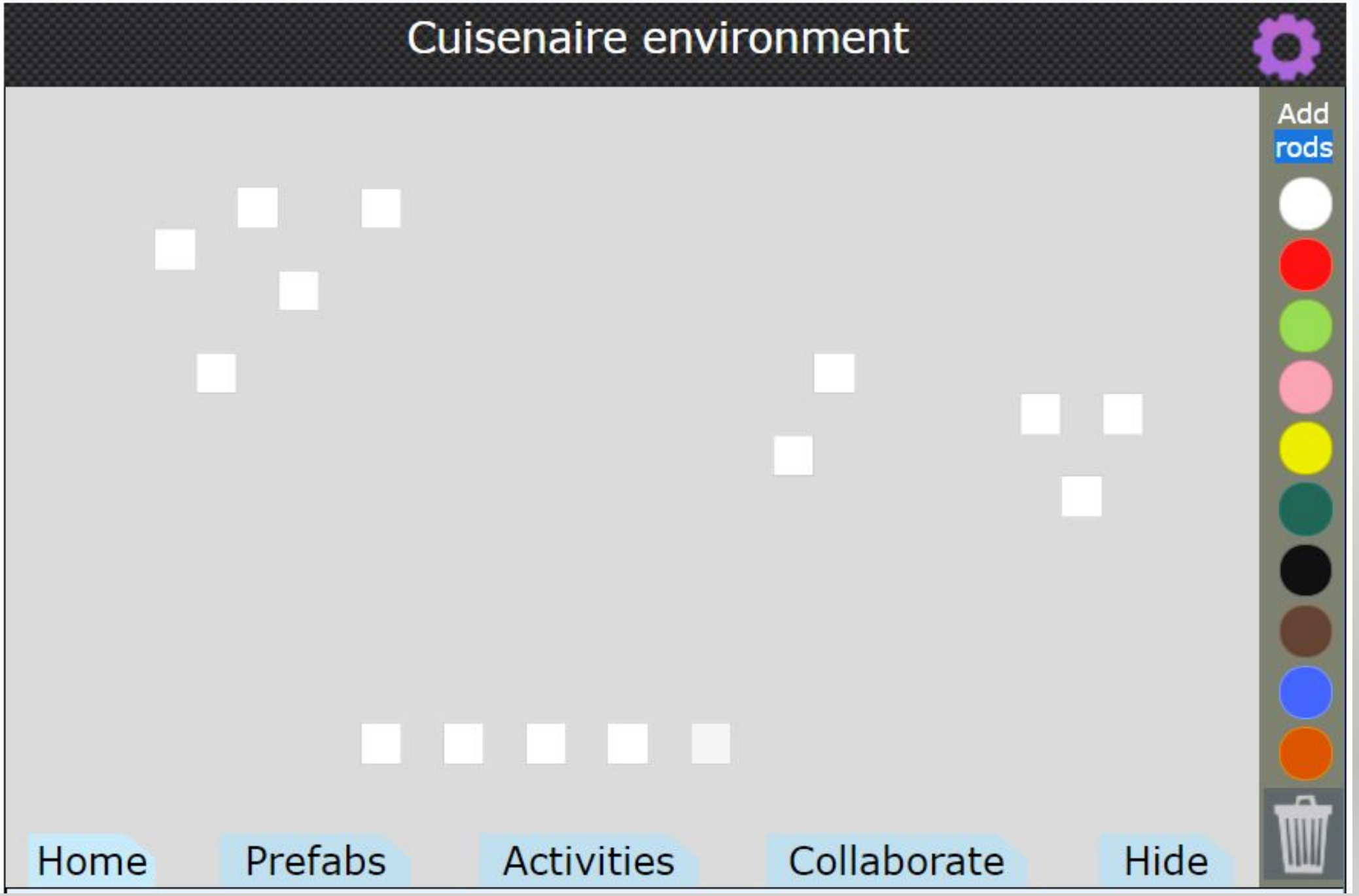
Cuisenaire environment



Are there other colours that make a "just enough" row on orange?

Add rods

Home Prefabs Activities Collaborate Hide

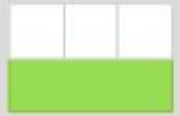


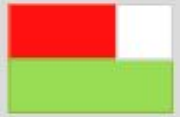
Arrangement or order do not affect count.

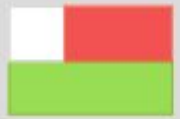
3 light green
4 pink
2 brown
randomize

Cuisenaire environment

Eventually want to move to what makes up a 3, for example.



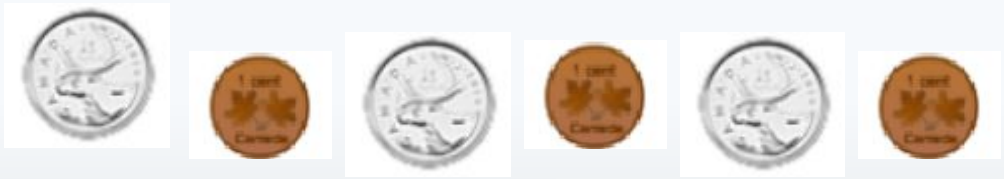




Add rods

Home Prefabs Activities Collaborate Hide

Let's make a pattern



Can you copy the pattern?

Can you name the coins in the pattern?

What do you think will come next?

Next 5 Levels (Our Journey to June)

Level 6: Verbally Count to 10 & Cardinality to 5 (counter of small amount).

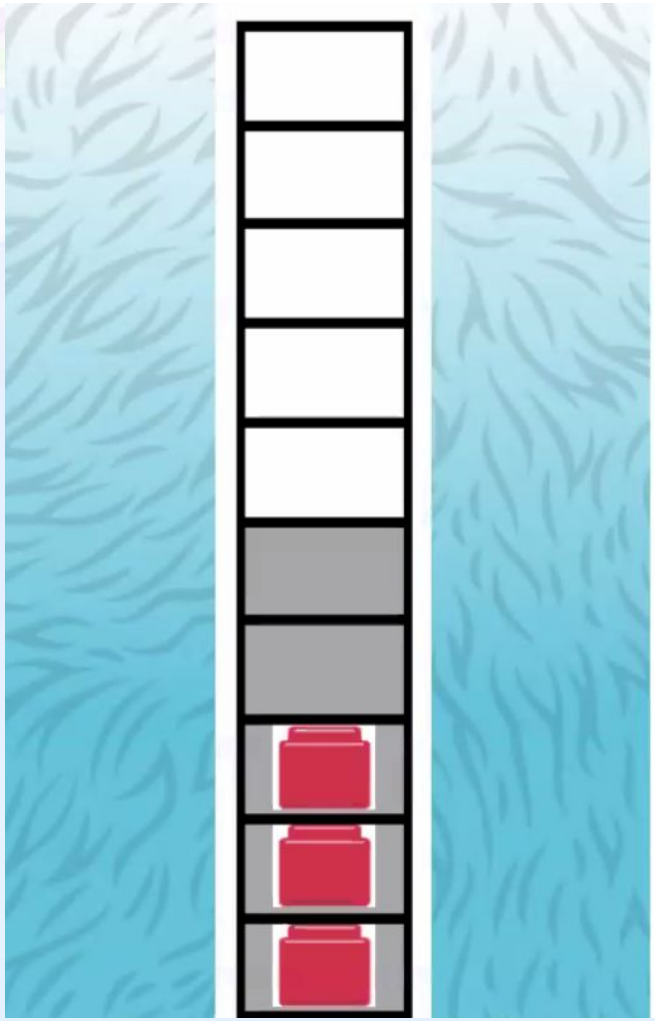
Level 7: Verbally Counting to 10, Cardinality to 10 and Producing a small set up to 4.

Level 8: Verbally Counting to 10, Producing a set to 10; Count structured arrangements to 10. Write a number to represent 10. Find the number just before or after only by counting up from 1.

Level 9: Counting Objects up to 10 and then in increasing steps up to 30. Counting objects in different arrangements. They can count and self-correct.

Level 10: Counting Backwards from 10.

Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022



Morin and Samelson (2009) argue that this version of the ten frame helps students see various concepts with counting, and a variety of number relationships. So here students would see the number 3. They can see that it is 2 more to 5. The can see that it is 7 away from 10. They would always start at the bottom and count up. They can see that the next number is larger than the number below it.

Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

Alternate version of 10 Frames

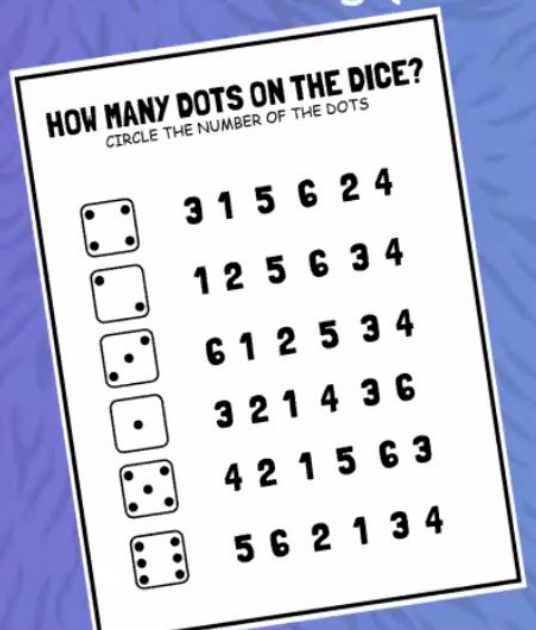
Dr. N Newton suggests making an interactive 10 frame (20 frame) out of a shower curtain and duct tape.

Number [Paths]

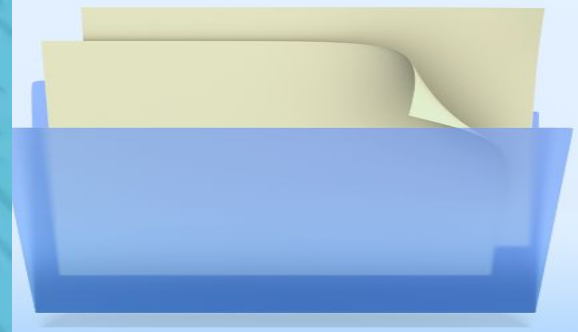
Plastic plates

Worksheet or Bingo?

Games are a great playful way to get children to engage in powerful mathematical thinking (Reed & Young, 2018).



Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022



Research on Number Lines

"Experience moving physically along numbers sequenced in a line helps children develop a 'mental number line'—a spatial representation of quantity that helps them reason about which is more and how much more."YM

Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

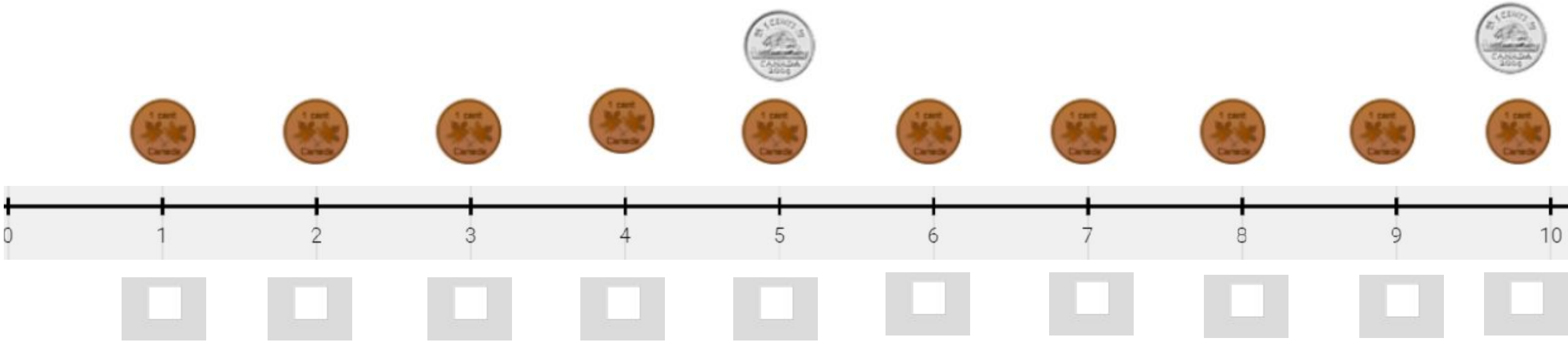
Number Line

Students Internalize Concepts (near, far, more, less, before, after, one more or two more)

Students can compare numbers

Teachers must build vocabulary throughout the activity

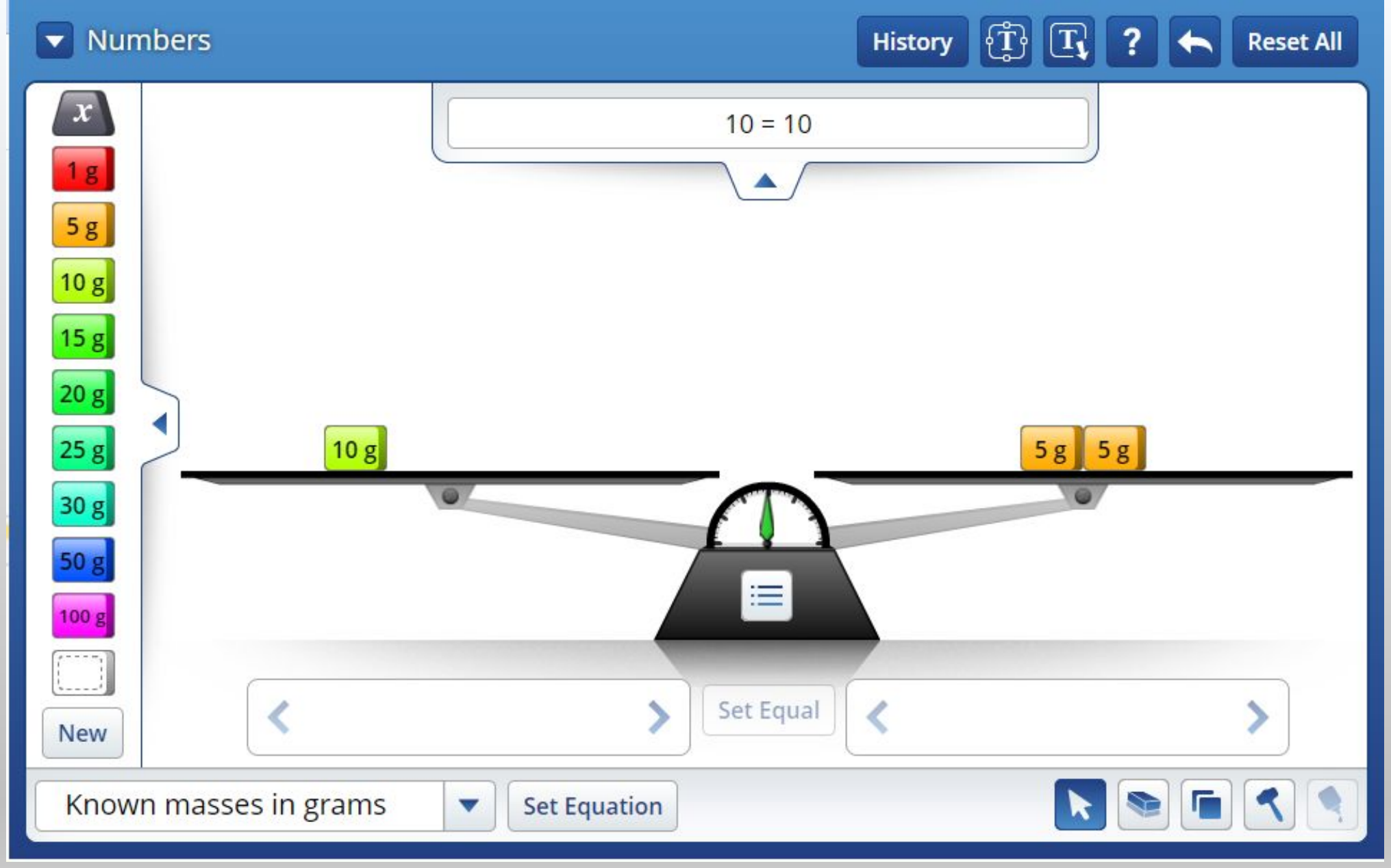
Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022



Use 1 cm grid to make a number line and using cuisenaire rods to show how far you have gone on the number line.

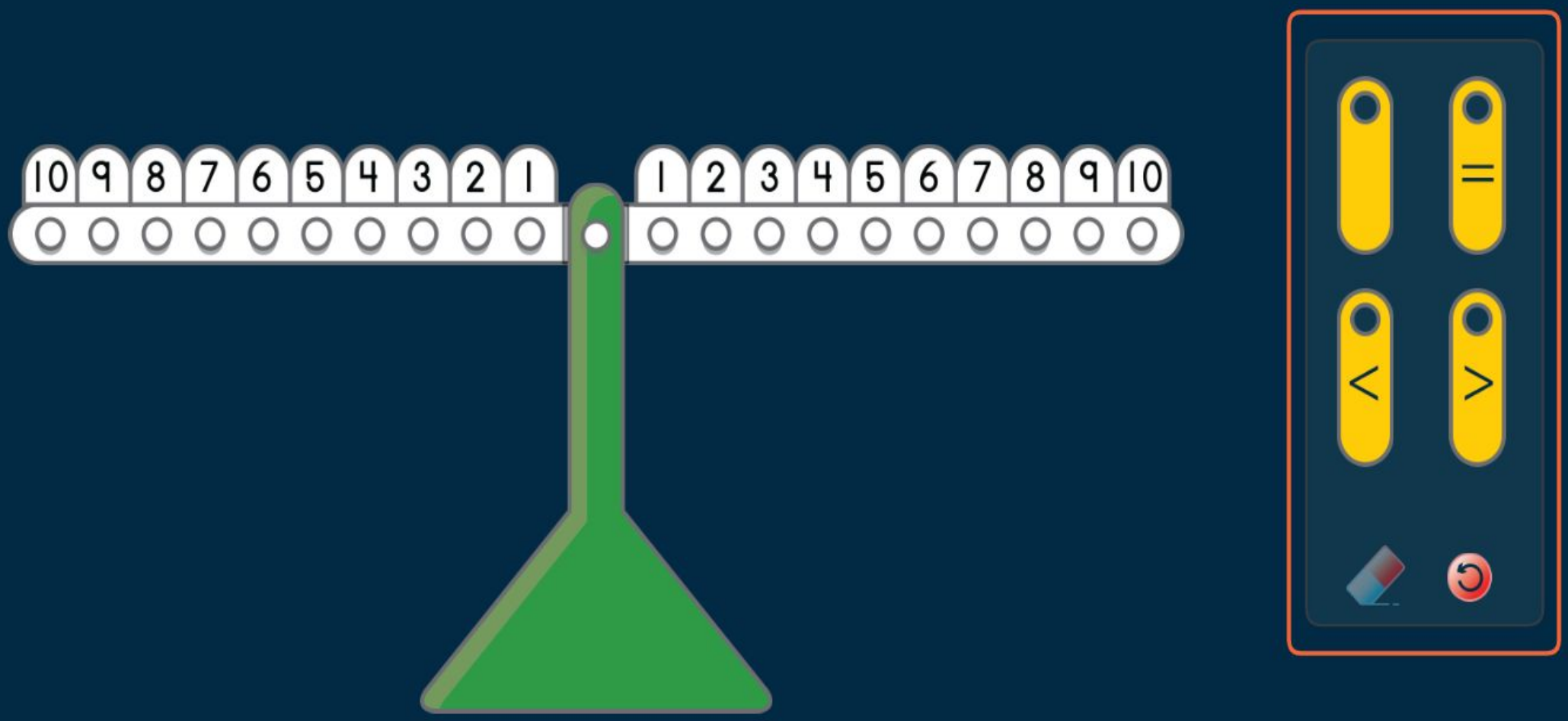
Activities and Strategies to Support learning

The following ar a collection of games and strategies to support the transition from counting from 5 Mastery to 10.



Link for balance

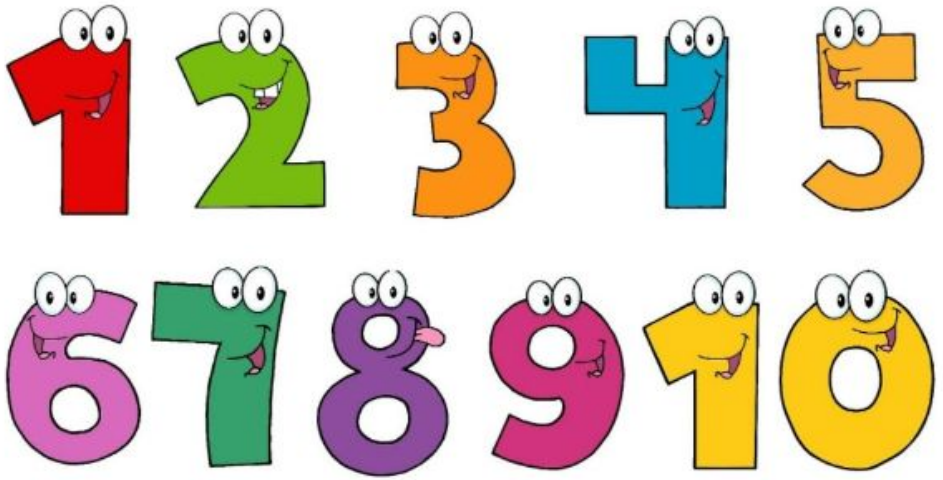
Link for most needed Manipulatives



[Link]

Intervention as Strategies and Assessment

Teacher Led

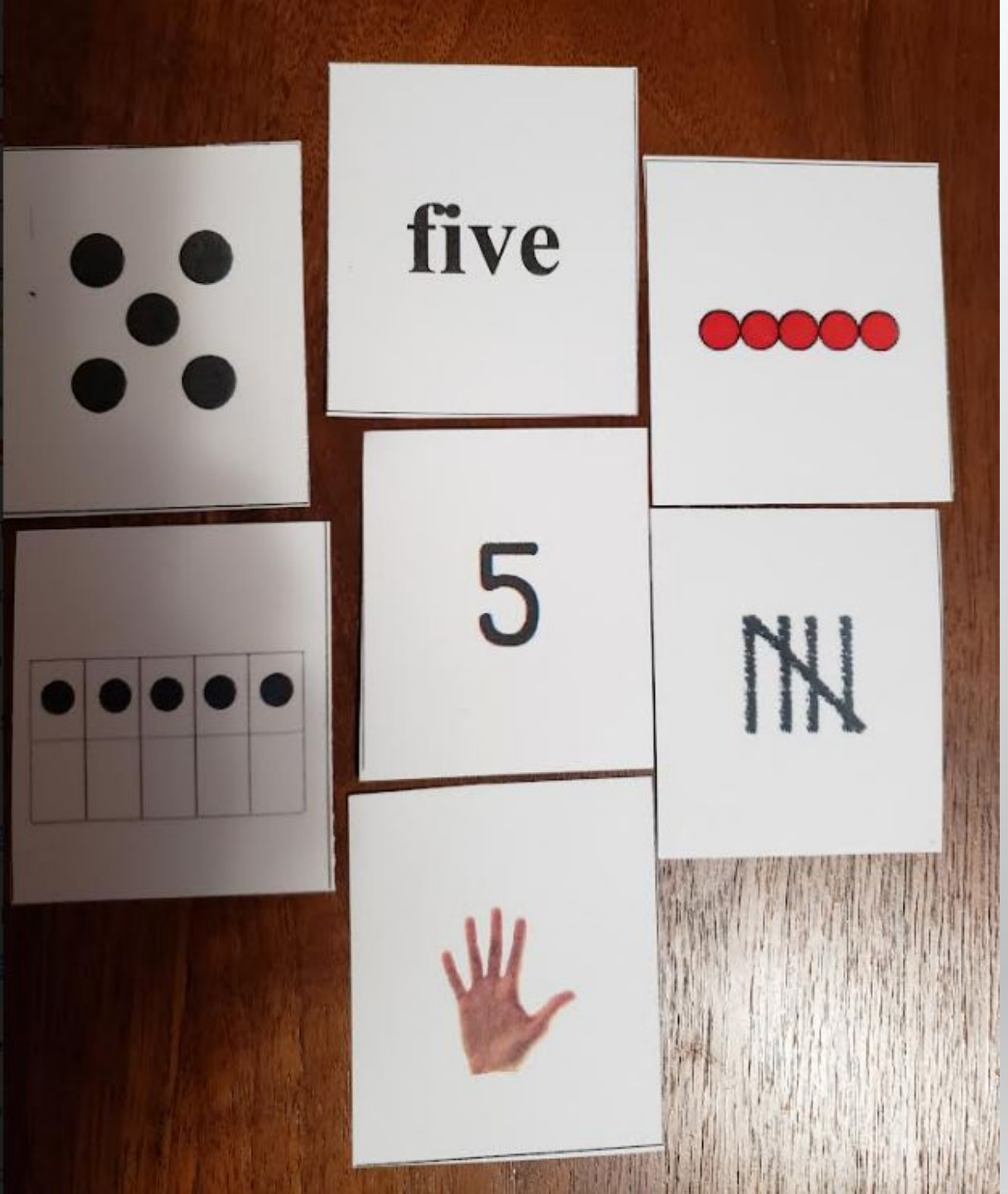


Educational Assistant Led Interventions


four
4


5
4


four
6



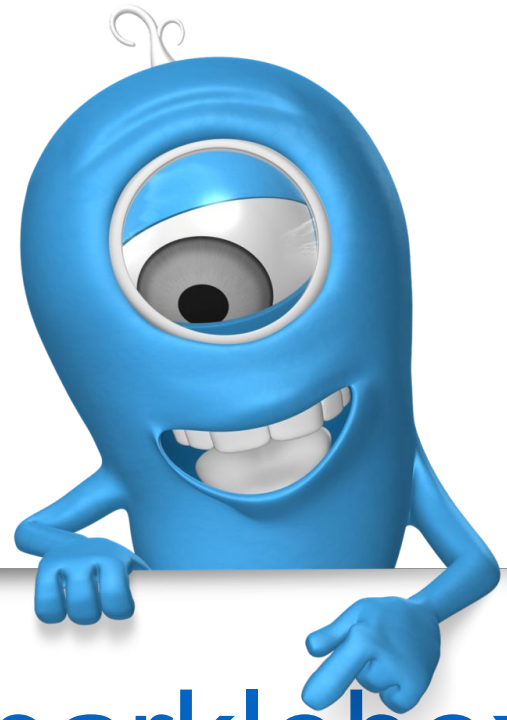
Using subitizing cards to match various representations of a number.

•Strategies or Activities to meet Outcomes

- Let's Make Ten — Decomposing Numbers to 10
- On and Off — Decomposing Numbers Less than 10 into pairs
- Jumping Frogs — Counting by One's
- Buzzing Numbers — Comparing Numbers
- Going Buttons — Counting and Comparing Numbers to 10

Look in the WRPS Division Folder for these Activities

Learning Trajectories



Sparklebox

Numberlines and resources

Thank you!

Chris Zarski
czarski@carcpd.ab.ca