NSR180

# 180 Days of

# Number Sense Routines

## Grade 5

## Days 121-140

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# 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.

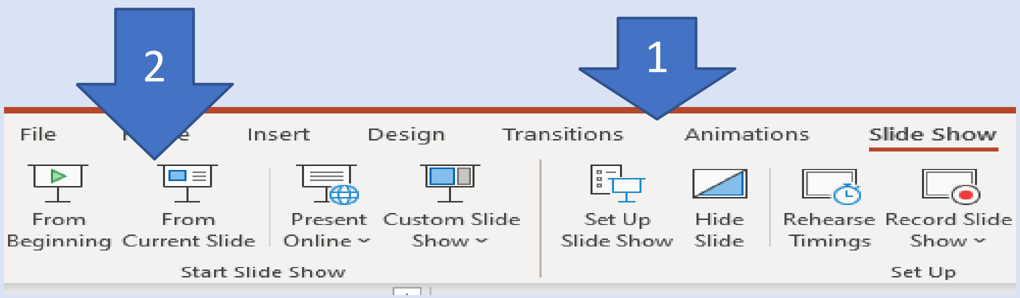
**WHAT ARE THE CCPS IMPLEMENTATION EXPECTATIONS?** Number sense routines have been developed for all 180 instructional days in grades 1-5. These routines are to be used every day, including early dismissal, late arrival, and field trip days. Because the routines do not require a specific order, it is permissible to trade routines among days 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 <u>in Slide Show mode</u>, 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 borrowed OER materials. We have made our work available in Open Educational Resources so that others may benefit as we have. Our deepest gratitude and respect to all those who 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

Day 121

# Dividing by ½

- SAY: **Today our Choral Counting will result from dividing numbers by 1/2**
  **As we count, look for patterns in the numbers that are recorded on the chart**
- **Let's think about what this means: If we begin with 4 and we divide those "4 things" in half, how many parts will we have?** (8)
- Write 8 on the chart
- **Now if we divide each of those 8 parts in half, how many parts do we have now? (16)**
- **Let's continue…. Remember to watch for patterns and to think about the generalizations we can make about dividing numbers by 1/2**

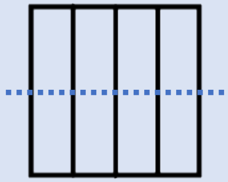
| | | | |
|---|---|---|---|
| 4 | 8 | 16 | 32 |
| 64 | 128 | 256 | 512 |
| 1024 | 2048 | 4096 | 8192 |

Patterns:

- Each column has the same digit in the ones place --- Ask, "Why is this pattern happening?"
  "If we had 5 columns, would that pattern still occur?" (no)
- The pattern of the ones place is 4, 8, 6, 2, 4, 8, 6, 2…. --- Ask, "If we had 5 columns, would this still be the pattern?" (yes)
- The number DOUBLES each time --- Ask, "Why is it doubling if if we are working with 1/2?"

Generalizations:

- When we DIVIDE by a fraction, the quotient has a greater value than the starting factor.
  Will this generalization always be true? (yes – WHEN the fraction is less than 1)



Day 121

# Dividing by ½

**4** ______ ______ ______

______ ______ ______ ______

______ ______ ______ ______

- **What patterns do you see?**
- **What generalizations can we make about dividing numbers by a fraction?**

CHORAL COUNTING

## Using the DECIDE & DEFEND routine

As you do this routine with students, USE the CHECKLIST on the left side of the problem as a way to help organize the thinking process

- **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.

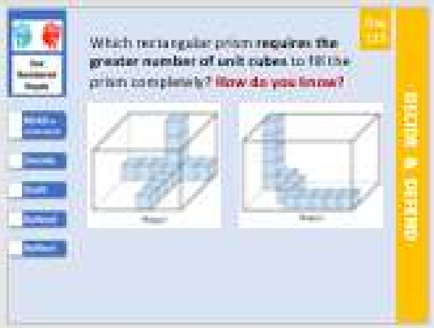
*NOTE: This is the CCPS adaptation of the original Decide and Defend protocol*

Day 122

# Use the NEXT SLIDE with students.

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

Remember to give TIME & SPACE for students to think about this on their own and then discuss this with others before intervening or beginning the class discussion. Remind students to think about how they will explain their thinking and justify their choice with math.



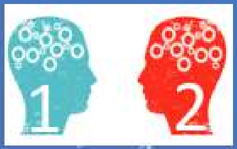

Prism 2 will require 40 more unit cubes than Prism 1 to fill it completely.

Prism 1:
Base = 6 x 5 = 30
Height = 4
Volume = 30 x 4 = 120 cubic units

Prism 2:
Base: 8 x 4 = 32
Height = 5
Volume = 32 x 5 = 160 cubic units

DECIDE & DEFEND

Day 122




Use Numbered Heads

**READ to Understand**

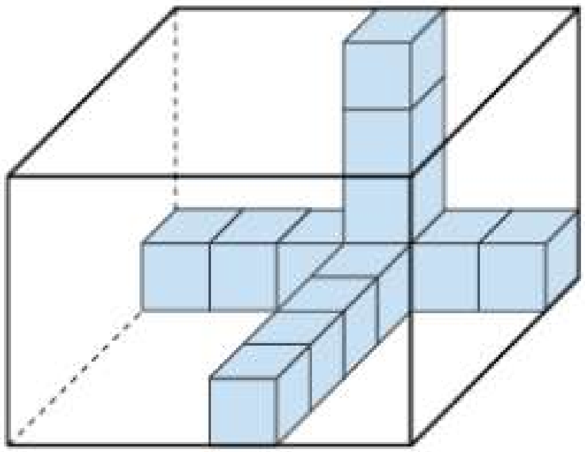
**Decide**

**Draft**

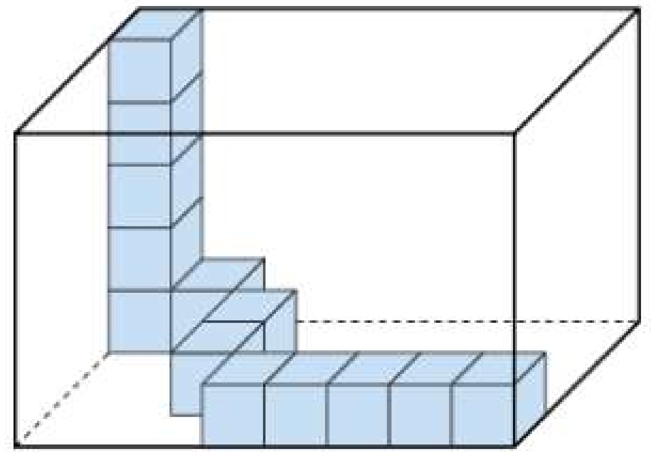
**Defend**

**Reflect**

# Which rectangular prism **requires the greater number of unit cubes** to fill the prism completely? **How do you know?**



Prism 1



Prism 2

**DECIDE & DEFEND**

Day 122

# Reflect on Learning

- A new math idea I learned today is…
- A math topic that I can explain better after today's discussion is….

DECIDE & DEFEND

Day 123

ESTIMATION

**Teacher directions for the student slide on the next page**

- This task is designed to have students REASON about the product;
- **DO NOT encourage or do the full calculation.**
- **The power of this activity is in the student reasoning and the discussions.**

- After collecting several student ideas of possibilities, lead a discussion about which ones MAY/MAY NOT fall within the range of 14,000-18,000 **and have students share their reasoning**.
- If students use the values more than once in an expression, even more possibilities are possible (you can decide to allow or not allow the repeat of values within an expression).
- Afterwards, open an on-screen calculator and calculate the product. Mark the ones that “worked” and those that didn’t.
- **Discuss the patterns and mathematical reasons.**

Some solutions that “work”

541 x 27

714 x 25 and 214 x 75 (note 1st digits are switched)

715 x 24 and 215 x 74 (note 1st digits are switched)

745 x 21 and 245 x 71 (note 1st digits are switched)

755 x 21

Discuss WHY these combinations work –

200 x 70 and 700x20 both equal 14,000 for example.

**Why do you think 255 x 71 and 241 x 57 do NOT work?**

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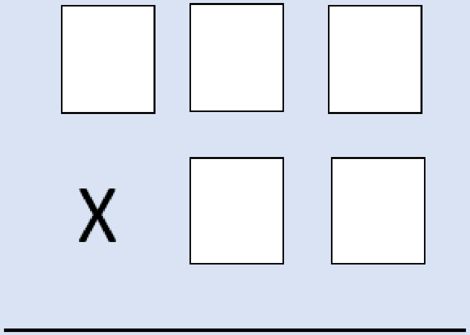
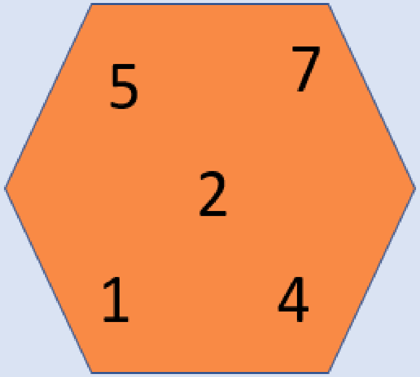
Day
123

**Our ideas for**
**POSSIBLE Solutions**

Using only the numbers in the hexagon, create an equation that MAY have a product that is between 14,000 and 18,000.




Click HERE for an online calculator

ESTIMATION

Day 124

NUMBER TALK

$1 \div 2$

$1 \div \frac{1}{2}$

$1 \div \frac{1}{4}$

$1 \div \frac{1}{10}$

**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**

**Dividing a whole number by a fraction**

Possible reasonings:

- Students may recognize that a division equation can be easily written in fraction notation, so 1 ÷ 2 is the same a ½ which means that the quotient of 1 ÷2 must be one-half (1/2)
- If 1 ÷ ½ we need to think of it as partitioning the whole into halves (or two parts). If we partition the whole in halves, you will now have a quotient of 2.
- Likewise, if we partition the whole into fourths, then the whole will be in 4 parts, so the quotient is 4
- Finally, we can reason that if we partition the whole into tenths, there will be 10 parts, so the quotient is 10
- Students should be guided to recognize that when they divide by a fraction that is LESS THAN ONE, then the quotient will be GREATER THAN the original dividend (1) and MAY conversely conclude that when we divide by a value that is greater than 1, then the quotient will have a value that is LESS THAN the original dividend (i.e. 1÷4 = ¼)

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**

**What PATTERNS do you notice when you divide a number by a fraction less than 1?**
**Help students recognize that when we divide ANY number by a value that is LESS THAN ONE, the quotient will ALWAYS be a value that is GREATER THAN the original dividend –and– when we divide by a value that is GREATER THAN ONE, the quotient will be a value that is less than the original dividend.**

$1 \div 2$

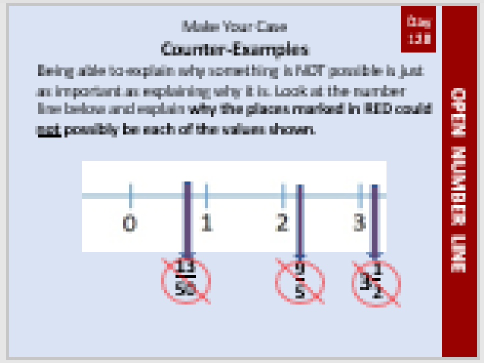
Day 124

NUMBER TALK

$10$

# Use the NEXT SLIDE with students.

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




Possible responses

- 13/50 is less than ½ but the red hash mark is past the ½ mark on the number line
- 9/5 is ALMOST 2, so it would not be past the 2 on the number line
- 3½ comes after 3, BUT when you look at the intervals of the other numbers, the ½ way mark is much farther to the right than where the 3½ was placed

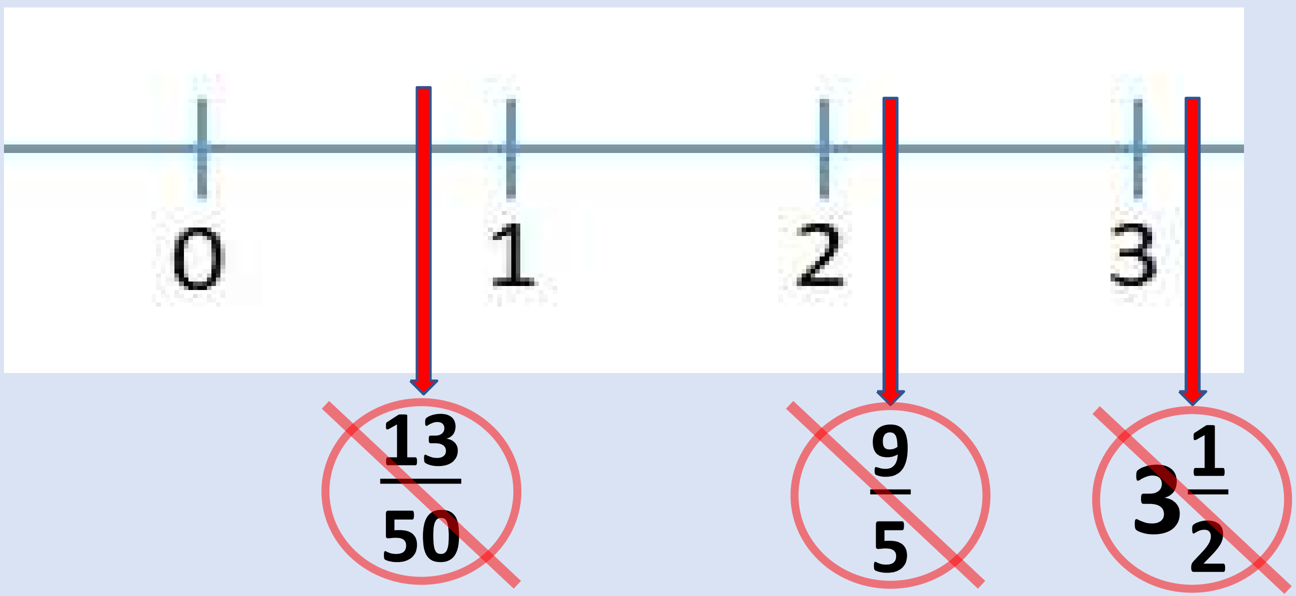
Day 125

Make Your Case

# Counter-Examples

Being able to explain why something is NOT possible is just as important as explaining why it is possible.

Look at the number line below and explain **why the places marked in RED could <u>not</u> possibly be the values shown**.




OPEN NUMBER LINE

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## 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 126

# What do you NOTICE?

QUICK COUNT

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**What did you NOTICE?**

# How many **pennies**?

What counting shortcut did you use?

Day 126

QUICK COUNT

I noticed ____ so I _____

(They) noticed ____ so they___

# 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 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.

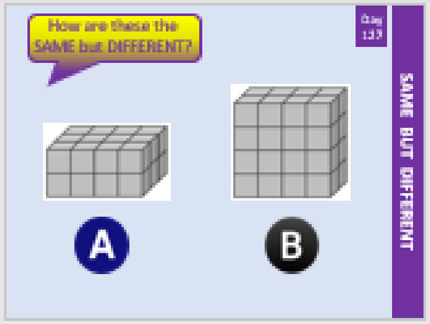
Day 127

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 are rectangular prisms
- Both have one dimension that is 4 unit cubes
- Both have one dimension that is 2 unit cubes
- A has a volume of 4x2x3 = 24 cubic units but B has a volume of 4x4x2 = 32 cubic units
- A has a height of 2 (as it is pictured here). But B has a height of 4.

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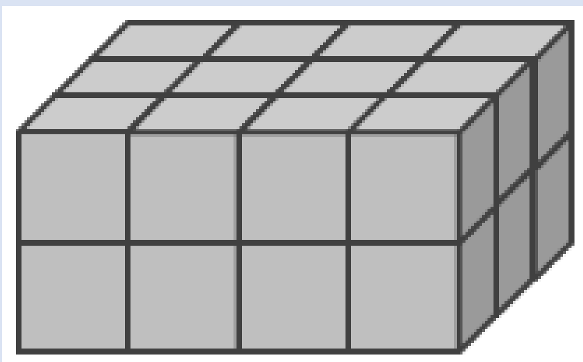
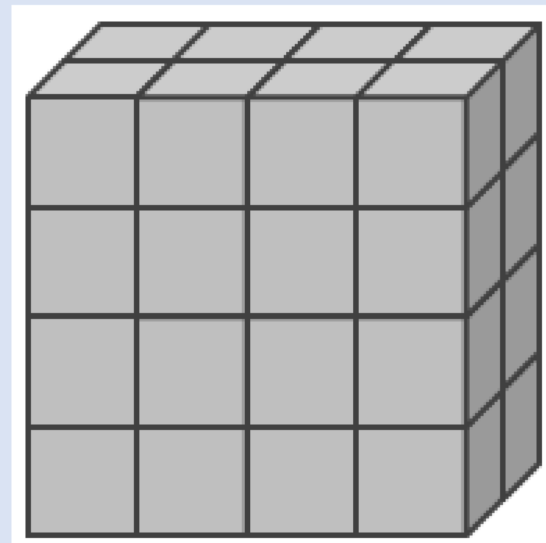
Day 127

# How are these the SAME but DIFFERENT?



A



B

SAME BUT DIFFERENT

Day 128

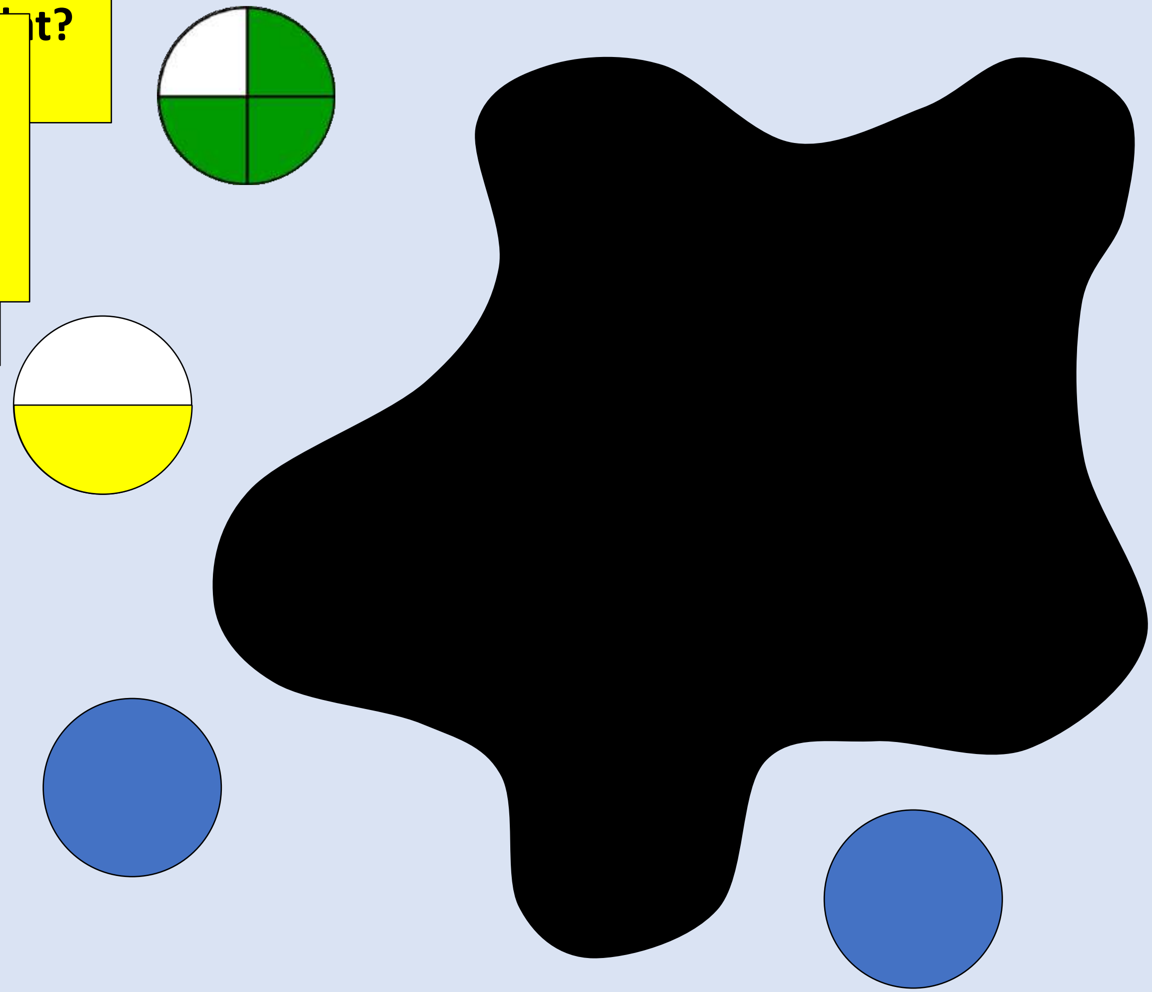
# 7

What total can

What value must be

How else could the hidden value be represented?

What can we learn from this picture?



SPLAT!

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Adapted from template by Steve Wyborney

Day 129

WHICH ONE DOESN'T BELONG?

# Use the NEXT SLIDE with students.

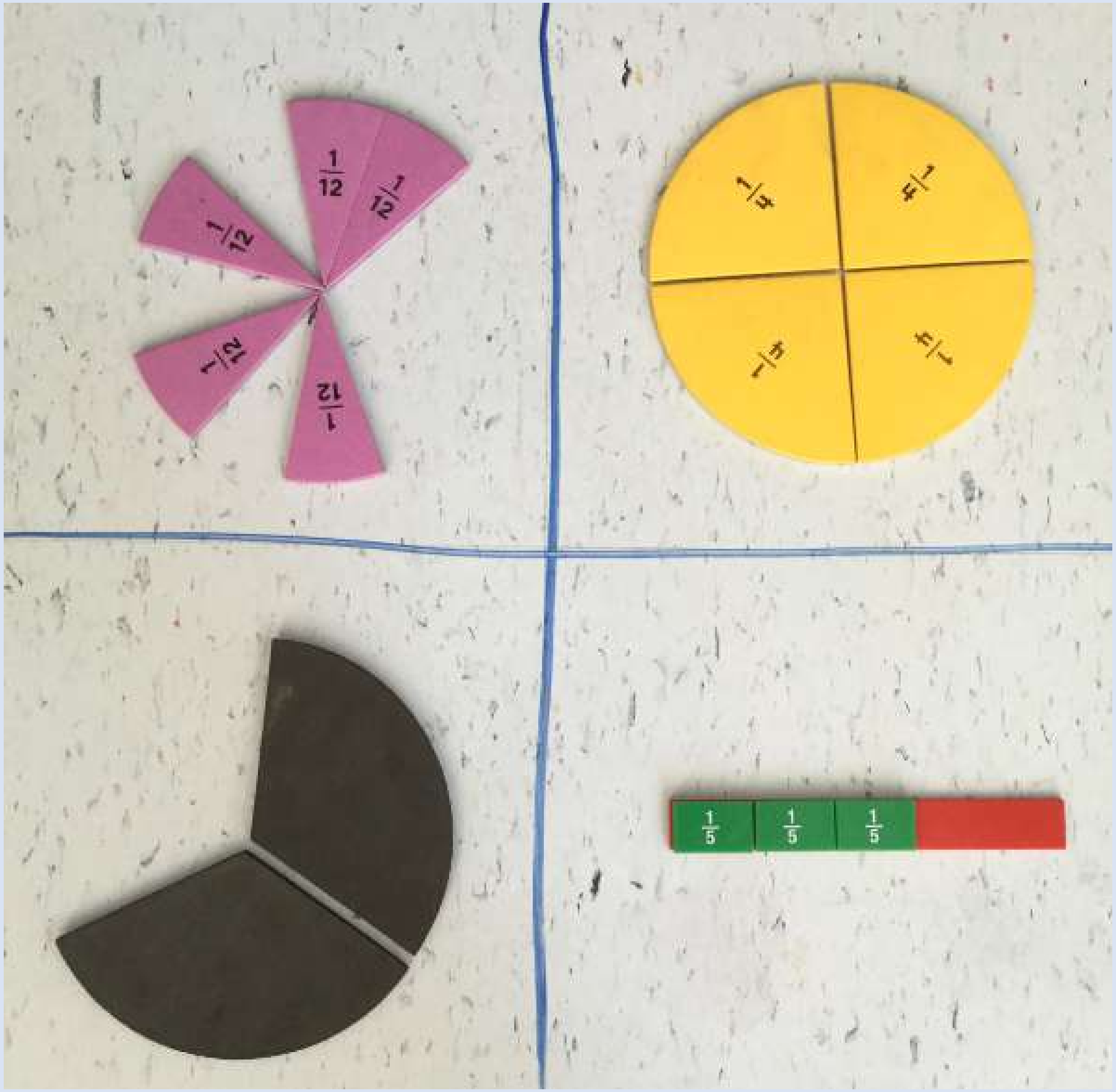
Here is are some possible responses. This list is not all-inclusive. Additional ideas encouraged!


**Possible Responses**

- Three of these images represent a value that is greater than ½. The 5/12 does not represent a value that is greater than ½.
- Three of these images represent a value that is less than 1 whole. The 4/4 do not represent a value that is less than 1 whole.
- Three of these images have the fractional value marked on the pieces. The black piece (2/3) does not have the fractional value marked.
- Three of these images represent a fraction as part of a circle. The 3/5 is represented as a bar (or rectangle).

Day 129






**Three of these images….**

# Use the NEXT SLIDE with students.

Day 130

**This Choral Counting routine is designed to do several things:**

- Review Powers of 10
- Help students to practice saying very large numbers
- Help students to visually see the patterns and relationships that exist when we work with powers of 10

**Expected Outcomes:**

- Students recognize that when we multiply 10 to a power the number of trailing zeros behind the 1 will be the same at the power
- Students recognize that as we increase the power by 1, we get a value that is TEN TIMES larger than the previous value because the base is the number 10 and using exponents is a function of multiplication by the base number
- Help students to recognize the pattern of 1, 10, 100 within each period as we say the number name (thousands and millions – and it continues into the billions, trillions, quadrillions, and beyond….)

**Volume**

- 10 to the zero power is 1 (one)
- 10 to the 1st power is 10 (ten)
- 10 to the 2nd power is 100 (1 hundred)
- 10 to the 3rd power is 1000 (1 thousand)
- 10 to the 4th power is 10,000 (10 thousand)
- 10 to the 5th power is 100,000 (100 thousand)
- 10 to the 6th power is 1,000,000 (1 million)
- 10 to the 7th power is 10,000,000 (10 million)
- 10 to the 8th power is 100,000,000 (100 million)

CHORAL COUNTING

# Powers of Ten to Really Big Numbers!

**Sentence stem: "Ten to the Power of ____ is ____"**

Day 130

| | | |
|---|---|---|
| $10^0$ | Ten to the power of zero | is 1 |
| $10^1$ | Ten to the power of 1 | is 10 |
| $10^2$ | Ten to the power of 2 | is ________________________ |
| $10^3$ | Ten to the power of 3 | is ________________________ |
| $10^4$ | Ten to the power of 4 | is ________________________ |
| $10^5$ | Ten to the power of 5 | is ________________________ |
| $10^6$ | Ten to the power of 6 | is ________________________ |
| $10^7$ | Ten to the power of 7 | is ________________________ |
| $10^8$ | Ten to the power of 8 | is ________________________ |

**What patterns do you see?**

CHORAL COUNTING

# 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.**


# How many markers?

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.

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**Clue #1**

There are 6 layers, but every layer does not have the same quantity

**Clue #2**

No layer has more than 6 markers

**Clue #3**

$n + 7 > 30$ when n represents the number of markers

**Clue #4**

The total is a prime number

**Clue #5**

You should have 2 possibilities, but 9 is not one of the digits.


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

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**The Reveal**

**Click to see the answer.**

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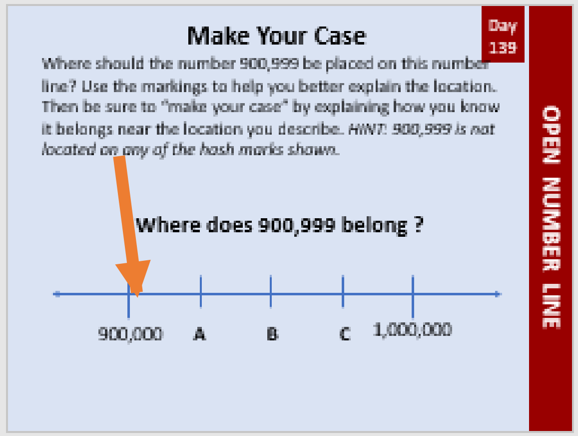
Day 132

# Use the NEXT SLIDE with students.

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

Remember to give students plenty of individual Think Time and then give about a minute of partner discussion time before the class discussion.




Possible responses

- Halfway between 900,000 and 1,000,000 would be 950,000. So B = 950,000.
- Halfway between 900,000 and 950,000 would be 925,000. So A = 925,000
- The value shown would hit approximately at this location so it should be closer to 925,000
- 900,999 would fall between the starting point 900,00 and Point A.
- Because it is only 1000 away from 900,000 compared to being 24,000 away from 925,000, it will be MUCH closer to 900,000 than it is to Point A on the number line.
- The magnitude of numbers is relative – that means a number like 999 is only large when it is compared to a small number, but when it is placed on a number line that has intervals of 25,000, it is a very small number.

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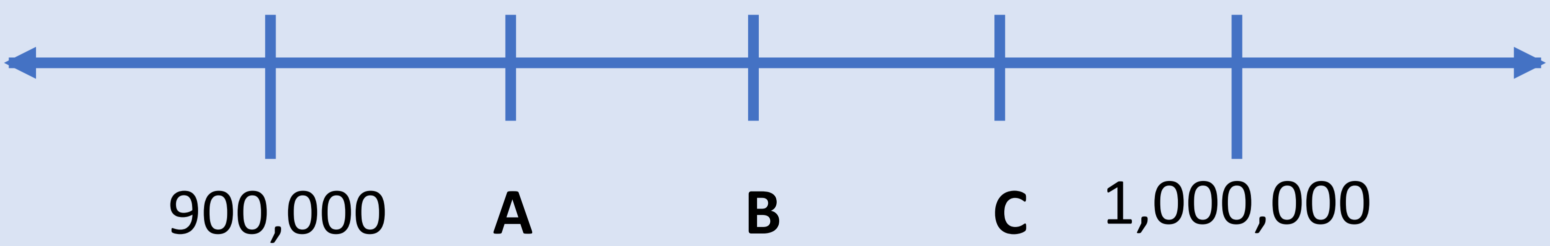
OPEN NUMBER LINE

Day 132

# Make Your Case

Where should the number **900,999** be placed on this number line? *How do you know?*

## Where does 900,999 belong ?




*HINT: It is not located directly on any of the hash marks shown*

OPEN NUMBER LINE

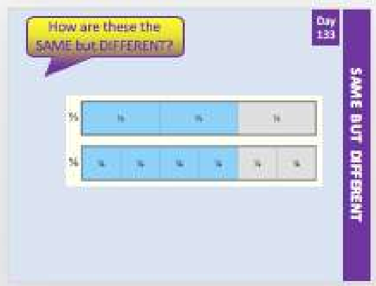
Day 133

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….”

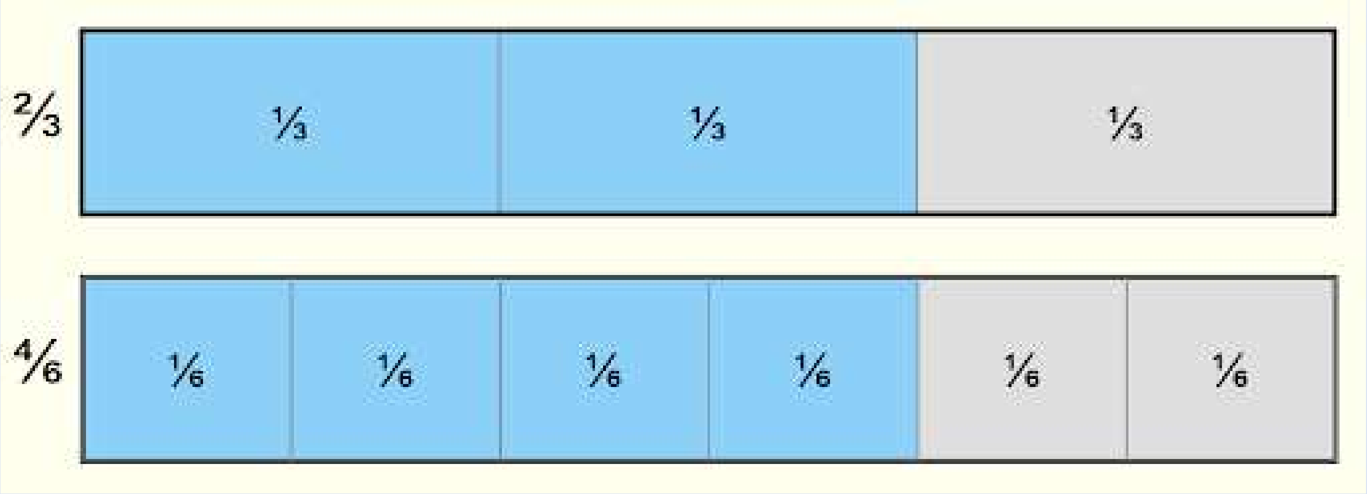



**POSSIBLE RESPONSES**

- Both represent the same whole but one is partitioned into 3 pieces and the other is partitioned into 6 pieces.
- Both have the same amount shaded in blue but one has 2 pieces shaded and the other has 4 pieces shaded.
- Both are broken into fractions but one is thirds and the other is sixths.
- One shows 2/3 but the other shows 4/6. These are equivalent values.
- Both have 1/3 unshaded. One is expressed at 1/3 and the other is 2/6.

How are these the SAME but DIFFERENT?



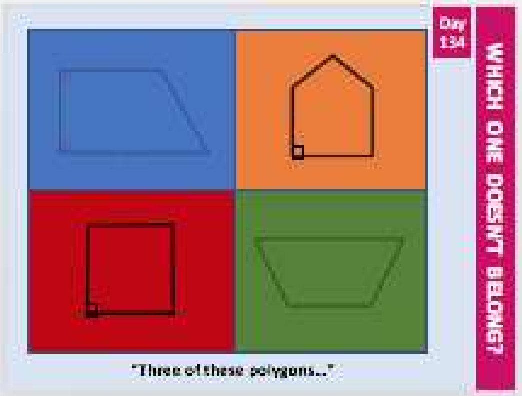


Day 134

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!

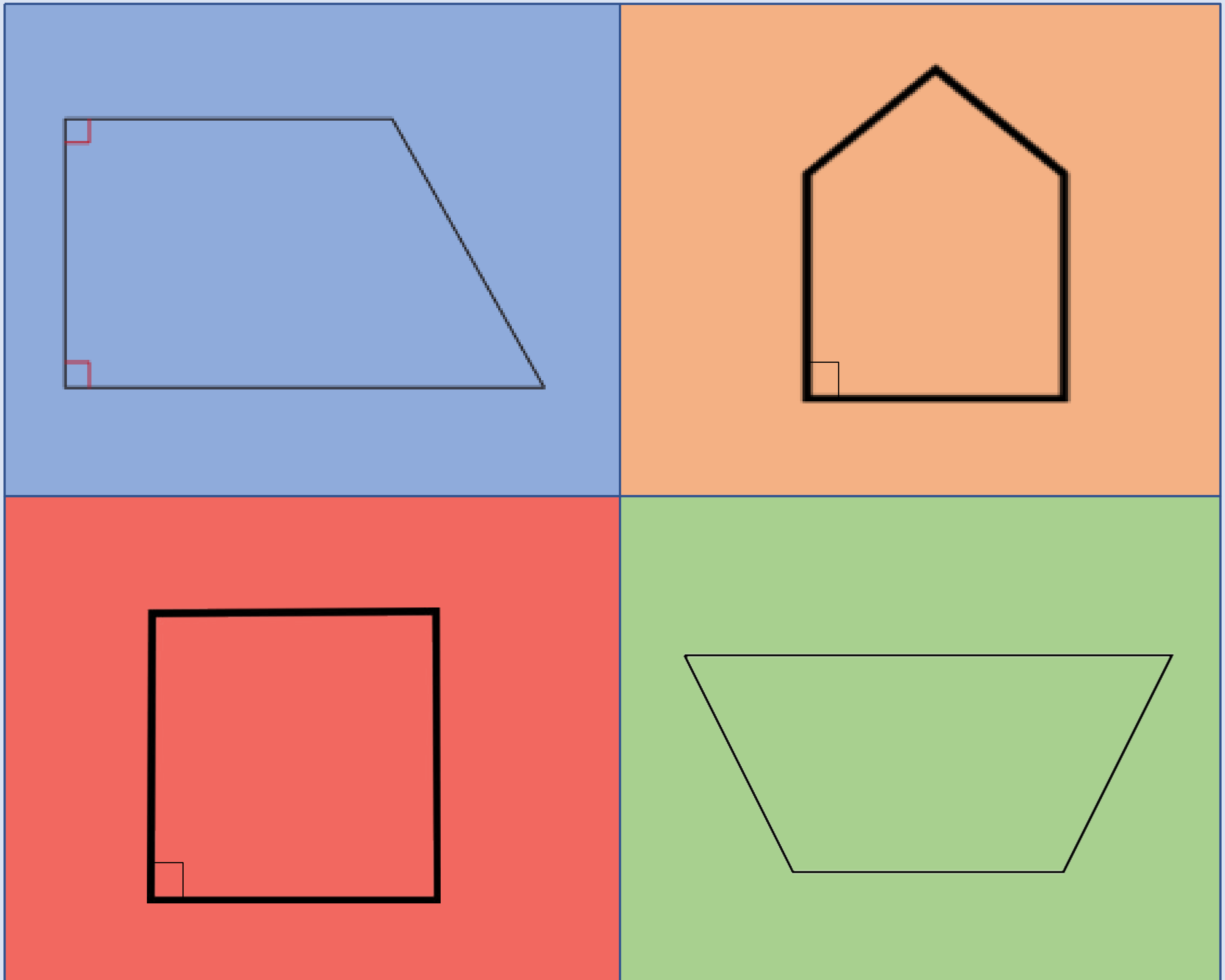



Possible Responses:

- Three of these polygons have at least 2 sides with equal lengths. The blue polygon does not have 2 least with equal lengths.
- Three of these polygons are quadrilaterals (4 sides). The orange polygon is not a quadrilateral.
- Three of these polygons have at least two sides with different lengths. The red polygons does not have any sides of a different length.
- Three of these polygons have at least one right angle. The green polygon has no right angles.

Day 134

# WHICH ONE DOESN'T BELONG?



**"Three of these polygons…"**

# Using the DECIDE & DEFEND routine

As you do this routine with students, USE the CHECKLIST on the left side of the problem as a way to help organize the thinking process

- **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!






If you convert everything to liters, the fabric softener would be 3.25 liters since 1000 milliliters equals 1 liter.

The correct order is "A" : 4 liters, 3250 milliliters, 2.9 liters

# MEASUREMENT CONVERSIONS

Day 135

Use Numbered Heads

READ to Understand

Decide

Draft

Defend

Reflect

Garrett's mother bought 4 liters of liquid laundry detergent and 2.9 liters of bleach. She also bought 3,250 milliliters of fabric softener.

**Which list below is ordered greatest to least based on liquid volume?**

A. detergent – fabric softener – bleach
B. detergent – bleach – fabric softener
C. fabric softener – bleach – detergent
D. fabric softener – detergent – bleach

DECIDE & DEFEND

# Reflect on Learning

- A new math idea I learned today is…
- A math topic that I can explain better after today's discussion is….
- Next time I plan to… because….

DECIDE & DEFEND

$6 \div 2$
$6 \div ½$
$7 \div ½$
$7 \div ¼$

Day 136

TEACHER NOTES

NUMBER TALK

**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**

**Dividing a whole number by a fraction**

Possible reasonings:

- If 6 ÷ 2 is 3 then 6 ÷ ½ cannot also be 2. When you divide 6 by 2, you get 2 groups of 3. When you divide 6 by ½, you are really trying to find out how many ½'s can 6 be partitioned into (12).
- Students will (hopefully) come to recognize that when you divide a number by a value less than 1, you get a value that is greater than the original divisor.
- Students may notice that the 6 "doubles" when you divide by ½, so 7 will also "double".
- If dividing by ½ causes the dividend to "double" then dividing by ¼ must make it "quadruple x4" in value.

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**

**What PATTERNS do you notice when you divide a number by a fraction less than 1?**

**Help students recognize that when we divide ANY number by a value that is LESS THAN ONE, the quotient will ALWAYS be a value that is GREATER THAN the original dividend and when we divide by a value that is GREATER THAN ONE, the quotient will be a value that is less than the original dividend.**

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Day 136

6 ÷ 2

NUMBER TALK

Day 137

# What do you NOTICE?

QUICK COUNT

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What did you NOTICE?

How many **BROWN** eggs?
What counting shortcut did you use?

QUICK COUNT

I noticed ____ so I _____

(They) noticed ____ so they___

Day 137

QUICK COUNT

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Day 137

# Reflect

**What was mathematically important?**

QUICK COUNT

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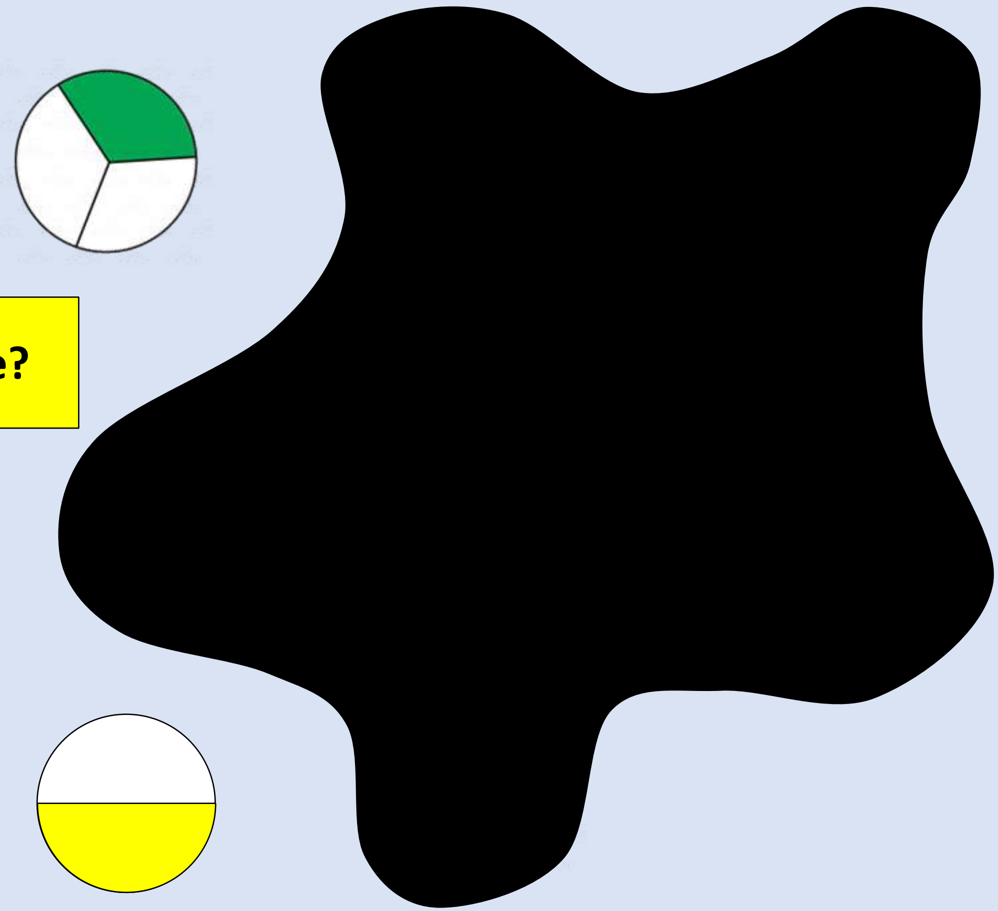
Day 138

# $2\frac{2}{3}$

What fractions do the pieces we see

How many more of each kind are needed to equal the total value shown?

Are other combinations possible?



SPLAT!

Day
139

# 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.**

**NOTE:** ***This task is especially rigorous and will likely require paper/pencil and additional time. You might also decide to offer calculators to students.***

ESTIMATION

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Day 139

# Use the NEXT SLIDE with students.

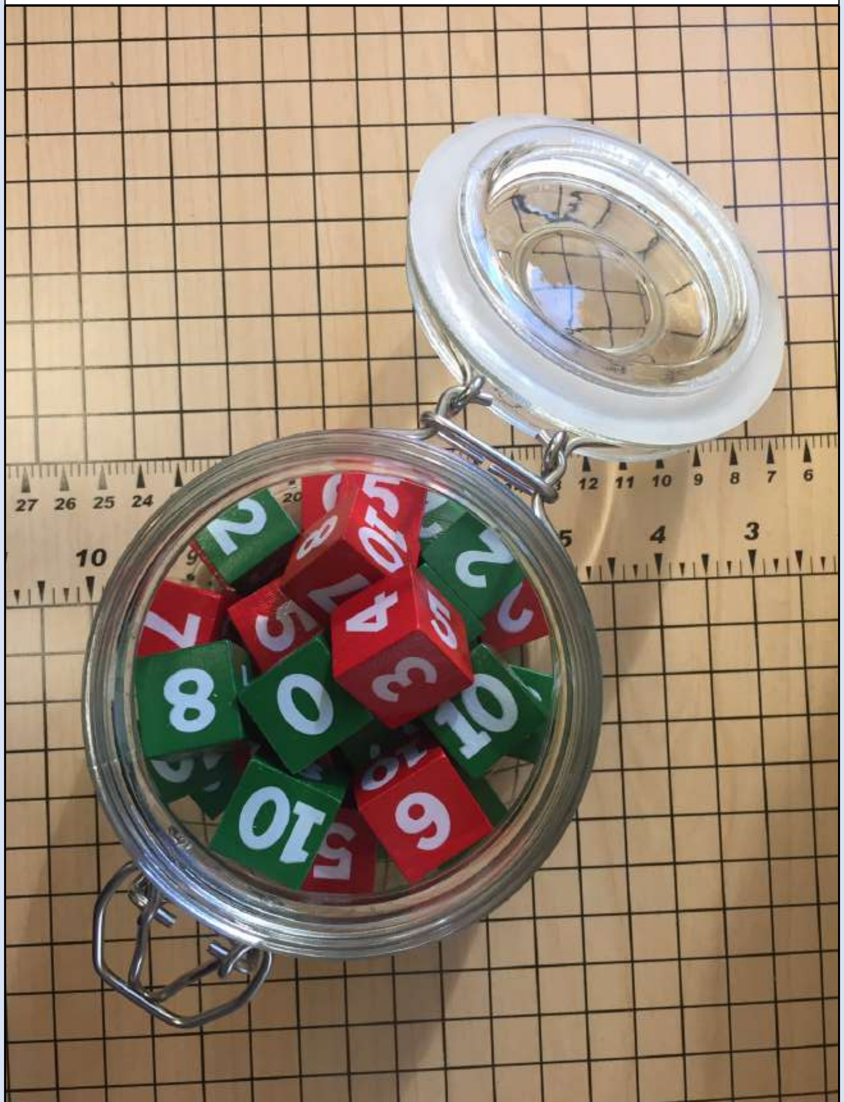
Here is are some possible responses. This list is not all-inclusive. Additional ideas encouraged!

Follow-up discussion.
There are 32 dice total (4 sets of 8)
½ of the dice (that's 16 dice) have 0-5 on the faces. 0+1+2+3+4+5 = 15
15x16=240
½ of the dice (that's the other 16 dice) have 5-10 on the faces. 5+6+7+8+9+10 = 45
45x16=720
240+720=960

**<u>CHECK OUT this flexible thinking idea!!!</u>**
**Since a pair of dice of each type equals 0+1+2+3+4+5+6+7+8+9+10=60, we can multiply 60 times the 16 PAIRS of dice for a total of 16x60=960.**

ESTIMATION

# What is the SUM of all the numbers on these dice?

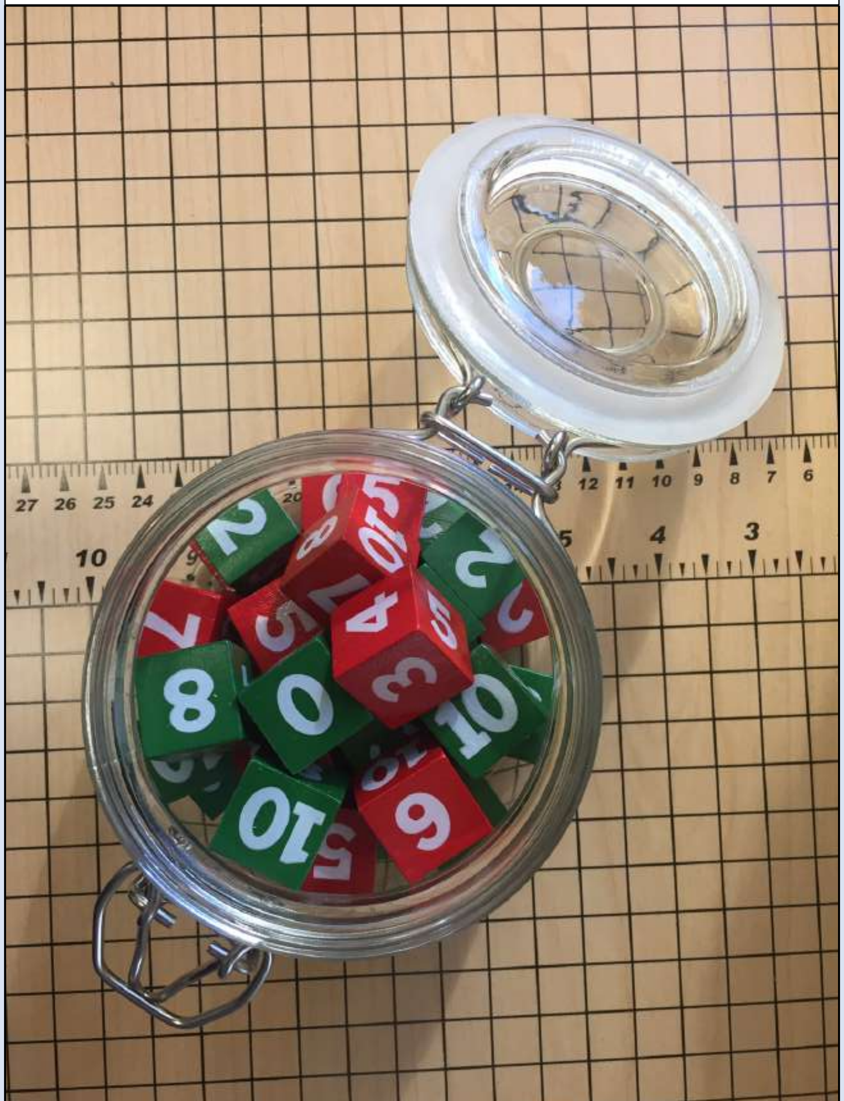


How do you find the SUM of the face values on numbered cubes?

Usually, dice have the numbers 1 through 6, so we would add 1 + 2 + 3 + 4 + 5 + 6 to discover that a *typical* dice has a total value of 21.

The numbered cubes in this jar are NOT like typical dice. Pay attention to the clues to discover the sum.

**What is the SUM of all the numbers on these dice?**



**<u>Clue #1</u>**
**The jar contains 4 sets of dice**

**<u>Clue #2</u>**
**Each set has 8 dice**

**<u>Clue #3</u>**
**½ of the dice have the numbers 0-5 on each face**

**<u>Clue #4</u>**
**½ of the dice have the numbers 5-10 on each face**

**<u>Clue #5</u>**
**1000 > Total Sum > 900**

**What is the SUM of all the numbers on these dice?**


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

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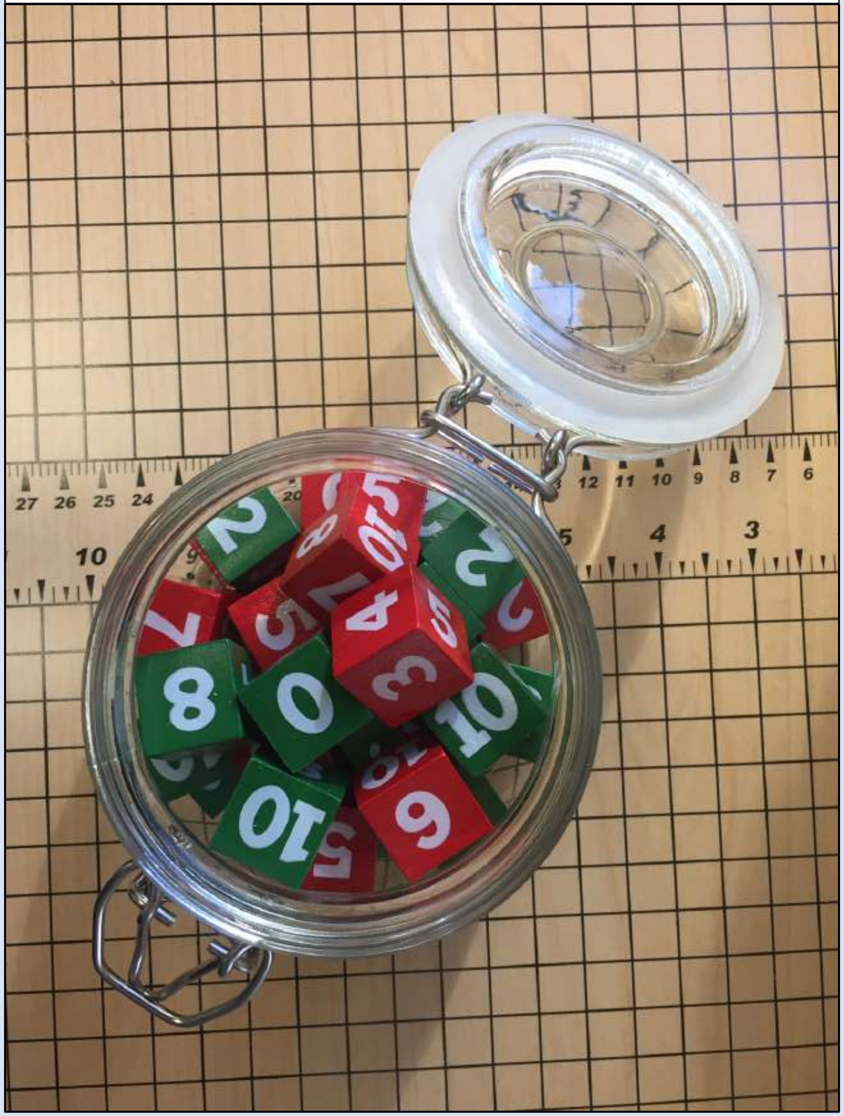
**What is the SUM of all the numbers on these dice?**



**The Reveal**
**Click to see the answer.**

**Without multiplying**, which product has a greater value?

$1 \times \frac{1}{16}$ or $2 \times \frac{1}{16}$

$\frac{3}{16} \times \frac{57}{8}$ or $\frac{8}{15} \times \frac{44}{99}$

$\frac{1}{4} \times \frac{4}{8}$ or $\frac{1}{2} \times \frac{1}{4}$

Day 140

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**

**Comparing products WITHOUT doing the actual calculation**

Possible reasonings: *(Students should use REASONING and should NOT do the actual calculations)*

- Since the 1/16 is the same, the second one will be greater because it is multiplied by a greater value
- The first is a number LESS THAN 1 multiplied by a value GREATER THAN 1, so the first one is greater since the second one has two values less than 1 being multiplied against each other
- Both expressions have ¼ as one of the factors and both are multiplied by a value that is equivalent to ½, so both expressions have a product that are EQUAL

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 to recognize the patterns that make doing the actual calculations unnecessary when simply trying to determine which will have a greater value.**

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Day 140

**Without multiplying**, which product within each pair of expressions has a greater value?

$1 \times \frac{1}{16}$ or $2 \times \frac{1}{16}$

NUMBER TALK