Kindergarten NUMBER SENSE Routines

Days 1-20

Before exploring the exciting content contained in the slide decks for these Number Sense Routines, we encourage you to take time to understand the purpose and value.

WHY IS DEVELOPING NUMBER SENSE IMPORTANT? Number Sense is the foundational building block for all strands of mathematics. Students who struggle in mathematics do not lack mathematical ability, but rather, they simply do not have a strong number sense on which to build their knowledge. Just as we are not born knowing how to read, we are not born with Number Sense. It must be developed and nurtured over time through a progression of understandings about numbers and their relationships to one another. With time and focused practice, students come to understand that numbers are meaningful, and outcomes are sensible and expected. Number Sense development encourages students to think flexibly and promotes confidence with numbers.

WHAT IS A NUMBER SENSE ROUTINE? A routine is an activity or event that occurs on a regular basis over time. Routines provide a framework for our day to support both the teacher and students. Routines help to build community and create a safe learning environment for students. Routines build a sense of belonging, ownership, and predictability which make the classroom a place to take risks. We learn through risk-taking; we take risks when we feel safe; we feel safe in a supportive learning environment; we create supportive learning environments through routines. Just as we have established routines for walking in lines and exiting the building during a fire drill, we must also establish routines that build mathematical thinking and discourse.

HOW WILL THESE NUMBER SENSE ROUTINES BENEFIT ME AND MY STUDENTS? What teachers do and how they do it is critically important and has a profound impact on the quality of the educational experience of our students. Effective pedagogy (the art and science of teaching) is a key element in the learning process. These Number Sense Routines are models of effective pedagogy and ensure that the critical Number Sense instruction we provide is equitable to all students regardless of geography, teacher experience, or student circumstance. As we prepare our students to be mathematically proficient in their lives beyond the classroom walls, these Number Sense Routines will help to lay the critical foundation for all future mathematical endeavors.

WHAT ARE THE IMPLEMENTATION EXPECTATIONS FOR CALVERT COUNTY PUBLIC SCHOOLS? These Number Sense Routines have been developed for all 180 instructional days. These routines should be used every day. Because the routines do not require a specific order, it is permissible to trade routines among days to best match the time available. Number Sense must be built over time. With consistency, we can build students' number sense creating a strong mathematical foundation. If students or the teacher is struggling with a routine, it is expected that the teacher collaborate with colleagues to build capacity in that routine – do not just choose to skip the routine. If additional help is needed, the teacher should seek the assistance of their content specialist or mathematics supervisor.

HOW ARE THESE NUMBER SENSE ROUTINES ORGANIZED?

There are 180 instructional slides organized into groups of 20. Plan to engage with each slide for about **10 minutes** using just **one slide each day**. Slides representing each of the nine categories appear at least twice within each set of 20 slides. During the first 18 days, the same routine will appear twice in a row to provide repetition as students learn how to engage with the specific routine. The slides decks increase in rigor as the year progresses to challenge students throughout the year.

- Clue by Clue
- Geo Chat
- Math Talks
- More or Less
- Number Strings
- Quick Count
- Rapid Naming
- Same But Different
- Splat!

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HOW DO I FACILITATE A NUMBER SENSE ROUTINE?

1. Gather students where the whole class meets. This can be on a rug or in chairs – be sure every student can see the board and distractions are minimal.
2. Have students look at the visual prompt.
3. Pose the question.
4. Allow plenty of Think Time (for some routines, allow partner discussions prior to the whole group discussion).
5. Ask students to signal when they have an answer in mind – it is highly recommended that students use a discreet thumbs up signal that is placed close to the chest rather than raising hands which can be distracting and may lead others to stop engaging in solution-seeking.
6. Wait until most students have signaled that they have an answer before beginning the class discussion.
7. Allow for multiple students to share ideas. It is important to not indicate correctness of student responses too early in the discussion to encourage elaboration and promote critical listening by classmates.
8. As students share ideas, decide if you will model the shared idea. Focus on modeling ideas that are accurate, efficient strategies for solving the problem. NOTE: Do not allow students to come up to the board since building mathematical language is a key component of these Number Sense Routines.

SUGGESTED HAND SIGNALS to use during NSR

Students hold these hand signals on their chest where the facilitator can see the signal. Hand-raising is discouraged during the thinking process since hands that are raised (and typically waved frantically in the air) can be a distraction for other students and often cuts thinking short since it is perceived that "others have thought of the answer already".

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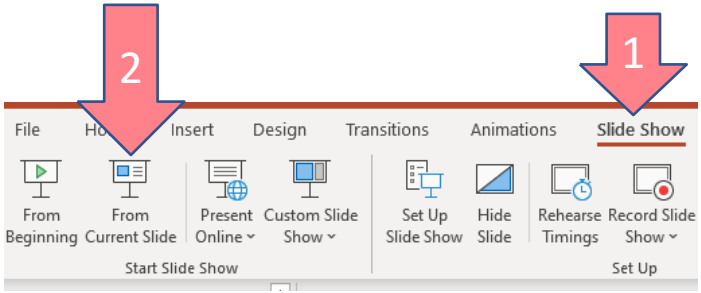
HOW TO RUN POWERPOINT IN SLIDE SHOW MODE:

Slides with animation features, must run in Slide Show mode of PowerPoint for the animations to work correctly.

1. Select <Slide Show> from the menu at the top
2. Select <From Current Slide>



HOW TO ANNOTATE STUDENT THINKING ON THE SLIDE:

- With the slide in Slide Show mode, right click on the slide
- Select <Pointer Options> then choose <Pen>

ACKNOWLEDGEMENTS

We are grateful to those who have inspired this project – and there have been many. These slide decks were designed for kindergarten with custom daily routines to match the early learning needs of this special group of young mathematicians. The nine routines blend original creations and adaptations of other OER materials. We have made our work available in Open Educational Resources so that others may benefit as we have. Our deepest gratitude and respect to all those who have inspired and supported us to help move our work forward for the benefit of all students who engage with these slides.

How to facilitate Clue by Clue

During this routine, students are shown a group of objects. Then they are given clues about the object's attributes that helps them to narrow the possibilities down to just one possible object from the group.

To facilitate this routine,

1. Show the group of objects to your students.

2. Tell students that you are thinking of ONE of these objects and you will give them clues to help them discover which object you are secretly thinking about.

3. Reveal the first clue. Ask students to think about which objects could be your mystery object. Which objects cannot be the mystery object. Discuss.

4. Use the annotation tool to visually mark off objects that do not fit the clue. In Slide Show mode, right click to annotate on the slide. Select >Pointer Options>Pen. Cross off images as students determine it does not fit the clue. The answer is revealed after Clue 3 is shown.

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Clue by Clue

Day 1

ASK: Can you guess which person I am describing? I'll give you some clues to help you.
NOTES: After each clue, discuss which person does not fit the clue. Each click removes one person.

Clue 1
My shirt has long sleeves

Clue 2
I have long hair

Clue 3
I am holding a balloon with a long string

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Clue by Clue

K.MD.A.1

Day 2

ASK: Can you use the clues to guess which object I am?
FACILITATION NOTE: Use the annotation tool to mark off pictures that do not fit the clue.

Clue 1
I am food

Clue 2
My color is orange

Clue 3
I am heavy

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Clue by Clue

K.MD.B.3

How to facilitate GeoChat

This routine is designed to build students understanding of various geometric concepts and the specialized vocabulary required to talk about geometric shapes.

To facilitate this routine,

1. Show the image on the slide
2. Ask the question shown on the slide.
3. Allow students to discuss their ideas with a partner first (this gives them time to gather their ideas and allows all students an opportunity to talk).
4. Ask a few students to share their ideas with the whole group.
   The focus of these number sense routines is for STUDENTS to do most of the talking as they make sense of the math. Encourage students to develop their mathematical vocabulary in a way that allows them to talk about their mathematical ideas with others.
5. Prompt students to also answer the question "How do you know?"

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GeoChat

Day 3

SAY: Let's play a game of "I Spy". Look closely at this picture. Do you see any CIRCLES?
Give students time to look at the picture. Have students name the object they spied that is shaped like a circle.
Consider using the annotation pen to outline the named items that are circles.
The "good stuff" happens after the first dozen or so circles are found…. be patient while students dig deeper.

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GeoChat

K.G.A.2

Day 4

ASK: Which of these shapes are circles? [circle student choices –allow for self-correction as needed].
After discussing/sorting the shapes, click for animation.
ASK: What shape is the mirror? (oval) How is an oval like a circle? How is it different?

circles

not circles





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GeoChat

K.G.B.4

How to facilitate Math Talks

This routine is designed to elicit multiple strategies and provide opportunities for students to reason about numerical relationships and make mathematical connections.

To facilitate this routine,

1. Show the image. Pose the problem by reading the prompt given on the slide.
2. Ask students to use the discreet signal system that has been established as a classroom Number Sense Routine norm – i.e., a thumbs up in front of their chests when they have an answer in mind.
3. When most students have signaled that they are ready, call on students to share their strategies as you annotate the answers they provided.
4. It is important to remain neutral as students respond; avoid indicating whether the student is correct or incorrect at this point in the discussion.
5. Encourage students to actively listen to each other's ideas, ask their classmates clarifying questions, and connect their own strategies to the other strategies that have been offered. Be patient and persistent – these skills will take time to develop.

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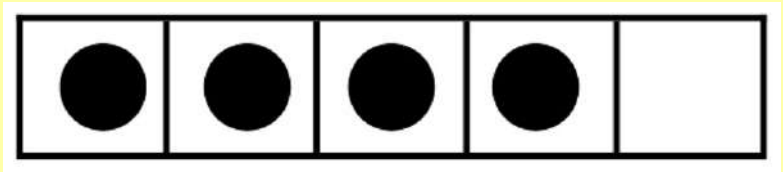
Day 5

FOCUS: Four
ASK: How many dots?
ASK: How did you count them?
ANNOTATION: Record student thinking with the pen or with gestures. Include written equations if appropriate.
POSSIBLE STRATEGIES:

- Five Frame Structure – students may know the frame holds five and one less is four
- Doubles – students may have seen two dots and two dots
- Counting On – students may have seen two dots and then counted two, three, four
- Count All – students may have counted one-by-one

ASK/DISCUSS: Were any of the strategies we talked about today similar?
ASK/DISCUSS: Which strategy do you think was most efficient for counting THESE dots? Why?



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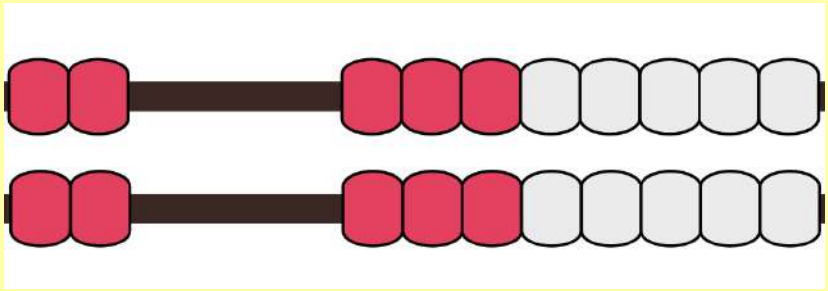
Math Talks

Day 6

FOCUS: Four
SAY: These beads are “in play”. These beads are “at rest”.
ASK: How many beads are “in play”?
ASK: How did you count them?
ANNOTATION: Record student thinking with the pen or with gestures. Include written equations if appropriate.
SOME OF THE POSSIBLE STRATEGIES:

- Doubles – students may have seen two beads and two beads
- Counting On – students may have seen two beads at the top and then count on the beads at the bottom two, three, four
- Count All – students may have counted the four beads one-by-one
- Use the Five/Ten Structure – students may have considered the 5 red beads or the 10 total beads on each row

ASK/DISCUSS: Were any of the strategies we talked about today similar?
ASK/DISCUSS: Which strategy do you think was most efficient for counting THESE beads? Why?



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Math Talks

How to facilitate More or Less

For this routine, students will determine which of the images shows "more" or "less" or if the two images show "equal" values.

To facilitate this routine,

1. Show the two images.
2. Ask the question shown on the slide.
3. Allow students to discuss their ideas with a partner first (this gives them time to gather their ideas and allows all students an opportunity to talk).
4. Ask a few students to share their ideas with the whole group.

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Day 7

ASK: Which picture shows FEWER flamingoes? How do you know?
TIP: Remember, even if students identify the picture incorrectly, allow them explain “How they know”
This will allow you understand areas where more support may be needed, and students often self-correct when asked to explain their thinking.

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More or Less

Day 8

ASK: Which momma duck has FEWER ducklings?
TIP: Students do not need to count to answer this question.
By subitizing, they will likely know that one of the ducks has just 4 ducklings while the other has more than 4.
This type of reasoning is appropriate to answer this question.

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More or Less

How to facilitate Number Strings

This routine includes a set of related math problems designed to teach strategies based on number relationships. To facilitate this routine,

1. Show the visual prompt. Ask the prompt question. Ask students to use the discreet signal system that has been established as a classroom Number Sense Routine norm – i.e., a thumbs up in front of their chests when they have an answer in mind.

2. When most students have signaled that they are ready, call on students to share their strategies. Decide if you are going to model the strategy shared. The goal is to find efficient ways to solve the problem accurately.

3. Advance the slide to progressively include additional problems within the number string.

4. If a number string's purpose is a certain strategy to be developed and that strategy is not emerging from students, then you may need to ask questions that encourage students to consider the strategy that is intended to be developed.

5. Throughout the routine, encourage students to actively listen to each other's ideas, ask their classmates clarifying questions, and connect their own strategies to the other strategies that have been offered. Be patient and persistent – these skills will take time to develop.

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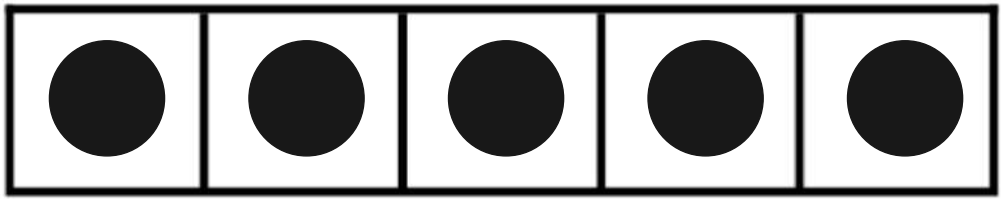
Day 9

FOCUS STRATEGY: Subitizing
There are five images with today's routine. Advance the slide to see each one.
Allow students to share their strategies before advancing to the next slide within this routine.
ASK: How many? How do you know?
NOTE: If the quantities are five or fewer, it is okay for students to "just know" without 1-by-1 counting.
WRAP-UP: We can often see small quantities of objects and just know how many there are without even counting the objects. This is called *subitizing*. Did you know that birds can subitize too? They can look at their nest and know if any of their eggs are missing without counting the eggs one-by-one (yes, this is true!).



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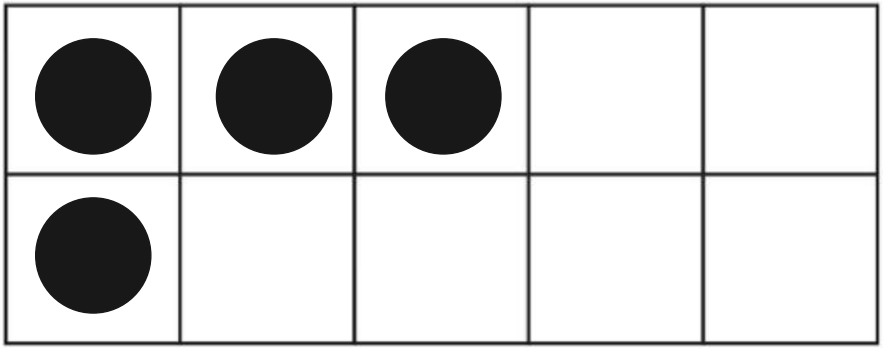
Number Strings

K.CC.B

Day 10

FOCUS STRATEGY: Subitizing
There are five images with today's routine. Advance the slide to see each one.
Allow students to share strategies before advancing to the next slide within this routine.
ASK: How many? How do you know?
NOTE: It is okay for students to "just know" without 1-by-1 counting if the quantities are five or fewer.
WRAP-UP: We can often see small quantities of objects and just know how many there are without even counting the objects. This is called *subitizing*. Did you know that birds can subitize too? They can look at their nest and know if any of their eggs are missing without counting the eggs one-by-one (yes, this is true!).



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Number Strings

K.CC.B

How to facilitate Quick Count

Quick Count is an instructional routine designed to build on students' natural ability to subitize (recognize the quantity of objects in sets of 1-5 without counting the objects one-by-one). This routine will help students become more aware and purposeful when subitizing and to apply subitizing skills when finding the total quantity of larger sets.

This routine follows a developmental progression with slight changes in the routine after several of the same type are presented.

Step-by-step directions are provided on each slide. Typically, a Number Sense Routine is one slide per day. A Quick Count routine is a single routine like all the other routines but contains more than one slide as part of that day's routine.

The Quick Count progression of skills is listed below:

- 5 subitizing routines
- 3 comparative quantities routines
- 6 composite subitizing routines that ask students to create an equation
- 6 teen number routines with a group of 10 ones and some additional ones

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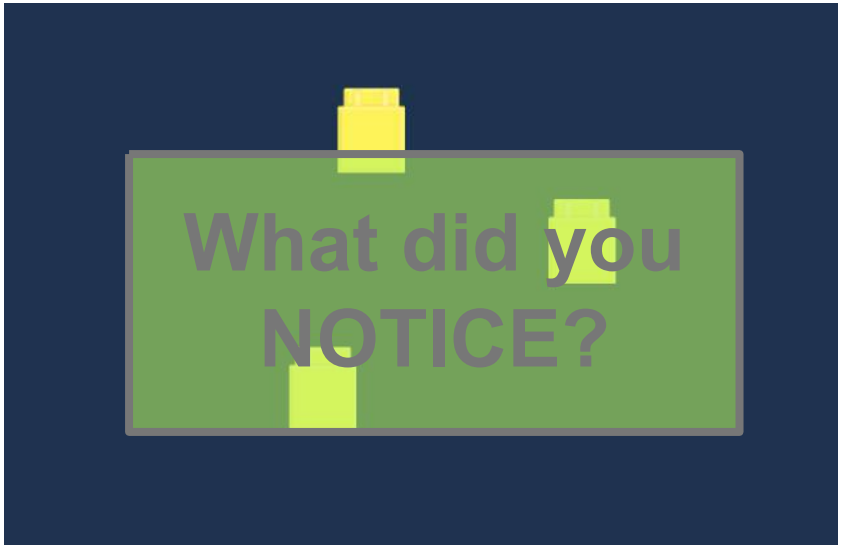
Quick Count

Day 11

SAY: I am going to show you an image. The image will appear for only two seconds, so pay close attention – I want you to remember what you saw. Remember, the image will appear and disappear quickly, you won't have time to count each object – see if your brain can just recognize how many objects without even counting.
****CLICK ONCE to begin the automated reveal process.*
Then allow students to share what they noticed – do not correct inaccurate observations – the image will be shown again.



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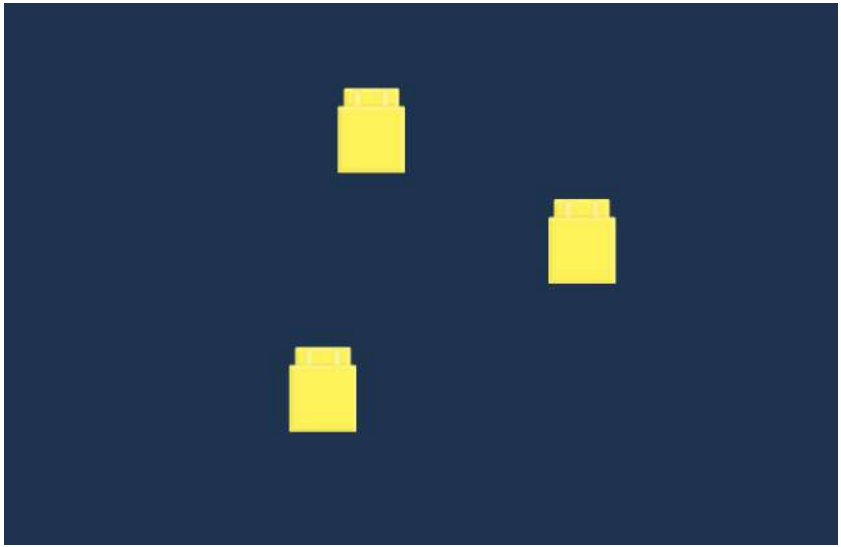
Quick Count

K.CC.B.4

Day 11

SAY: Here is the image again. This time it will not disappear.
ASK: Did you think there were three counters?
ASK: What if there was one more cube? How many cubes would we have then?



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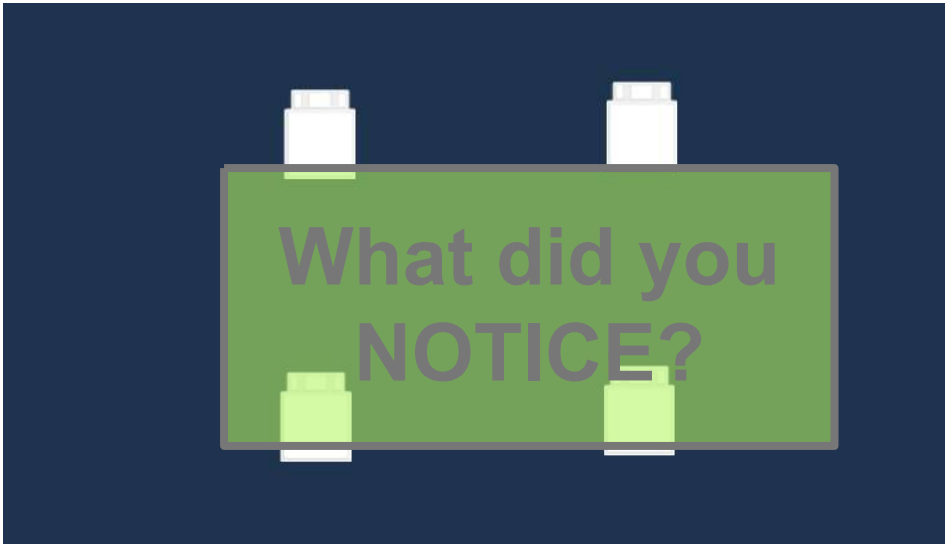
Quick Count

K.CC.B.4

Day 12

SAY: I am going to show you an image. The image will appear for only two seconds, so pay close attention – I want you to remember what you saw. Remember, the image will appear and disappear quickly, you won't have time to count each object – see if your brain can just recognize how many objects without even counting.
****CLICK ONCE to begin the automated reveal process.*
Then allow students to share what they noticed – do not correct inaccurate observations – the image will be shown again.



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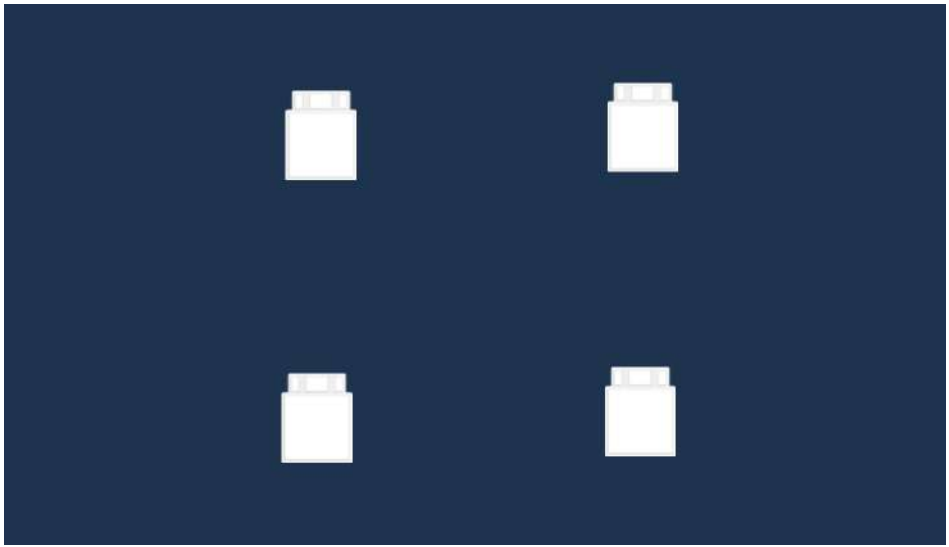
Quick Count

K.CC.B.4

Day 12

SAY: Here is the image again. This time it will not disappear.
ASK: Did you think there were four counters?
ASK: What if there was one more cube? How many cubes would we have then?



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Quick Count

K.CC.B.4

How to facilitate Rapid Naming

This routine is designed as a building block to arithmetic fluency. Research indicates that a student's ability to "rapid name" correlates to the student's skill in both reading and mathematical fluency.

To facilitate this routine,

1. Tell students to focus very carefully on the images that will appear on the screen.

2. Say, "As the images appear, say the name of the image out loud. We will be calling out the name of each item together. Try to name the image right when it appears."

3. Monitor students' ability to rapid name the images.

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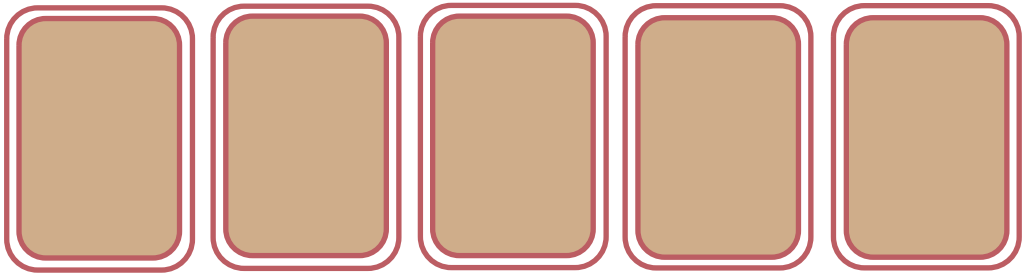
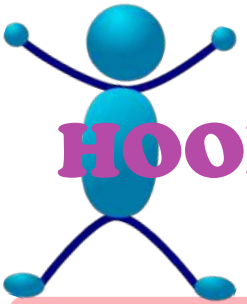
Day 13

SAY: Stay very focused to the board. The little doors will open briefly to reveal some number representations. We're going to see if we can name each of the numbers before the door closes shut again. Watch for some to be equal to zero. What will we see if the value is zero?
If it gets hard, keep trying. It'll get easier the more we practice. Ready?
****CLICK ONCE to begin the automated reveal process.*





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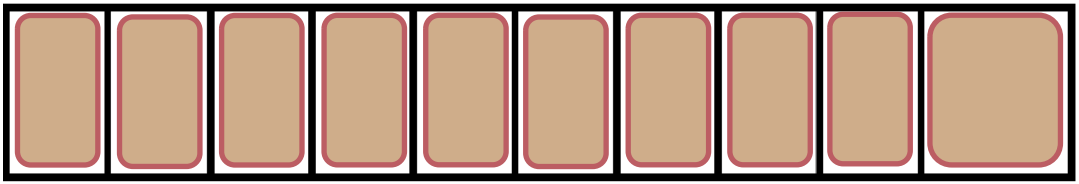
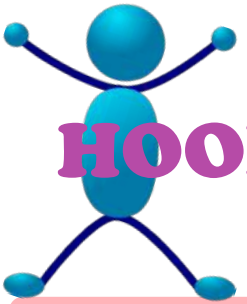
Rapid Naming

K.CC.B

Day 14

SAY: Stay very focused to the board. Say the number that is highlighted in yellow.
We're going to see if we can say each of the values before the next number gets highlighted. Ready?
****CLICK ONCE to begin the automated reveal process.*





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Rapid Naming

K.CC.A.1

How to facilitate Same But Different

At the start of this routine, students are shown two images. They are asked to identify not only the attributes that are the SAME between the two objects, but also the attributes that are different. This routine helps build students' grayscale thinking where things do not have to be all one or the other, they can be both at the same time.

To facilitate this routine,

1. Ask your students to think about what is the same about the two objects AND what is different. If scaffolding is needed, you can ask them to first think about how the objects are the same. Discuss. Then ask how the objects are different. Discuss.

2. Ideally, students will state how they are same and different in one sentence: For example, when shown a hula hoop and dinner plate, the student may respond, "They are both round but one is a toy, and the other is a dish."

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Same But Different

Day 15

ASK: How are these two images the SAME but DIFFERENT?
FOCUS: The focus is on recognizing that the number of balloons is the same but the color, shape, etc. is different.

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Same But Different

Day 16

ASK: How are these two images the SAME but DIFFERENT?
FOCUS: Both cups are the same size, but the amount of juice differs. The focus is on more/less thinking.

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Same But Different

K.MD.A.2

How to facilitate Splat!

This routine is designed to help students use strategies to count quantities efficiently, build addition and subtraction fluency within 10, and develop an understanding of the relationship between addition and subtraction facts.

To facilitate this routine,

1. Follow the prompts provided with each animation.

2. Students will be shown a set of dots. They will be asked how many dots are on the slide. Ask a few students, "How many dots do you see?"

3. Then ask students to explain how they counted the set of dots. As students explain their strategy (one-by-one counting, grouping, counting by 2s, etc.), annotate student thinking by writing on the slide or through simple gestures.

4. As the animation continues, a Splat! will cover some of the dots. Ask students to determine how may dots are hiding under the Splat! The student explanation of how they know is the most important part of this routine. Listen and celebrate the various efficient strategies that students share.

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DIRECTIONS: Click to view animations. Read each prompt as you go through the routine.
Remember to use gestures to annotate student thinking. Allow multiple students to share ideas.

3

How many blue

What can we learn from this picture?

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Splat!

DIRECTIONS: Click to view animations. Read each prompt as you go through the routine.
Remember to use gestures to annotate student thinking. Allow multiple students to share ideas.

5

How many blue

What can we learn from this picture?

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Splat!

Day 19

ASK: Can you use the clues to guess which object in this bedroom I am describing?
FOCUS: Vocabulary development, especially prepositional location words (on, under)

Clue 1
It is shaped like a sphere

Clue 2
It is on top of the bed

Clue 3
It is behind the toy bear

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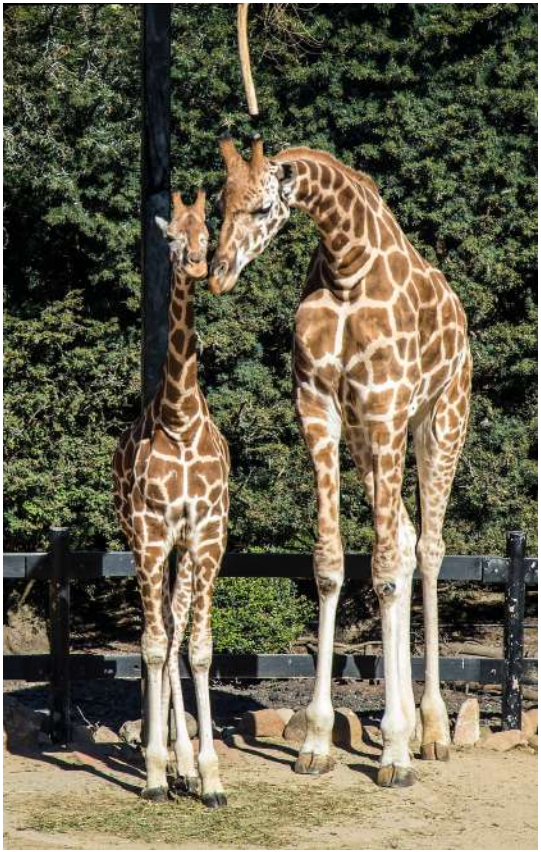
Clue by Clue

K.G.A.1

Day 20

ASK:
How are these giraffes the SAME but DIFFERENT?
FOCUS:
The focus on on comparing the various measurable attributes that are the same/different, such as height, weight, color, pattern, number of legs, etc.



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Same But Different

K.MD.A.2

Many THANKS!

180 Days of Number Sense Routines for Kindergarten

created by the Elementary Mathematics Team of **Calvert County Public Schools**, Maryland

Want to know more? Reach out to our team

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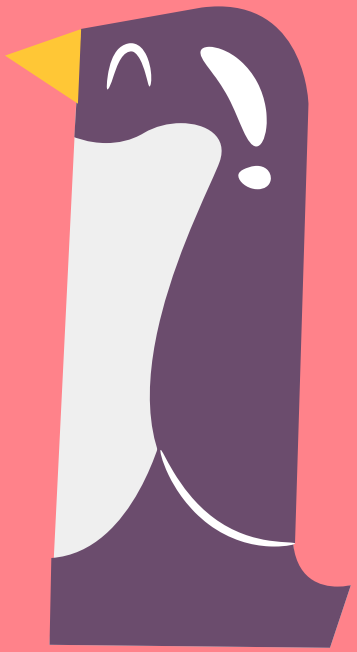

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Slide deck graphics and animations designed by Dawn Caine

September 2021

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