180 Days of
Number Sense Routines
Grade 3
Days 161-180

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.

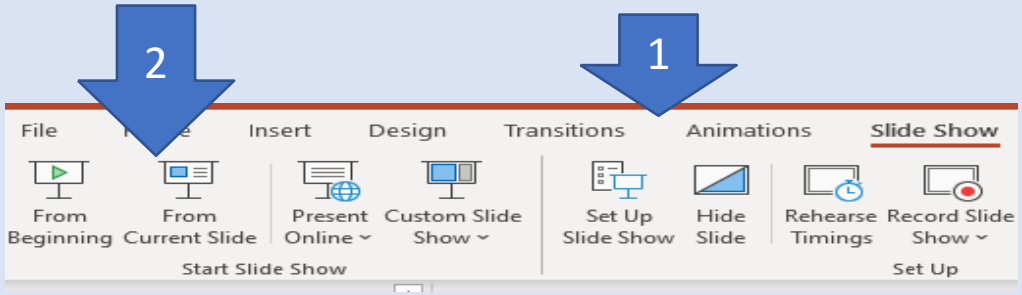
WHAT ARE THE CCPS IMPLEMENTATION EXPECTATIONS? Number sense routines have been developed for all 180 instructional days in grades Prekindergarten through Grade 5. These routines are to be used every day, including early dismissal, late arrival, and field trip days. Because the routines do not require 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.

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>

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

Day
161

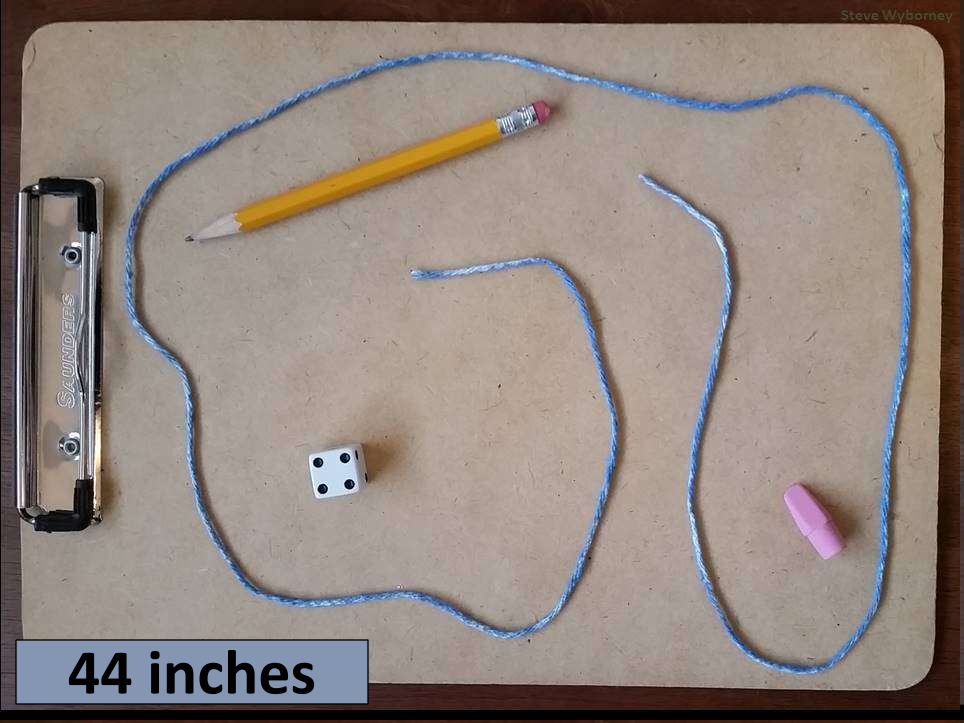
Estimation Activity

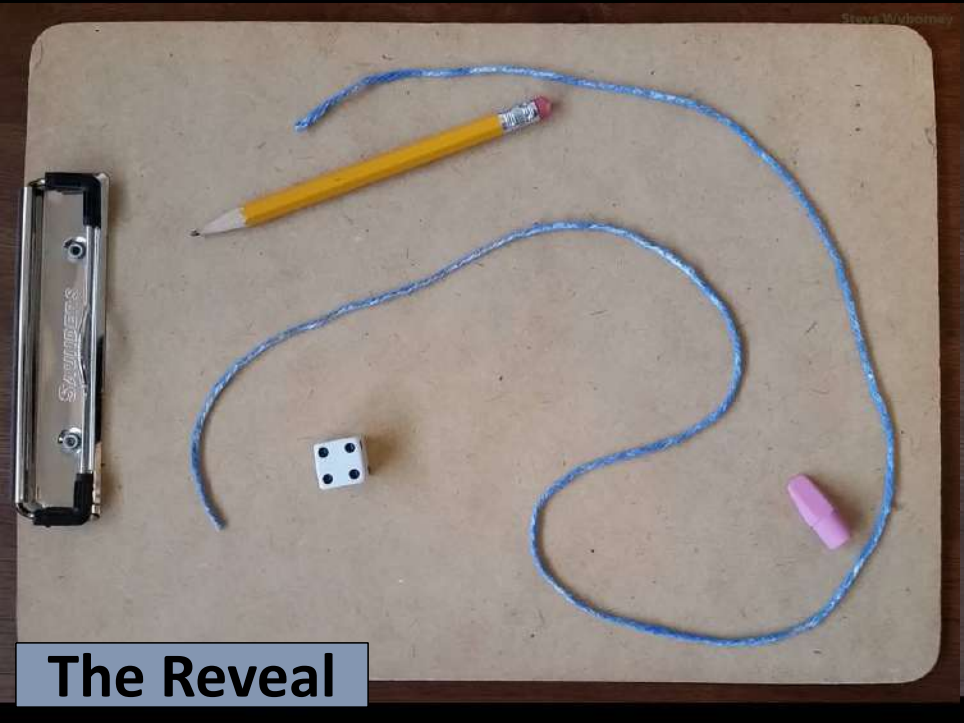
When you are ready to use this activity,
use the PowerPoint platform so the slides work properly.

PROMPT: **What is the length of the string in whole inches?**

ESTIMATION


What is the length of the string in whole inches?
SAUNDERS
The Reveal
Steve Wyborney
www.stevewyborney.com





Day 162

DECIDE & DEFEND

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.

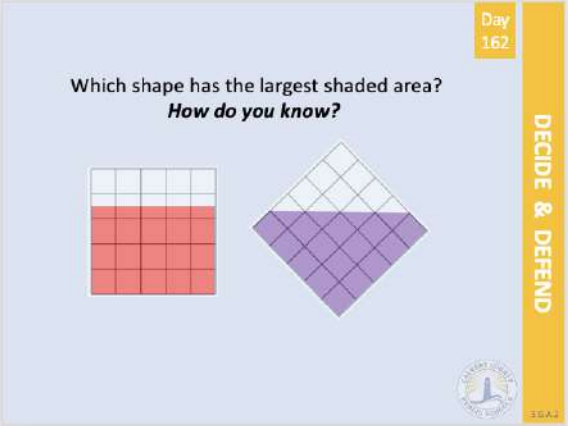
NOTE: This is the CCPS adaptation of the original Decide and Defend protocol

Use the NEXT SLIDE with students.

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

Day 162

DECIDE & DEFEND



There are several approaches to successfully determining the solution to this question: Here is one method students may use.

The red has 3 rows of 5 shaded. 3x5=15
The red also has 5 half boxes shaded. By putting two half boxes together, we get an additional 2 full boxes with a ½ shaded box leftover.

15+2+1/2 = 17½

The purple figure is a perhaps trickier.
We can count 15 fully shaded boxes – 5+4+3+2+1 looking left to right (with your head tipped a bit).
Then we see 4 half shaded boxes. By putting two halves together, we get 2 additional filled boxes.
15+2=17

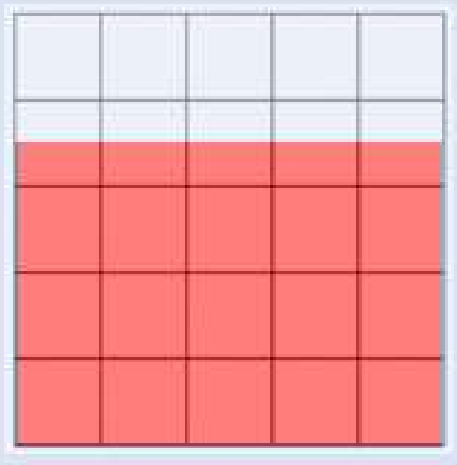
The red box has ½ unit more boxes that are shaded.

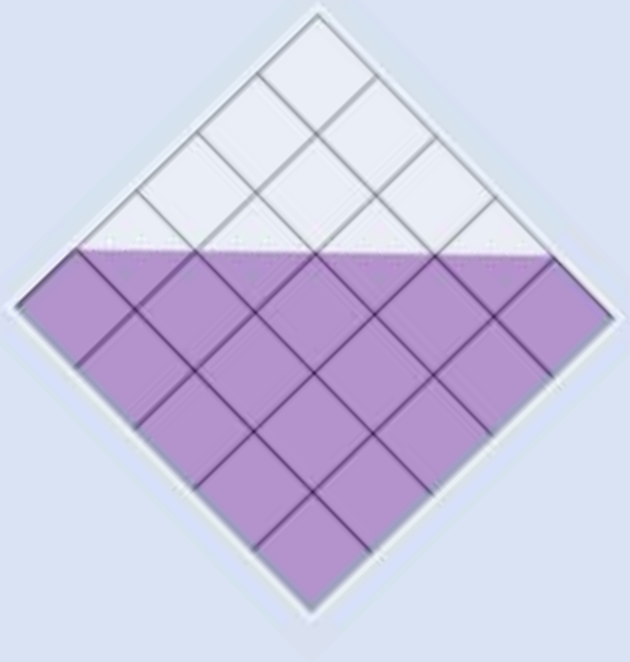
A common error for students is to believe that if ANY of the box is shaded then we count it as a shaded box rather than recognizing that we must piece together partially shaded boxes to make completely shade boxes.

Day 162

Which shape has the largest shaded area?

How do you know?



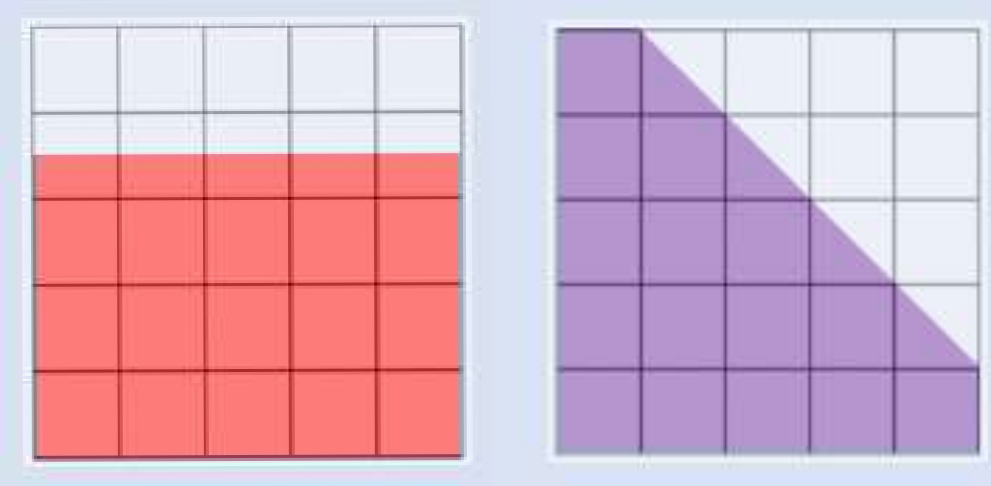


DECIDE & DEFEND

Day 162

TEACHER: Only use this slide IF any students question whether the squares are really the same size – they are.

In case you were wondering
if the boxes were the same size….



DECIDE & DEFEND

Intro

SAME BUT DIFFERENT

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.

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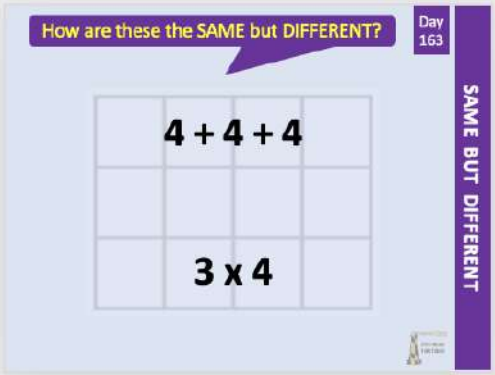
Use the NEXT SLIDE with students.

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….”



EX: Both have a value of 12, but one is addition and the other is multiplication

SAME
- Both expressions match the background area model shown
- Both have a value of 12
- Both can represent 3 groups of 4

DIFFERENT
- Addition vs. multiplication
- Three values vs two values in the expression
- Only 4s vs. 3s and 4s in the expression
- Sum vs. product

How are these the SAME but DIFFERENT?

Day 163

SAME BUT DIFFERENT

	4 + 4 + 4		
	3 x 4		

Day 164

CHORAL COUNTNG - Sixths

- Tell students that today we are going to count all together by **sixths**.
- We will count slowly so I can chart the count as we go.
- When we get to a fraction that is equivalent to a whole number, let's say the whole number – for example, when we get to six-sixths, we will say "1" instead.
- Ready? Let's begin 1/6, 2/6, 3/6, 4/6…
- CHART responses at your class counts together (next slide)
- **After charting the responses, look for patterns and push students to recognize WHY those patterns are happening on the chart** – remember, the patterns that are "obvious" to us, may be brand new discoveries for your students – celebrate their discoveries!

CHORAL COUNTING

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Day 164

Counting by Sixths

CHORAL COUNTING

3.OA.D.9

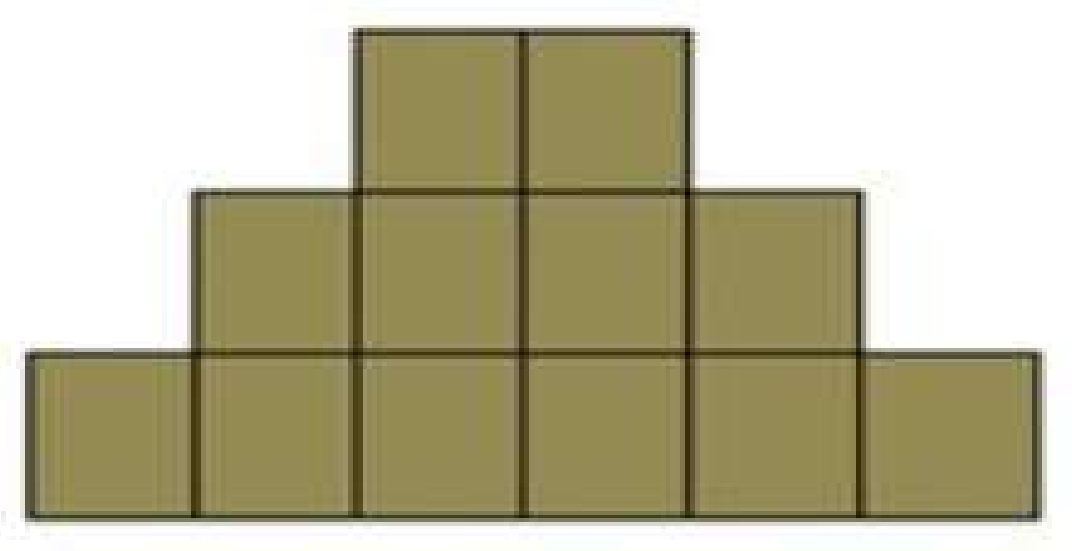
Directions for QUICK COUNT routines

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"

Day
165

QUICK COUNT



What do you NOTICE?

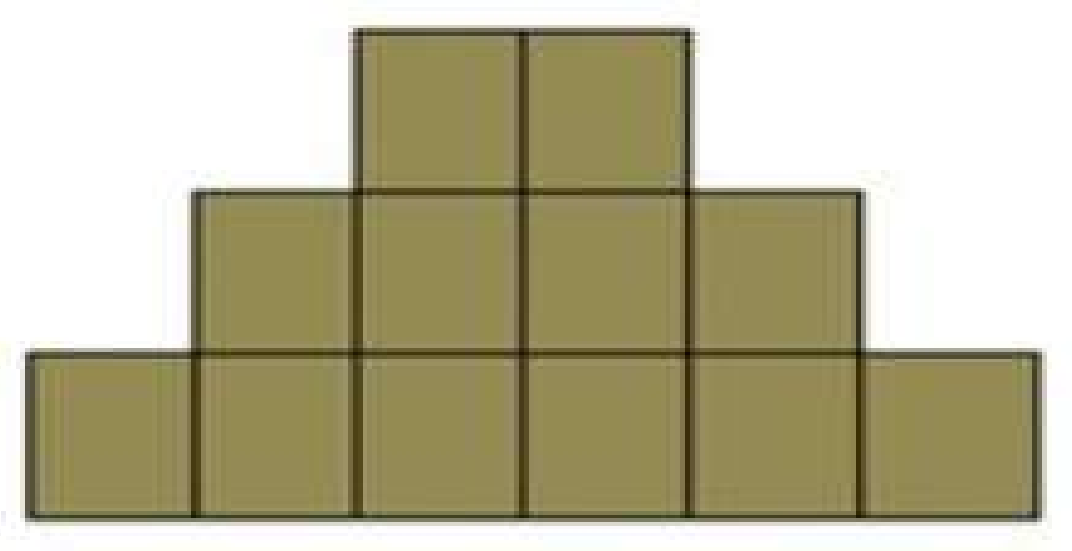
Day 165

QUICK COUNT

What did you NOTICE?

Day
165

QUICK COUNT



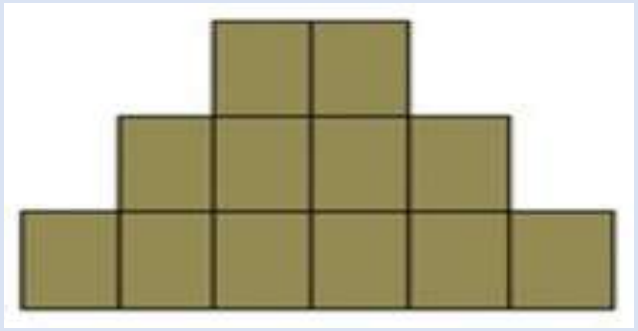
How many do you see?
What counting shortcut did you use?

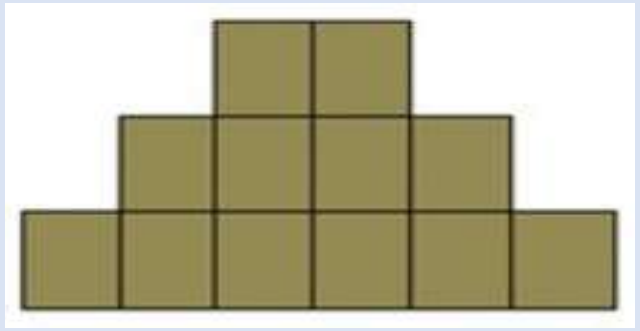
I noticed ____ so I _____

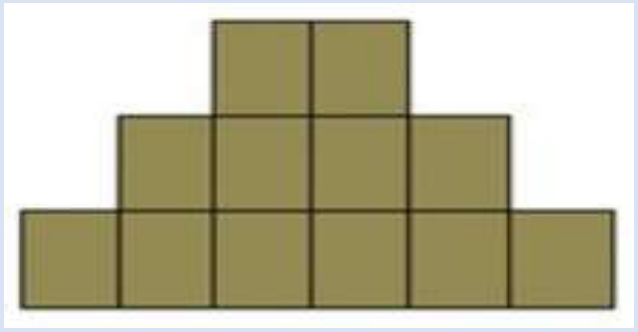
(They) noticed ____ so they___

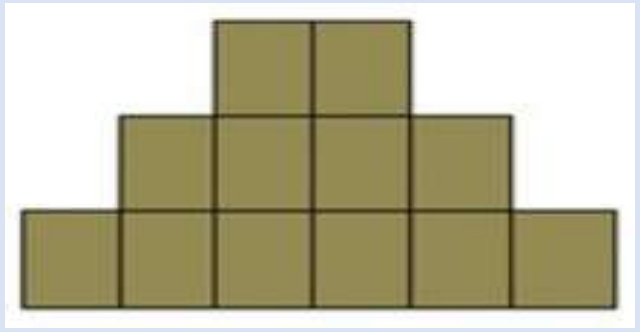
Day 165

QUICK COUNT









Day 165

Reflect

What was mathematically important?

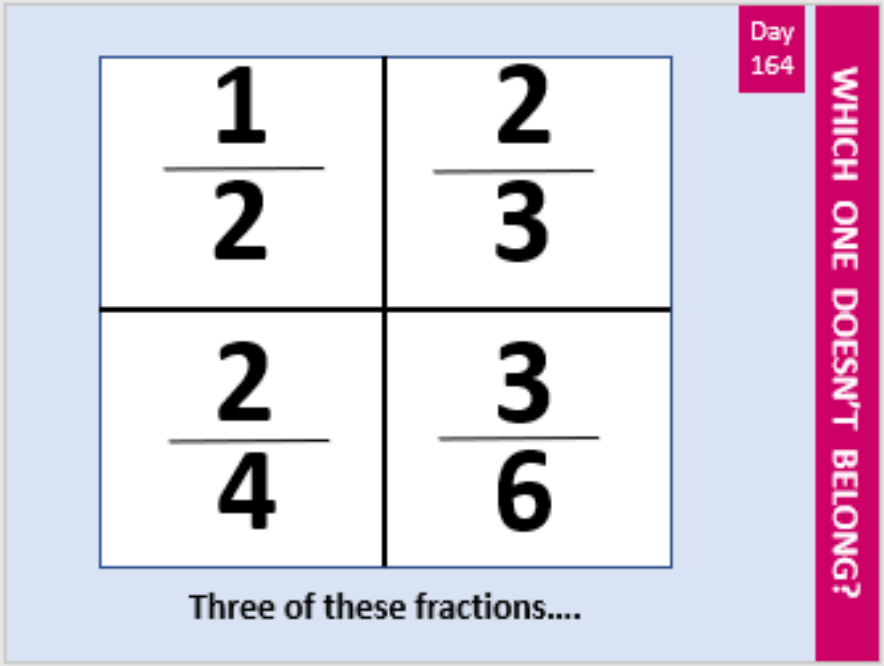
QUICK COUNT

Day 166

WHICH ONE DOESN'T BELONG?

Use the NEXT SLIDE with students.

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



Possible Solutions:

- Three of these fractions are composite fractions (not unit fractions with a 1 as the numerator). ½ is not a composite fraction, it is a unit fraction.
- Three of these fractions are equivalent to ½. 2/3 is not equivalent to ½.
- Three of these fractions have one even number and one odd number. 2/4 does not have any odd numbers as part of the fraction.
- Three of these fractions have the number "2". 3/6 does not have a two as one of the digits.

Day 166

WHICH ONE DOESN'T BELONG?

$\frac{1}{2}$	$\frac{2}{3}$
$\frac{2}{4}$	$\frac{3}{6}$

Three of these fractions….

3.NF.A.1

Day 167

99 - 62
100 - 62
899 - 27
900 - 28

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

Subtraction Using Compensation Strategies

Key Ideas:

- 99-62 – because this equation requires no regrouping, students should easily see the difference is 37. This expression is intended to lay the groundwork for the next.
- 100-62 – this expression is similar to the previous with the minuend being just one greater meaning the difference will also be one greater. Students may use the fact that the previous is 37 to determine this one is 38. Students may also think of 100 as 99 and 62 as 61 to maintain an equal distance but create an expression where regrouping is not needed. 99 – 61 is the same distance as 100 – 62 but the former does not require regrouping.
- 899 – 27 = 872
- 900 – 28 is the SAME DISTANCE between the numbers as the previous since both numbers shift greater by 1.

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

Discuss how compensation can be used to change the number while keeping the distance the same yielding the same difference when subtracting.

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99 - 62

Day 167

NUMBER TALK

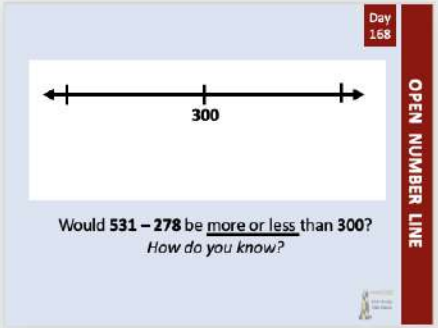
3.NBT.A.2

Use the NEXT SLIDE with students.

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

Day 168

OPEN NUMBER LINE



There are many ways to use the number line to assist in addition. Here is ONE way:

Students may begin at 531 and subtract:

- 531 – 200 = 331
- 331 – 78 is less than 300 since we only have 31 to give without taking from the 300 --- because the way that the question is worded, we do NOT need to continue to find an exact solution. Being able to explain the reasoning to this point is the purpose of this question

Students may begin at 278 and count on to 531

- 278 + 300 = 578 and since 578 is too much, that means we need to add LESS than 300 which indicates that the solution is less than 300

Students may use other reasoning

- 500 – 200 is 300
- And 31 – 78 would require us to make a fair trade from the hundreds place, thus making the overall value LESS than 300 since we must make a fair trade using some of the 300

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

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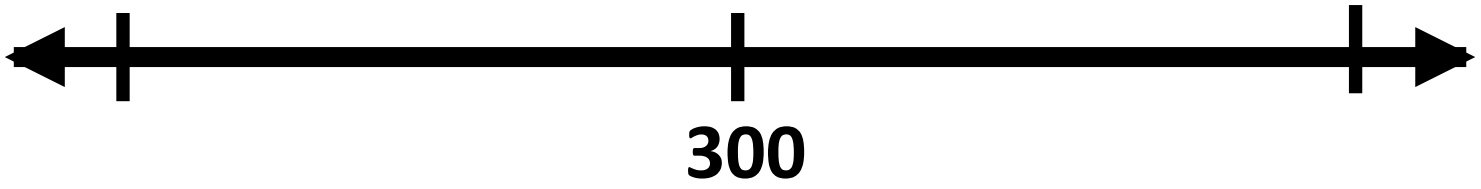
Day
168



Would **531 – 278** be more or less than **300**?

How do you know?

OPEN NUMBER LINE

3.NBT.A.2

6

Day 169

What is the value

Based on the total value,

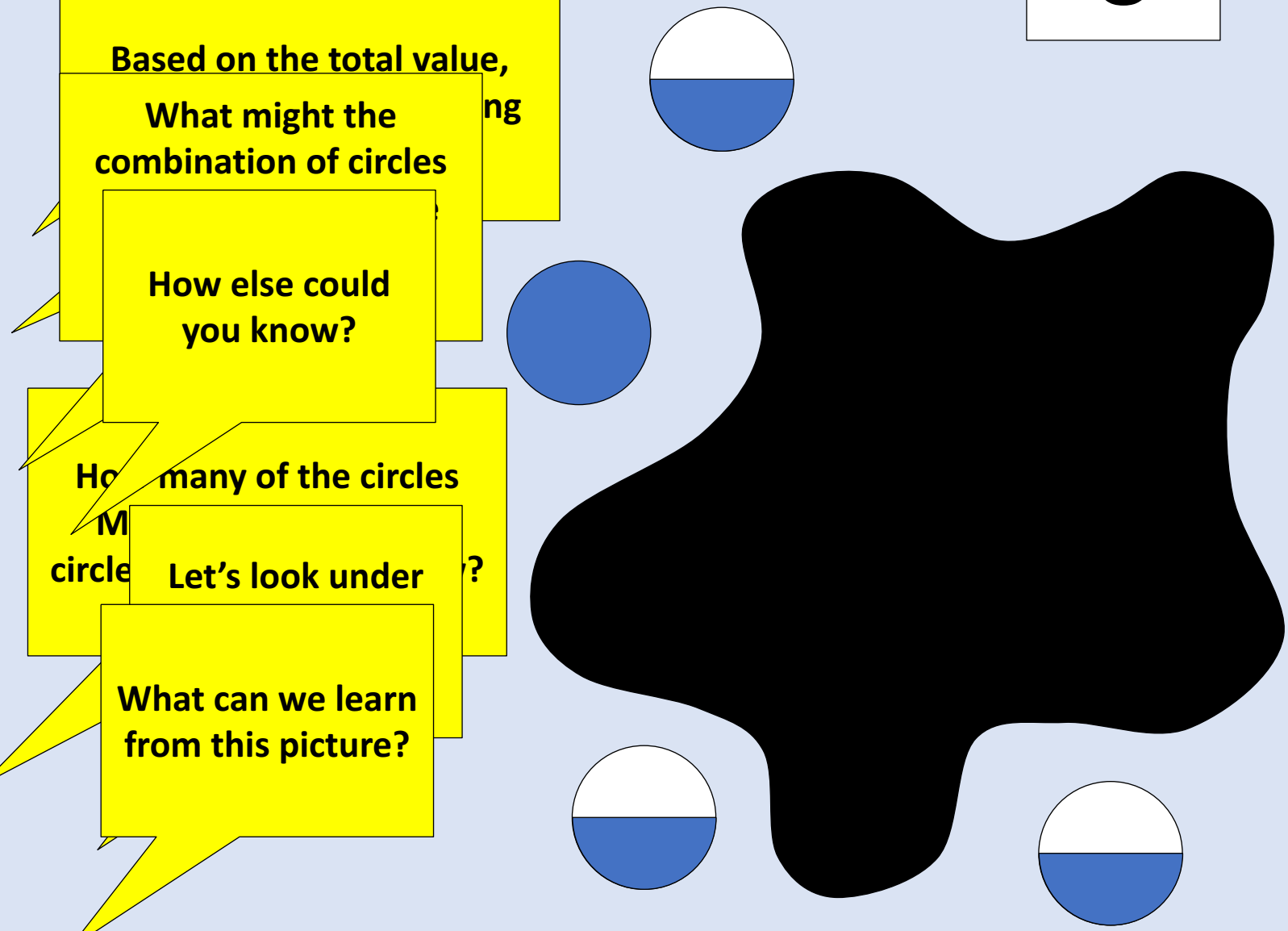
What might the combination of circles

How else could you know?

How many of the circles

Let's look under

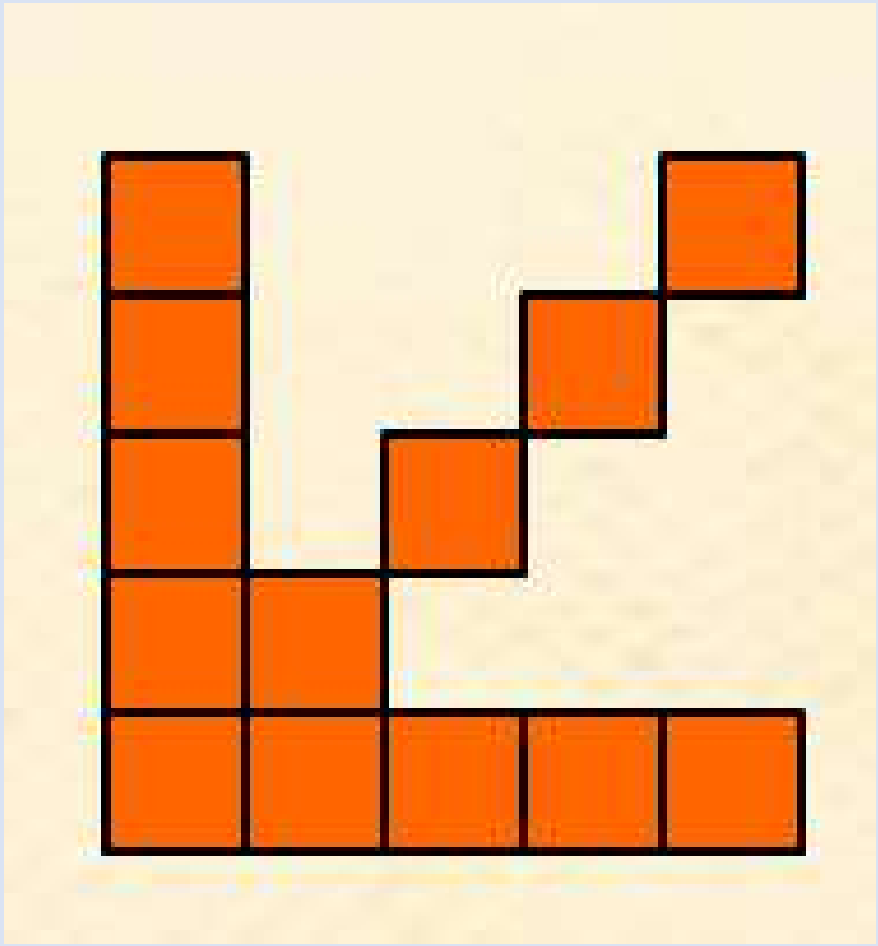
What can we learn from this picture?



SPLAT!

Day 170

What do you NOTICE?



QUICK COUNT

Day 170

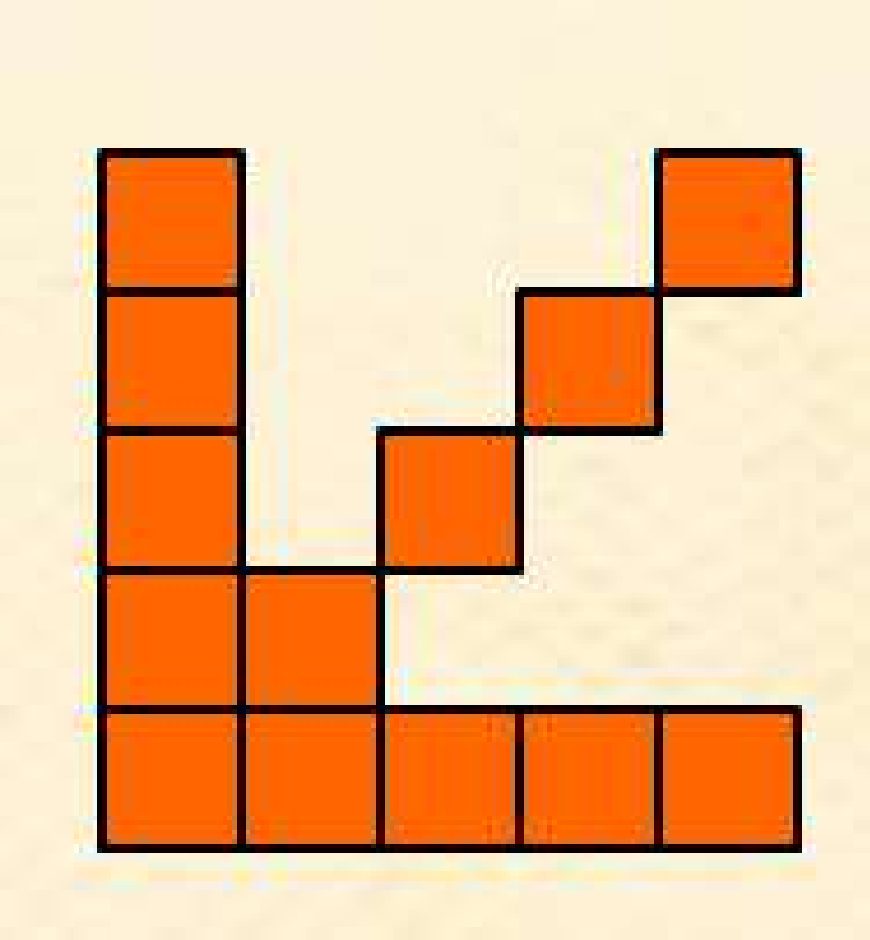
QUICK COUNT

What did you NOTICE?

Day 170

How many do you see?

What counting shortcut did you use?



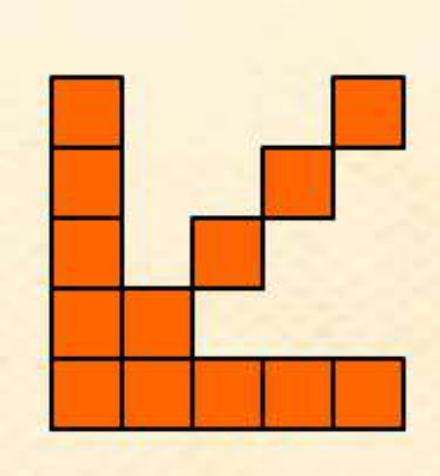
QUICK COUNT

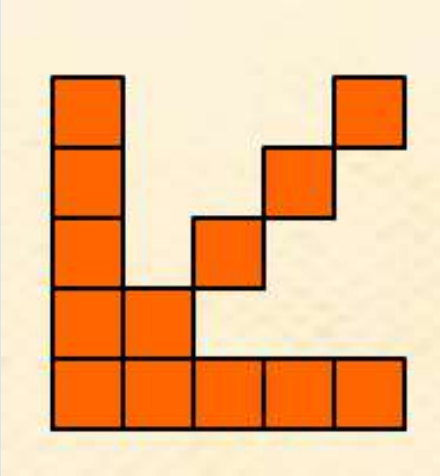
I noticed ____ so I _____

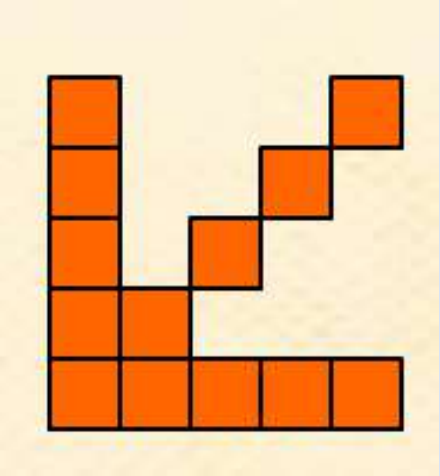
(They) noticed ____ so they___

Day 170

QUICK COUNT







Day 170

Reflect

What was mathematically important?

QUICK COUNT

Day 171

45 X 10
45 X 9
59 X 10
59 X 9

TEACHER NOTES

BEFORE

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DURING

Use what you know about multiplying by 10 to calculate products

Possible Responses:

- 45 X 10 = 450 this one should be quick and is used to simply provide foundation for the next one
- 45 X 9 >>>>> since 45 x 10 = 450 then 45 x 9 would be 45 less than 450 >>>>> 450 – 45 = 405
- 59 X 10 = 590 again, this one is designed to provide foundational information for the next
- 59 X 9 >>>>> since 59 x 10 = 590 then 59 x 9 would be 59 less than 590 >>>>> 590 – 60 = 530 and 530 + 1 = 531

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

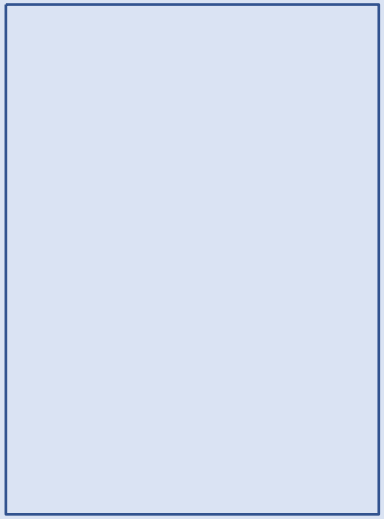
Highlight the idea that if we know our basic multiplication/division facts, we can extend that knowledge to larger numbers by applying what we know about values that are ten times more than the known fact. The remainders will simply be the amount leftover after dividing.

NUMBER TALK

Day 171

45 X 10

45 X 9



NUMBER TALK

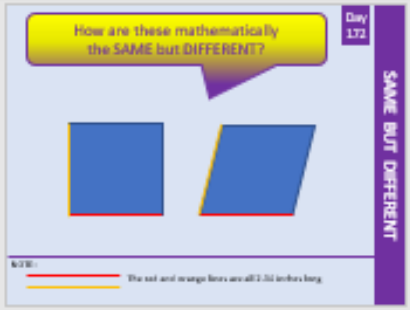
3.OA.C.7

Day 172

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….”



SAME:

- Both are quadrilaterals
- Both have four sides
- Both have 4 vertices
- Both are types of rhombuses (yes, a square is a special type of rhombus)
- The length of the sides is the same on all four sides (2.34 inches when designed)

DIFFERENT

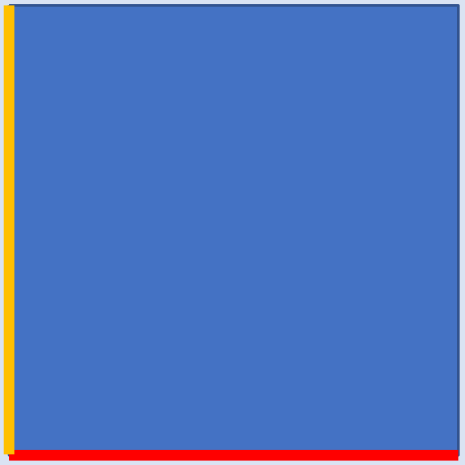
- One is a square, the other is not a square
- One has right angles (90*)
- One has both acute and obtuse angles
- Yes, they are the same color (although, that may not be mathematical unless we consider the formulation of the specific blue shade which is R68 G114 B196)

SAME BUT DIFFERENT

CALVERT COUNTY PUBLIC SCHOOLS

Day 172

How are these mathematically the SAME but DIFFERENT?



NOTE:

All red and orange lines are 2.34 units long

SAME BUT DIFFERENT

3.G.A.1

Day 173

ESTIMATION

Which answer is

As Close as it Gets?

Explain that NONE of the answers shown are the exact solution.

- Students should use **mathematical reasoning** to select the answer that is **closest** to the actual answer. **Discourage complex calculations, encourage estimation and reasoning.**
- Students are expected to **explain the reasoning they used** to select the answer that they think is closest to the actual answer.

Possible Reasoning: *The closest answer is 5:00*
Ben started at 4:00. The walk to the river and back is about ½ an hour (16 minutes each way). Then he about another ½ hour preparing dinner which makes a total of 1 hour. 1 hour past his start time of 4:00 is 5:00

Day 173

Which answer is

As Close as it Gets?

At 4:00, Ben walked down to the river with his dog.
The walk takes about 16 minutes each way.
After the walk, Ben spent 29 minutes preparing dinner.
What time did Ben eat dinner?

4:45	5:00	5:15

What mathematical reasoning did you use to decide on the closest answer?

ESTIMATION

3.MD.A.1

Day 174

WHICH ONE DOESN'T BELONG?

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 these times are represented in digital form. The round clock time is not in digital form, it is analog time. Three of these times do not indicate if the time is a.m. or p.m. 9:31 shows that the time is at night (p.m.)
- Three of these times show the time as 9-something. 8:31 is not 9-something.
- Three of these times represent a time that represents 31 minutes past the hour. 9:32 does not end in 31.

Day 174

WHICH ONE DOESN'T BELONG?

Three of these times…

CHORAL COUNTNG - Eighths

Day 175

- SAY: Today we are going to count all together by eighths.
- SAY: We will count slowly so I can chart the count as we go.
- SAY: When we get to a fraction that is equivalent to a whole number, let's say the whole number – for example, when we get to eight-eighths, we will say "1" instead.
- SAY: Ready? Let's begin 1/8, 2/8, 3/8, 4/8…
- CHART responses at your class counts together
- After charting the responses, look for patterns and push students to recognize WHY those patterns are happening on the chart – remember, the patterns that are "obvious" to us, may be brand new discoveries for your students – celebrate their discoveries!
- ASK: How is this chart same/different from the chart we created two weeks ago when we were counting by sixths?

CHORAL COUNTING

Day 175

Counting by Eighths

CHORAL COUNTING

3.OA.D.9

Day 176

DECIDE & DEFEND

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.

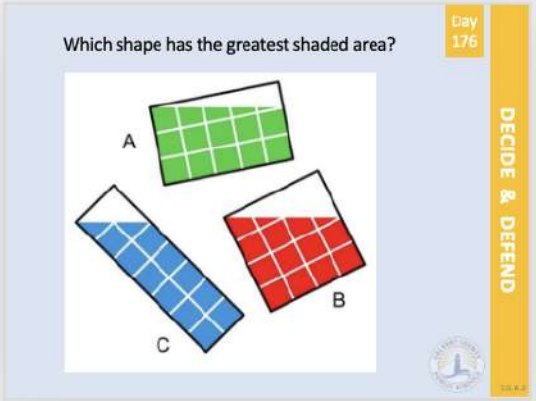
- **RELECT**: To further develop comprehension, have students use ONE of the sentence starters on the "Reflect on Learning" slide after they have discussed and listened to new ideas with classmates.

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

Day 176

Use the NEXT SLIDE with students.

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



On Day 162, we saw a similar task. This task builds on the knowledge acquired on Day 162 and increases the rigor. Notice that we now have 3 figures. All of the lines are not drawn in so students must visualize the additional lines. Also notice that the partial square units are not just ½ filled – students must combine fractional pieces strategically to create whole units where possible.

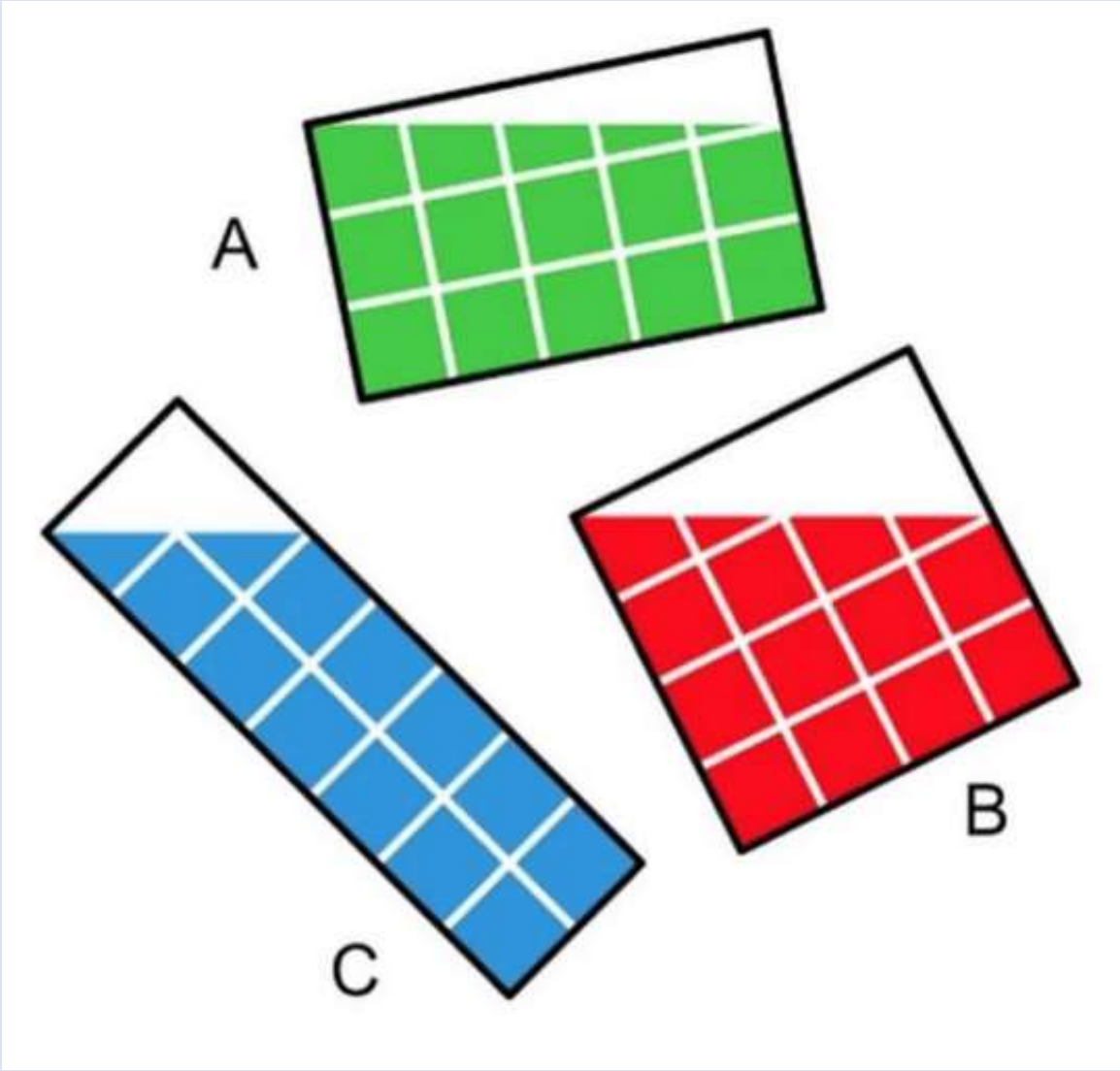
GREEN = 2x5 whole units + 2½ units when the fractional pieces are combined = 12½ shaded units
RED = 2x4+2 whole units + 2 units when the fractional pieces are combined = 12 shaded units
BLUE = 2x5+1 whole units + 1 unit when the fractional pieces are combined = 12 shaded units

Green is ½ unit more shaded than red or blue.

DECIDE & DEFEND

Day 176

Which shape has the greatest shaded area?



DECIDE & DEFEND

3.G.A.2

Day 176

Reflect on Learning

- A new math idea I learned today is…
- Next time I plan to… because….

DECIDE & DEFEND

Day 177

SPLAT!

The total is…

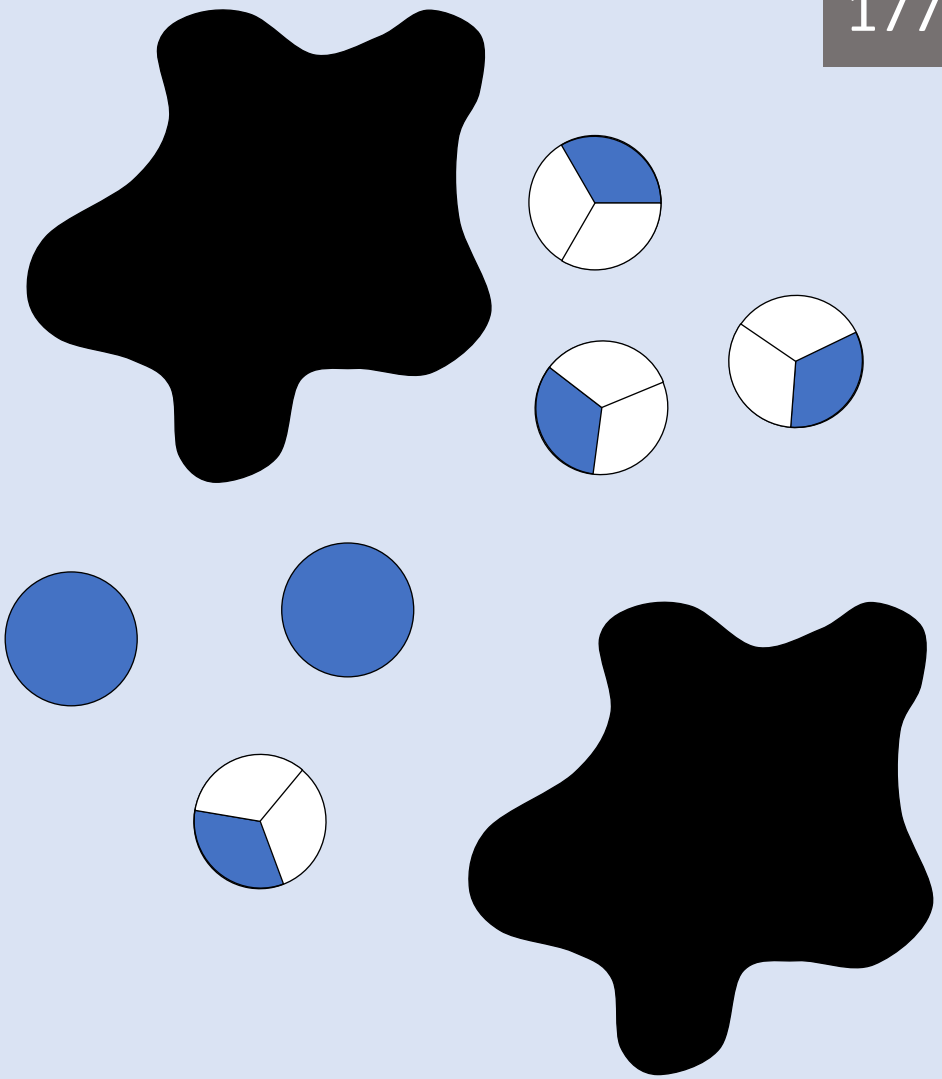
6

Let's look under each splat to see what value is there.

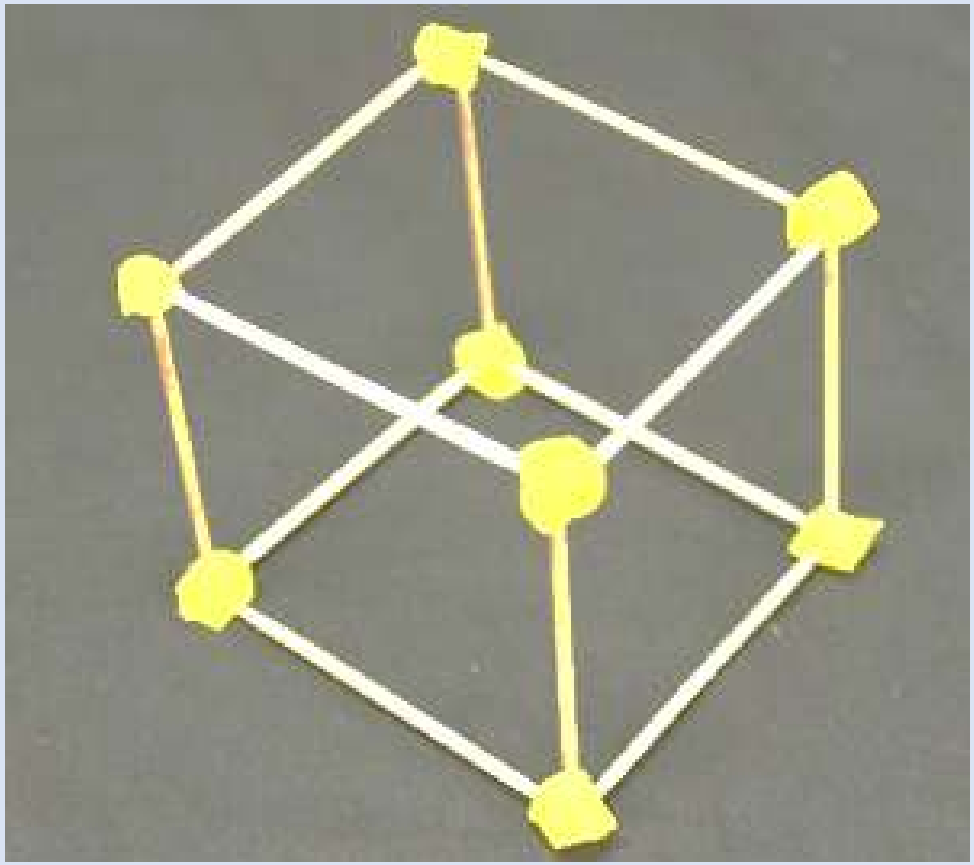
How else could you know?

What is the value under EACH splat?

How else could you know?



Day
178



What do you NOTICE?

QUICK COUNT

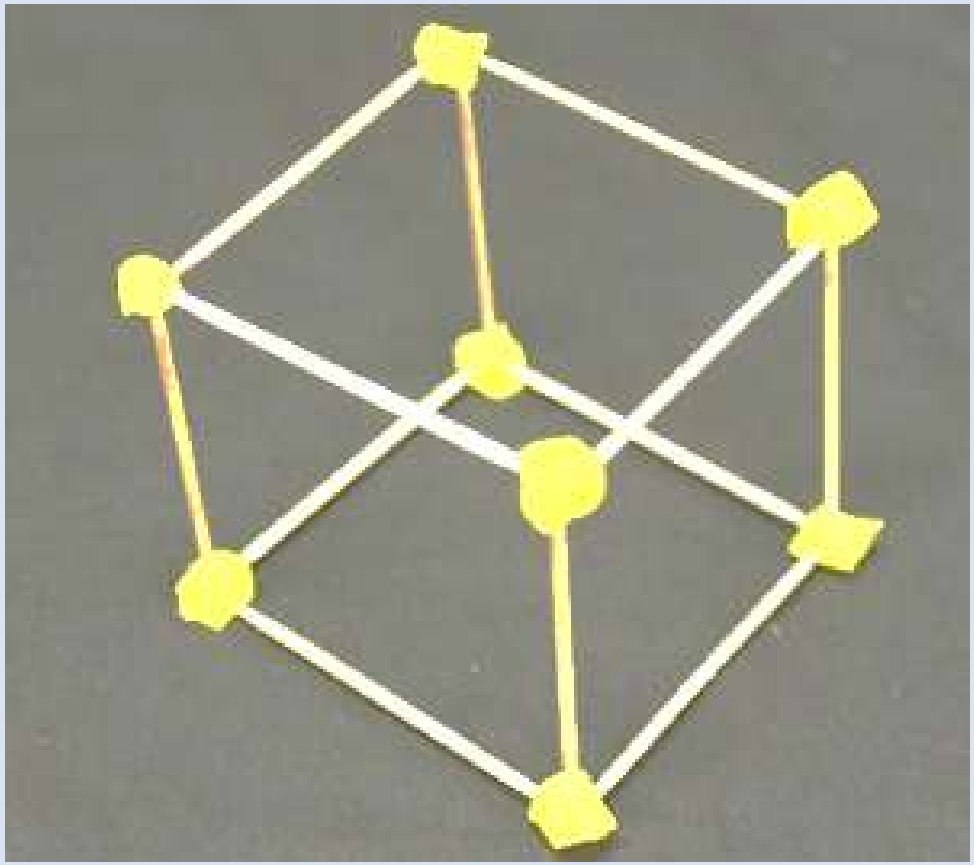
Day
178

QUICK COUNT

What did you NOTICE?

Day
178

QUICK COUNT



How many **edges** do you see on this model?

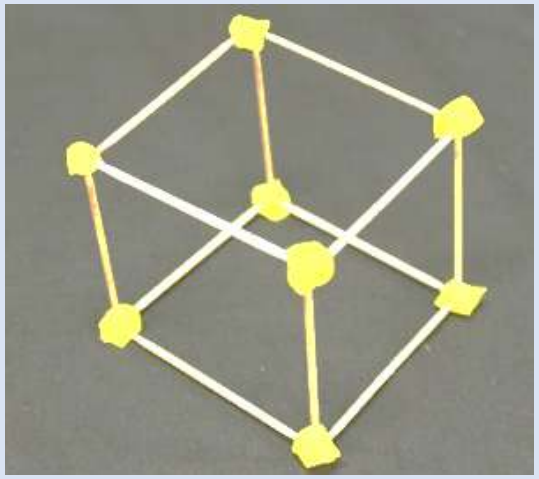
What <u>counting shortcut</u> did you use?

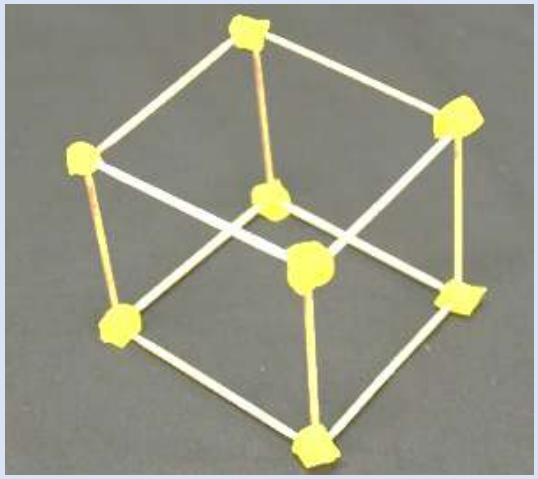
I noticed ____ so I _____

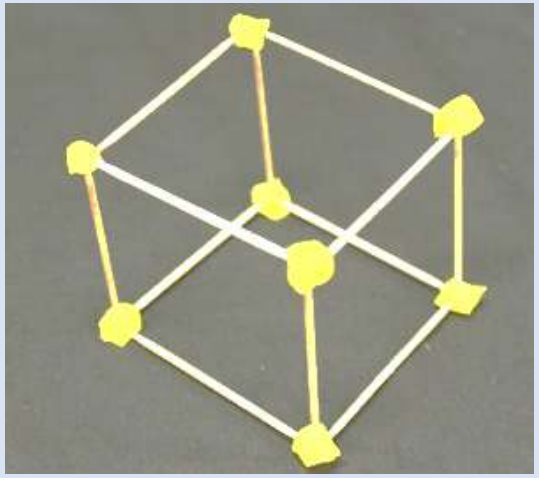
(They) noticed ____ so they___

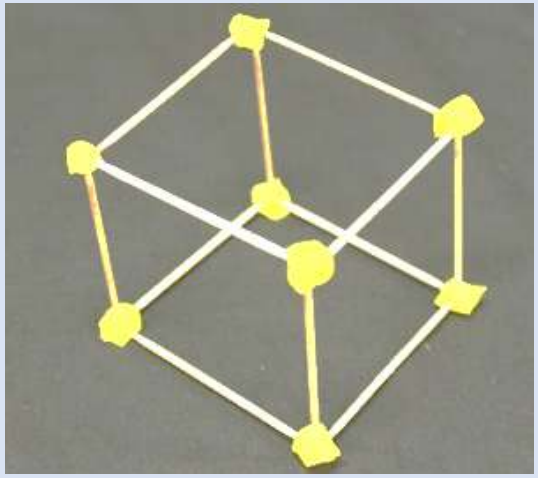
Day 178

QUICK COUNT









Day 178

Reflect

What was mathematically important?

QUICK COUNT

Day 179

5

What is the total valu… of the shade…

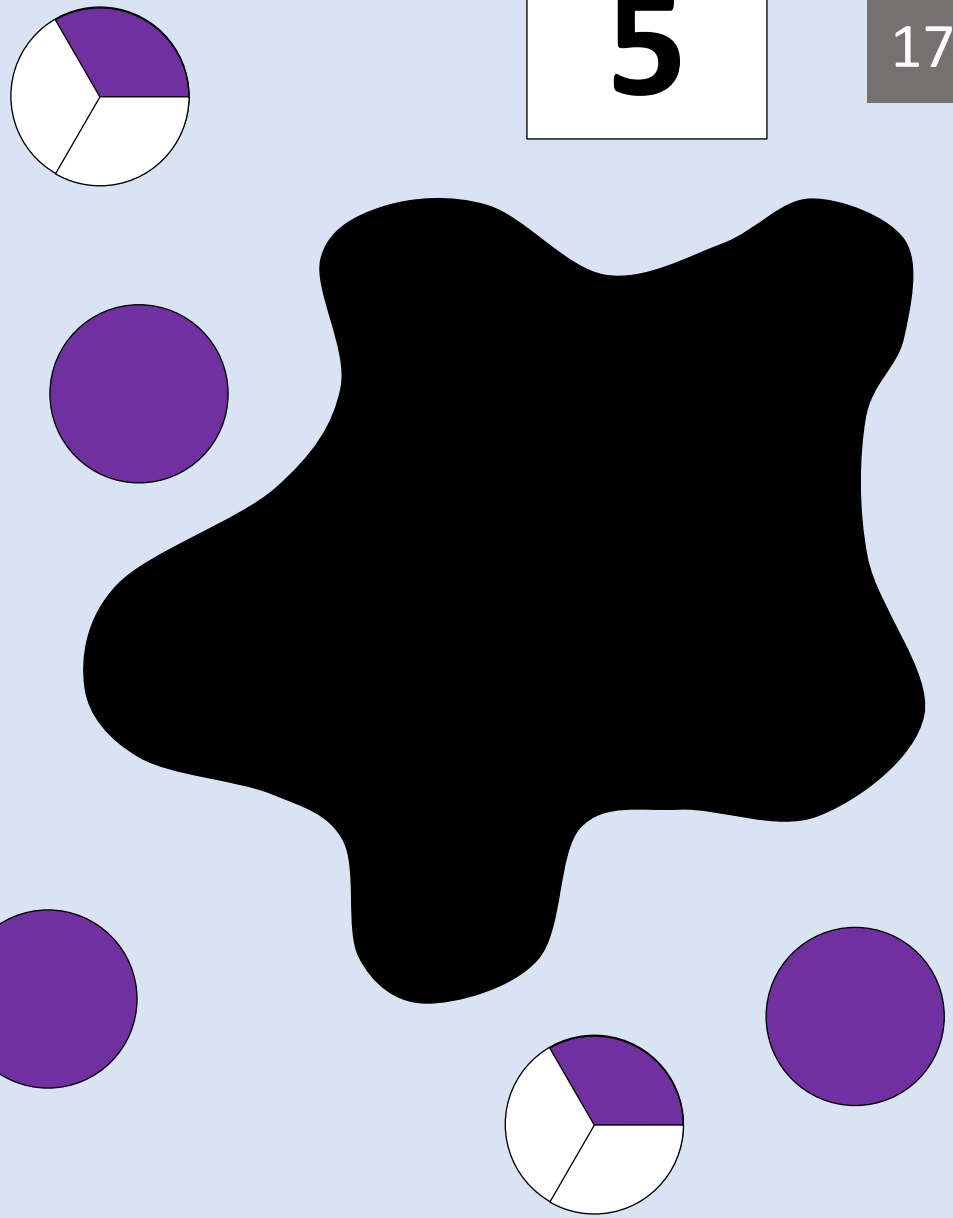
What is the value of the hidden circles?

Ho…

How else could …v?

Let's look under the s… the hi…

What can we learn from this picture?



SPLAT!

Day 180

DECIDE & DEFEND

Using the DECIDE & DEFEND routine

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Use the NEXT SLIDE with students.

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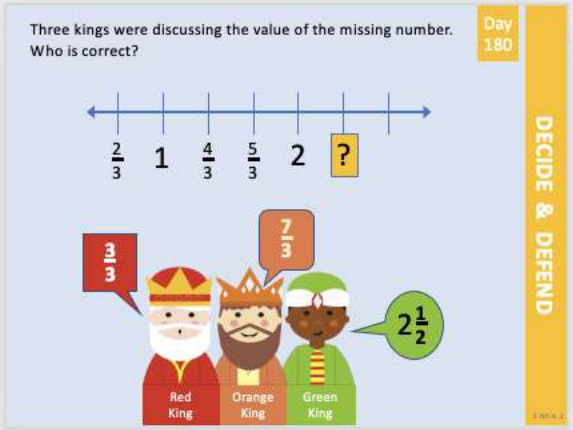
Day 180

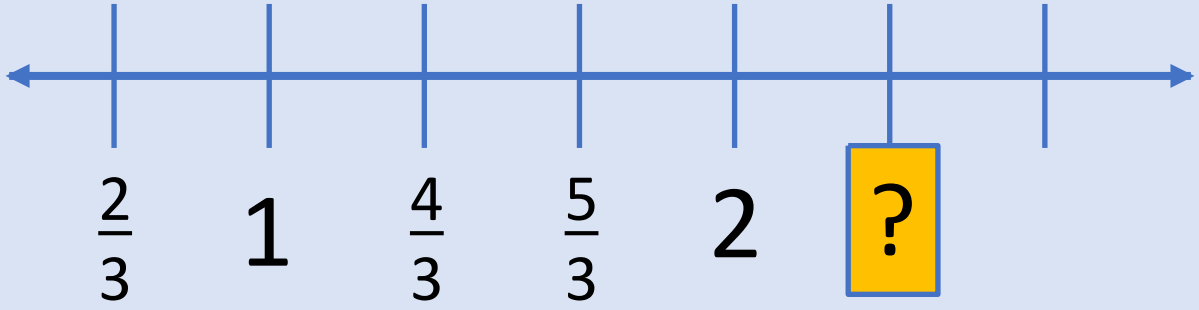
DECIDE & DEFEND



Notice that the number line is partitioned into THIRDS.
2 is equal to six-thirds, so the next value would be 7/3 (seven-thirds) which is one-third greater than 2

Three kings were discussing the value of the missing number. Who is correct?

Day 180



DECIDE & DEFEND

3.NF.A.2

Day 180

Reflect on Learning

- A new math idea I learned today is…
- An important thing to remember about fractions is…

DECIDE & DEFEND