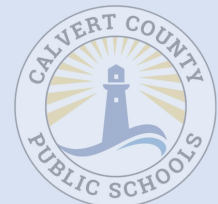


180 Days of Number Sense Routines

Grade 5

Days 1-20

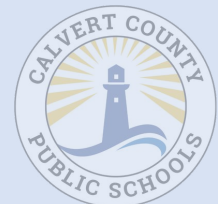


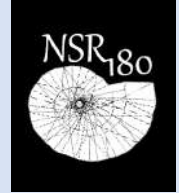


180 Days of Number Sense Routines

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 bus dismissal and fire drills, we must also establish routines that build mathematical thinking and discourse.



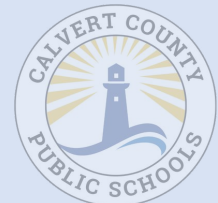
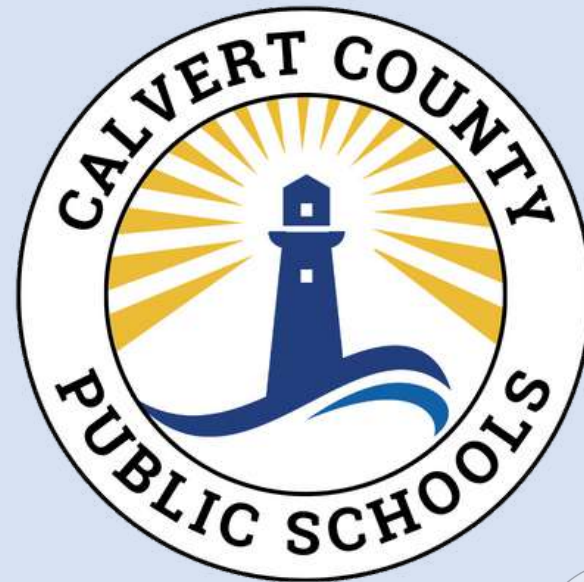


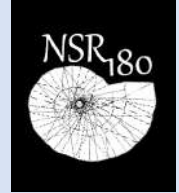
180 Days of Number Sense Routines

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. The Number Sense are models of effective pedagogy and ensure that the critical Number Sense instruction we provide is equitable to all our 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 CCPS IMPLEMENTATION EXPECTATIONS?

Number sense routines have been developed for all 180 instructional days in grades 1-5. These routines are to be used every day, including early dismissal, late arrival, and field trip days. Because the routines do not require a specific order, it is permissible to trade routines among days within the week 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.



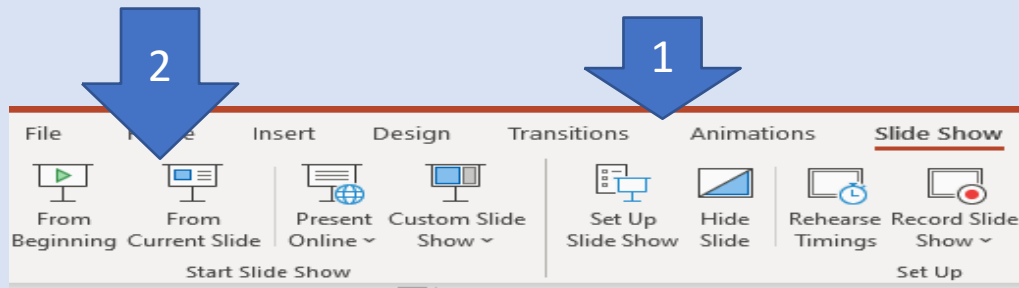


180 Days of Number Sense Routines

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>

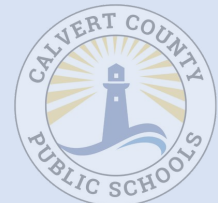


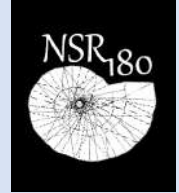
HOW TO ANNOTATE STUDENT THINKING ON THE SLIDE:

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

TROUBLESHOOTING:

These slides were created using the font **Calibri**. For formatting problems, check the font translation.





180 Days of Number Sense Routines

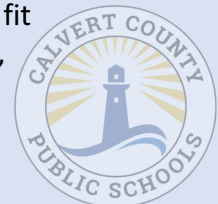
Acknowledgements

We are grateful to those who have inspired this project – and there have been many. These slide decks were designed for Grades 1–5 with custom-built daily routines for each grade level. The nine routines blend original creations, adaptations, and OER materials. We have made our work available in Open Educational Resources so that others may benefit as we have from the collaboration of other educators. Our deepest gratitude and respect to all those who helped move our work forward, and a special thank you goes to the following whose own work had such a tremendous impact on our 180 Days of Number Sense Routines:

- *Decide & Defend* and *Quick Count* routines were adapted from templates created by Grace Kelemanik and Amy Lucenta at <http://FosteringMathPractices.com>
- *Estimation Clipboard*, *Esti-Mysteries*, and *Splat!* templates created by www.SteveWyborne.com
- *Same But Different* discussion from Developing Grayscale Thinking by Looney Math Consulting at <https://www.samebutdifferentmath.com>
- *Which One Doesn't Belong* tasks adapted from <http://wodb.ca> by Mary Bourassa
- *As Close As It Gets* <https://www.mathisfigureoutable.com/ascloseasitgets> by Pam Harris

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Directions for SPLAT! routines

Intro



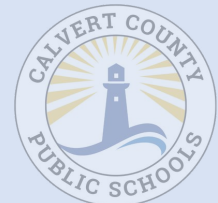
SPECIAL NOTE for Days 1-20: During the first 20 days, the same routine is presented two days in a row. The first day is designed to help students learn the protocols of the routine, so go slow and allow time and space for students (and you) to learn the protocols and how to engage with the routine. When the routine is repeated the next day using a different prompt, students should have a higher level of comfort that will enable them to engage with the mathematics and the math discussion more fluidly and deeply.

SPLAT! is a number sense activity that was developed by an educator in Oregon. There are dozens of SPLAT! activities including SPLAT! within ten, multi-SPLAT!, colored SPLAT!, and fraction SPLAT!

In order for SPLAT! to work, you must keep this activity in PowerPoint format.

To learn more about Steve Wyborney's Splat activity, click this link <http://www.stevewyborney.com/?p=893> then scroll down the webpage to see the video link for SPLAT!

A KEY component of SPLAT! is to discuss COUNTING STRATEGIES. How can we count the dots efficiently instead of counting them one by one?



SPLAT!

How many blue

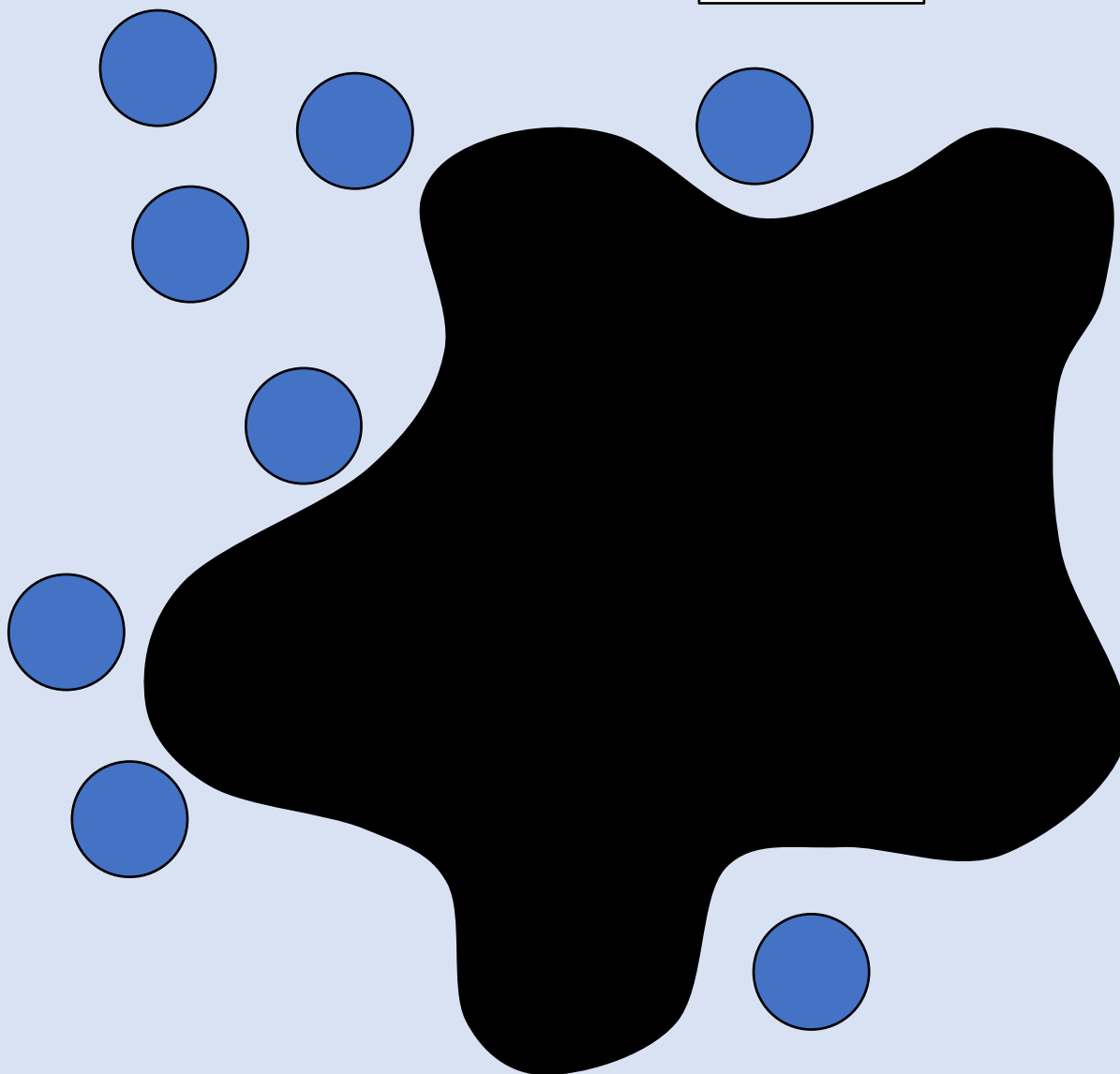
How did you
count them?

Are there any under the
splat? How do

How else could
you know?

Let's look under
the splat to see
how many shapes

What can we learn
from this picture?



Splat!

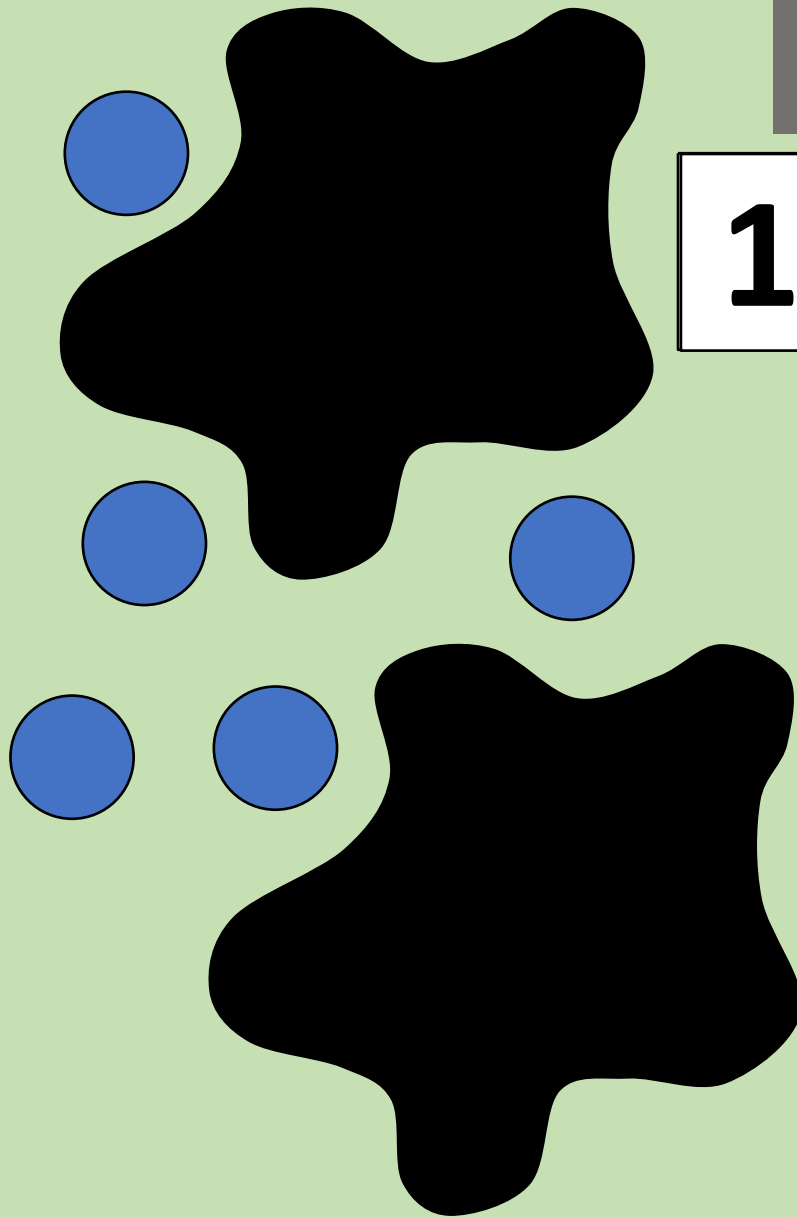
We don't know the total number of blue shapes. We do know that because both of the splats are the same color they must

**What could the total be?
What are some possibilities?**

**How is the list of possibilities
possible totals like**

Let's look under

What is the total?



About the SAME BUT DIFFERENT Routine

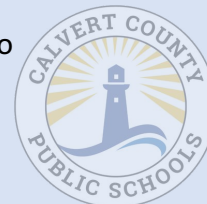
Same But Different is a powerful routine for use in math classrooms. The *Same but Different* routine compares two things **calling attention to both how they are the same and how they are different**. This apparent paradox is the beauty of the activity. In this analysis, *instead of making a choice and trying to prove that these are the same or prove that they are different, **students consider how two items can be both***. This is a critically important distinction from many other tasks.

One of the reasons students struggle in math is that they struggle to make connections. Someone who has poorly developed number sense might see each number as its own thing, and not part of the larger network of mathematical ideas. A mathematical conversation using the language *same but different* that calls attention to how a new concept in math is the same as another familiar and comfortable concept but different in a specific way is a useful conversation in growing a student's network of connections. Building these connections could also reduce anxiety as children become the sense-makers in the conversation.

Source: www.samebutdifferent.net.com/about

Facilitating the SAME BUT DIFFERENT Routine

1. Present the slide
2. Ask students to THINK about how the two items are both the SAME AND DIFFERENT.
3. Do not allow conversation at this time -- give ample think time for students to consider the possibilities
4. After some time has been given (a minute or so), ask students to talk with their Number Head partner or small group about their ideas -- allow this conversation to dominate the time dedicated to this routine
5. As students talk with partners/groups, walk around and listen to the conversations. Resist jumping in; let them grapple with the ideas with their peers.
6. As you walk around listening, take notes. You will use these notes to help direct the whole group conversation.
7. Refocus student attention to the front of the room for a whole group debriefing session. Ask students to share some of their ideas about how the two were both the SAME and DIFFERENT – use the notes you took to bring out important ideas that will benefit the entire room.



Use the NEXT SLIDE with students.

Here are some possible responses. This list is not all-inclusive.

Additional ideas encouraged!

- Students may simply recognize a component that makes them the “same” OR “different”
- Some students may state a same/different relationship and say that they are the “same because.... But different because....”

How are these the SAME but DIFFERENT?

Day 172

SAME BUT DIFFERENT

$20 - 12 = 8$

$20 = 12 + 8$

SAME:

- Both are same fact family: 20, 12, 8
- Both have an equal sign (are equations)
- The numbers are written in the same order for both

DIFFERENT

- The first is subtraction. The second is addition.
- The first has two numbers on the left of the equal sign. The second has one number to the left of the equal sign.
- The first has the operation sign (-) to the left of the equal sign. The second has the operation sign (+) on the right of the equal sign.
- (Note: Be cautious to avoid saying “the answer is” – we should help students to recognize that the equal sign indicates BALANCE on each side and does not mean “the answer is”

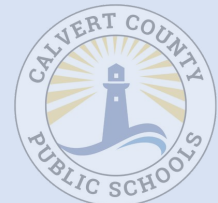
How are these the SAME but DIFFERENT?

Day
3

$$20 - 12 = 8$$

$$20 = 12 + 8$$

SAME BUT DIFFERENT

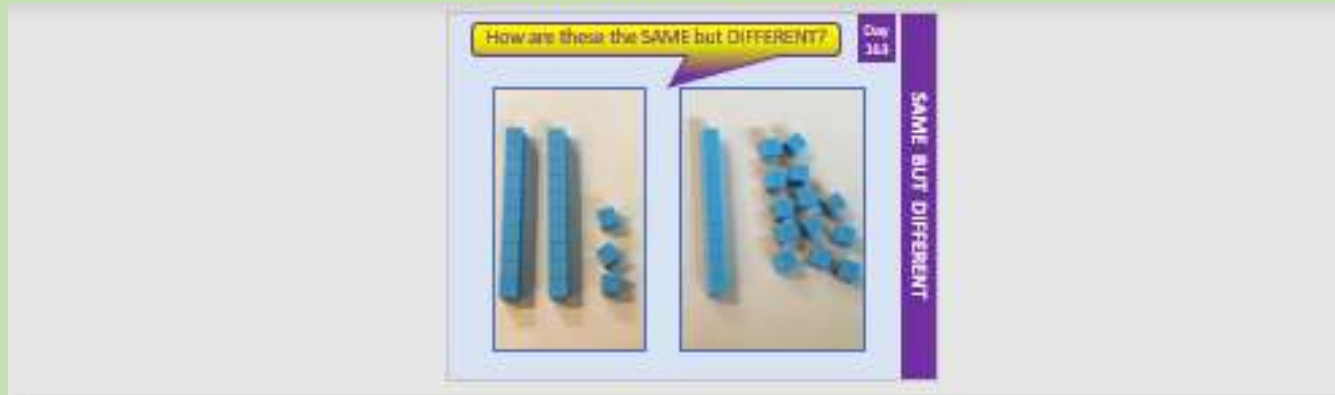


Use the NEXT SLIDE with students.

Here are some possible responses. This may not be an all-inclusive list.

Day
4

- Students may simply recognize a component that makes them the “same” OR “different”
- Some students may state a same/different relationship and say that they are the “same because.... But different because....”



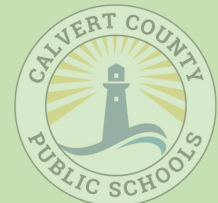
SAME:

- Both have a value of 23
- Both use Base Ten Rods and Unit Cubes
- Both have at least 1 ten rod
- Both have at least 3 unit cubes

DIFFERENT

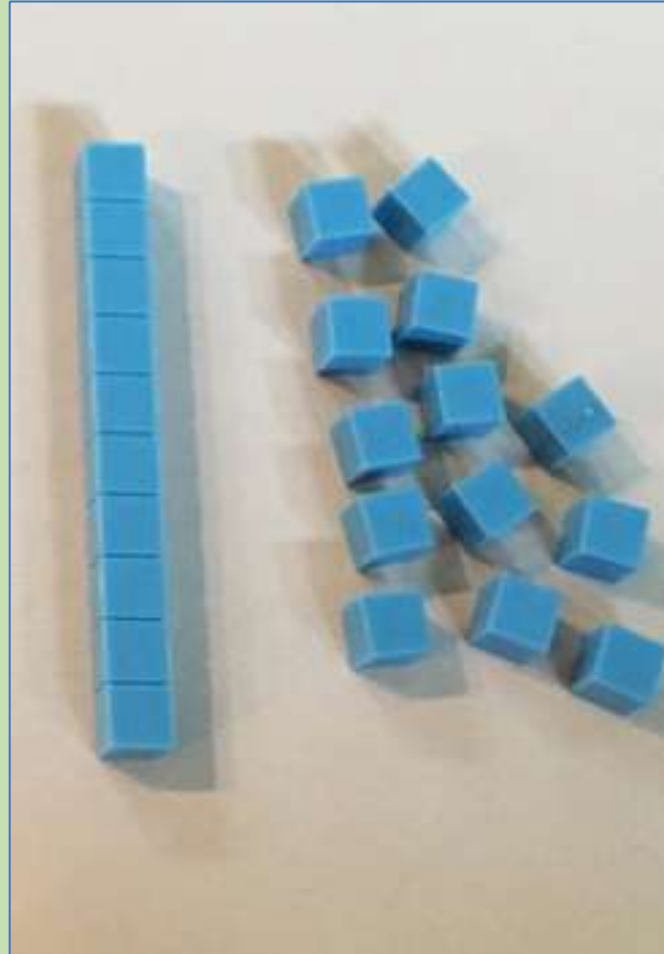
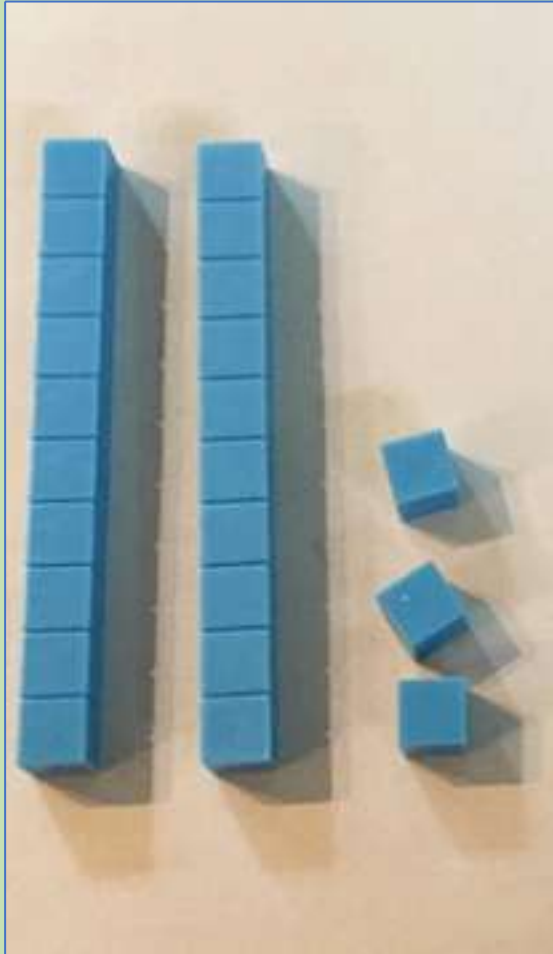
- The first is $20 + 3$ while the second is $10 + 13$
- The first has 2 tens and 3 ones while the second has 1 ten and 13 ones

SAME BUT DIFFERENT



How are these the SAME but DIFFERENT?

Day
4

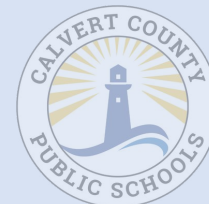


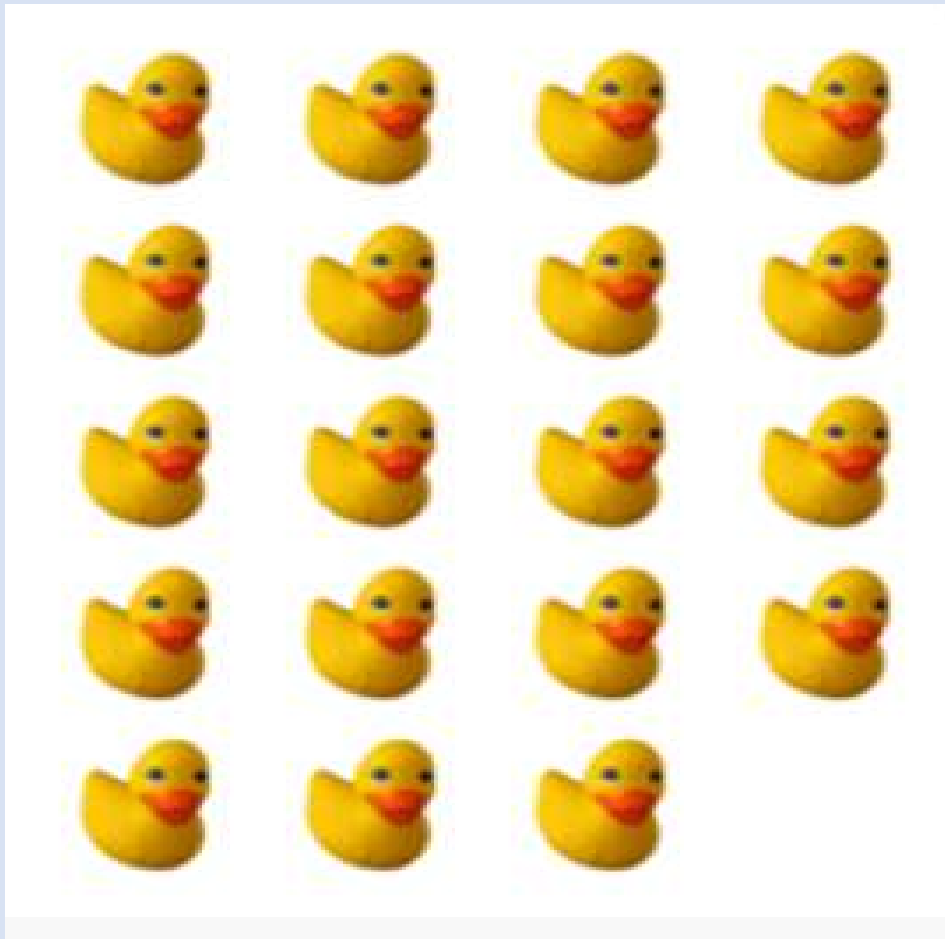
SAME BUT DIFFERENT

Directions for QUICK COUNT routines

Quick Count is an instructional routine designed to shift attention away from mindless calculations and toward necessary structural interpretations of mathematics. This routine fosters structural thinking, Math Practice 7, and promotes student discourse.

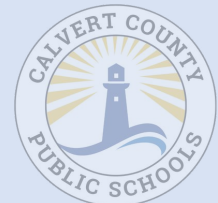
1. Pair students into Numbered Heads (or Peanut Butter Jelly partners, etc.)
2. Show students the first image slide for about 3-5 seconds depending on the complexity of the image and level/experience of the students.
3. With their partner, students discuss everything they can remember about the image.
4. After a minute of partner discussions, have students share ideas to the group.
5. Create a list of student ideas that students can refer to when the image is shown again.
6. Tell students that you are going to put the slide back up. Ask students to COUNT the images using some type of shortcut strategy (chunking, symmetry, arrays...)
7. Show the image again and leave it displayed as students look for counting shortcuts.
8. With their partner again, students discuss how many objects are in the image and how describe the shortcut counting strategy they used. Give time for partner discussions. Walk around and take notes about discussions to determine which students will share.
9. Use the slide with identical images as a comparative visual as students take turns explaining how they counted the objects in the image.
 - Use your notes to select different students with different approaches.
 - The student explains his/her shortcut as the teacher **gestures** over the image.
 - A **different student** is asked to **REPEAT the original student's shortcut** as the teacher **annotates** (circles, underlines) on the image to show the shortcut used.
 - Repeat the process using different student-generated shortcut strategies.
10. End by asking students to explain what was “mathematically important”

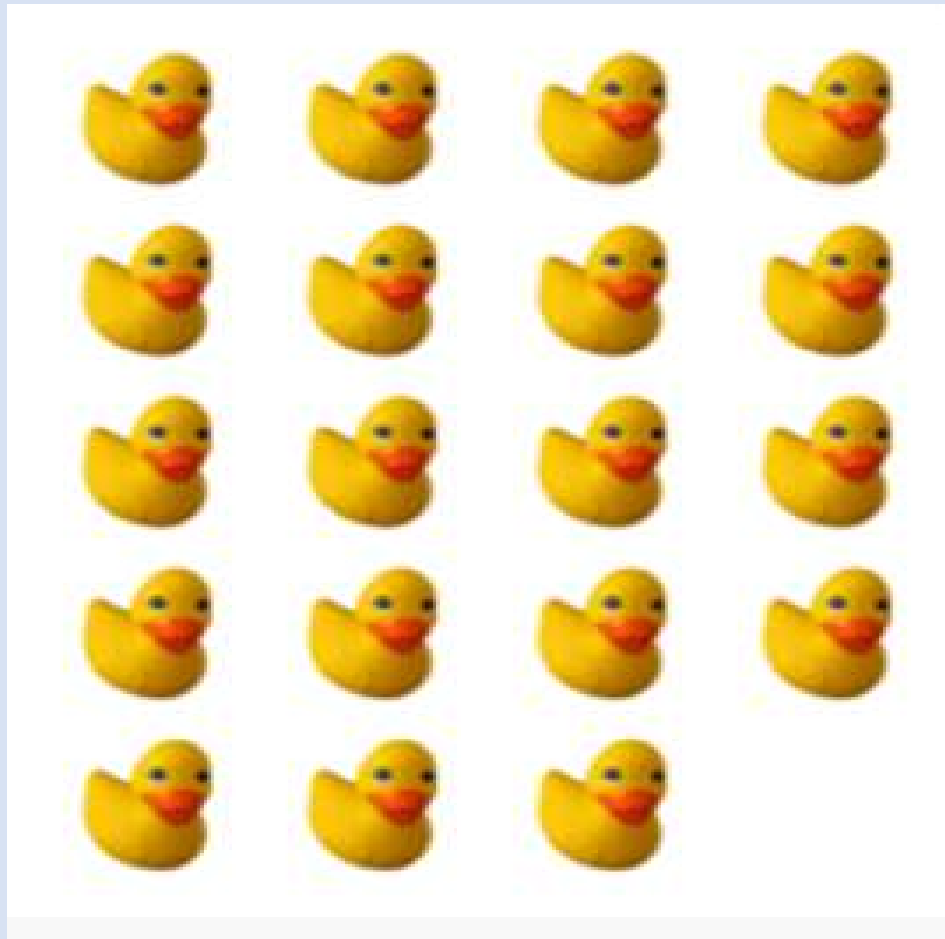




What do you NOTICE?

**What did you
NOTICE?**

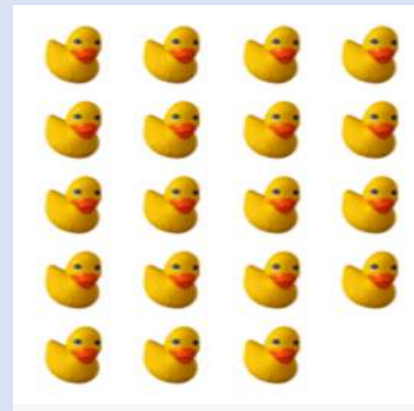
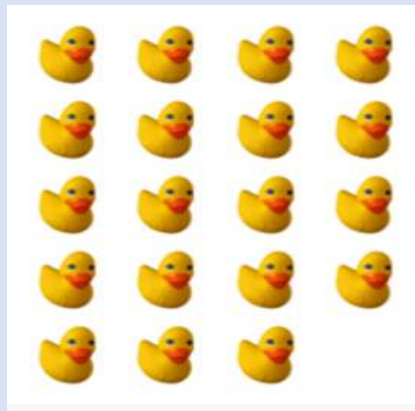
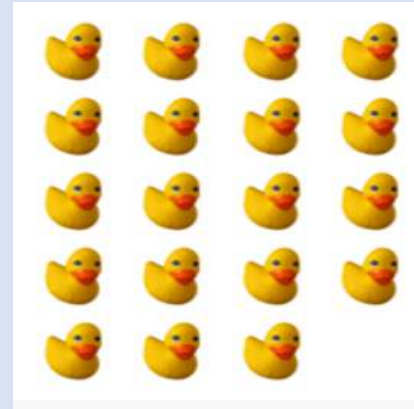
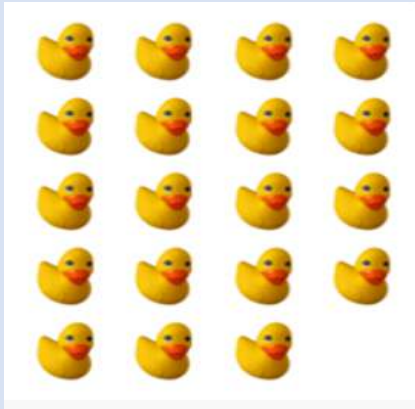




How many do you see?
What counting shortcut did you use?

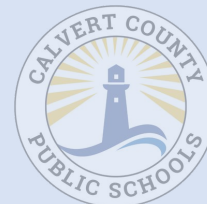
I noticed ____ so I ____

(They) noticed ____ so they ____



Reflect

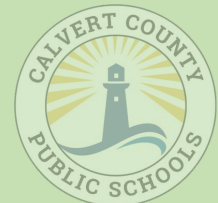
**What was
mathematically
important?**





What do you NOTICE?

**What did you
NOTICE?**

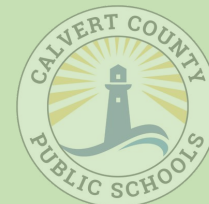




How many do you see?
What counting shortcut did you use?

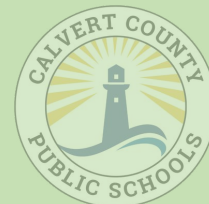
I noticed ____ so I ____

(They) noticed ____ so they ____



Reflect

**What was
mathematically
important?**



Esti-Mystery

Estimation Activity with clues!

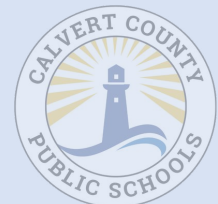
Students use clues to solve the estimation mystery.

After all of the clues are revealed, students will have enough information to determine if their initial estimate was correct.

Clues are revealed one at a time with time to discuss and refine original estimates after EACH clue is revealed.

No one should be stuck with their original estimate – encourage mindful refinements.

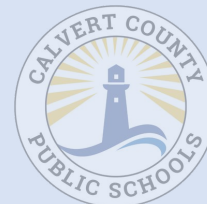
Students may benefit from using paper and pencil to work through possibilities or consider creating a class chart where possibilities are added and crossed off as each clue is revealed.

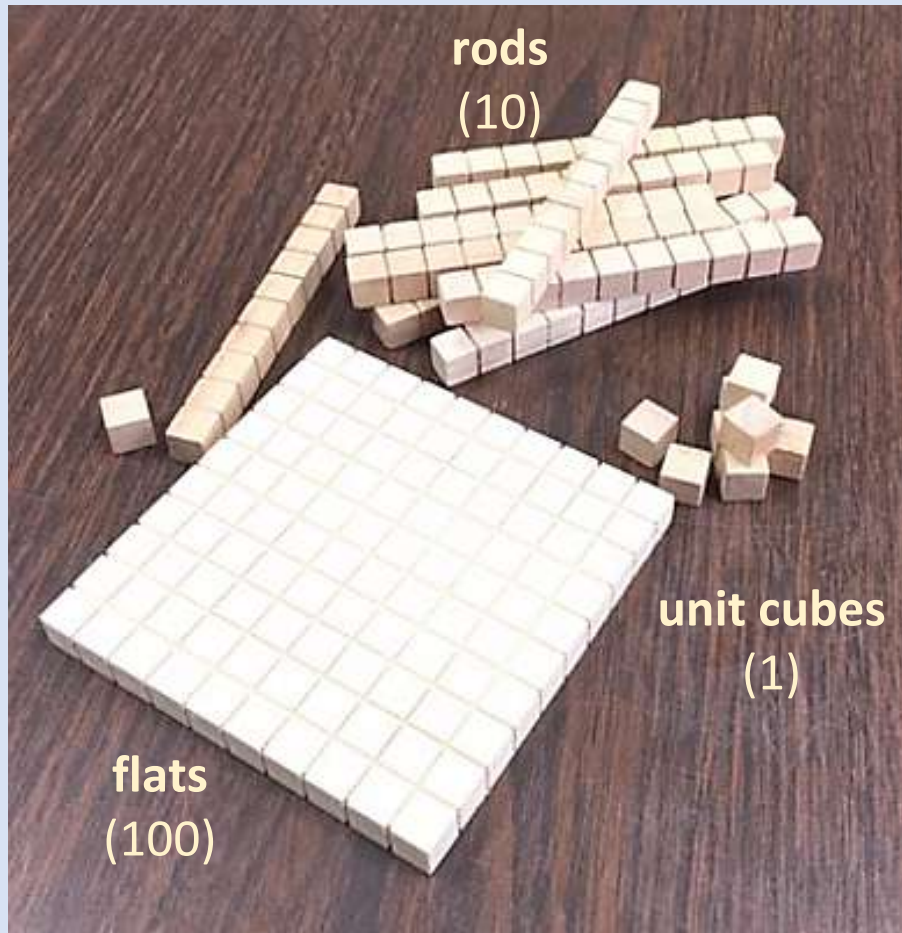




**What number do these
Base Ten Blocks represent?**

As the clues appear, use the information to narrow the possibilities to a smaller set. Then use estimation to determine which of the remaining answers is the most reasonable.





Clue #1

The large flat is worth 100

Clue #2

The rods are worth 10

Clue #3

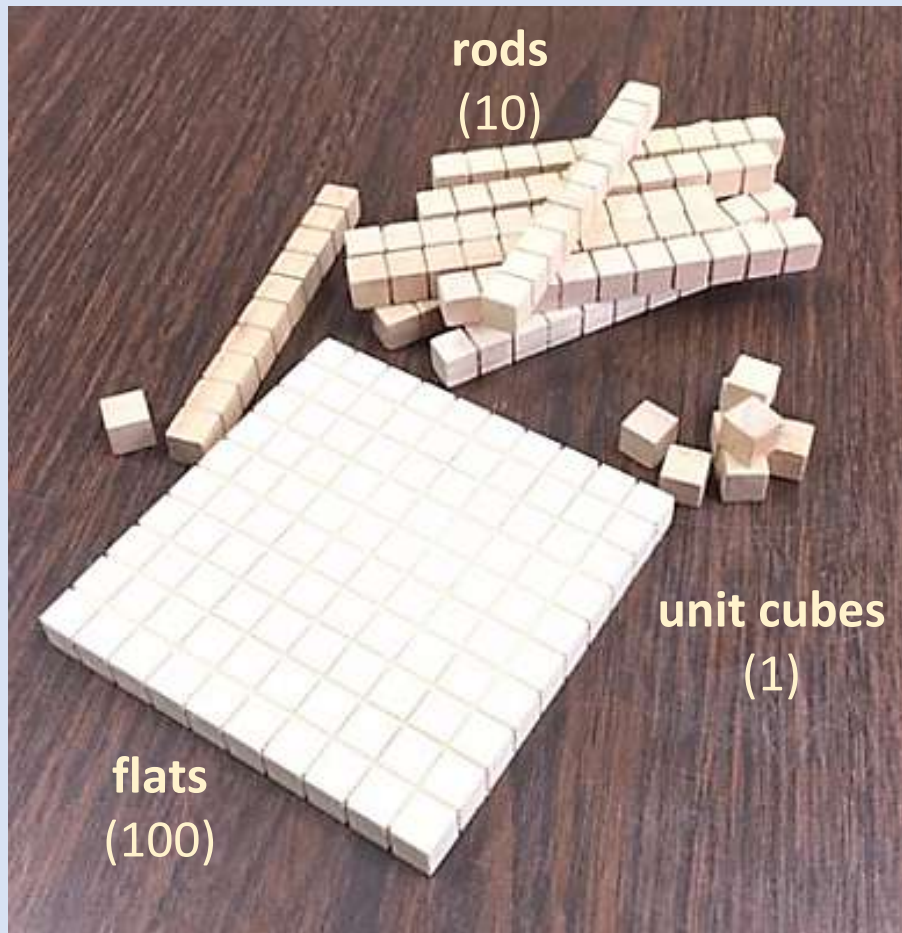
**The total value is
greater than 200**

Clue #4

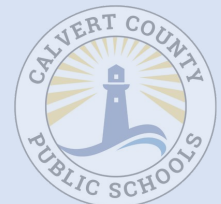
There are 12 rods

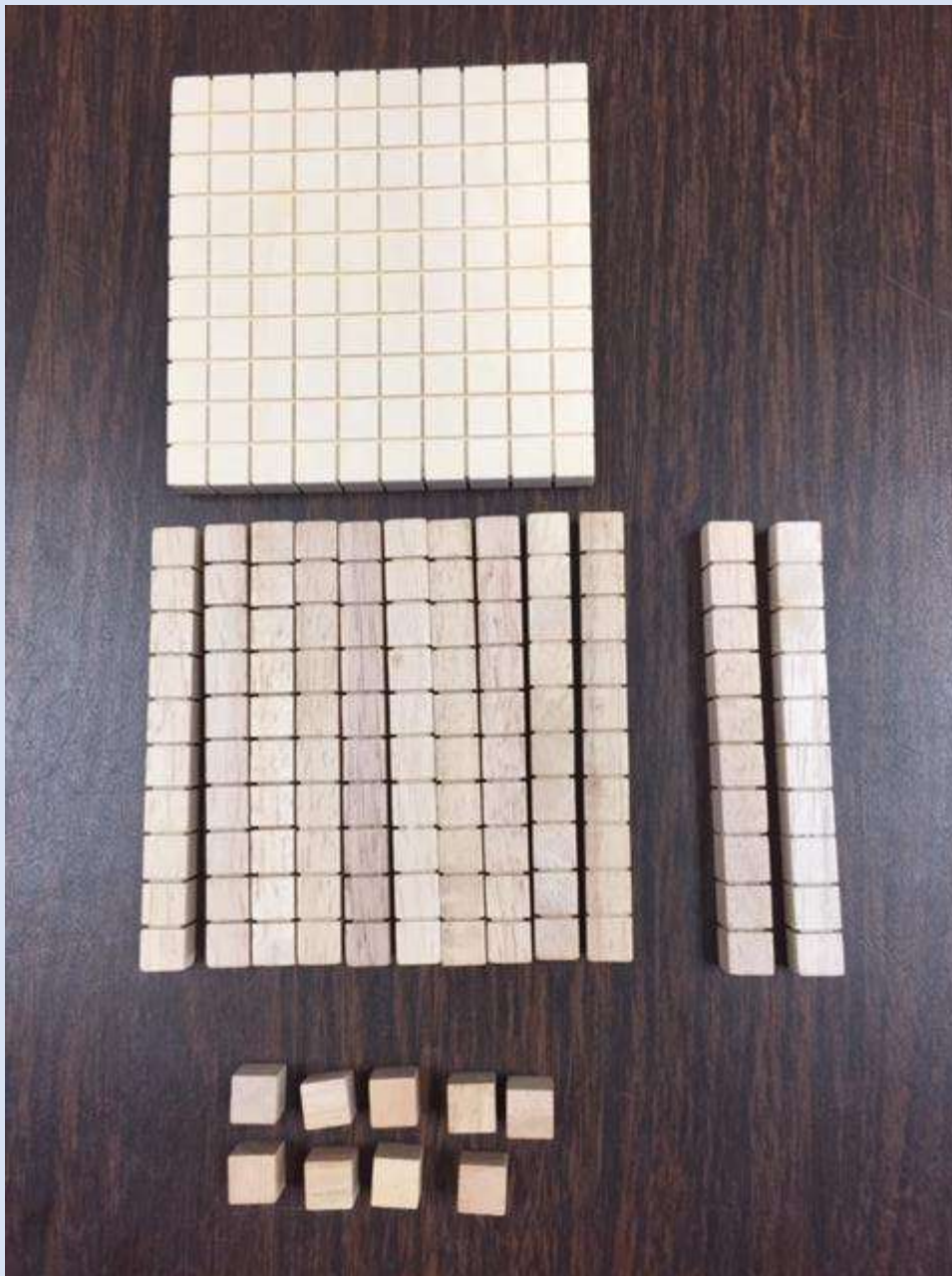
Clue #5

**Some are stacked and
hidden, but there are 9 unit
cubes**

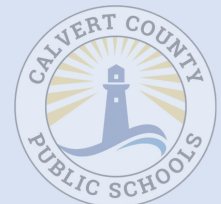


By combining the clues and estimation, you now have enough information to determine the answer.





The Reveal
Click to see the answer.

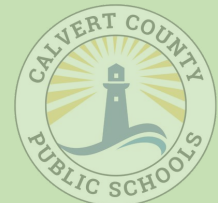




How many pencils?

As the clues appear, use the information to narrow the possibilities to a smaller set. Then use estimation to determine which of the remaining answers is the most reasonable.

You may want to use paper/pencil to keep track of the possible solutions.





Clue #1

**There is a 1 in the
hundreds place**

Clue #2

There is a 4 in the tens place

Clue #3

**The number is less than
 $127 + 16$**

Clue #4

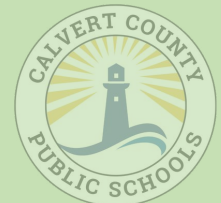
**You should have just 3 possible
answers. What are they?**

Clue #5

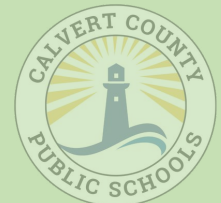
**It's the number with
the greatest value**



By combining the clues and estimation, you now have enough information to determine the answer.



The Reveal
Click to see the answer.



Rationale, Goals, and Directions for OPEN NUMBER LINE routines

Intro

Rationale

The Number Line contains number values that continue without end in both directions. It is not until Grade 6 that we introduce students to negative numbers. Even so, a number line that begins at 0 and continues beyond 1,000,000 is much too large of a tool for us to make practical use. For this reason, we introduce students to the Open Number Line which offers greater flexibility and helps to develop student Number Sense.

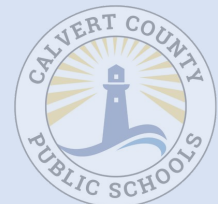
Goals

The Open Number Line will build student understanding in the following areas:

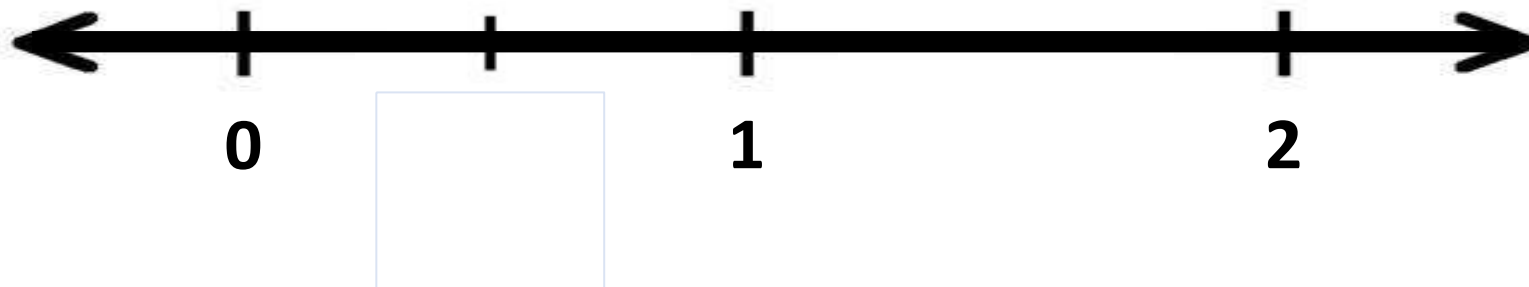
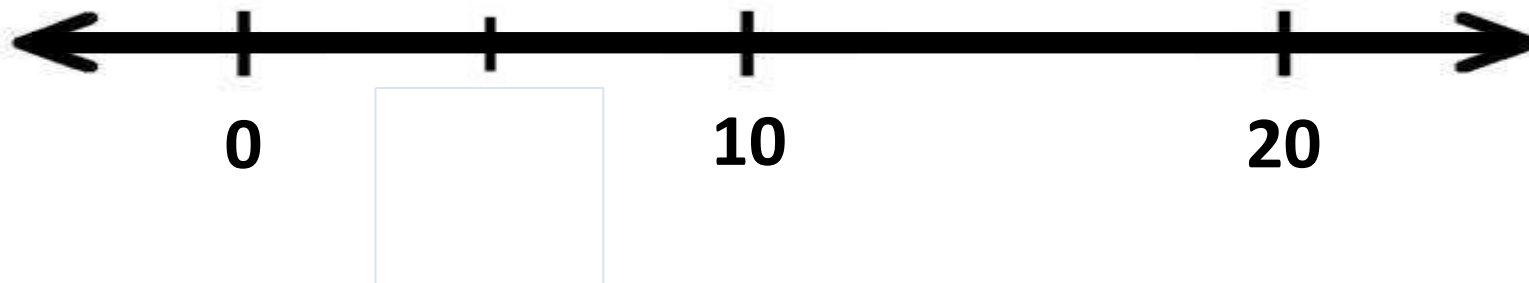
- **Patterns and Sequence of Number:** The Open Number provides a visual representation that builds student understanding of the patterns and number sequence of our number system.
- **Intervals:** Students will learn that equal spaces between numbers indicates that the interval is equal.
- **Benchmark Numbers:** Students will learn to work efficiently through the use of benchmark numbers that allow for reasoning and the ability to calculate in fewer steps (efficiency).
- **Reasoning:** Through Open Number Line activities, students will use the pattern of numbers, intervals, and benchmark numbers to reasoning about numbers on the number line.

Directions

Several number lines will be given on these slides but, for most students, interactive physical number line activities may offer a richer experience leading to a deeper understanding. To see how to use string, markers, and simple paper tents to use these number line activities on an interactive number line, visit MathSnack.blogspot.com: <https://mathsnack.blogspot.com/search?q=open+number+line>.

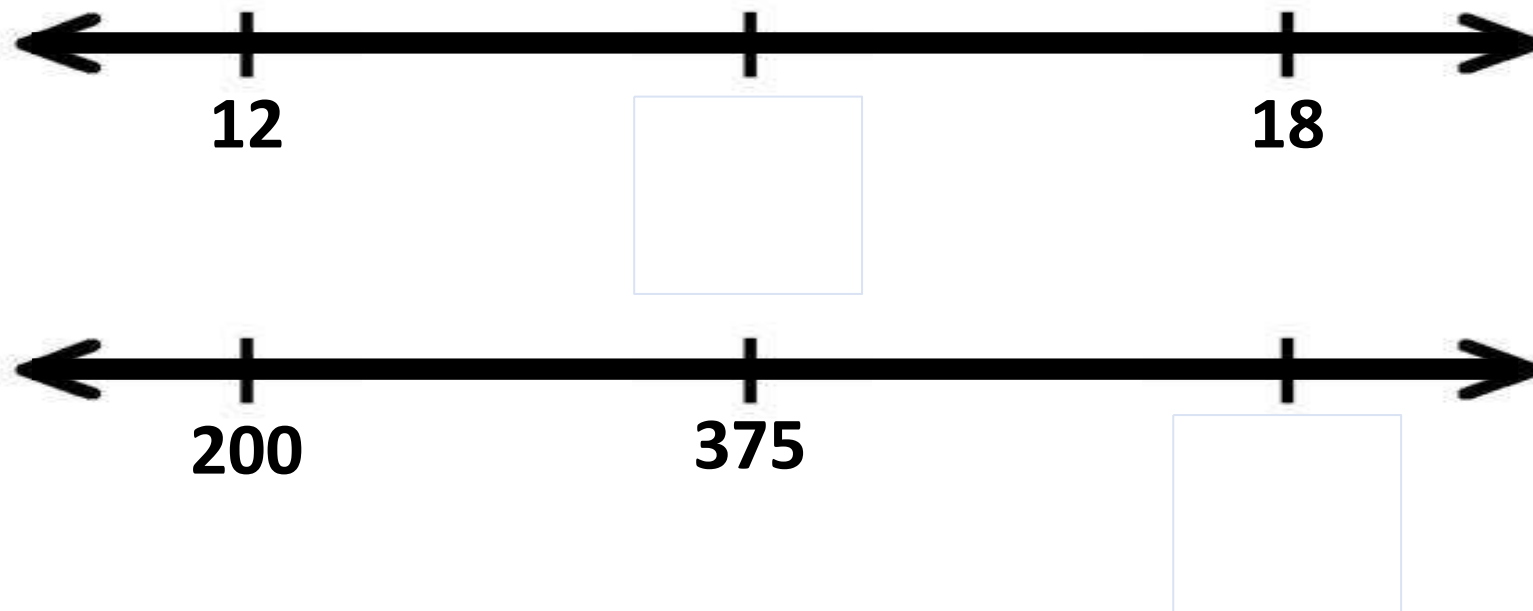


How are these two number lines the SAME?
How are they DIFFERENT?



What number goes in each space? *How do you know?*

If the intervals are equal, what is the missing value?



Directions for NUMBER TALK routines

A Number Talk is a very specific routine with its own structure when used with a group of students.

- Gather students to the board where the problem is written
- Use the silent hand signals (thumbs up at chest) to indicate ready
- Give plenty of think time
- Collect the various solutions that students think are correct
- Have a different student pick and defend one of the solutions
- Annotate the student's ideas
- Avoid taking over and teaching – if students make an error or have an incorrect solution, continue to annotate as the student is describing. The student may self-correct or another student may continue the discussion by pointing out the mathematical error.
- Once a student has correctly identified the solution, do not discuss through incorrect solutions. Instead, ask if any student got the same solution in a different way.
- Annotate the new way suggested by students.
- See more about NUMBER TALKS in the *Number Talks* books by Sherry Parrish or visit our MathSnack.blogspot.com page. On the website, there are videos of teachers in action and additional information. [CLICK HERE](#)



$$\begin{array}{l} 27 + 10 \\ 27 + 20 \\ 72 + 20 \\ 72 + 30 \end{array}$$

TEACHER NOTES

BEFORE

The next slide has a string of expressions that you will use for today's Number Talk. Use this slide in Smart Notebook format so you can easily use the pen to annotate. Use the screen shade to show just one expression at a time.

DURING

Adding Multiplies of 10 to a 2-digit number

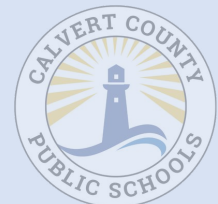
Key Ideas:

- Students should recognize that by adding tens, we are only impacting the number of tens.
- $27 + 20$, for example, we have 2 tens and 7 ones and we are adding 2 more tens for a total of 4 tens giving us a new total of 4 tens and 7 ones or 47

Remember, students will come with a variety of strategies. During a Number Talk, the students explain their way of thinking. When students find ways that are especially efficient, highlight those strategies in the reflection that should follow the Talk. Help students to understand a wide variety and guide them into understanding that some strategies work better in some situations, so knowing more than one way to solve an equation like this one is important so they can later choose the method that is most efficient.

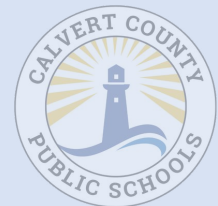
AFTER

Use the 100s chart if needed to model adding multiples of 10. Be sure that students understand that each row has 10 numbers, so moving down one row will add 10 to the number.



$$27 + 10$$

Day
11



NUMBER TALK

$48 - 30$

$48 - 35$

$44 - 20$

$44 - 23$

TEACHER NOTES

BEFORE

The next slide has a string of expressions that you will use for today's Number Talk. Use this slide in Smart Notebook format so you can easily use the pen to annotate. Use the screen shade to show just one expression at a time.

DURING

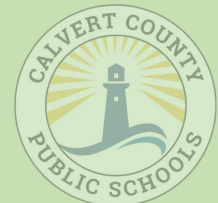
Adding subtracting by decomposing the subtrahend (number being subtracted)

Key Ideas:

- Students may find it easier to decompose the subtrahend into tens and ones and subtract each part.

$$48 - 35 = 48 - 30 - 5 = 18 - 5 = 13$$

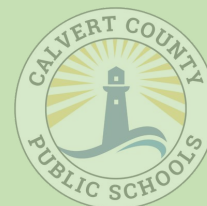
Remember, students will come with a variety of strategies. During a Number Talk, the students explain their way of thinking. When students find ways that are especially efficient, highlight those strategies in the reflection that should follow the Talk. Help students to understand a wide variety and guide them into understanding that some strategies work better in some situations, so knowing more than one way to solve an equation like this one is important so they can later choose the method that is most efficient.



$$48 - 30$$

Day
12

NUMBER TALK



Directions for the CHORAL COUNT routine

Choral Counting is an activity in which the teacher leads children in counting aloud together by a given number. As the class calls out each number, the teacher records the count on the board, pausing the count at strategic moments.

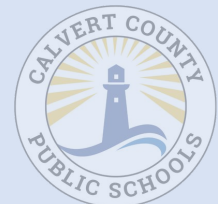
To begin, the teacher decides on a number for the students to skip count by, whether to count forwards or backwards, and what number to start and end the count on. Different numbers lend themselves well to surfacing different mathematical ideas.

The goal of this activity is not just to practice rote counting, but to engage children in reasoning, predicting, and justifying. To do this, teachers record the count so that patterns within the numbers are readily noticeable and pause during the count to ask questions like, “What do you think will come next? How do you know?”

– Tedd.org



Want to see a Choral Counting routine in action?
Click the image.



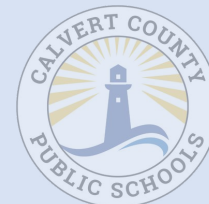
WRITING NUMERALS (VISUAL SUPPORT)

Intro

It may be beneficial to write the numerals as the students say them. This support provides students with a visual representation of what is going on in their heads. Great discussions about relationships among numbers arise from this added visual support, especially if you are thoughtful about the way you write the sequence as students count.

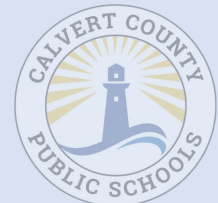
Number Line Format														
← 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 →														
List Format	Number Grid Format													
97								97	98	99	100			
98								101	102	103	104	105	106	
99								111	112	113	114	115		
100														
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112														
113														
114														
115														

CHORAL COUNTING



Choral Count Ten More

- *We are going to count all together. The count will be nice and slow so I can write the numbers as you say them on the chart.*
- *We will start on the number 56.*
- *Each time we say a number, we'll say the number that is 10 MORE than the previous number, so the next number after 56 will be 66.*
- *Remember, we are counting all together, nice and slow, so I can write the numbers as you say them.*
- As students count, write the numbers on the chart (see chart on the next slide)
- After you have filled the counting chart, ask students what mathematical patterns do they notice. DISCUSS.

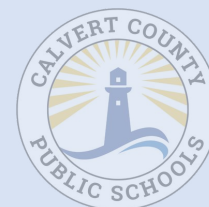


Ten More

Day
13

56

(stop – go to next slide)



Ten More

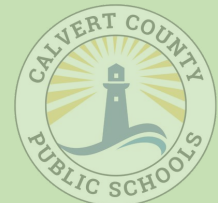
Day
13

Using the numbers we've already recorded, can you predict what number will go in the red box?
What patterns do you see that will help?

56	66	76	86	96
106	116	126	136	146
156	166	176	_____	_____
_____	_____	<div style="border: 2px solid red; padding: 5px; display: inline-block;">_____</div>	_____	_____

Choral Count Ten LESS

- *We are going to count all together. The count will be nice and slow so I can write the numbers as you say them on the chart.*
- *We will start on the number 378.*
- *Each time we say a number, we'll say the number that is 10 LESS than the previous number, so the next number we will say after 378 is 368.*
- *Remember, we are counting all together, nice and slow, so I can write the numbers as you say them.*
- As students count, write the numbers on the chart (see chart on the next slide)
- After you have filled the counting chart, ask students what mathematical patterns do they notice. DISCUSS.

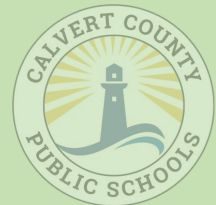


Ten LESS

Day
14

378

(stop – go to next slide)



Ten Less

Using the numbers we've already counted can you predict what number will go in the red box using the patterns you can see. Let's discuss.

378 368 358 348 338

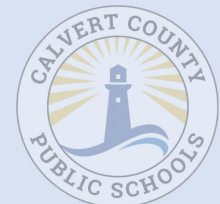
328 318 308 298 288

278 268 258 _____ _____

Using the DECIDE & DEFEND routine

- **READ to Understand:** Begin by having students discuss the question being asked. At this time, do NOT focus on the math calculations required or the answer. This step is designed for students to understand the context of the question (What is the gist of the question?)
- **DECIDE:** Pair or group students. Using a consistent pairing will make this routine more fluid so you do not have to take time to pair students every time you want them to discuss. Have students discuss the question and discuss the question and decide which solution is correct (note: partners may not agree and that is fine provided they can justify their own thinking).
- **DRAFT:** Students draft a statement about their ideas (either as a group or individually and it can be written or oral – teacher’s choice)
- **DEFEND:** Students share their ideas and defend their reasoning with the whole group. Encourage active listening and accountable talk.
- **RELECT:** To further develop comprehension, have students use ONE of the sentence starters on the “Reflect on Learning” slide after they have discussed and listened to new ideas with classmates.

NOTE: This is the CCPS adaptation of the original Decide and Defend protocol



Use the NEXT SLIDE with students.

Here are some possible responses. This list is not all-inclusive.
Additional ideas encouraged!

Day 15

Milana and Justina are discussing place value.
Which student is correct?


$4 \times 1000 + 9 \times 10 + 7 \times 1$
has a greater value

$4 \times 1000 + 2 \times 100 + 3 \times 1$
has a greater value

Milana

Justina

DECIDE & DEFEND



Justina is correct. We must be mindful of place value
and not just the numbers used.

Milana: 4097

Justina: 4203

Milana and Justina are discussing place value.
Which student is correct?

$4 \times 1000 + 9 \times 10 + 7 \times 1$
has a greater value

$4 \times 1000 + 2 \times 100 + 3 \times 1$
has a greater value

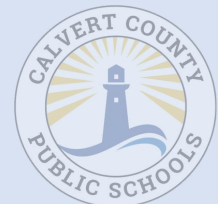


Milana

Justina

Reflect on Learning

- What was mathematically important in the problem?
- What new math idea did you learn today?



Use the NEXT SLIDE with students.

Here are some possible responses. This list is not all-inclusive.
Additional ideas encouraged!

Day
16

DECIDE & DEFEND

Clark's Convenience Store sells green, orange, and red gummy bears. Each color costs a different price.



Which color is the best price?
How do you know?

10 green gummy bears cost 30 cents
5 orange gummy bears cost 20 cents
20 red gummy bears cost 80 cents


© 2012-13

There are several ways to solve this one: unit price or by finding the price for the same size set, for example.

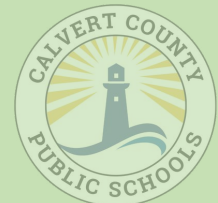
GREEN is the best price

Students may have determined the cost per bear

- GREEN: 3 cents each since $3 \times 10 = 30$
- ORANGE: 4 cents each since $4 \times 5 = 20$
- RED: 4 cents each since $20 \times 4 = 80$

Students may have determined equal numbers of bears and found the price

- 20 green bears = 60 cents (10×2 and 30×2)
- 20 orange bears = 80 cents (5×4 and 20×4)
- 20 red bears = 80 cents (20×1 and 80×1)

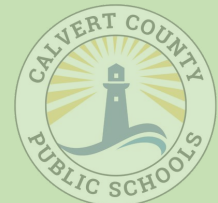


Clark's Convenience Store sells green, orange, and red gummy bears. Each color costs a different price.

Which color is the best price?
How do you know?

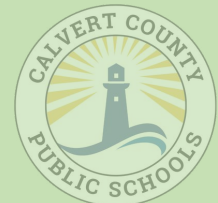


10 green gummy bears cost 30 cents
5 orange gummy bears cost 20 cents
20 red gummy bears cost 80 cents



Reflect on Learning

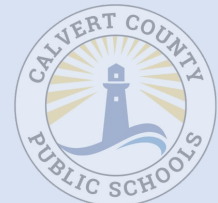
- What was mathematically important in the problem we explored?
- What new math idea did you learn today?
- Next time I plan to...



Teacher Information

Watch this video to learn how to use the Estimation Clipboard activities.
Note: The Estimation Clipboard activities must be viewed in PowerPoint Slide Show format in order to be seen properly.

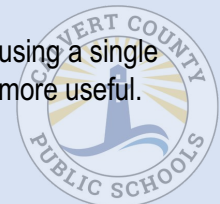
The Estimation Clipboard



Tips for Using The Estimation Clipboard

Intro

1. When the first image (of 4) appears, invite the class to share some estimates aloud. Typically, a few students will offer some estimates. Don't spend much time on the first image. After you have received a few responses, reveal the answer.
1. Make a mental note: If you hear answers from a small number of students, you are also hearing silence from nearly all of your class. Anticipate engaging all students in mathematical reasoning by the time you reach the third image.
1. When the second image appears, invite the class to share some estimates aloud again. You will likely hear estimates from more students than the first time. You may want to spend a little more time on the second image, but the power of The Estimation Clipboard is yet to come.
1. When the third image appears, change your approach. Remember, you haven't heard from several students at this point, but everyone's context is growing. When you show the third image, instead of asking for answers aloud have all of the students write down their estimate. Then have them discuss these two questions with a partner: "What was your estimate? Why did you choose it?" Listen in on students' conversations to hear how they are reasoning.
1. When the moment is right, reveal the third answer. Notice how your students are becoming increasingly engaged in the estimation process. That's partly because you are re-inviting them into a growing context. It's also because they have engaged in writing and discussion. The moment of writing has become a springboard for discussion. They have been given space to voice their ideas, and they are learning more about their ideas and gaining confidence as they discuss their estimations.
1. When the fourth image appears, repeat the process from the previous step. Everyone in the classroom writes down their estimate, and then everyone tells their partner what estimate they chose and why they chose it. Expect the conversation to take a little longer here and notice that the conversations about the estimates – and about the estimation process itself – are becoming more detailed. You may see several students pointing to the screen during their discussions.
1. When you reveal the final answer, listen to your class. Simply listen. Just take a moment to notice the level of engagement, the precise language they are using, the articulation of their reasoning, and their increased willingness to take academic risks.
1. Eventually, perhaps after you have tried several sets, introduce the concept of using a range to estimate – rather than using a single number. Look for opportunities to encourage your students to self-select whether a range or a single number would be more useful.
1. As a learner yourself, engage in the process. Be a wonderer in front of your students. If you want a good question to wonder about, begin with this one: "What is estimation?"

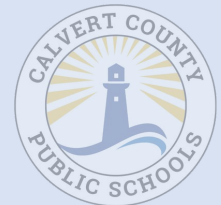


Estimation Activity

Have you already watched the teacher information video?

When you are ready to use this activity,
use the PowerPoint platform so the slides work properly.

PROMPT: How many marbles are in the bowl?



How many
marbles are in
the bowl?



The Reveal



29 marbles

The Reveal



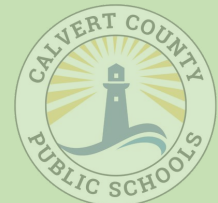
The Reveal

The Reveal

Estimation Activity

When you are ready to use this activity,
use the PowerPoint platform so the slides work properly.

PROMPT: How long is each string?



Total Length

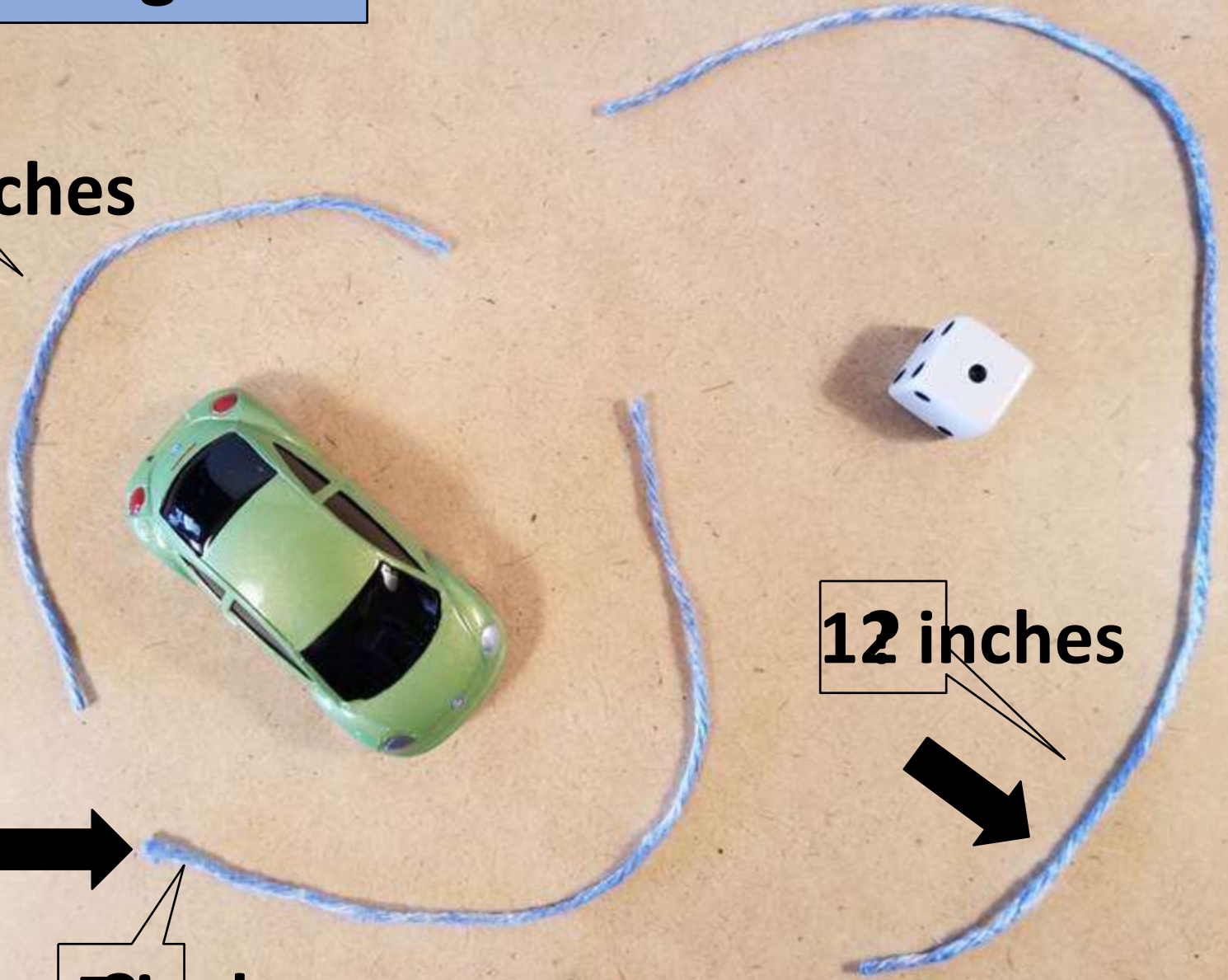
6 inches



12 inches



7 inches



Total Length

Steve Wyborney



9 inches

6 inches

10 inches

Directions for WHICH ONE DOESN'T BELONG routines

Say: "Today we are going to do an activity called 'Which One Doesn't Belong'"

Students are shown four images.

Say: "Look at these four images.
Decide which one does not belong.
Have a reason ready that explains why
the one you picked does not belong
with the other three images. Try to begin your
sentence with the sentence starter 'Three of the
images ____ but ____.'"

Show the image. Leave the image visible throughout.

Give students think time.

Ask students to share.



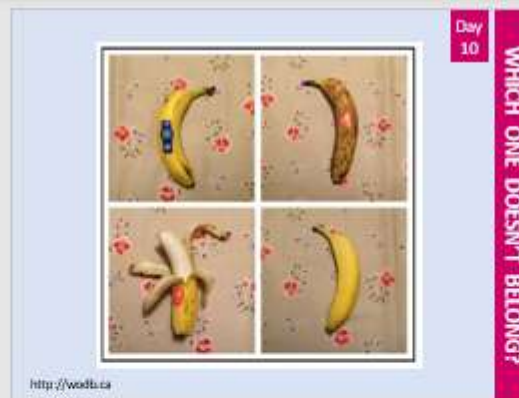
Examples (NOTE: These are not the only responses possible)

- Three of the bananas curve to the left. Top Left doesn't belong because it curves in the opposite direction of the rest
- Three of the bananas are mostly yellow. Top Right doesn't belong because it is brown and the others are mostly yellow
- Three of the bananas are unpeeled. Bottom Left doesn't belong because it is peeled and the others are not
- Three of the bananas have stickers. Bottom Right doesn't belong because it doesn't have any stickers



Use the NEXT SLIDE with students.

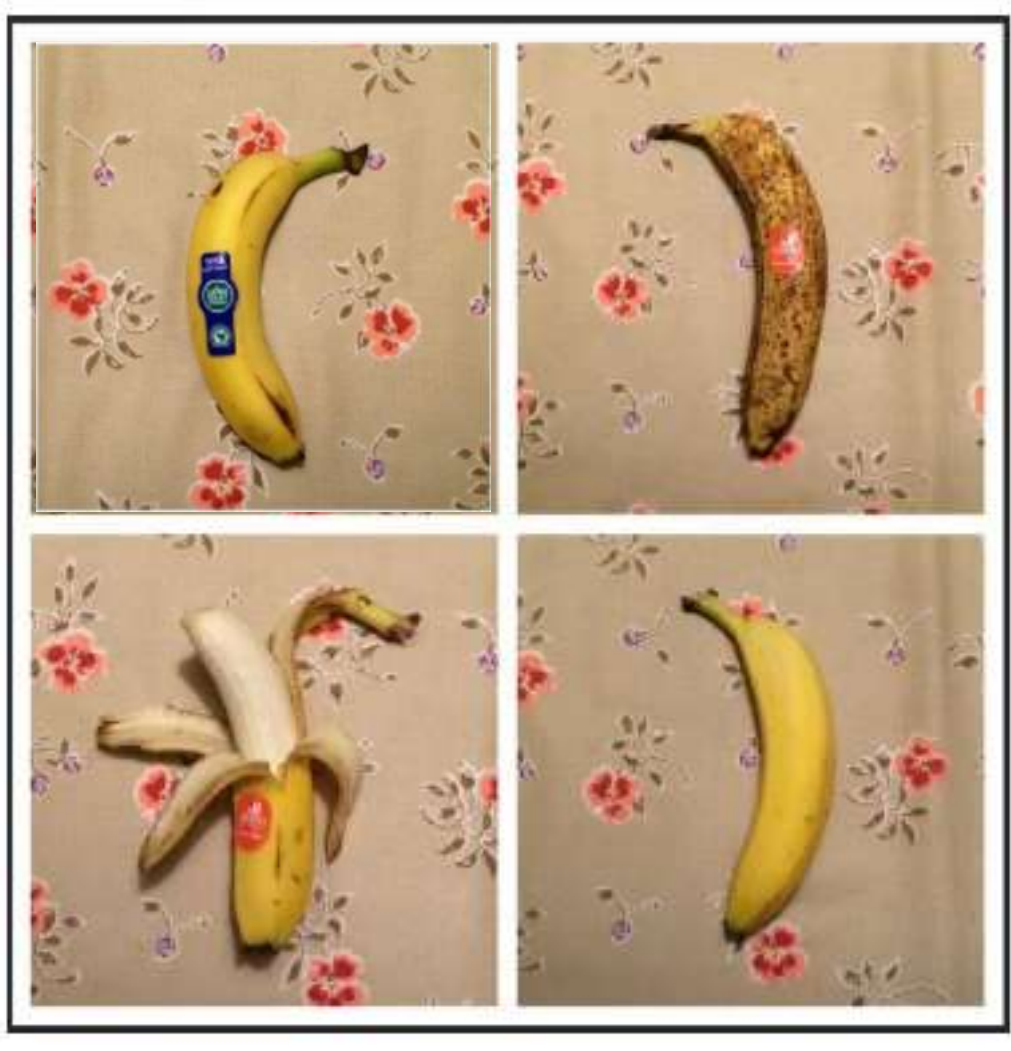
Here are some possible responses. This list is not all-inclusive.
Additional ideas encouraged!



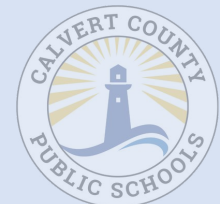
Encourage the use of the sentence starter "Three of the _____."

Possible Responses:

- Three of the bananas curve to the left. Top Left doesn't belong because it curves in the opposite direction of the rest
- Three of the bananas are mostly yellow. Top Right doesn't belong because it is brown and the others are mostly yellow
- Three of the bananas are unpeeled. Bottom Left doesn't belong because it is peeled and the others are not
- Three of the bananas have stickers. Bottom Right doesn't belong because it doesn't have any stickers



“Three of these bananas...”



Use the NEXT SLIDE with students.

Here are some possible responses. This list is not all-inclusive.
Additional ideas encouraged!

1550	335
830	770

Day
20

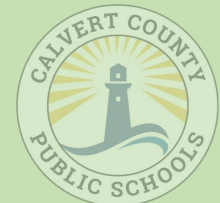
WHICH ONE DOESN'T BELONG?

"Three of these numbers..."

Encourage the use of the sentence starter "Three of the _____."

Possible Responses:

- Three of the numbers are 3-digit numbers. 1550 doesn't belong because it is the only one that is not a 3-digit number
- Three of the numbers have a zero in the ones place value. 335 doesn't belong because it is the only one that does not end in a zero
- Three of the numbers have digits that repeat (55, 33, 77). 830 doesn't belong because it is the only one that does not have digits that repeat
- Three of the numbers have digits with a sum of 11. 770 doesn't belong because it is the only one whose digits do not add up to equal 11 ($7+7+0=14$)



1550

335

830

770

“Three of these numbers...”

