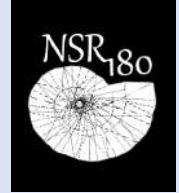# 180 Days of
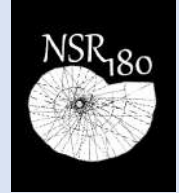# Number Sense Routines
Grade 3
Days 101-120

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.
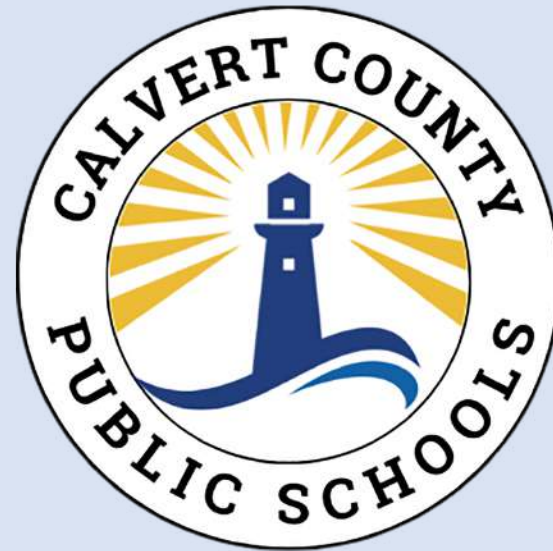
180 Days of
Number Sense Routines

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 Prekindergarten through Grade 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, 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.
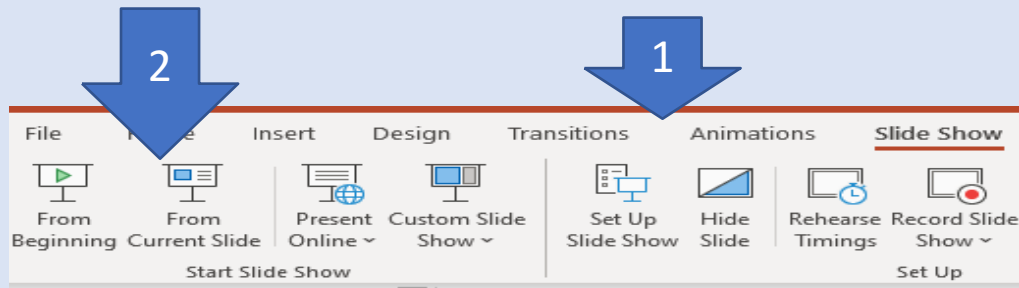
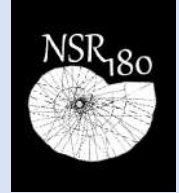**HOW TO RUN POWERPOINT IN SLIDE SHOW MODE:**
Slides with animation features, must run in Slide Show mode of PowerPoint for the animations to work correctly.

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>

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.SteveWyborney.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

Usage Rights

Looking for Patterns: Skip Counting by 9's

- **SAY: "**We are going begin with the task of skip-counting by 9's. We'll begin with the number 9. Remember, we will count slowly all together.
- Count together: 9, 18, 27, 36, 45, ….
- **As students count, CIRCLE the number on the chart (next page)**
- **Once you get to 45, stop for reflection.**
- **SAY:** "Think about the strategy you used to know what number to say next."
- Give a moment of think time.
- **ASK:** "Let's share some of the strategies you used." Allow several students to share their strategies.
- **SAY**: "Let's continue counting. As I circle the numbers, see if you can see a pattern that allows us to easily predict the next number."
- Start back at 9 and point to the numbers that are already circled. Then continue circling as the count grows.
- **After you get to 117 where the chart runs out, SAY: "**Math is all about patterns and relationships. Does anyone see a pattern with the numbers we circled during our count?"
- **DISCUSS:** Take time to discuss the pattern of circled numbers. Ask questions to continue focusing the discussion on the reasons WHY we see those patterns (9 is one less than 10, so the circled numbers will always be down one (+10) and then back one (-1) when it is charted.
- **ASK: "**Think about the strategies you used when you were trying to figure out the number you should say. Look at the chart of circled numbers. To efficiently count by 9's could we add 10 and then subtract 1?"
- **SAY:** "Let's try counting by 9's again, but this time, let's begin with the number 8. It sounds like it will be difficult, but think about the pattern we discovered to make it easier…."
- Erase the first circles and begin circling the new numbers: 8, 17, 26, 35, 44….
- **ASK**: "Do we see the same PATTERN?" yes – down one (+10) and back one (-1)

Looking for Patterns
Skip Counting by 9's

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120

CHORAL COUNTING

Use the NEXT SLIDE with students.

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

There are many ways to count these cups efficiently.
ONE way is to determine that each row has 15 cups and there are 3 layers.
$15 \times 3 = 10 \times 3 + 5 \times 3 = 30 + 15 = 45$
She needs 48. She only has 45. She will be 3 cups short.

DECIDE & DEFEND

Reflect on Learning

- A new math idea I learned today is…

- Next time I interpret someone else's work, I will… *(ask myself, pay attention to,…)*

- To convince a skeptic, it's important to ….

DECIDE & DEFEND

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.

ESTIMATION

How many bears?

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
There are more than 10 bears

Clue #2
The yellow bears equal the number of red bears

Clue #3
There is one blue bear less than the number of yellow bears

Clue #4
There are 5 red bears

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

58 + 36

24 + 78

88 + 14

68 + 33

TEACHER NOTES

BEFORE

This slide has the String of expressions that you will use for today's Number Talk. You can use Smart Ink, right click for PowerPoint Pen, or convert this slide to Smart Notebook so you can easily annotate on the slide. The annotation is an important part of the routine. The expressions should be presented one-at-a-time with skills building on one another.

DURING

Making Landmark or Friendly Numbers – one addend that is two away from a multiple of ten or a landmark number.

- The goal of today's Number Talk is for students to recognize that an efficient way to add numbers is to (sometimes) create Landmark Numbers (or Friendly Numbers) by decomposing the other addend before adding the values. Students should know a variety of ways to decompose a number to fit the needs of the situation. For example 36 can be decomposed into 30+6 but that would not be as helpful in this situation as decomposing 36 into 2+34 and then using the 2 to bring 58 up to 60 before adding the remaining 34.
- For 24+78, students should recognize that the second addend would be more efficient to bring up to a Landmark (Friendly) Number. 24+78 = 80+22 = 102

Remember, students will come with a variety of strategies. 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

Bring students attention back to the strategies that were highly efficient. In this case, decomposing one of the addends to create a Landmark (Friendly) Number with the other addended.

NUMBER TALK

58 + 36

NUMBER TALK

3.NBT.A.2

Use the NEXT SLIDES with students.

Where would the number $4\frac{3}{8}$ fall on this number line? Justify your reasoning.

Day 105

OPEN NUMBER LINE
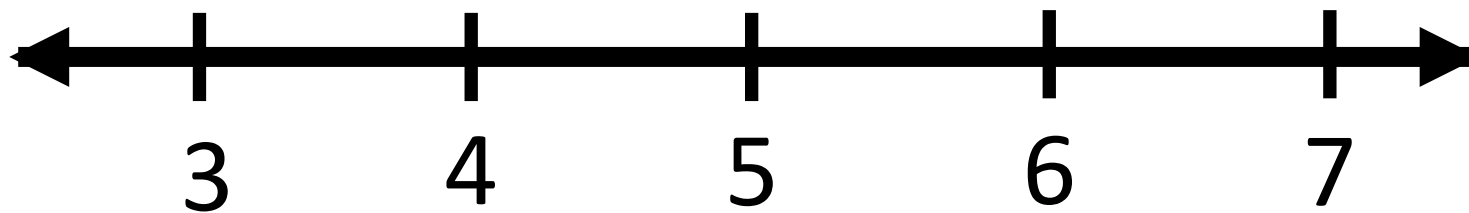
3 4 5 6 7

For more Open Number Line Activities, visit http://www.MathSnack.blogspot.com

4-3/8 would fall BETWEEN 4 and 5 but would be CLOSER to 4 than 5 because 3/8 is less than half so it should be less than halfway between the whole numbers.

For more Open Number Line Activities, visit http://www.MathSnack.blogspot.com

Where would the number $4\frac{3}{8}$ fall on this number line? Justify your reasoning.

3   4   5   6   7

Use the NEXT SLIDE with students.

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

363 3439
9886 4362
Erick

"Three of these runner's bibs…"

POSSIBLE RESPONSES

- Three of these runner's bibs are 4-digit numbers. 363 is not a 4-digit number.
- Three of these runner's bibs end in a digit that is less than the digit before it. 3439 does not end in a digit that is less than the one before it (9 is greater than 3)
- Three of these runner's bibs have the number 3 as one of the digits. 9886 does not have a digit that is 3.
- Three of these runner's bibs have digits that repeat within the number (33, 33, 88). 4362 does not have any repeating digits.

"Three of these runners' bibs…"

WHICH ONE DOESN'T BELONG?

3.R.1

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 3 different student-generated shortcut strategies.
10. End by asking students to explain what was "mathematically important"
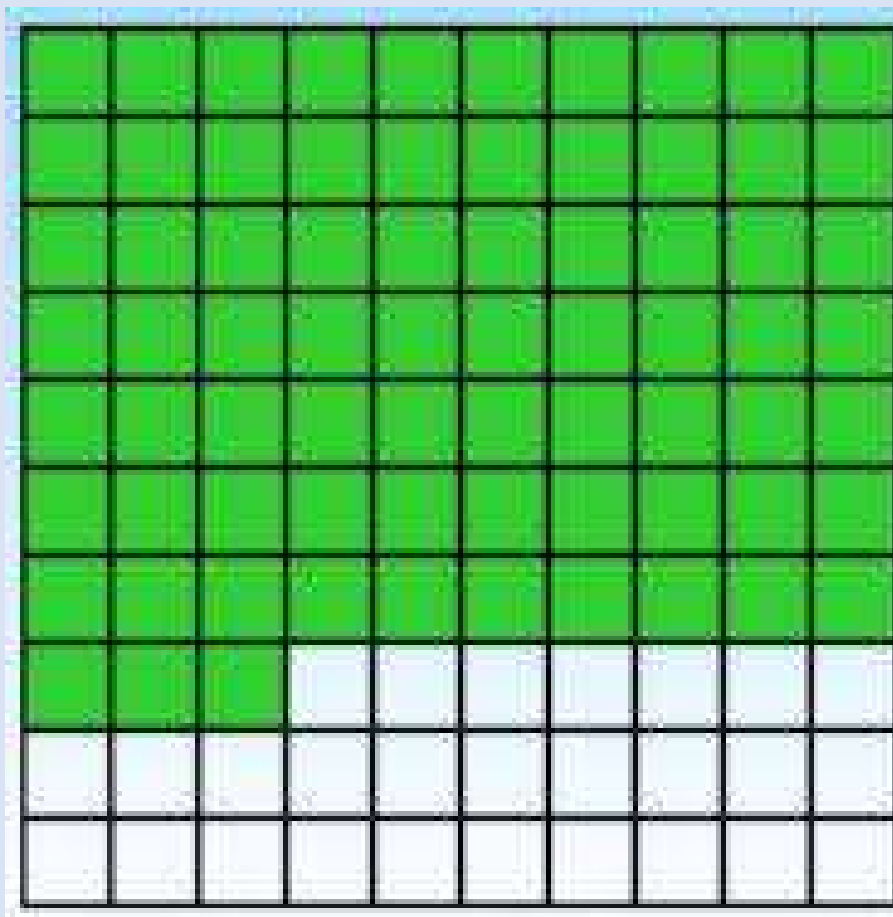
CALVERT COUNTY PUBLIC SCHOOLS
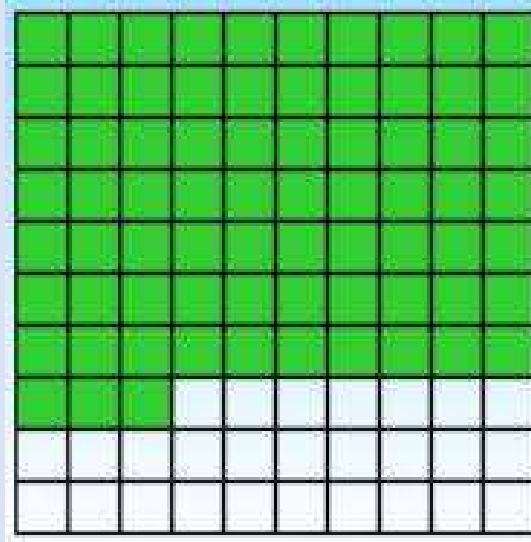
What do you NOTICE?

3.R.4
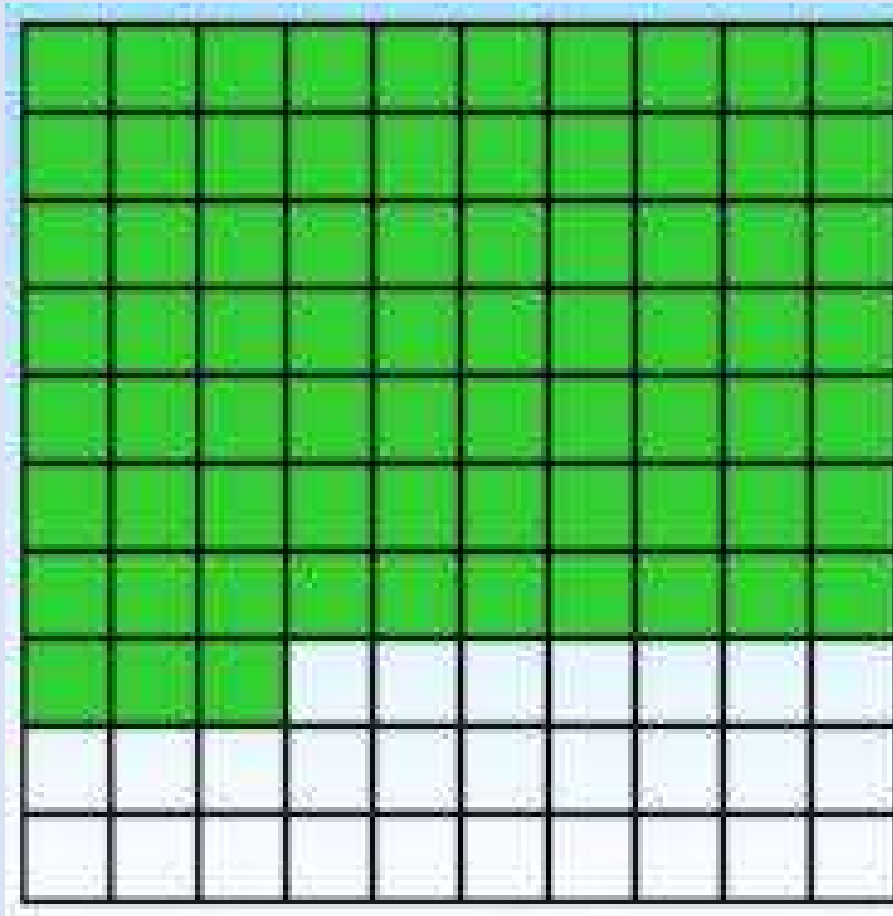
What did you NOTICE?

How many boxes are shaded?
What counting shortcut did you use?
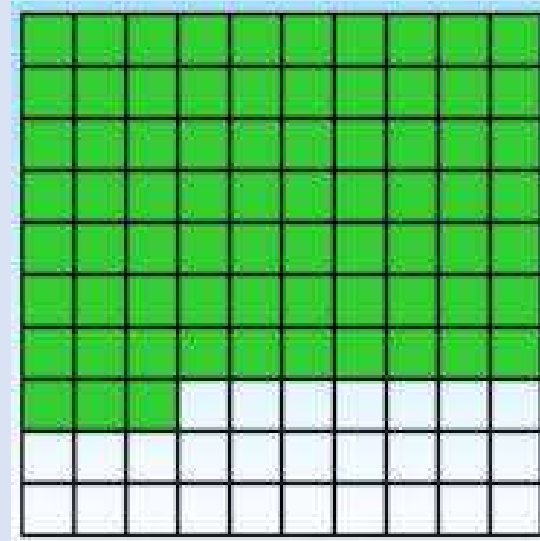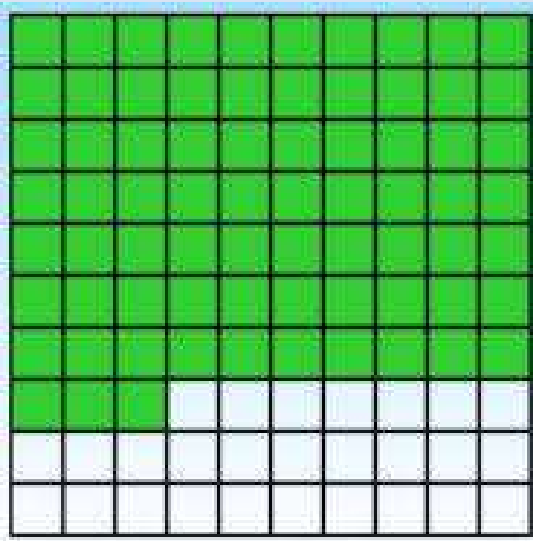
Reflect

What was mathematically important?

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 <u>both</u> how they are the same <u>and</u> 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 <u>both</u>***. 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.
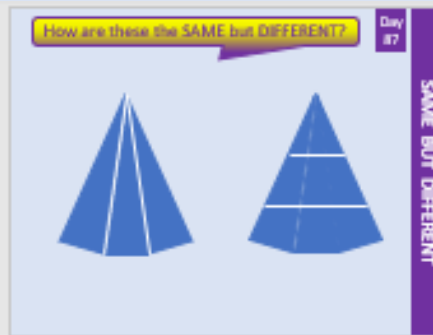
SAME BUT DIFFERENT

Use the NEXT SLIDE with students.

Here is 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...."


POSSIBLE RESPONSES

- Both shapes are pentagons (5-sided figure) but they are not partitioned the same
- Both pentagons are partitioned into 3 parts, but the second figure does not have equal parts
- Both pentagons are partitioned into 3 parts but all of the shapes on the first one are triangles; the shapes of the second has 1 triangle, 1 trapezoid (or quadrilateral), and 1 hexagon (6-side shape)

How are these the SAME but DIFFERENT?
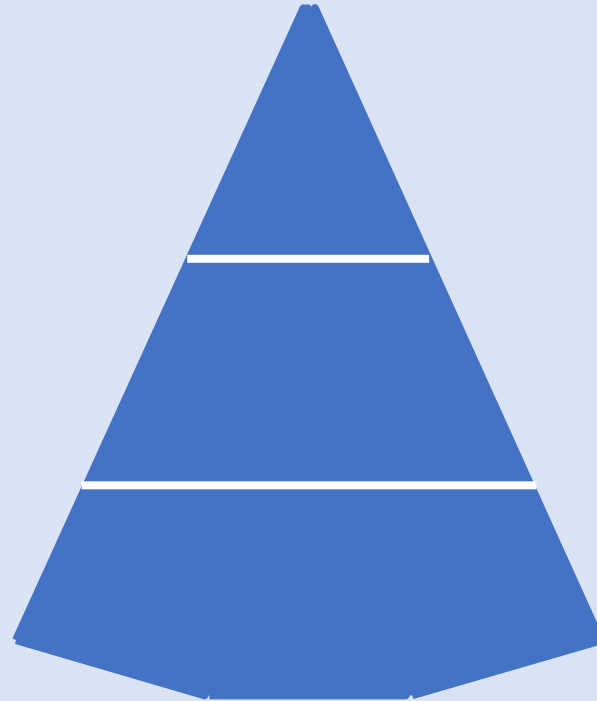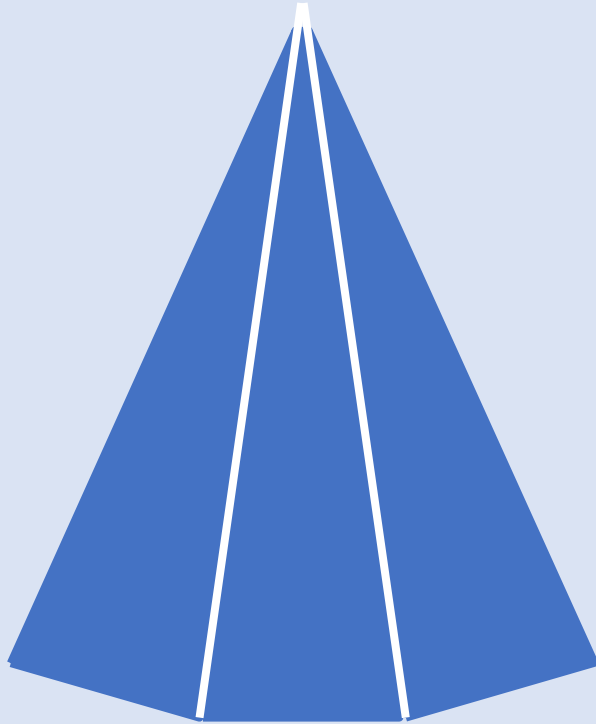
3.G.A.2
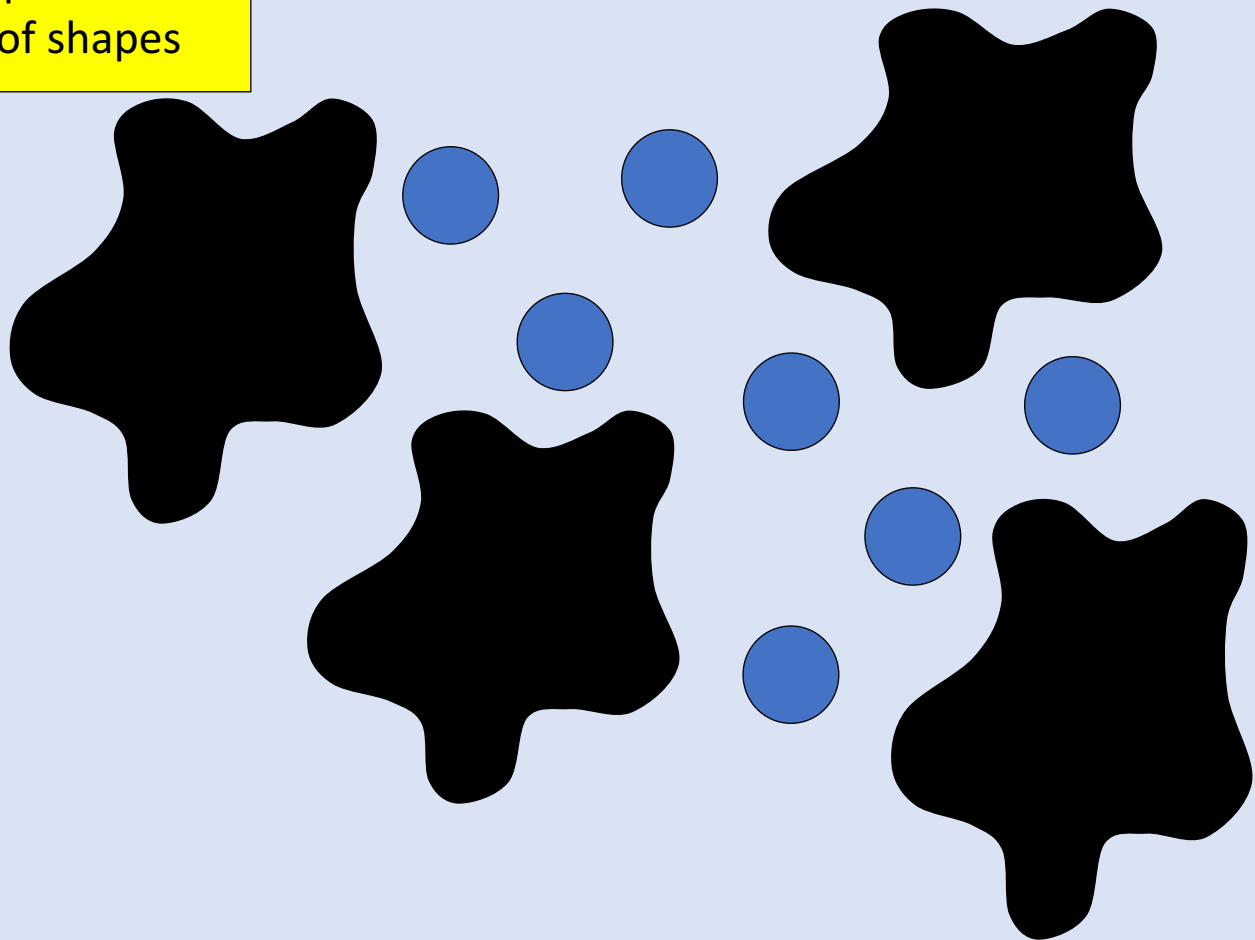
Use the NEXT SLIDE with students.

Here is are some possible responses. This list is not all-inclusive. Additional ideas encouraged!
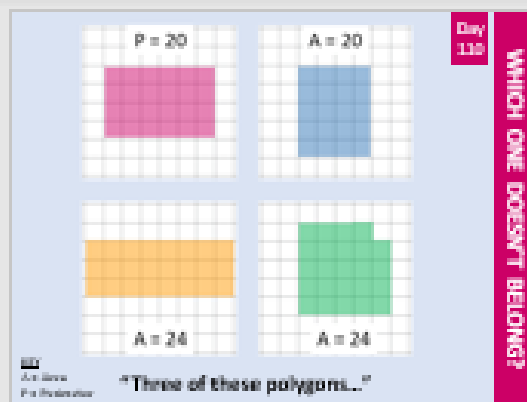
Possible Responses:
- Three of the these have the area stated.
  The PINK one does not have the area stated, it has the perimeter.
- Three of the these have an area of 24.
  The BLUE polygon does not have an area of 24, it is 20.
- Three of the these have at least one side that is 4 units long.
  The ORANGE polygon does not have any side that is 4.
- Three of the these are rectangle.
  The GREEN one is not a rectangle; it is a hexagon (6-sided figure).

P = 20

A = 20

A = 24

A = 24

WHICH ONE DOESN'T BELONG?
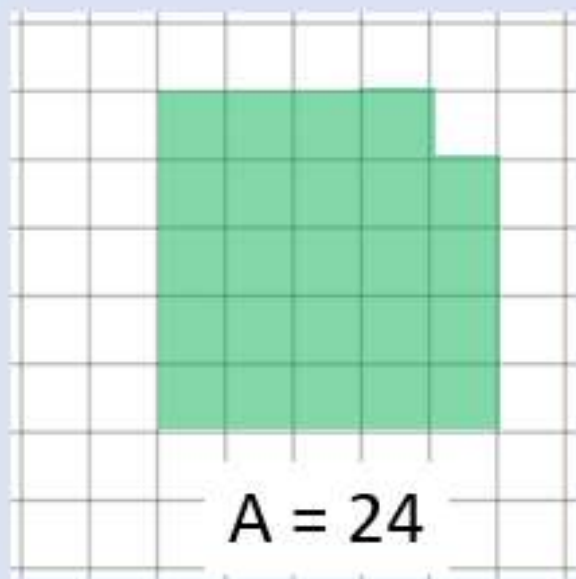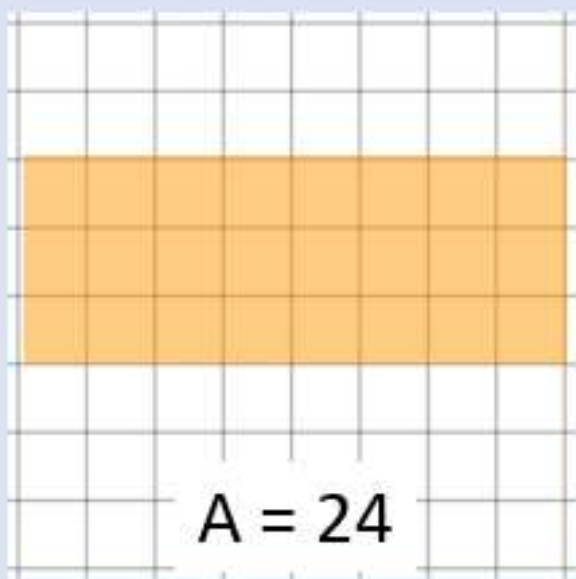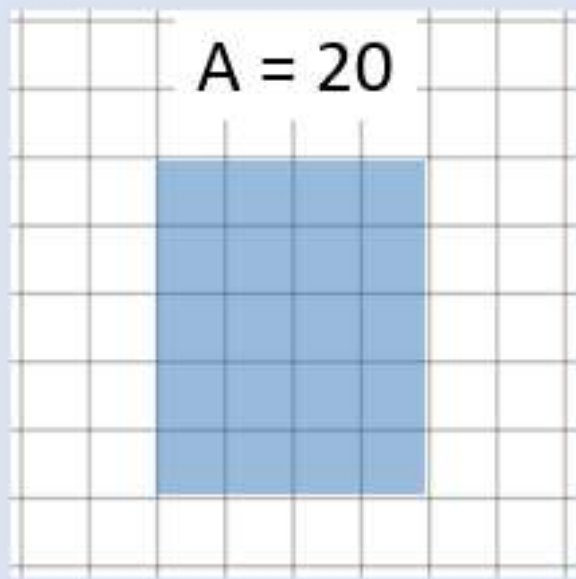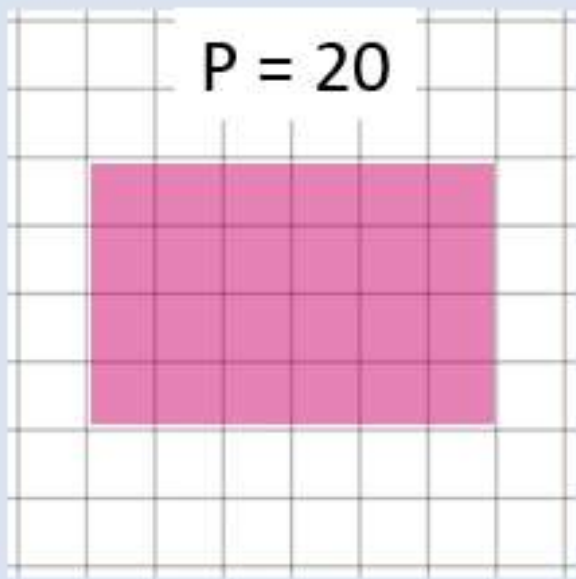
KEY
A = Area
P = Perimeter

"Three of these polygons…"

3.R.4
3.MD.C.6
3.MD.D.8

FRACTION INTERVALS

NOTE: **This Choral Counting activity must be <u>run in Slide Show mode</u> of PowerPoint for the animations to work.**

For this Choral Counting routine, students will be guided by visual representations of fourths. You do not need to rush through the count. The count, really doesn't even have to sound like a traditional count. Take time to explore the meaning of fourths and the graphics that support student understanding.

When students are asked to say what number goes in one of the boxes, really take time to explore a wide range of strategies that could be used to do this accurately.

Adding fourths

Let's count by fourths

1   2

STOP!
What do you notice
about 4/4?

STOP!
How many whole rectangles
are equal to 8/4?

What fraction goes here?
How do you know?

How else could you know?

CALVERT COUNTY PUBLIC SCHOOLS

3.NF.A.3c

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.

ESTIMATION

How many blueberries?

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
There are less than
75 blueberries in the jar

Clue #2
The number is a multiple of 3

Clue #3
It is more than 50

Clue #4
It is not a multiple of 6

Clue #5
If you add the digits of the
answer, you will get 12

By combining the clues and estimation, you now have enough information to determine the answer.
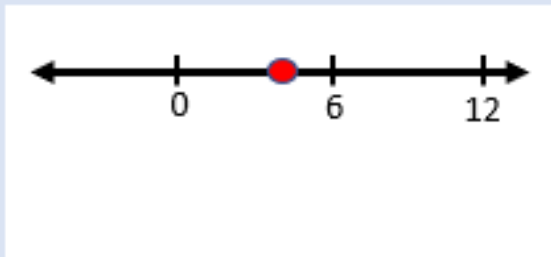
Where should we place the fraction $\frac{12}{3}$ on this number line? **Justify your reasoning.**

Day 113

OPEN NUMBER LINE

For more Open Number Line Activities, visit http://www.MathSnack.blogspot.com

12/3 is equivalent to the whole number 4, so is would fall to the left of the midpoint number 6. The number 3 would be a midpoint worth marking between 0 and 6. It will be closer to 6 than 0 since 4 is only 2 away from 6 and is 4 away from 0.

Be sure that students FULLY explain their reasoning and do not simply justify that the number is to the right of 0 and left of 6 because it is a fraction.
Be aware that a common misconception is that fractions are LESS THAN ZERO, so they are to the left of 0 on a number line.

For more Open Number Line Activities, visit http://www.MathSnack.blogspot.com

Where should we place the fraction $\frac{12}{3}$ on this number line? **Justify your reasoning.**

A number line with points marked at 0, 6, and 12.

Use the NEXT SLIDE with students.

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

30 cookies at 50 cents each ($15 sales) with a cost to make of $8 has a profit of $7 (15-7=7)

30 cookies sold for $14 with a cost to make of $6 has a profit of $8 making this the better deal with $1 more profit (14-6=8)

WOULD YOU RATHER?

Sell 30 cookies for 50 cents each after spending $8 to make the cookies?

-or-

Sell 30 cookies for a total of $14 after spending $6 to make the cookies?

DECIDE & DEFEND

3.OA.D.8

Reflect on Learning

- A new math idea I learned today is…

- Next time I interpret someone else's work, I will… *(ask myself, pay attention to,…)*

DECIDE & DEFEND

Use the NEXT SLIDE with students.

Here is 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…."
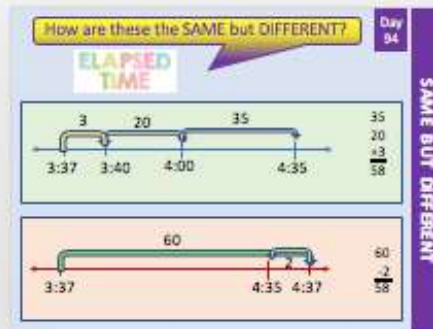
Possible Responses:

- Both have an elapsed time of 58 minutes
- Both begin at 3:37 and end at 4:35
- Both make use of friendly numbers to make calculations more efficient and easier to do mentally

- The green model gets started by using a benchmark value of 4:00. The orange model gets started by jumping ahead 1 hour.
- The green model used 3 jumps. The orange model used only 2 jumps.
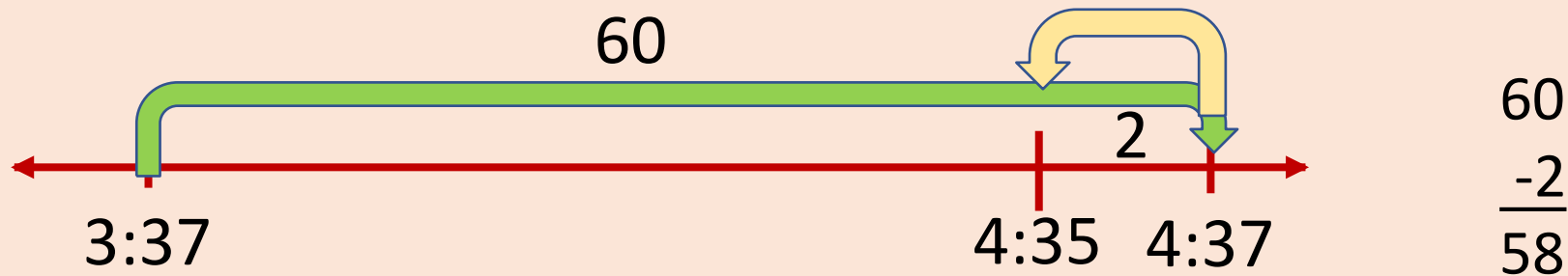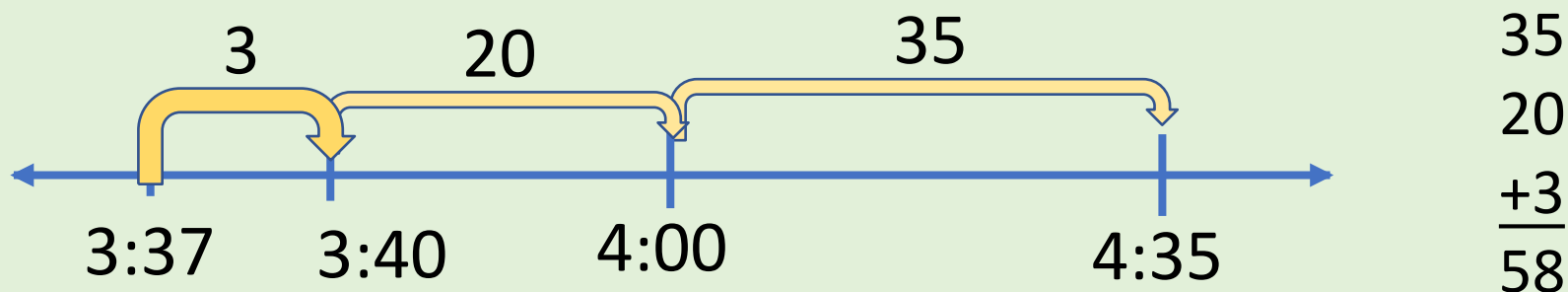- The green model used only addition. The orange model uses subtraction and addition.

IMPORTANT: Give plenty of THINK TIME prior to beginning the discussion.
Consider using the "thumbs up" signal for students to indicate when they have ideas to discuss.

SAME BUT DIFFERENT

How are these the SAME but DIFFERENT?

ELAPSED TIME

3   20   35

3:37   3:40   4:00   4:35

$$
\begin{array}{r}
35 \\
20 \\
+3 \\
\hline
58
\end{array}
$$

60

3:37   4:35   4:37
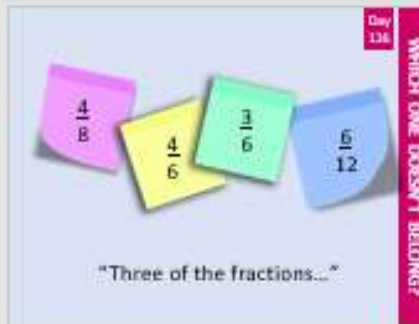
2

$$
\begin{array}{r}
60 \\
-2 \\
\hline
58
\end{array}
$$

SAME BUT DIFFERENT

Use the NEXT SLIDE with students.

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

Possible Responses:
- PINK: Three of the fractions have 6 as one of the values. 4/8 does not have 6 parts.
- YELLOW: Three of the fractions are equivalent to ½. 4/6 is not equivalent to ½
- GREEN: Three of the fractions have an even number as the numerator. 3 is not an even number.
- BLUE: Three of the fractions use only single-digit values. 12 is not a single-digit value.

$\frac{4}{8}$

$\frac{4}{6}$

$\frac{3}{6}$

$\frac{6}{12}$

"Three of the fractions…"

199 + 199
149 + 149
129 + 129
119 + 119

NUMBER TALK

TEACHER NOTES

BEFORE
This slide has the String of expressions that you will use for today's Number Talk. You can use Smart Ink, right click for PowerPoint Pen, or convert this slide to Smart Notebook so you can easily annotate on the slide. The annotation is an important part of the routine. The expressions should be presented one-at-a-time with skills building on one another.

DURING
Making Landmark or Friendly Numbers – Two and three digit addends.
Both addends are one away from a multiple of ten or landmark number.

Possible reasonings:
- Students may recognize that 199 is just one away from the Landmark number 200. Students might quickly add 200+200=400 then subtract the 2 additional that they added in to make the number easy to add.
- 149+149 >>> think 150+150=300 >>> 300-2=298
- 129+129 >>> think 130+130=260 >>> 260-2=258
- 119+119 >>> think 120+120=240 >>> 240-2=238

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
Help students recognize that numbers that are very close to Landmark Numbers can be mentally added as those Landmark numbers and then the extra that we put in to make it a Landmark Number (Friendly Number) can be quickly subtracted back out at the end.

199 + 199

149 + 149

129 + 129

119 + 119

NUMBER TALK

3.NBT.A.2
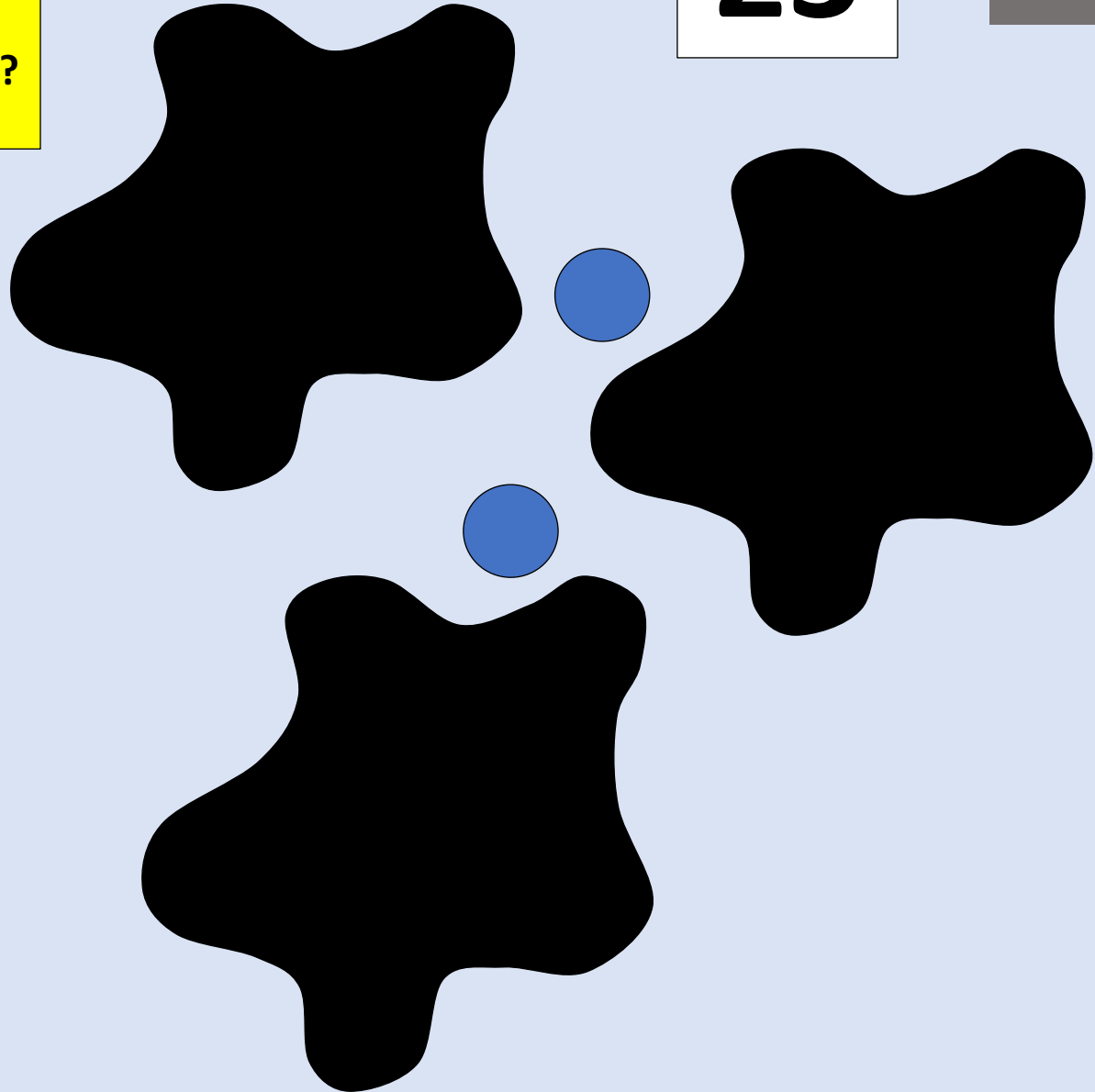
What do you NOTICE?

What did you NOTICE?

CALVERT COUNTY PUBLIC SCHOOLS
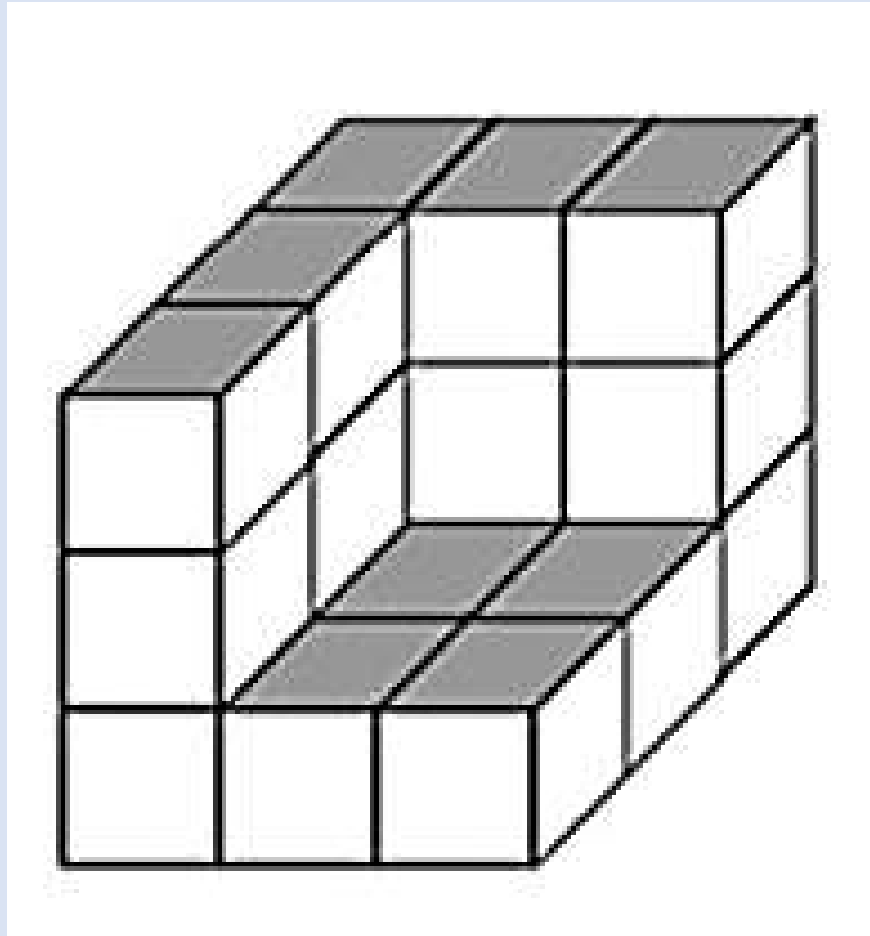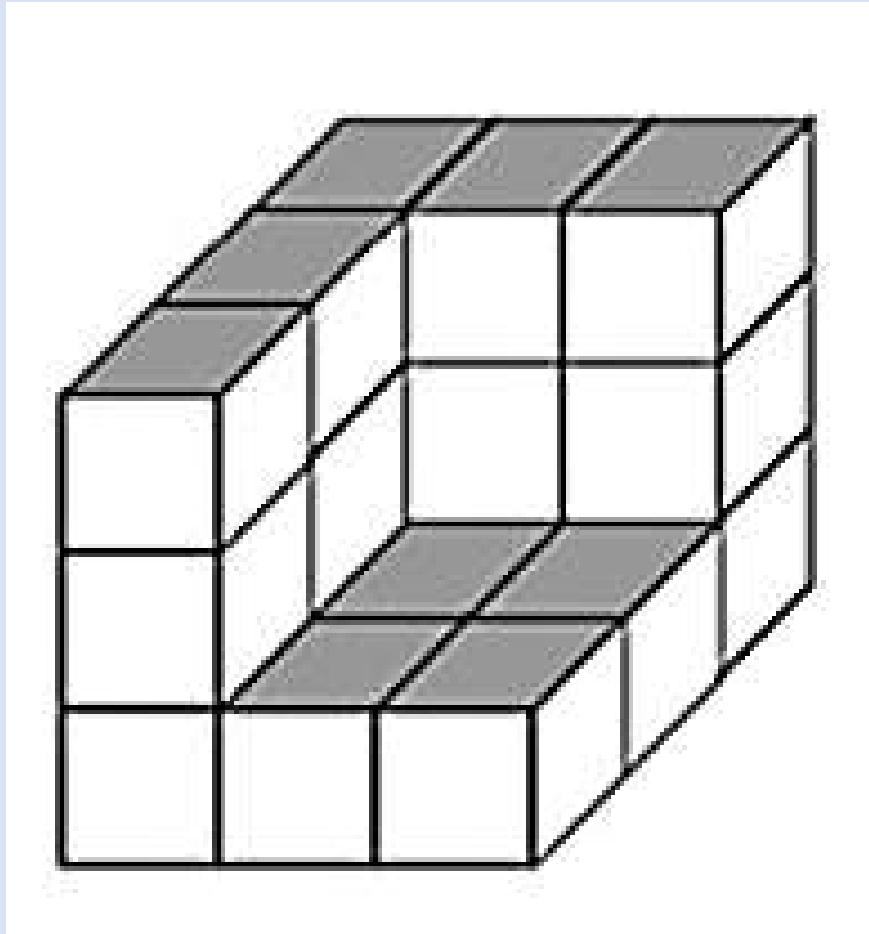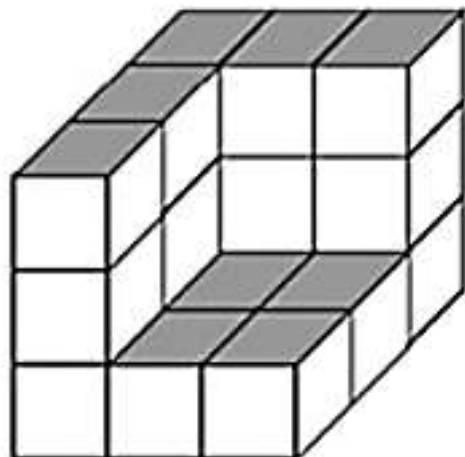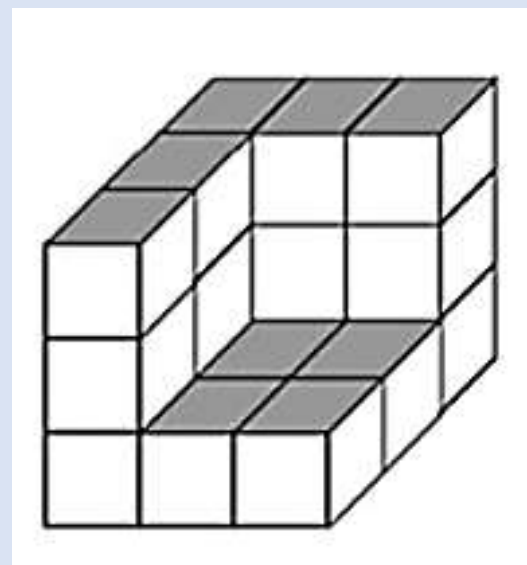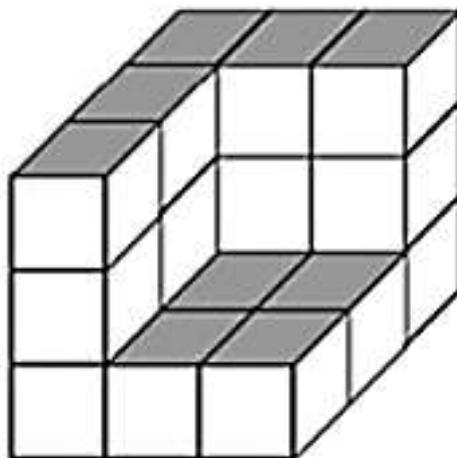
How many do you see?
What counting shortcut did you use?

I noticed _____ so I _____

(They) noticed _____ so they _____

QUICK COUNT

Reflect

What was mathematically important?

198 + 7
199 + 13
148 + 27
139 + 43

<center>**TEACHER NOTES**</center>

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DURING
Making Landmark or Friendly Numbers – Two and three digit addends.
Both addends are one away from a multiple of ten or landmark number.

Possible reasonings:
- Students may recognize that 198 is just two away from the Landmark number 200. Students may recognize that they can decompose 7 into 2+5 and use the 2 to bring 198 up to a Landmark (Friendly) Number to make adding more efficient. 200+5=205
- 199+13 = 200+12 = 212
- 148+27=150+25=175
- 139+43=140+42=182

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
Help students recognize that numbers that are very close to Landmark Numbers can be easily made into the Landmark Number by decomposing the other addend and then simply adding what is left to the new Landmark Number – an efficient mental strategy to use!

NUMBER TALK

198 + 7