Unpacking the New Grade 1 Math

Provincial

November 24, 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.

During this session we will have another look at December/January and February. Specifically we will look at strategies and manipulatives for interpreting, representing and explaining quantities(including with money), addition and subtraction with composition and decomposition and equal sharing. We will be using Cuisenaire rods as one of our tools. Either have them in front of you or you can do them virtually.

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)
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November

1N1.2 Students interpret and explain quantities to 100.(to 50)

- Each number counted includes all previous numbers (counting principle: hierarchical inclusion)
- A quantity can be determined by counting more than one object in a set at a time.

1N1.3 Students interpret and explain quantities to 100.(to 50)

- A quantity can be perceived as the composition of smaller quantitiesQuantity can be partitioned by sharing or grouping.

1N1.1 Students interpret and explain quantities to 100.(to 50)

- Quantity is expressed in words and numerals based on patterns.
- Quantity in the world is represented in multiple ways. including with money.

1N1.4 Students interpret and explain quantities to 100.(to 50)

- A quantity can be perceived as the composition of smaller quantities.

1N1.5 Students interpret and explain quantities to 100.(to 50)

- Two quantities are equal when there is the same number of objects in both sets.
- Equality is a balance between two quantities.

quantities within 20.(to 10)

- Quantity can be partitioned by sharing or grouping.

1N2. 1 Students examine addition and subtraction within 20.(introduce)

- Addition and subtraction are processes that describe the composition and decomposition of quantity.

December

Number: Quantity is measured with numbers that enable counting, labelling, comparing and operating.

1N1.2 Students interpret and explain quantities to 100.(to 50)

- Each number counted includes all previous numbers (counting principle: hierarchical inclusion)
- A quantity can be determined by counting more than one object in a set at a time.

1N1.3 Students represent equal sharing and grouping of quantities within 20.

- Quantity can be partitioned by sharing or grouping.

1N1.1 Students interpret and explain quantities to 100..(to 50)

- Quantity is expressed in words and numerals based on patterns.
- Quantity in the world is represented in multiple ways. including with money.

1N1.4 Students interpret and explain quantities to 100..(to 50)

- A quantity can be perceived as the composition of smaller quantities.

1N1.5 Students interpret and explain quantities to 100..(to 50)

- Two quantities are equal when there is the same number of objects in both sets.
- Equality is a balance between two quantities.

1N2. 1 Students examine addition and subtraction within 20.

- Addition and subtraction are processes that describe the composition and decomposition of quantity

January

1N1.2 Students interpret and explain quantities to 100.

- Each number counted includes all previous numbers (counting principle: hierarchical inclusion)
- A quantity can be determined by counting more than one object in a set at a time.

1N1.3 Students represent equal sharing and grouping of quantities within 20.

- Quantity can be partitioned by sharing or grouping.

1N1.1 Students interpret and explain quantities to 100.

- Quantity is expressed in words and numerals based on patterns.
- Quantity in the world is represented in multiple ways. including with money.

1N1.4 Students interpret and explain quantities to 100.

- A quantity can be perceived as the composition of smaller quantities.

1N1.5 Students interpret and explain quantities to 100.

- Two quantities are equal when there is the same number of objects in both sets.
- Equality is a balance between two quantities.

1N2. 1 Students examine addition and subtraction within 20.

- Addition and subtraction are processes that describe the composition and decomposition of quantity

How can quantity be communicated?

1N1.1 Students interpret and explain quantities to 100.

Knowledge	Understanding	Skills & Procedures
A numeral is a symbol or group of symbols used to represent a number. The absence of quantity is represented by 0.	Quantity is expressed in words and numerals based on patterns. Quantity in the world is represented in multiple ways.	Represent quantities using words, numerals, objects, or pictures. Identify a quantity of 0 in familiar situations.

1N1.2 Students interpret and explain quantities to 100.

Knowledge	Understanding	Skills & Procedures
Counting can begin at any number. Counting more than one object at a time is called skip counting.	Each number counted includes all previous numbers (counting principle: hierarchical inclusion). A quantity can be determined by counting more than one object in a set at a time.	Count within 100, forward by 1s, starting at any number, according to the counting principles. Count backward from 20 to 0 by 1s. Skip count to 100, forward by 5s and 10s, starting at 0. Skip count to 20, forward by 2s, starting at 0.

1N1.3 Students interpret and explain quantity to 100.

Knowledge	Understanding	Skills & Procedures
Sharing involves partitioning a quantity into a certain number of groups. Grouping involves partitioning a quantity into groups of a certain size.	Quantity can be partitioned by sharing or grouping.	Partition a set of objects by sharing and grouping. Demonstrate conservation of number when sharing or grouping.

1N1.4 Students interpret and explain quantity to 100.

Knowledge	Understanding	Skills & Procedures
Familiar arrangements of small quantities facilitate subitizing.	A quantity can be perceived as the composition of smaller quantities.	Recognize quantities to 10.

1N1.5 Students interpret and explain quantity to 100.		
Knowledge	Understanding	Skills & Procedures
Comparisons of quantity can be described by using words such as • equal • not equal • less • more Equality can be modelled using a balance. The equal sign, =, is used to show equality between two quantities. The unequal sign, ≠, is used to show that two quantities are not equal.	Two quantities are equal when there is the same number of objects in both sets. Equality is a balance between two quantities.	Investigate equal and unequal quantities, including using a balance model. Identify numbers that are one more, two more, one less, and two less than a given number. Represent a quantity relative to another, including symbolically.

How can addition and subtraction provide perspectives of number?		
1N2.1 Students examine addition and subtraction within 20.		
Knowledge	Understanding	Skills & Procedures
Quantities can be composed or decomposed to model a change in quantity. Addition can be applied in various contexts, including • combining parts • to find the whole increasing an existing quantity Subtraction can be applied in various contexts, including • comparing two quantities taking away • one quantity from another finding a part of a whole Addition and subtraction can be modelled using a balance.	Addition and subtraction are processes that describe the composition and decomposition of quantity.	Visualize quantities between 10 and 20 as compositions of 10 and another quantity. Model addition and subtraction within 20 in various ways, including with a balance. Relate addition and subtraction to various contexts involving composition or decomposition of quantity.

Grade 1 Skills and Concepts December - January

Represent quantities using words, numerals, objects, or pictures.
Represent a quantity relative to another, including symbolically.
Count within 100, forward by 1s, starting at any number, according to the counting principles.
Count backward from 20 to 0 by 1s.
Skip count to 100, forward by 5s and 10s, starting at 0.
Skip count to 20, forward by 2s, starting at 0.
Partition a set of objects by sharing and grouping.
Demonstrate conservation of number when sharing or grouping.
Describe a quantity in relation to a purpose or need using comparative language.
Solve problems in familiar situations by counting.
Relate addition and subtraction to various contexts involving composition or decomposition of quantity.
Identify a quantity of 0 in familiar situations.
Identify numbers that are one more, two more, one less, and two less than a given number.
Investigate equal and unequal quantities, including using a balance model.
Recognize quantities to 10.
Visualize quantities between 10 and 20 as compositions of 10 and another quantity.
Model addition and subtraction within 20 in various ways, including with a balance.

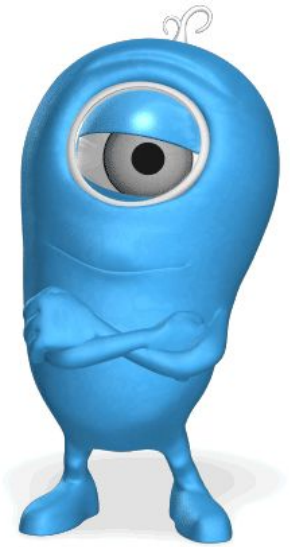
Represent
Count
Identify
Relate/Visualize/Model

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

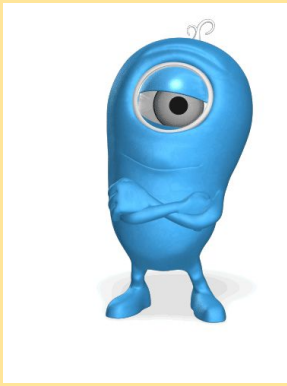
Pictures of the actual thing being counted.	More Abstract Representation of the thing being counted.	Symbolic Representation
		

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

Make Chocolate 10 frames!!!!

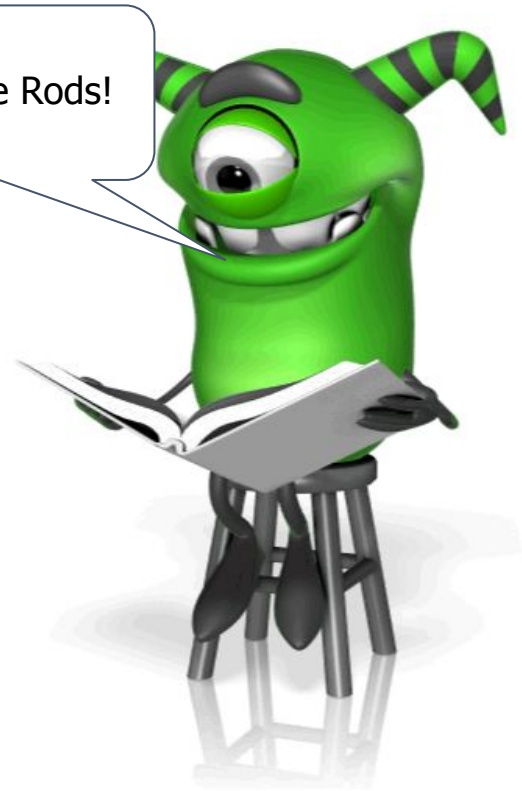
Pictures of the actual thing being counted.	More Abstract Representation of the thing being counted.	Symbolic Representation
		

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



Names of coins, quantity, attributes …

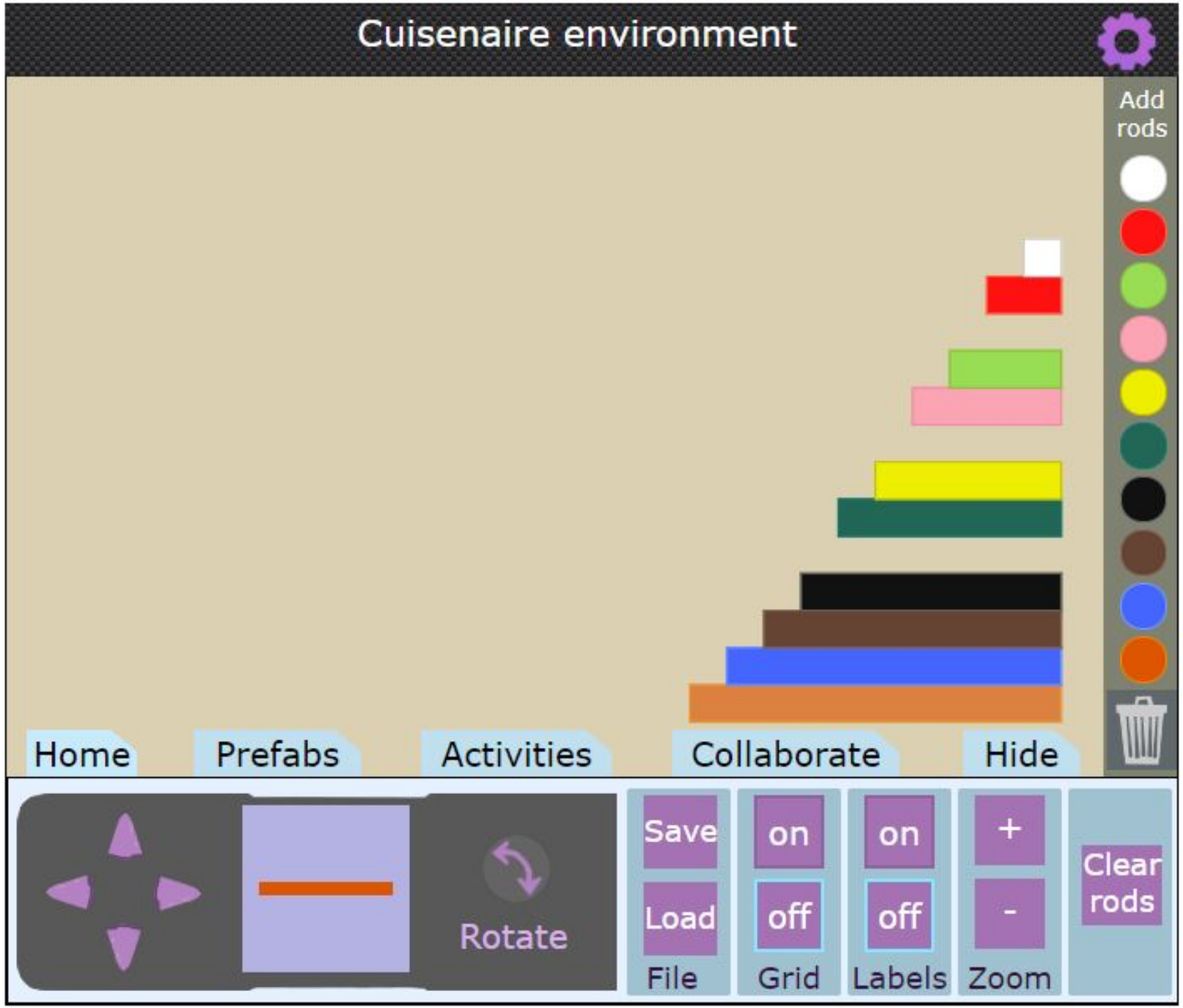
Adapted from Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

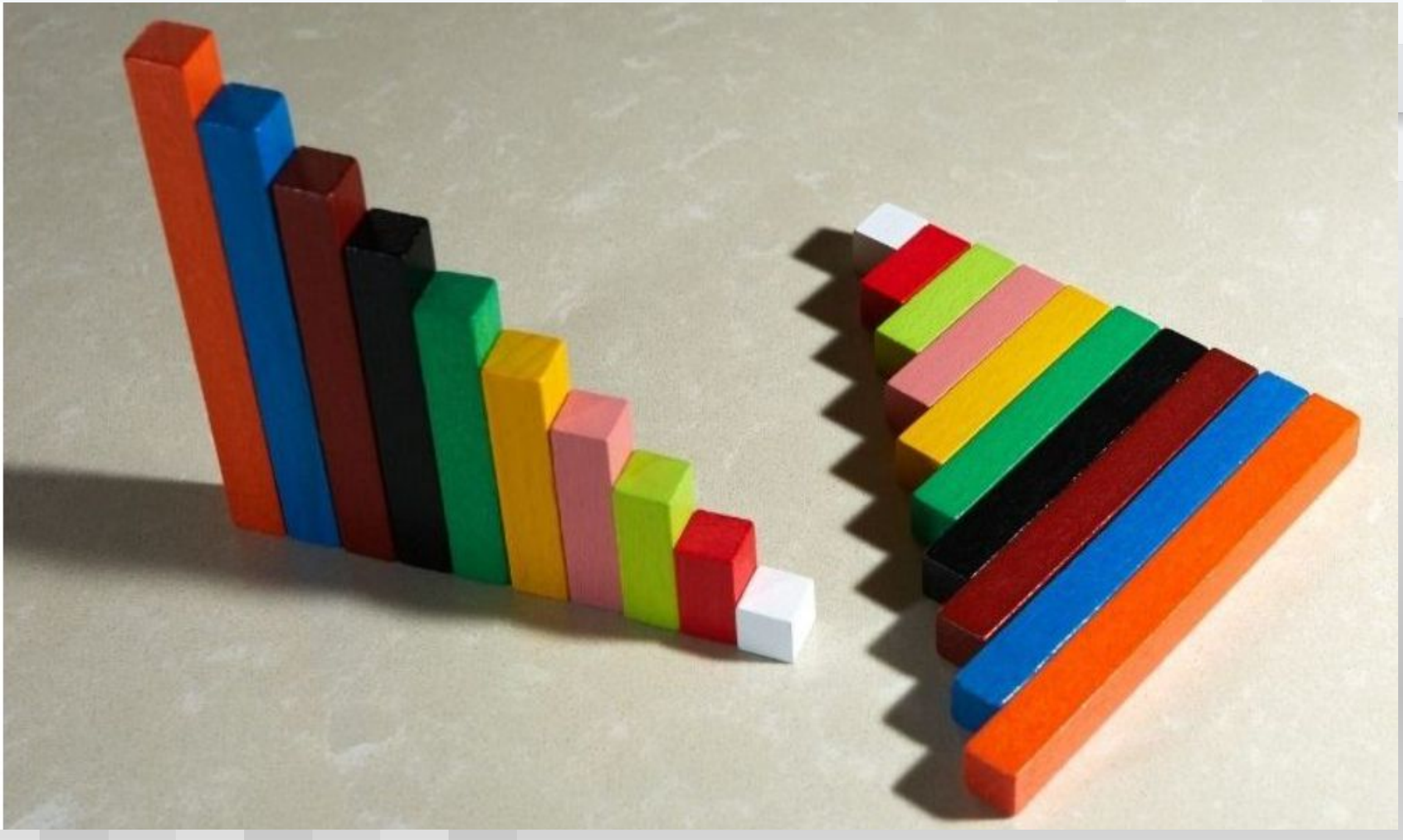


Cuisenaire Rods

Virtual Manip

Using Cuisenaire Rods



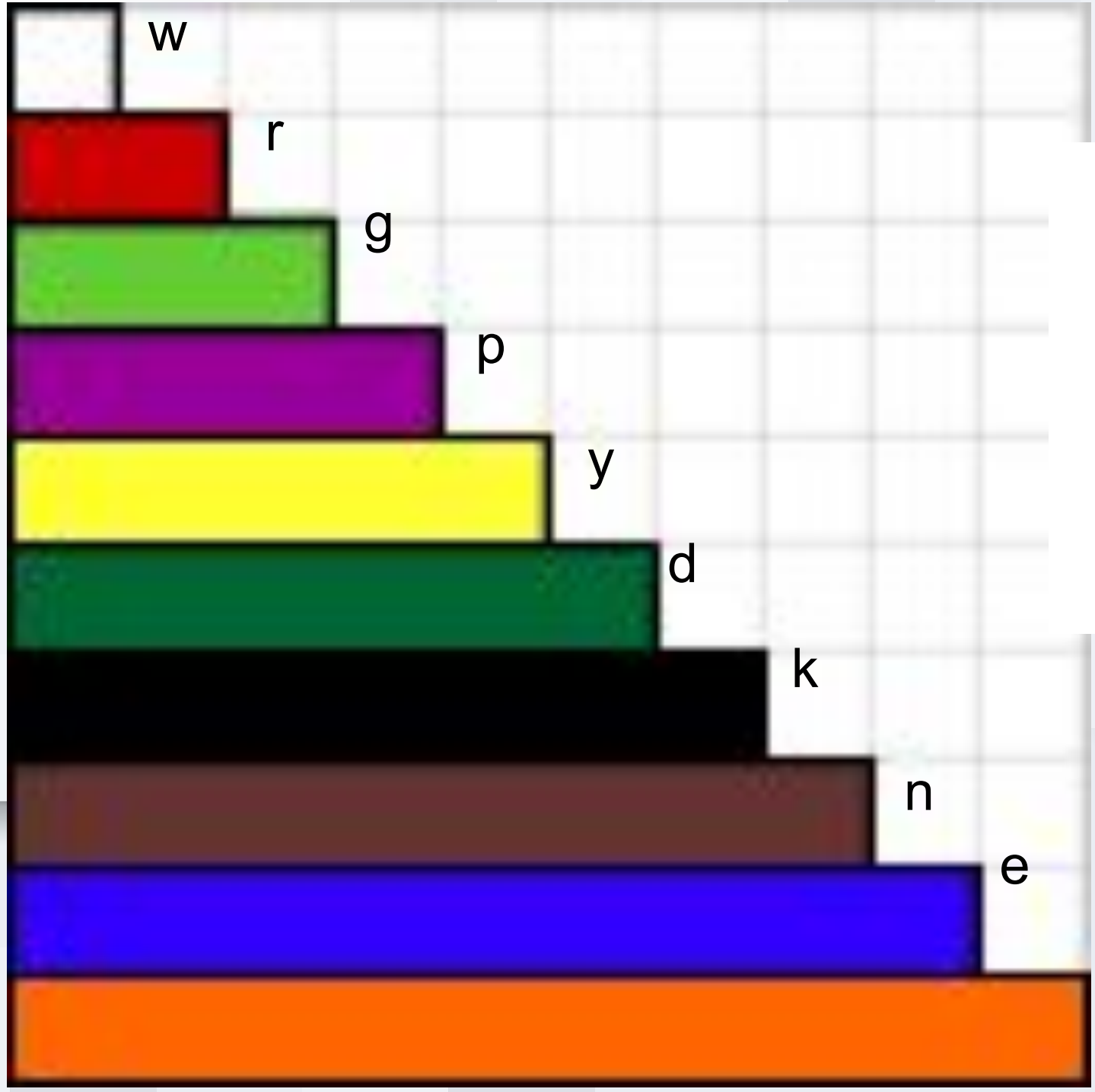


Giving quantity (number) to Cuisenaire Rods

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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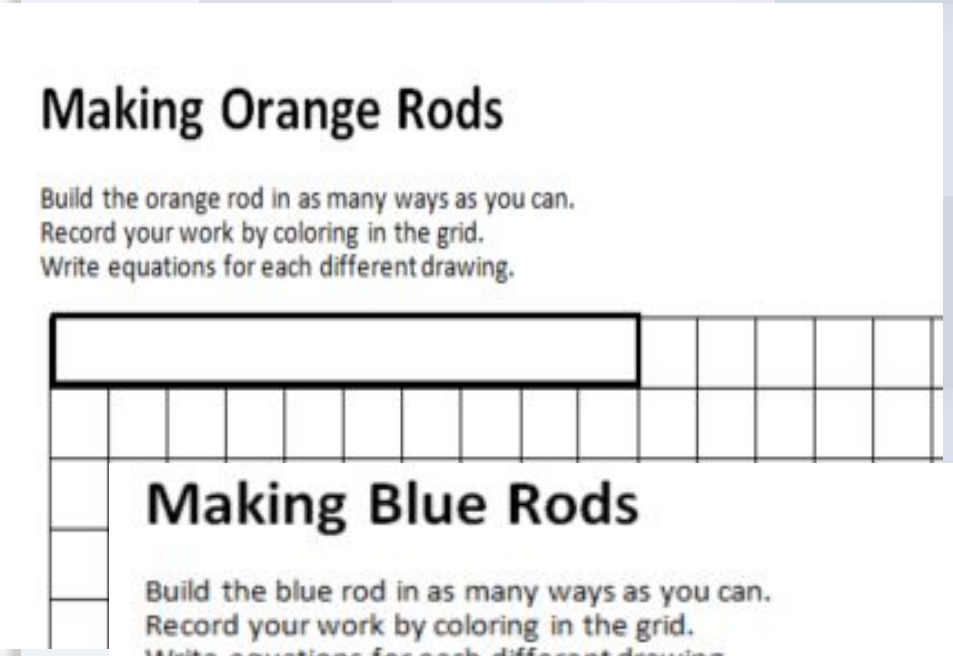
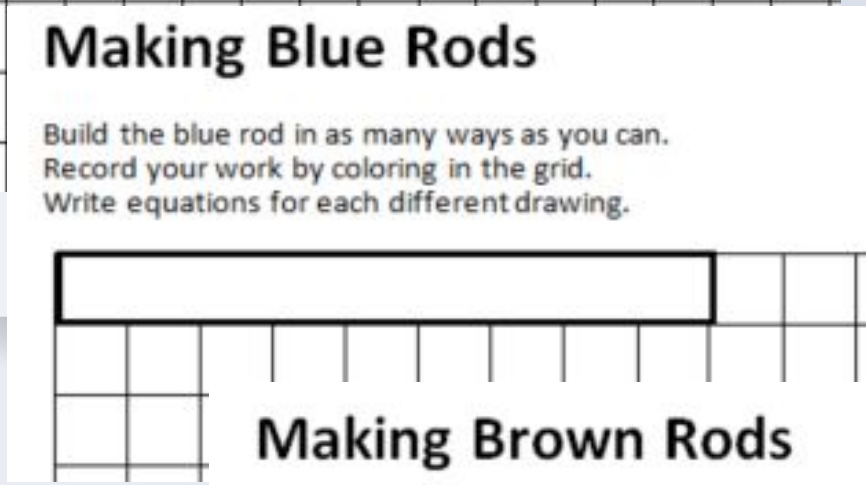
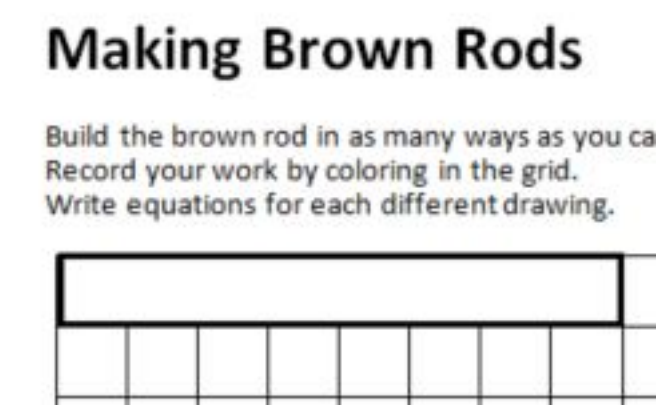

Making Orange Rods
Build the orange rod in as many ways as you can.
Record your work by coloring in the grid.
Write equations for each different drawing.


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.

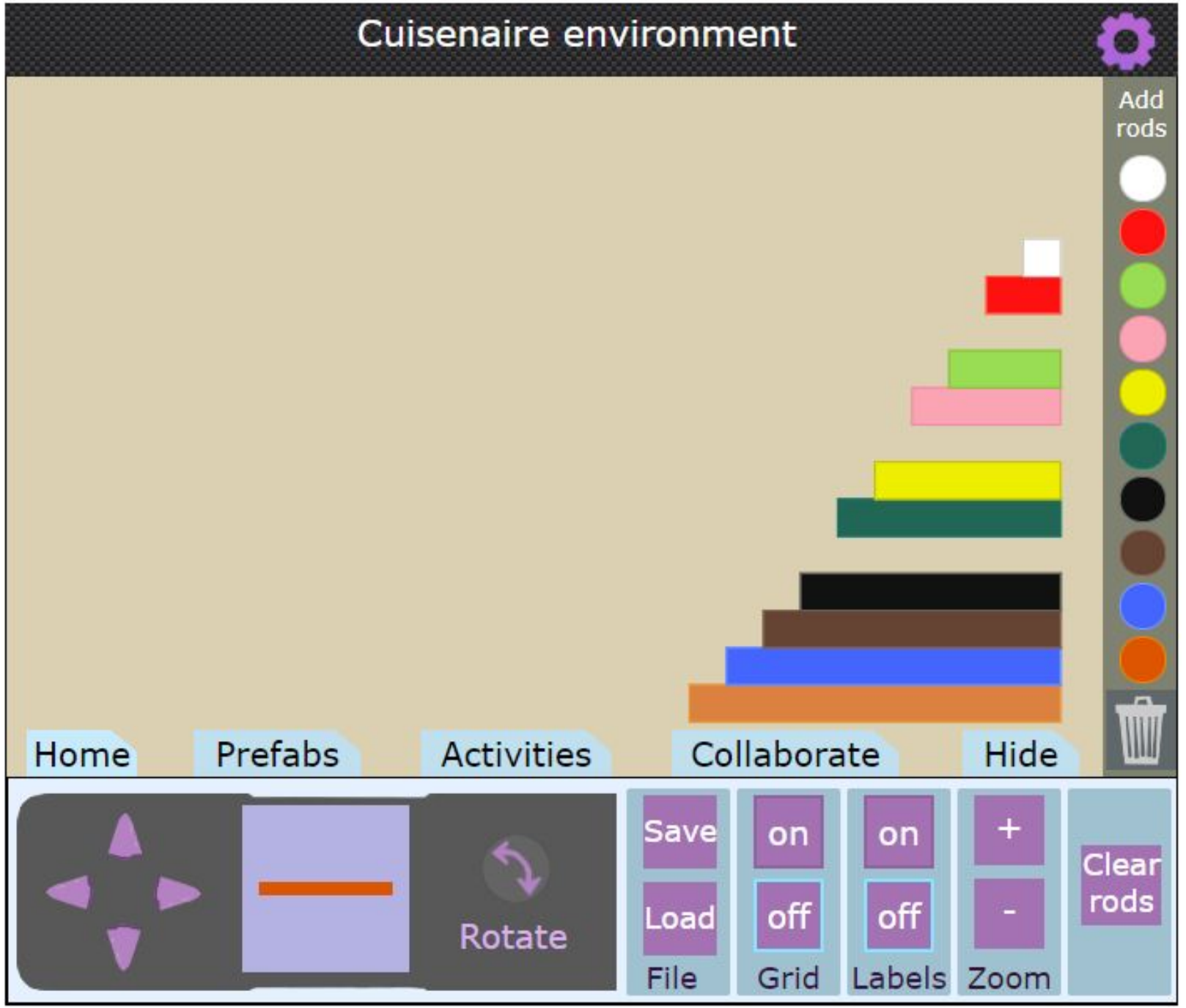

Making Brown Rods
Build the brown rod in as many ways as you ca
Record your work by coloring in the grid.
Write equations for each different drawing.

Using Comparative Language

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

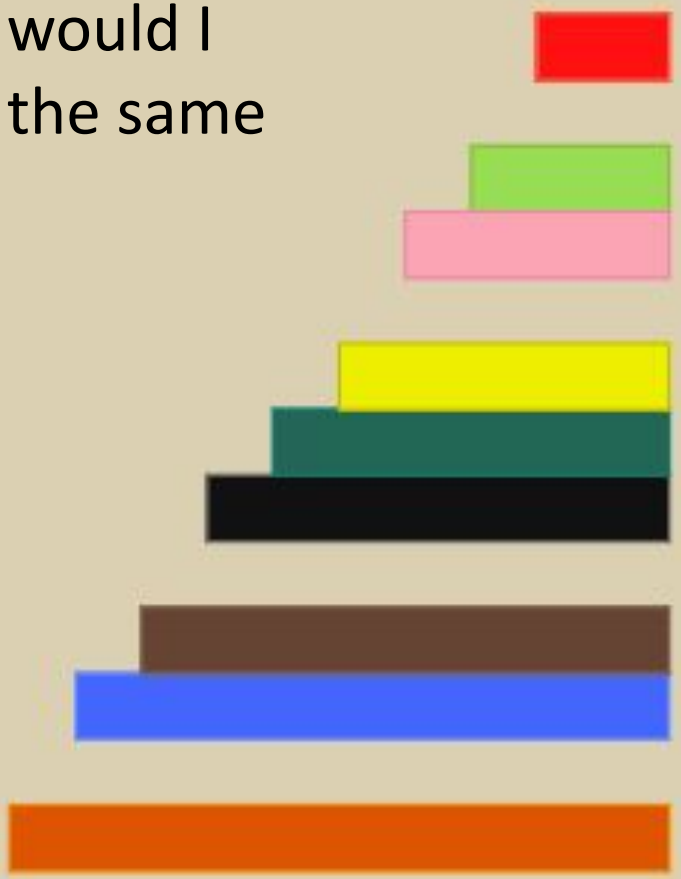
Comparative Language
- more
- same
- less
- enough
- not enough

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

Add rods

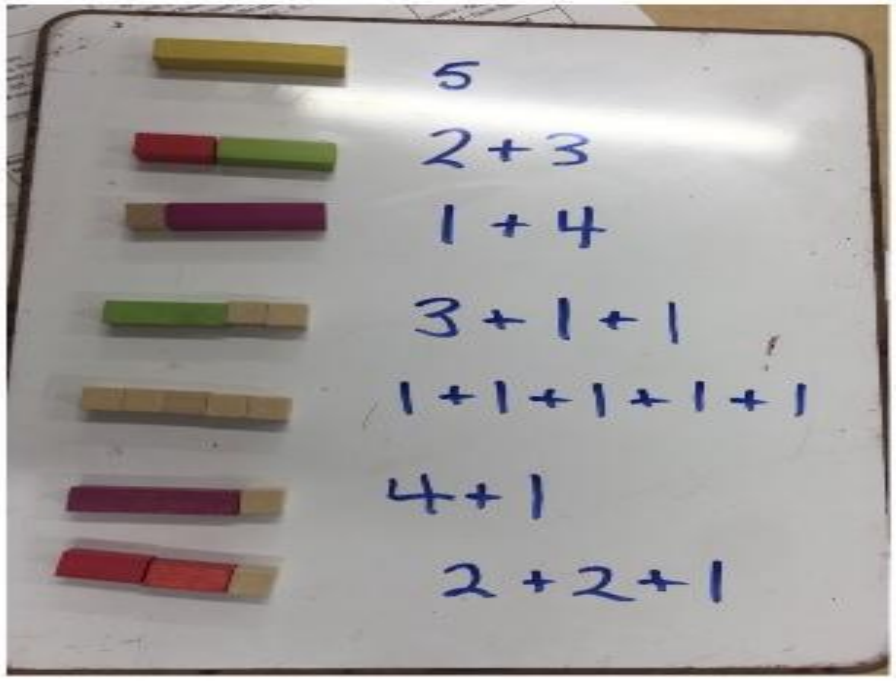
Eventually want to move to what makes up a 3, for example.

What two colours make up an orange?

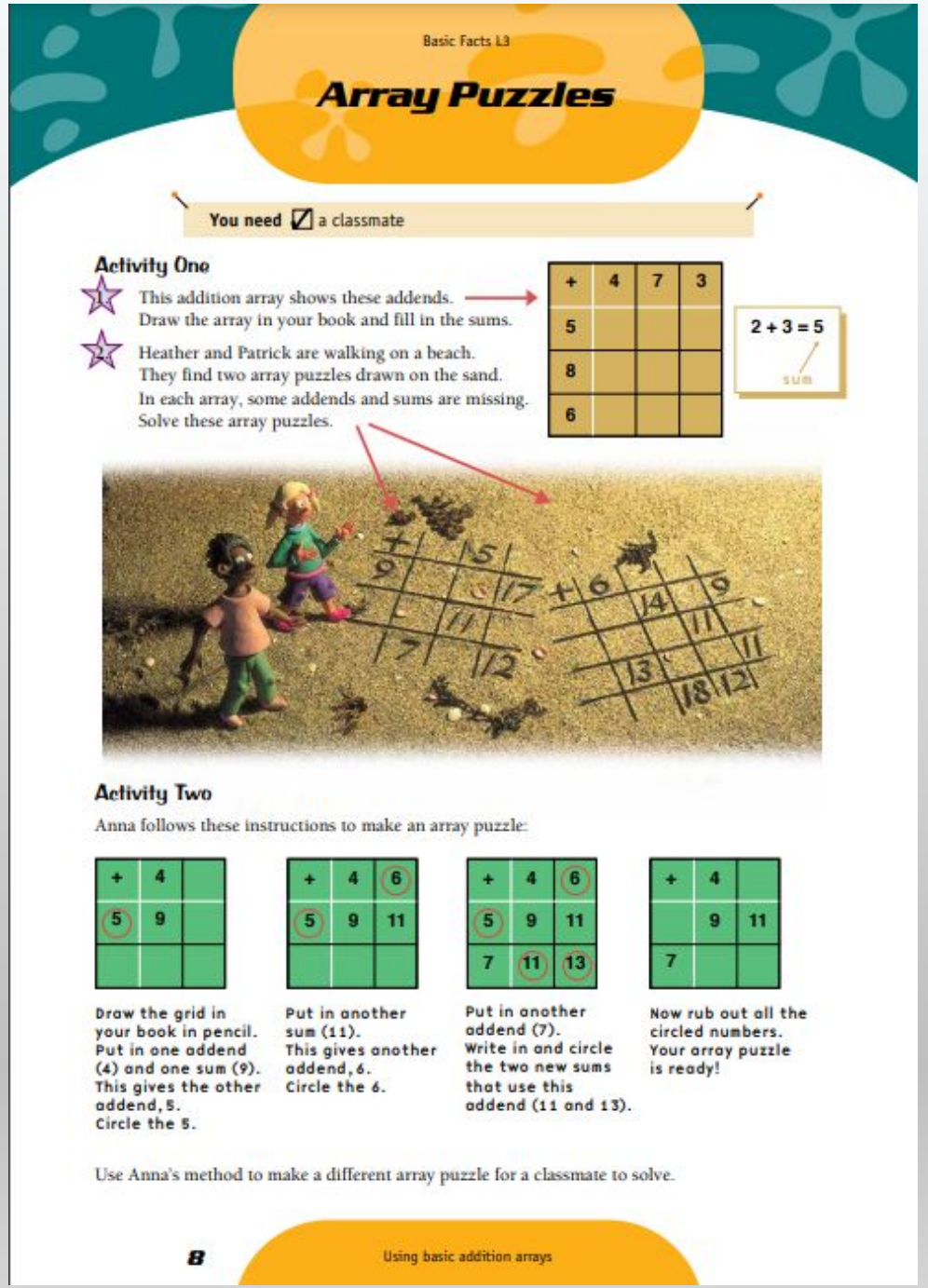
Home Prefabs Activities Collaborate Hide

1+1+2+3=10
8+2=10
10+0=10
7+3=10

How many ways can you show a number, decomposing numbers.



Concept Circles Promote Reasoning



Basic Facts L3

Array Puzzles

You need ☑ a classmate

Activity One

1. This addition array shows these addends. Draw the array in your book and fill in the sums.

+	4	7	3
5			
8			
6			

2 + 3 = 5 (sum)

2. Heather and Patrick are walking on a beach. They find two array puzzles drawn on the sand. In each array, some addends and sums are missing. Solve these array puzzles.

Activity Two

Anna follows these instructions to make an array puzzle:

+	4	
5	9	

Draw the grid in your book in pencil. Put in one addend (4) and one sum (9). This gives the other addend, 5. Circle the 5.

+	4	6
5	9	11

Put in another sum (11). This gives another addend, 6. Circle the 6.

+	4	6
5	9	11
7	11	13

Put in another addend (7). Write in and circle the two new sums that use this addend (11 and 13).

+	4	
	9	11
7		

Now rub out all the circled numbers. Your array puzzle is ready!

Use Anna's method to make a different array puzzle for a classmate to solve.

8 Using basic addition arrays

Using Basic Addition Facts to solve puzzles.

New Zealand Ministry

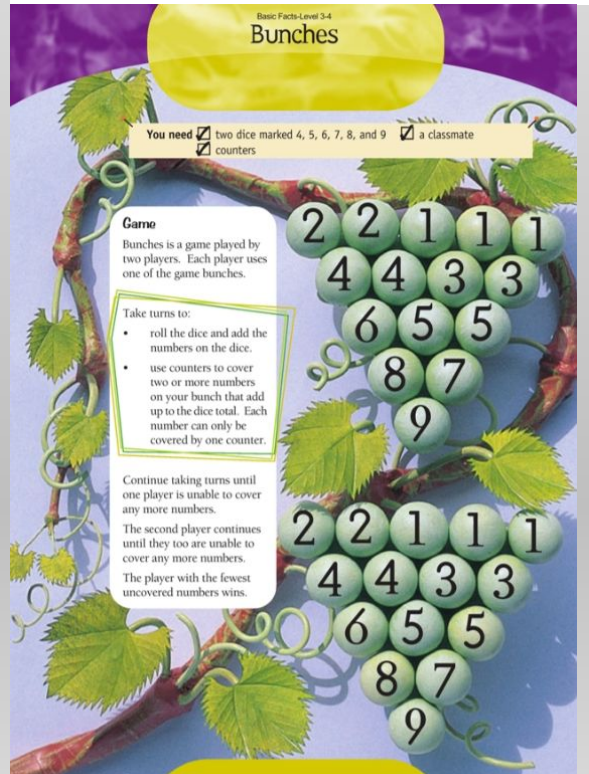
[Array Puzzles]

A Square of [Circles]

Using the numbers 1 – 9 put a different number in each circle. Arrange the numbers so that the sums of the three numbers on each side are

- all different sums
- all the same sums
- all even sums
- all odd sums

What is the biggest and smallest side sums that you can make?



Basic Facts-Level 3-4

Bunches

You need ☑ two dice marked 4, 5, 6, 7, 8, and 9 ☑ a classmate ☑ counters

Game

Bunches is a game played by two players. Each player uses one of the game bunches.

Take turns to:

- roll the dice and add the numbers on the dice.
- use counters to cover two or more numbers on your bunch that add up to the dice total. Each number can only be covered by one counter.

Continue taking turns until one player is unable to cover any more numbers.

The second player continues until they too are unable to cover any more numbers.

The player with the fewest uncovered numbers wins.

[Bunches]

[NZ Maths]

Next 5 Levels (Our Journey to June)

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

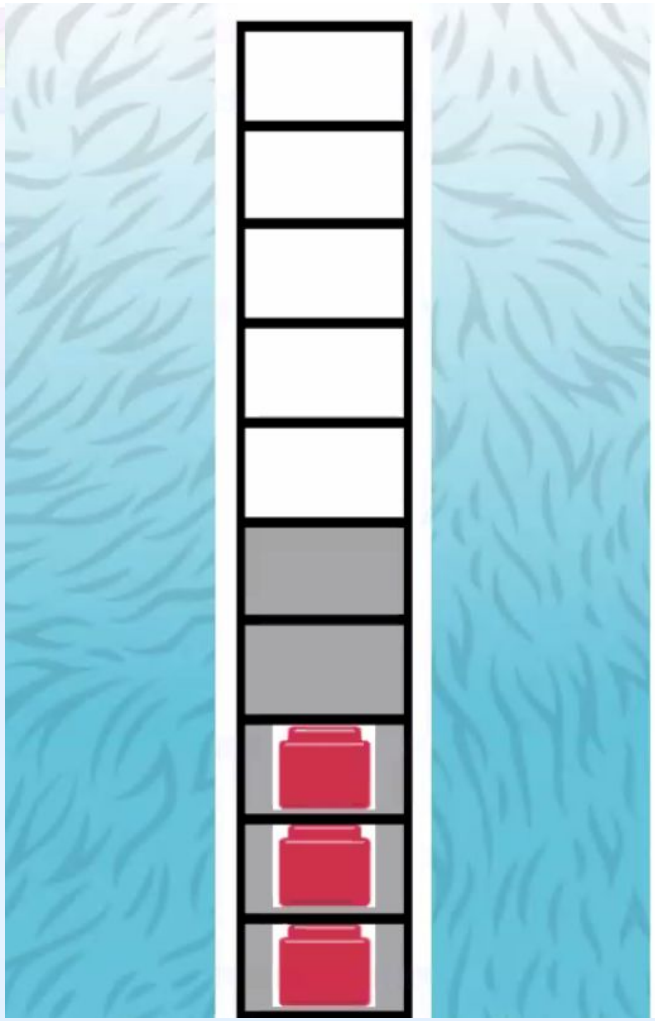
Level 7: Verbally Counting to 10, Cardinality to 10 and Producing a small set up to 4.

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

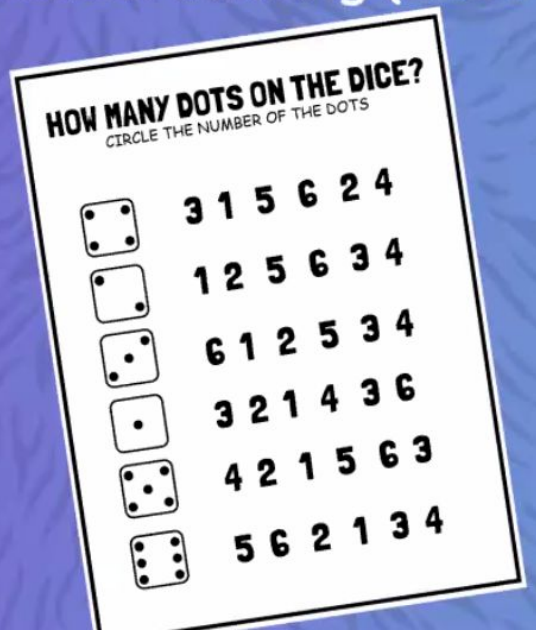
Alternate version of 10 Frames

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

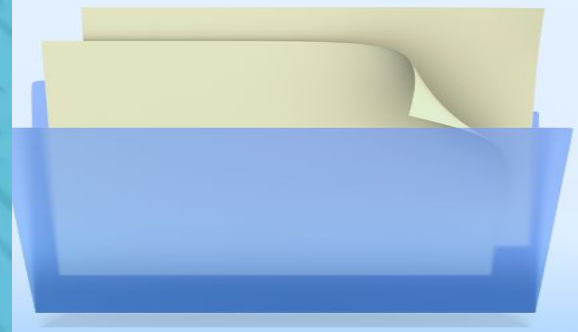
Plastic plates

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)

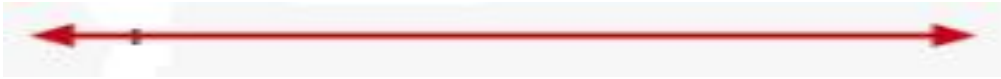
Students can compare numbers

Teachers must build vocabulary throughout the activity

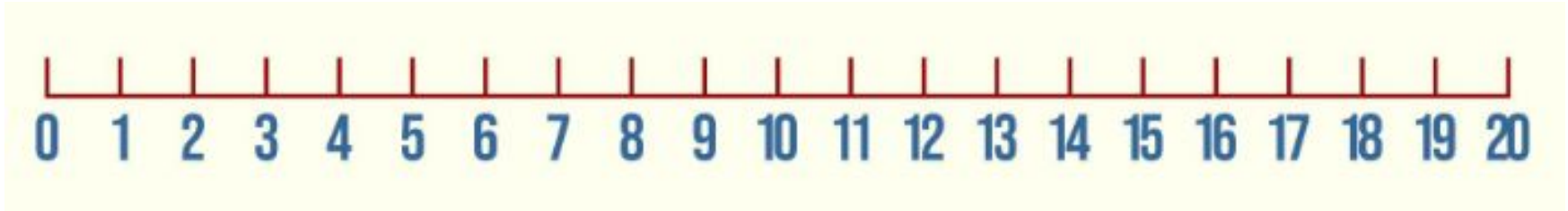
Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022

What is a Numberline?

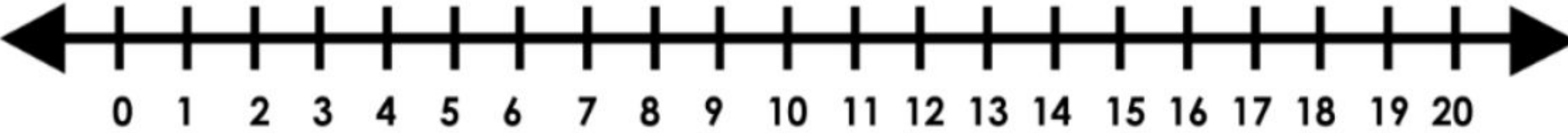
- A straight **horizontal** line
- It has arrows on the ends
- It has smaller **vertical** lines at **regular increments**
- Each of the vertical lines can have a number associated with it.

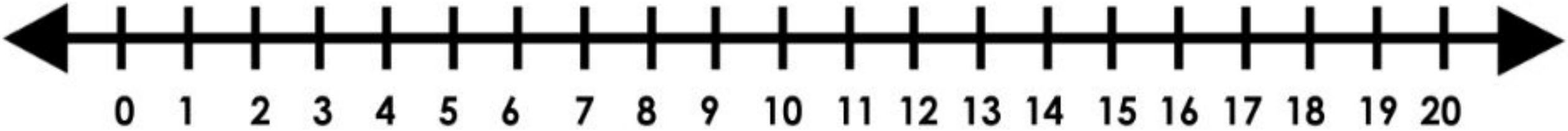


- From 0 to 1 is really important!



Looking at Numbers 1-20

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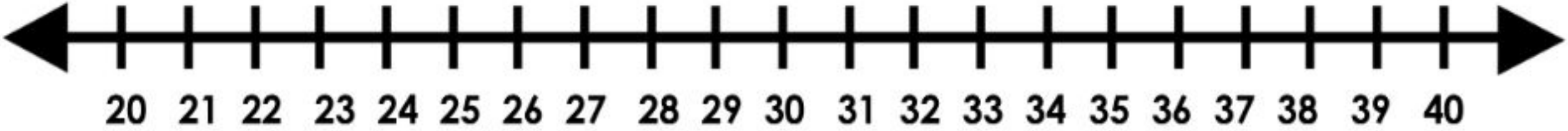
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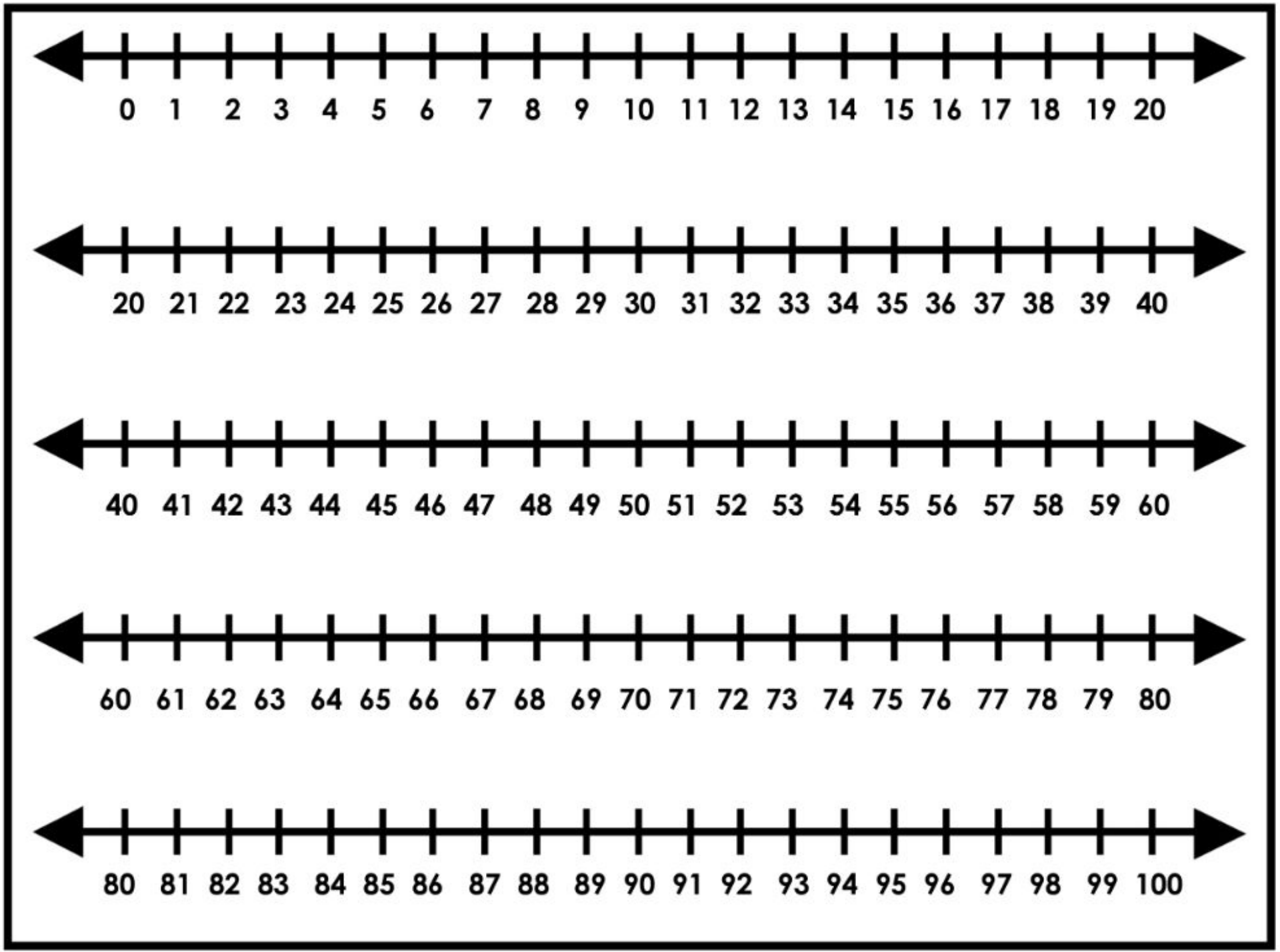
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40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

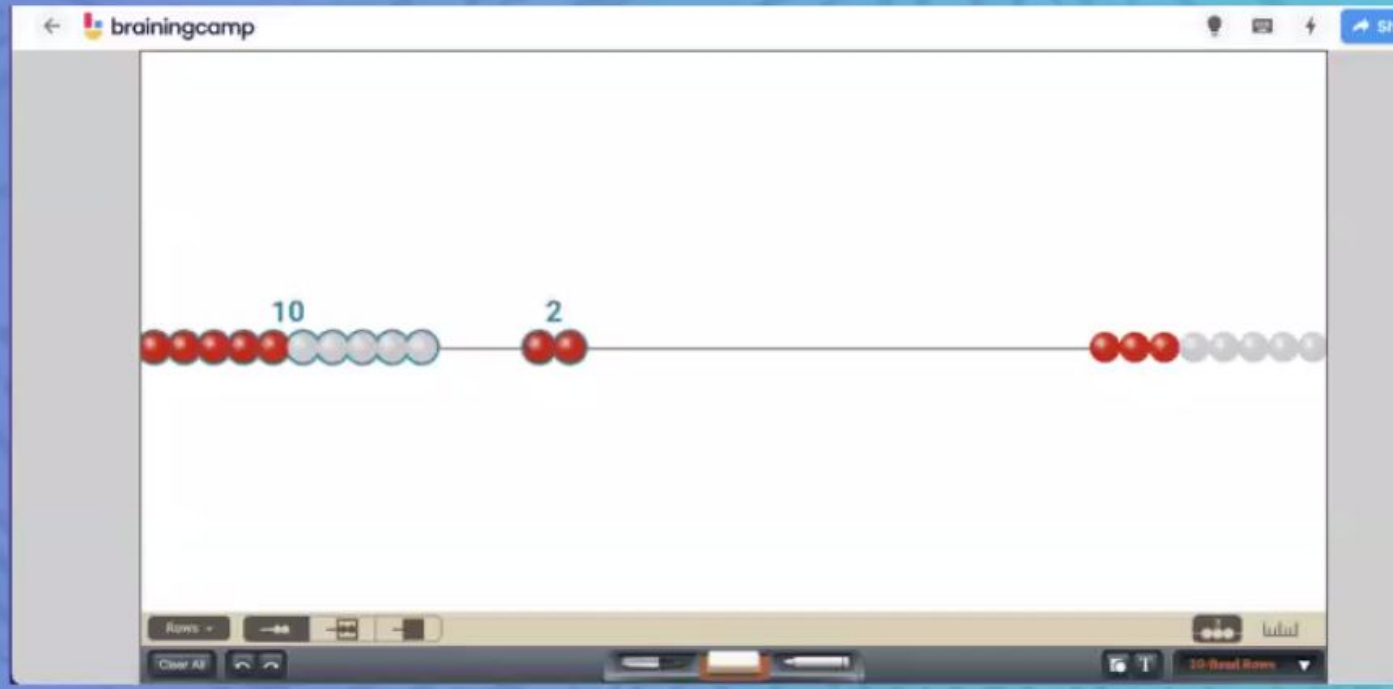
Counting Teen Numbers - Look out for

Omitting and Repeating Numbers

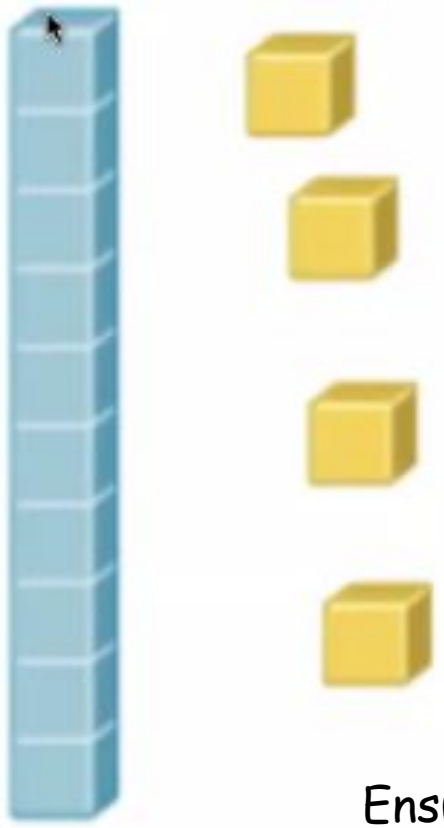
Skipping Numbers (Clements & Sarama, 2014, Fuson, 2012)

Students struggle with teen numbers... because they do not follow a pattern (Bamberger, 2010).

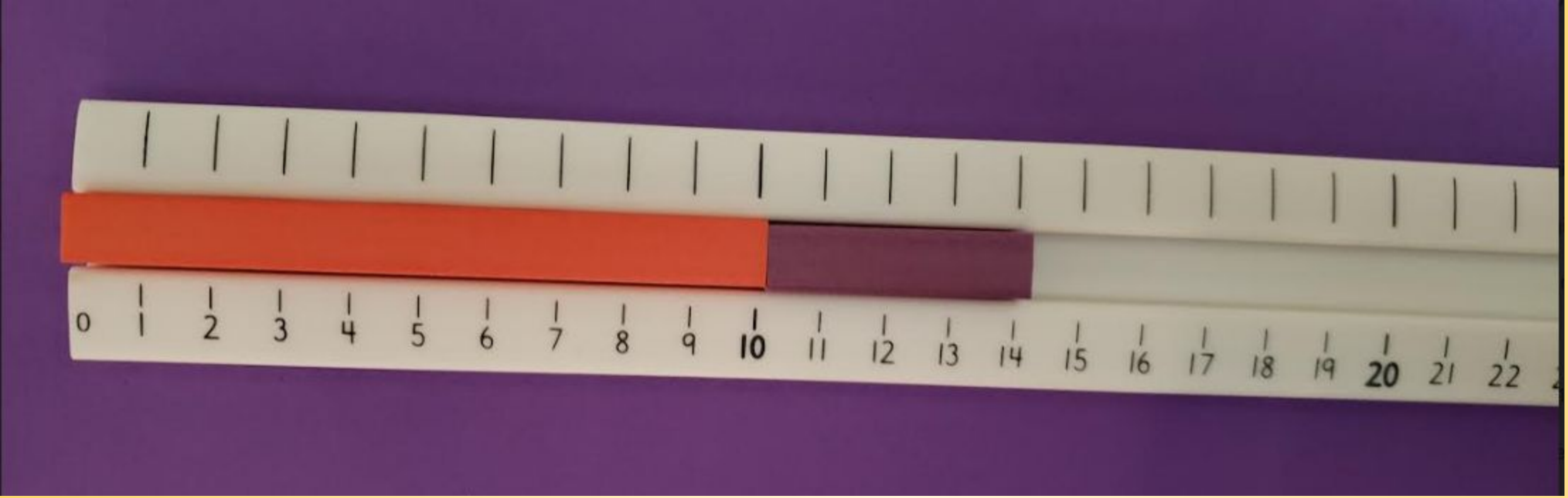
Working with teen numbers



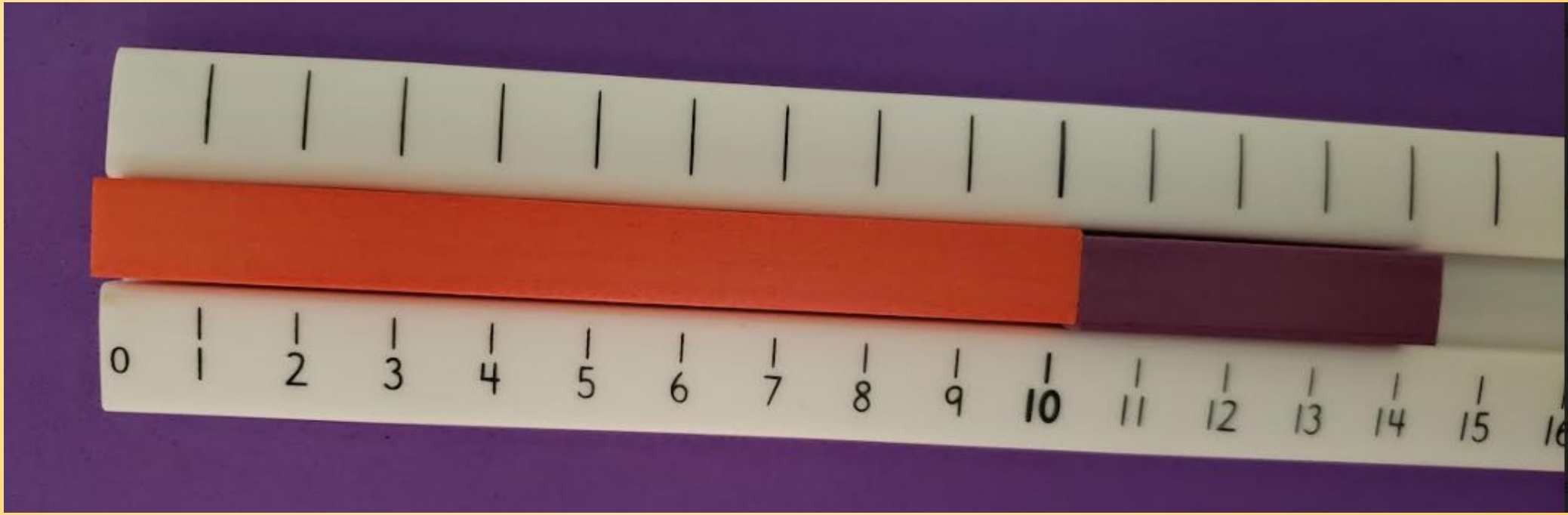
Dr. Nicki Newton, Counting is More Than 1, 2, 3, 2022



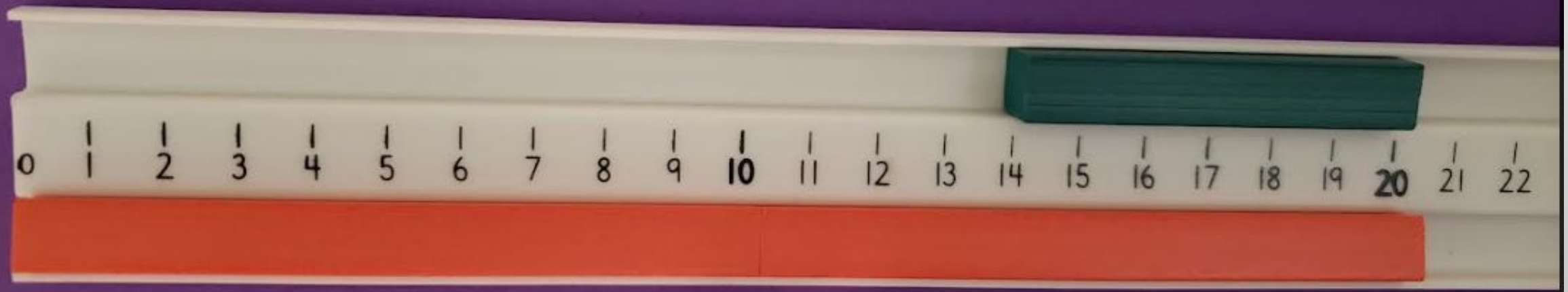
Ensure tens are not the same as the ones in colour. They should be visibly distinguishable.



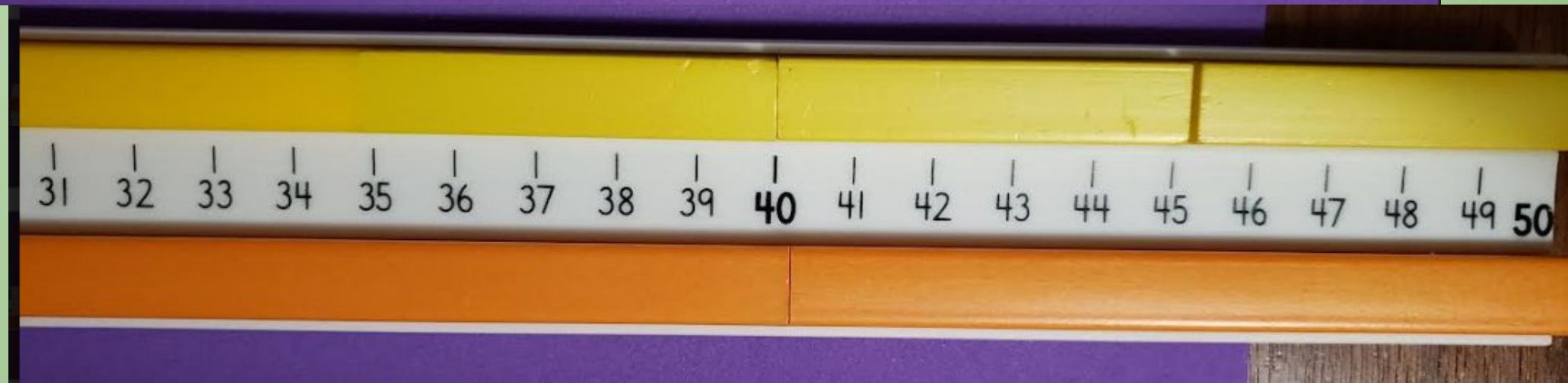
10 plus a number



Every addition can be a subtraction


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Skip Counting



2's, 5's, 10's

Number Path Games

Should be "linear numerical board games with squares numbered from 1 on the left end to 10 on the right."

The can also be vertical with 1 starting at the bottom and going up.

With intensive work with students playing these games helped students with "numerical magnitude comparison, number line estimation, counting and numeral identification."

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

Teacher Questioning

Reed and Young suggest that we ask questions like:

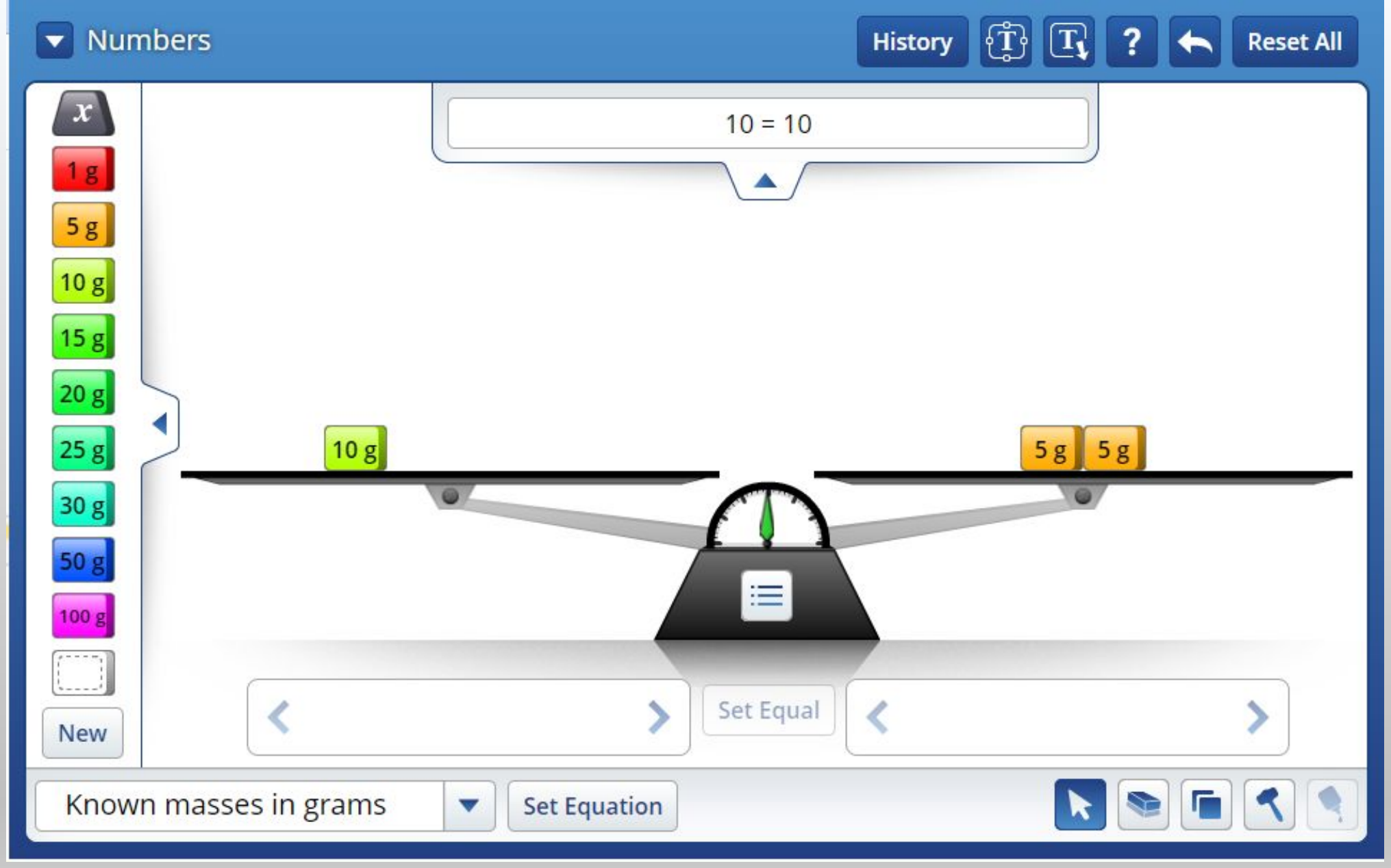
- Which number did you start on?
- Which number did you land on?
- How far are you from where you started?

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

[Number Paths]

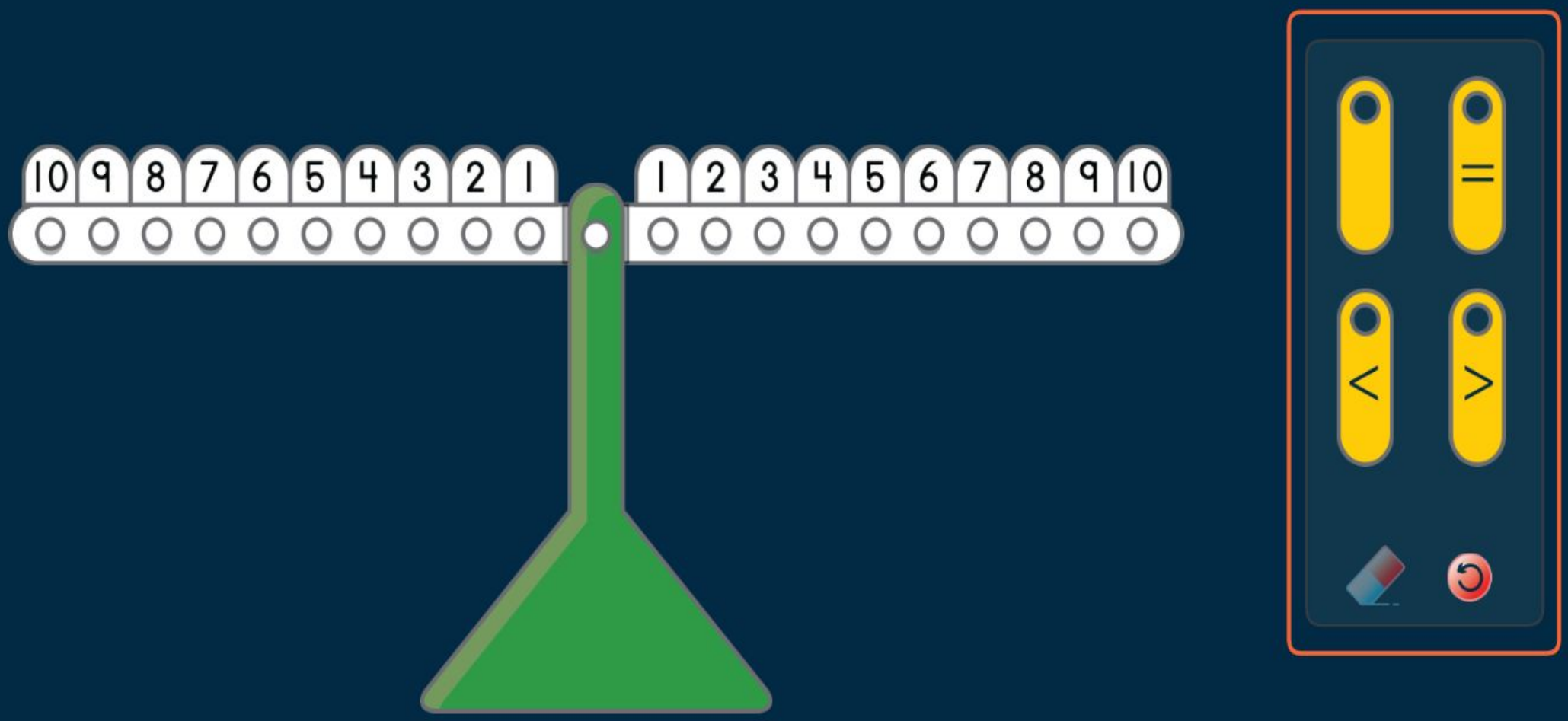
Activities and Strategies to Support learning

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

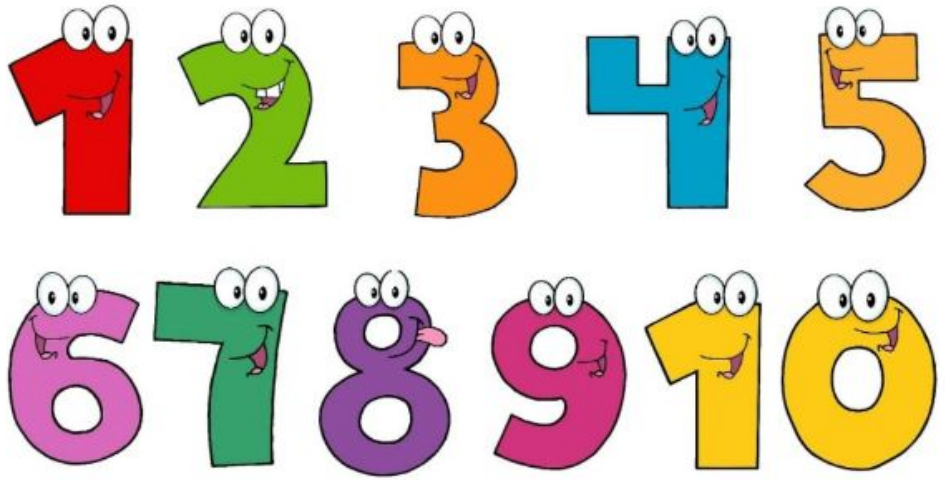


[Link]

Concept of Equality

Intervention as Strategies and Assessment

[Teacher Led]

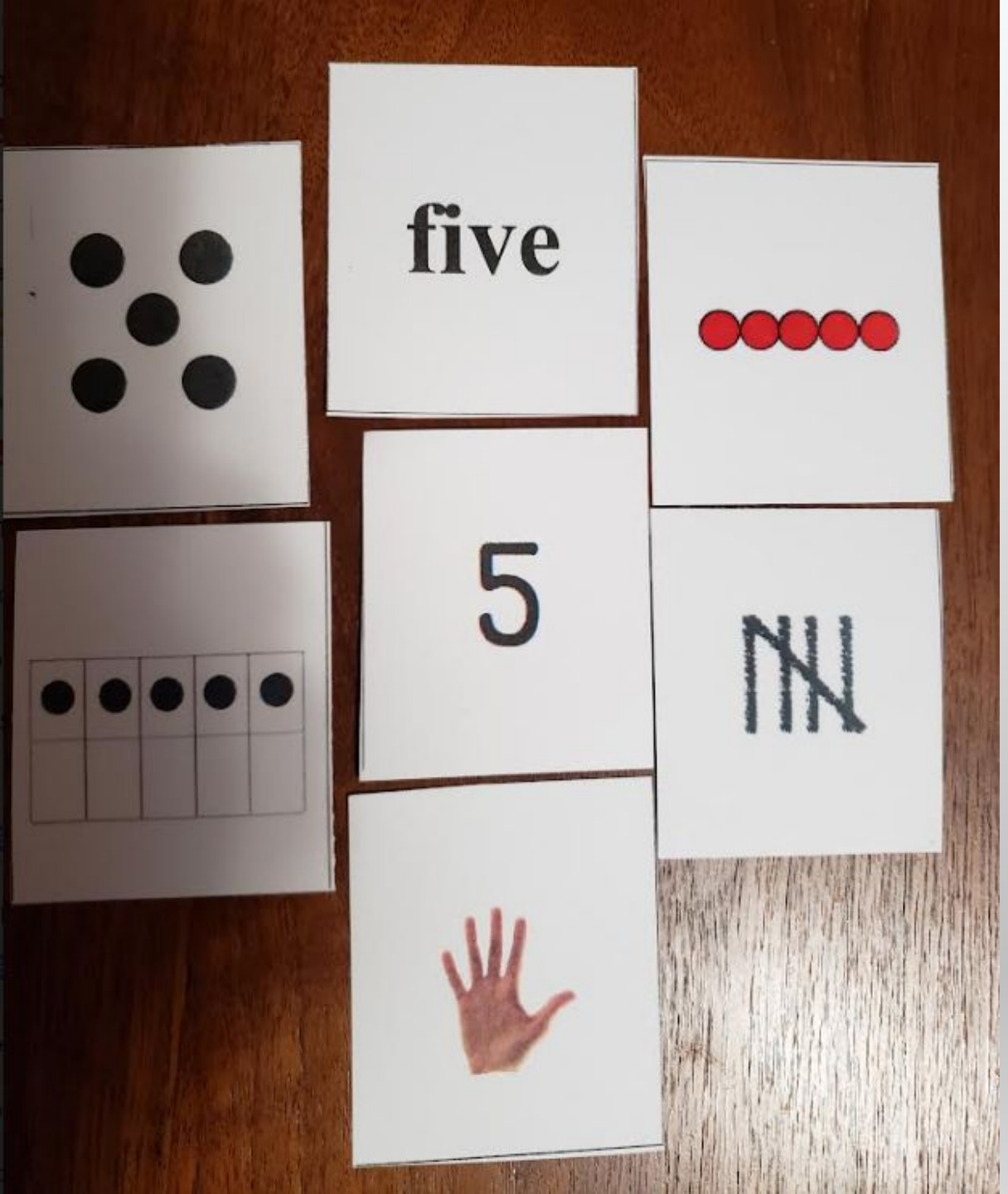


Educational Assistant Led [Interventions]

5
4

III

IIII IIII
fourteen



Using subitizing cards to match various representations of a number.

Playing a game of card 'war'

- highest number
- sum
- difference

•Strategies or Activities to meet Outcomes

- **Counting to 120** — Gameboard
- **Drop and Add** — Adding using objects to represent the problem.
- **Domino Dots** — Counting to answer "how many"
- **Turtle Number Walk** — Counting to 20
- **One Fish Two Fish, Red Fish, Blue Fish** — Sorting

Look in the[www.movingforward curriculum.ca](http://www.movingforwardcurriculum.ca) website for these Activities

Next Five Levels

Level 11: At this level students start to count on , counting verbally and with objects from numbers other than 1 and they can tell you the number before and after another number without having to start at 1.

Level 12: Counting by 10s to 100; they can cross decades easily

Level 13: Counting to 100

Level 14: Count with snaps, taps and sounds

Level 15: Skip Count by 2's and 5's fluently

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

Level 15: Skip Count by 2's and 5's fluently

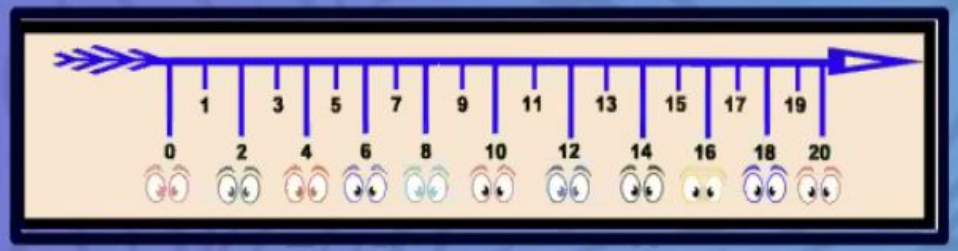
SKIP COUNTING BY TWO

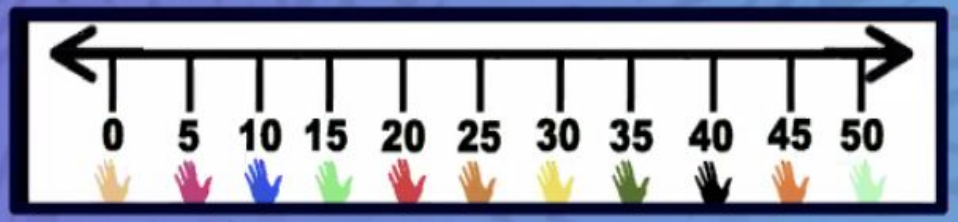
2 4 6

8 10 12

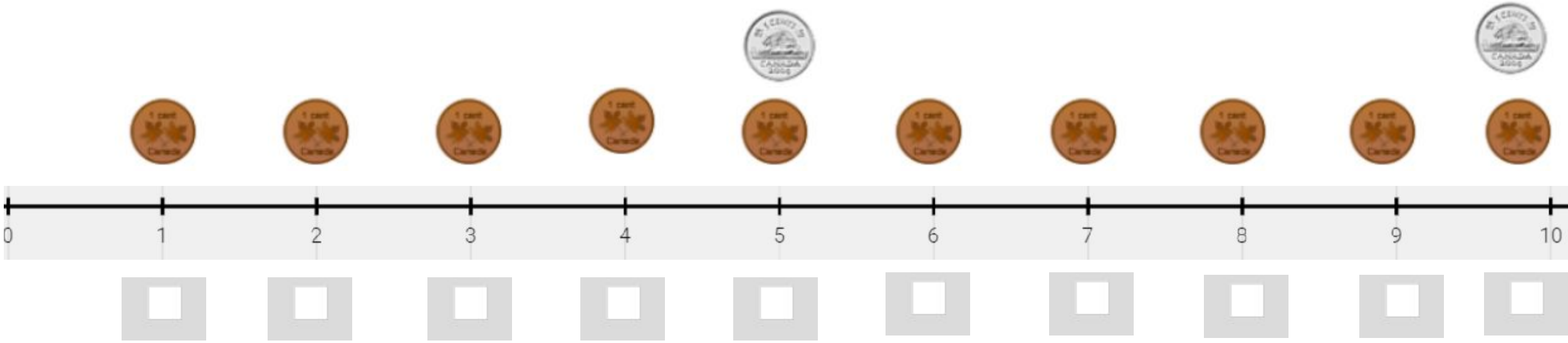
14 16 18

20 22 24





5	10	15	20	25	30	35	40	45	50



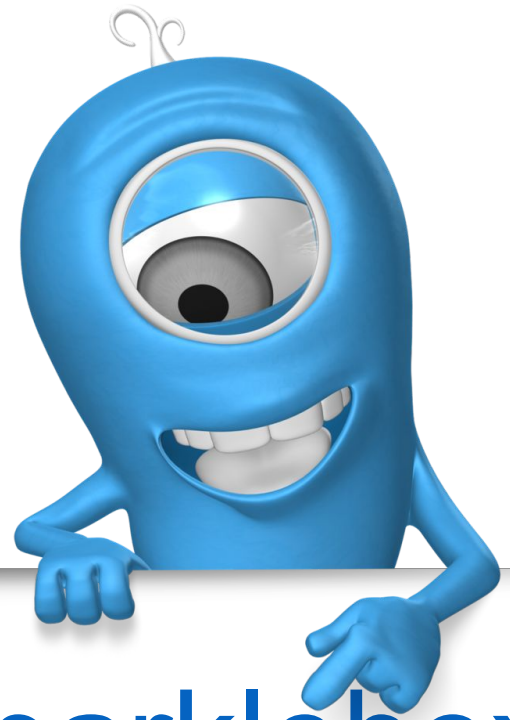
Use 1 cm grid to make a number line and using cuisenaire rods to show how far you have gone on the number line.

Leveraging Money

Skip Counting in a Real World Context

Learning Trajectories

Dr. Nicki Newton - Counting
https://vimeo.com/564452067



Sparklebox

Number Lines and resources

Ontario Kindergarten - Counting

Grade 1 - Counting

One Fish

Two Fish

Red Fish

Blue Fish

Sorting

Link

By Eric Curts ControlAltAchieve.com @ericcurts

Sources

Newton, Dr. Nicki. *Counting is More Than 1, 2, 3*.
Original Presentation 2021 can be viewed at https://vimeo.com/564452067
Updated Presentation was shared November 2022.

Virtual Manipulative Sources:
NRICH Cuisenaire Rods https://nrich.maths.org/4348
University of Cambridge, Faculty of Mathematics

Thank you!

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czarski@carcpd.ab.ca

Where are the files going to be?

www.movingforwardcurriculum.ca Folder