Number Routines in the Math Classroom

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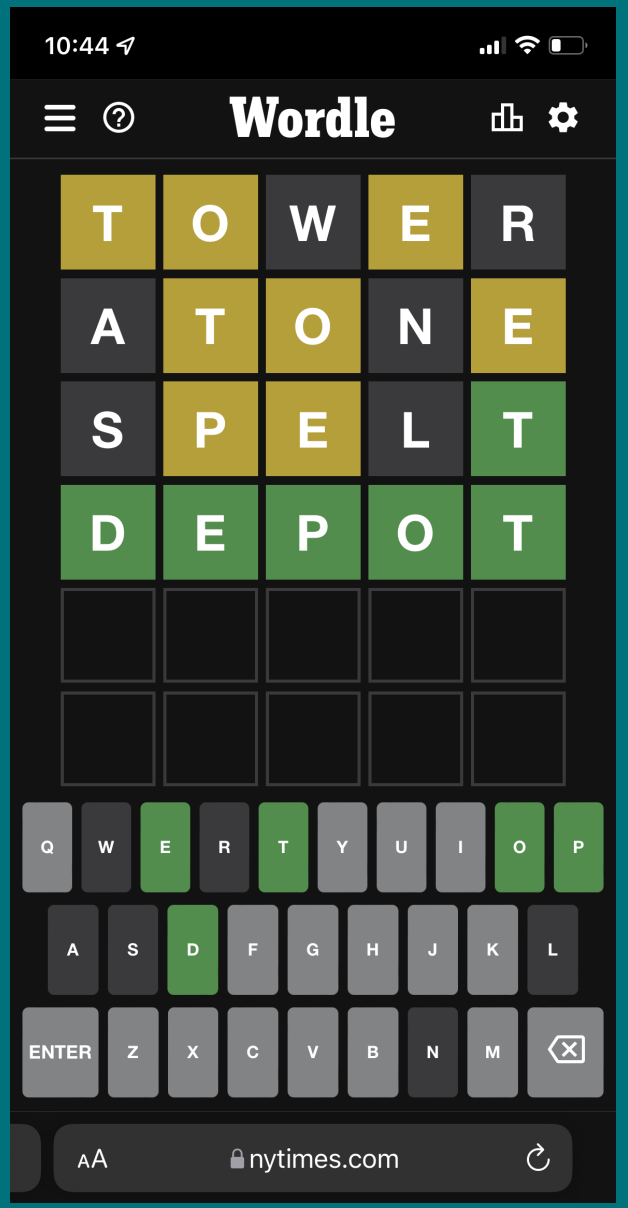
Why Routines?

Let’s start by talking about Wordle



Wordle is Just a Routine

-Short and the stakes are LOW

-You aren't expected to get it right on the first try – in fact, it's less interesting if you do

-Predictable (the rules never change)

-Mistakes help you move forward

-It's adaptable (variations within the game & with those that you play with)

-People who don't normally play word games (like myself) still love to play

Math Routines

-Short and the stakes are LOW

-You aren't expected to get it right on the first try – in fact, it's less interesting if you do

-Predictable (the rules never change)

-Mistakes help you move forward

-It's adaptable (variations within the game & with those that you play with)

-People who aren't always engaged in math still love to engage

For many students, math class is intimidating.

Math class often focuses on what students don't know, creating a more fearful environment that is difficult to learn and succeed in.

Consider your first year teaching...

When students know HOW the experience will go, they are better able and more likely to engage in the WHAT we hope they learn.

Your Working Memory

1-4 items

30 seconds

Some popular routines that that teachers are using

-Number talks

-Splat

-How Many?

-Which One Doesn't Belong?

-Number Routines with NumberBlocks

-Three Act Tasks

-Counting Collections

-Notice/Wonder

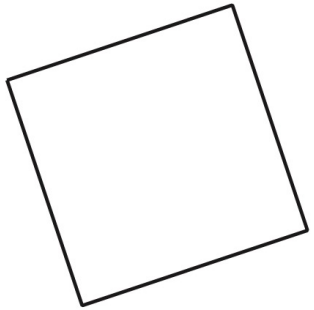
-Math Flips

-Ways to Make

Let’s Engage in Some Routines

Which One Doesn't Belong?

A



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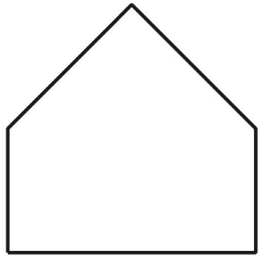

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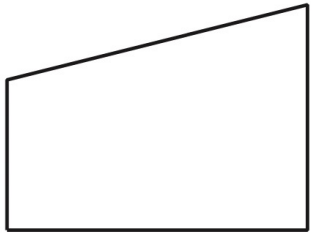

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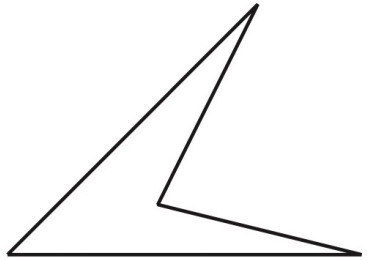
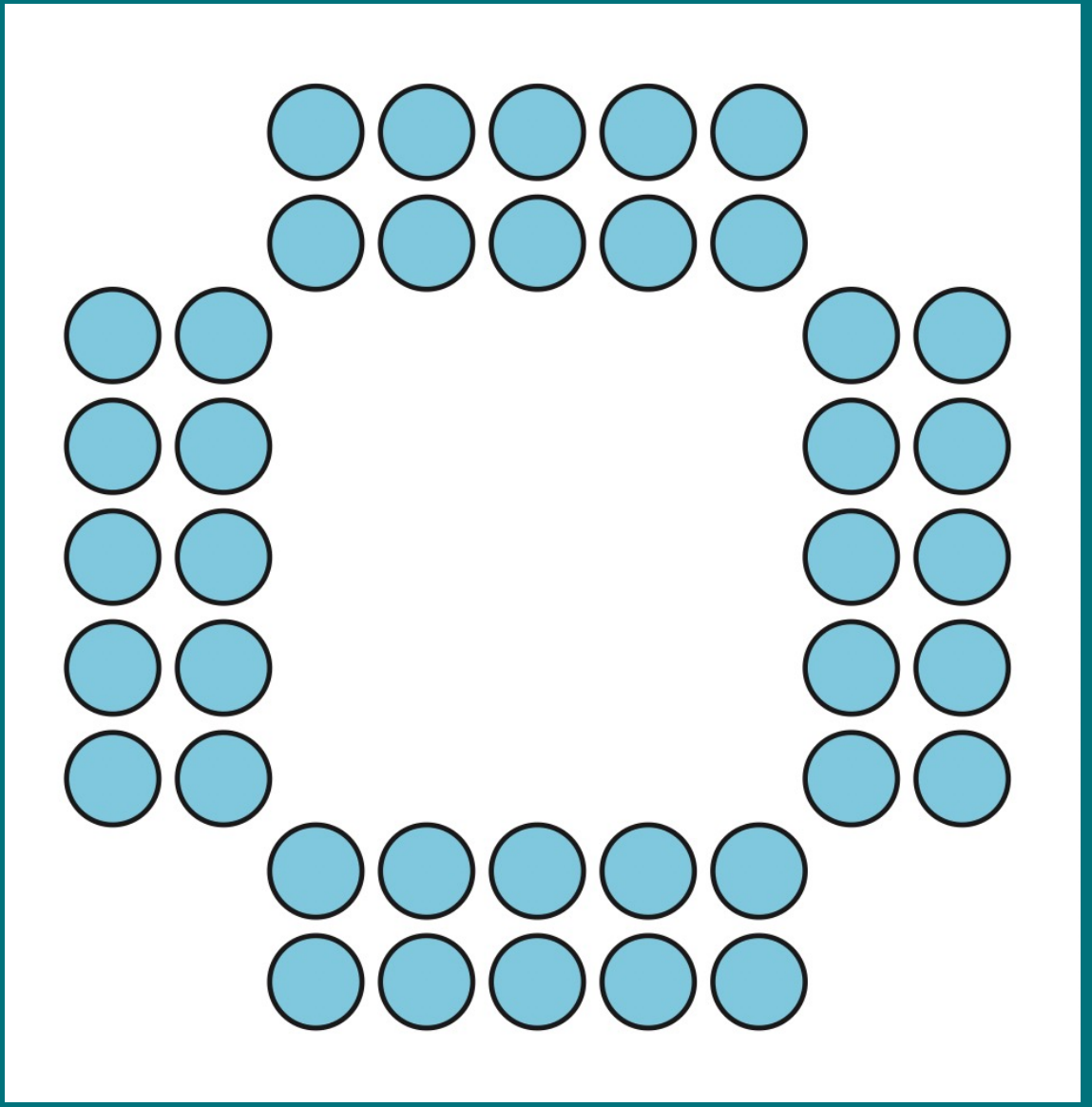


How Many?



Ways to Make 100

The Counting Principles:

1. Stable Order/Standard Order
2. One to One
3. Cardinality
4. Conservation of Cardinality
5. Successor

Stable Order

When counting, the list of words used to count must be said in a repeatable order.

Standard Order

When counting, the names of the counting numbers are always said in the same order, and that order is meaningful.

One to One

When counting a set of objects, each and every object in the set is tagged with one and only one number in the counting sequence and each number with one and only one object.

Cardinality

When counting (in accordance with the standard order and one to one principles) the last number word spoken describes an important characteristic of the whole set. The last number word indicates the cardinality of the set.

Conservation of Cardinality

The cardinality of a set remains stable when:

-The order in which the objects in the set are counted is changed, or

-The objects in the set are rearranged or transformed.

Successor

There is a number that is one greater than every counting number.

Important Counting Concepts

1. Subitizing
2. Unitizing
3. Hierarchal Inclusion

Subitizing

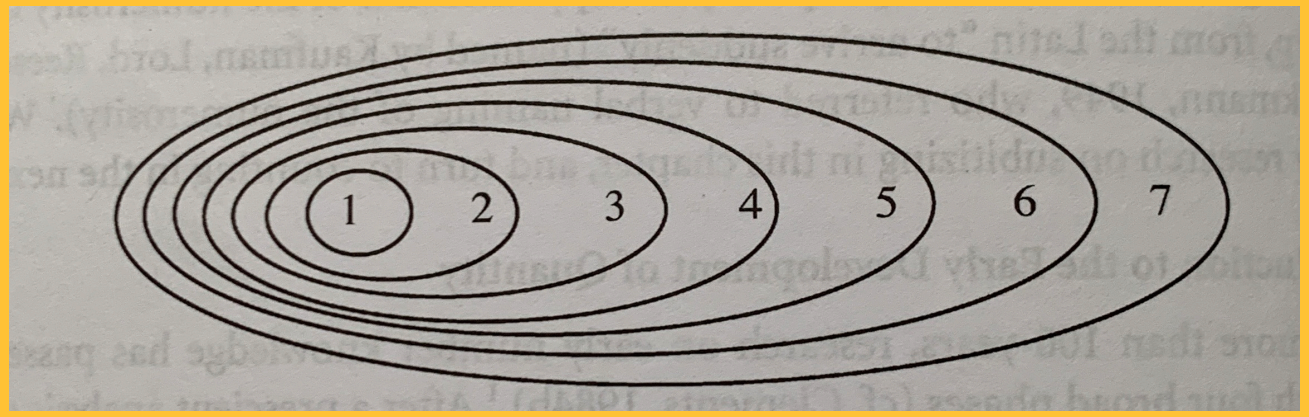
Subitizing is quickly recognizing and naming the number in a group without counting.

Unitizing

Understanding that you can count a large group of items by counting smaller, equal groups of items from within the large group.

Hierarchal Inclusion

Each cardinal number includes those that come before it. The number 7 contains a set of 6, a set of 5, a set of 4, etc.



Sarama & Clements, 2009

Number Blocks

hand2mind

More or Less

Today's Number

Conservation of Number

7 Number Routines

What's Missing?

Guess My Number

Choral Counting

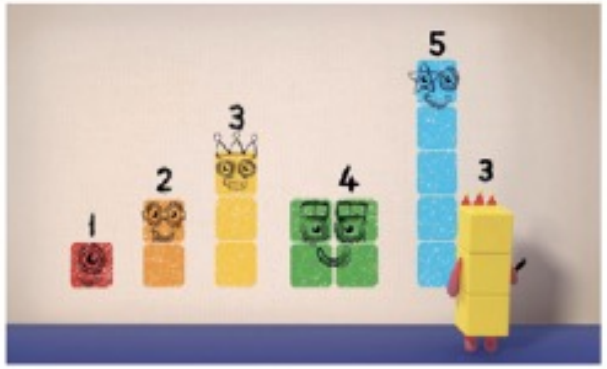
Ways To Make A Number

Ways to Make Four

Ways to Make Four

Introduce the Routine

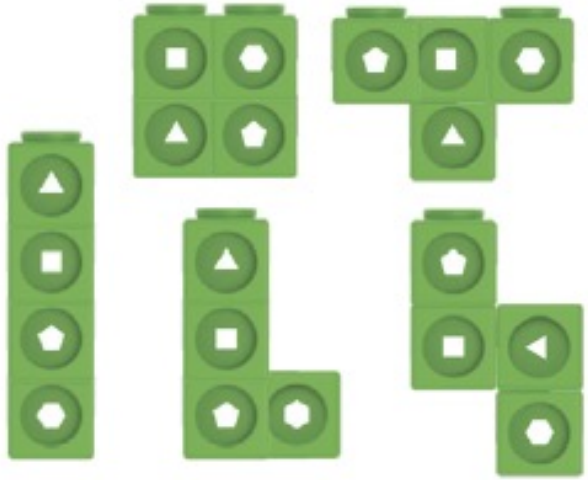
- **Ask:** *What are the Numberblocks doing?* [They are making different shapes by moving around their blocks.]
- *What did the Numberblocks notice about the different shapes they became?* [No matter their shape, they are always their same number.]
- **Ask:** *In the beginning One was sad because she could not make different shapes. What did One learn at the end that made her happy again?* [She learned that all the other numbers are made from 1s.]



Ways to Make Four

Activity

- Have students work individually. Give each student 4 green MathLink® Cubes.
- Have the students build Numberblock Four using green cubes, then have them draw the model on paper.
- Students can continue building new shapes of Four and drawing the build on their paper. Have them continue until they think they have made all possible shapes.



Ways to Make Four

Wrap Up

- Bring students back as a whole group to share all the different ways Four could be shaped. Draw them on the whiteboard as students share. Ask probing questions:
  - *Are all of our shapes still Four? How do we know?*
  - *Why can One only be 1 shape?* Make sure students understand that One is made of just 1 cube, so she has nothing to rearrange. Four is made of 4 cubes, so they can be moved around but always still show the quantity 4.

Why Number Routines with Numberblocks?

-Help students to see and experience the core counting principles and ancillary ideas

-Each episode allows students to engage in foundational mathematical ideas and concepts

-Short videos engage and meet students where they are

-Hands-on development of some “big ideas” in mathematics with focus on the Counting Principles

-Routine structure allows students a safe place to discuss, take risks, and collaborate with peers

-Repeatable lessons are low-prep and high-engagement

-Supports wide variety of learning styles with visual, auditory, and kinesthetic components in every lesson

Am I Still Four?

Introduce the Routine

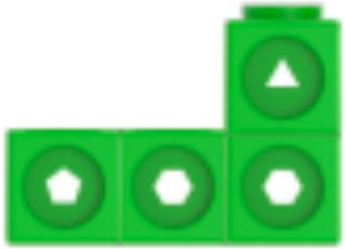
- **Say:** *Let's think about our 3 rules of counting.* Have students repeat them aloud as a group or write them on the board as you explain them.
- **Say:** *Rule 1: Count everything once.* Use Numberblock Four to model counting 1, 2, 3, 4, connecting each cube as you go.
- **Say:** *Rule 2: Say the numbers in the right order.* Model counting 1, 2, 3, 4 and remind students of Five's advice to touch each item as you count.
- **Say:** *Rule 3: The last number is how many altogether. Here on Four, we can count 1, 2, 3, 4 cubes altogether. There are 4 cubes altogether.* Using a finger gesture, such as forming a full circle around the arrangement of cubes, will help to reinforce understanding.

Activity

- Have students work individually. Give each student 4 green MathLink® Cubes.
- Have students build Four as shown in Figure 1. Then, ask them to count the number of cubes they used, remembering the 3 rules of counting.
- Have students build Four as shown in Figure 2.
- Students can discuss with a partner if there are still 4 cubes now that Four has changed shape.
- **Ask:** *Are there other ways to show Four?*

Figure 1

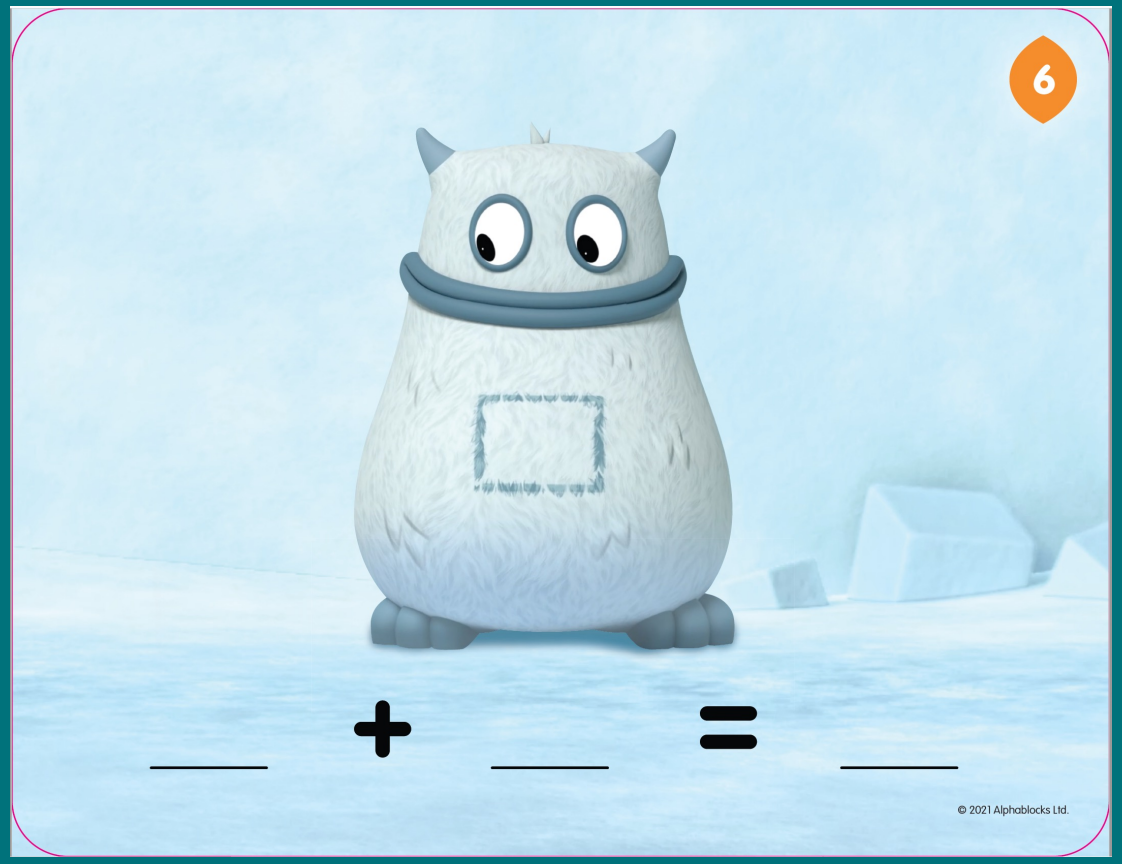
Figure 2



Wrap Up

- Bring students back as a whole group to share their discoveries. Ask probing questions:
  - *Were there still 4 cubes each time? How do you know?*
  - *What happens when you move 1 cube to a new spot? Does it change how many there are?*
- **Ask:** *How do you know how many cubes there are altogether in a group?* Use the same finger gesture to reinforce for students.

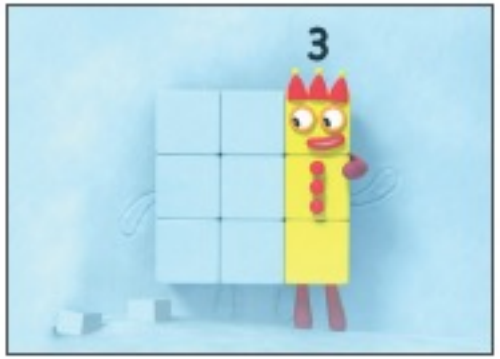
What Happened to Nine?



What Happened to Nine?

Introduce the Routine

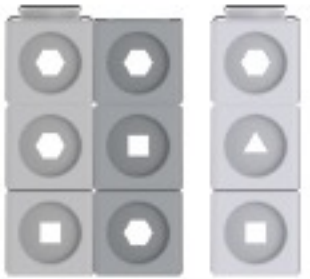
- **Ask:** *Who do the Numberblocks see at Lucky Mountain?* [Big Tum]
- **Ask:** *When Big Tum eats some of the blocks from Numberblock Nine, how many blocks are left? How many blocks are missing?* [3 blocks left; 6 blocks missing] Model how Numberblock Nine can be split into groups of 6 and 3 blocks using demonstration cubes and Demonstration Card #6.

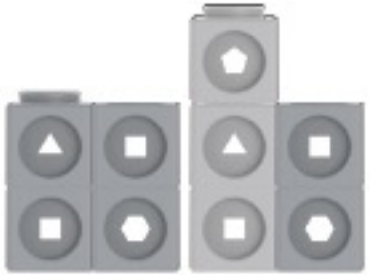


What Happened to Nine?

Activity

- Group students in pairs. Give each pair 9 grey MathLink® Cubes (3 of each color variation).
- **Say:** *Let's take turns pretending we are Big Tum. One partner must take Nine and hide him, breaking off a portion of his cubes. Next, they will give what is left of Nine to their partner.*
- **Say:** *Just like One in the episode, you need to figure out how many cubes are missing from Nine.*
- Partners can take turns removing a section of blocks from Nine, saying how many blocks remain in order to figure out how many are missing.





What Happened to Nine?

Wrap Up

- Bring students back as a whole group. Ask probing questions:
  - *How many cubes are missing when only 6 remain? How many cubes are missing when only 8 remain?* Write the equations as the students respond.
  - Write down the rest of the missing addend equations for the number 9. Example 2 +___ = 9.
- As students share, model their thinking using Nine's demonstration cubes.
- After the review, have the whole group pretend to be Big Tum once more and **say**, "Yum!Yum! Well done!"

THANK YOU!

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