



180 Days of Number Sense Routines

Grade 2

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 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 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 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

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Count Back by 10

SAY

- *Today we are going to count BACK by 10s starting on 277.*
- *Remember, this is a Choral Count, which means that we are going to count altogether. We will need to go slowly so that everyone can participate in the counting.*

DO

- As students count slowly, you can advance the slide one click at a time to reveal the next number.
- The power of this activity comes from the discussion that FOLLOWS the counting – not just from the actual counting.

NOTE:

- **Today's routine MUST be run in PowerPoint on Slide Show mode to work properly** (see page 4 of this slide deck to see more detailed directions if needed)

Count Back by 10

		277							

What PATTERNS do you notice on this chart when we counted back by 10s?
 What numbers would go in the two blank boxes at the beginning of this chart?
How do you know? What's another way you could know?

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 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



MEASURING LENGTH



Use
Numbered
Heads

READ to
Understand

Decide

Draft

Defend

Reflect



Sam and Stan are twins. They learned about measuring at school. They are measuring things in their bedroom. Sam measures the length of his bed and says that it is 5 yards long. Stan thinks that 5 yards is not a reasonable length for a bed.



Is 5 yards a reasonable
length for a bed?
How do you know?

Reflect on Learning

- A new math idea I learned today is...

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.**

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.

The Reveal
Click to see the answer.



Directions for QUICK COUNT routines

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

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



What do you NOTICE?



**What did you
NOTICE?**

How many hearts?
What counting shortcut did you use?



I noticed ____ so I ____

(They) noticed ____ so they ____



quick count

Reflect

**What was
mathematically
important?**

quick count

$$27 + 10$$

$$27 + 20$$

$$27 + 40$$

$$27 + 29$$

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

Adding Multiples of Ten

- The goal of today's Number Talk is to help students quickly add multiples of 10 to a given number.
- For the last expressions, students will hopefully recognize that they can add the multiple of ten (30) and then subtract the extra that should not have been added.

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

Help students to recognize the PATTERN of adding multiples of TEN to a number. Then help them to recognize that we can use what we know about adding multiples of ten to adding numbers that are NEAR multiples of ten.

$$27 + 10$$

Day
105

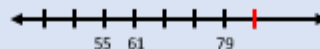
NUMBER TALK

Use the NEXT SLIDES with students.

Day
106

OPEN NUMBER LINE

What do you NOTICE about this number line?



What number would go on the RED hash mark?
How do you know?

How else could you know? What would be an
efficient way to find the value of the RED mark?

Solution: 85

Be sure to debrief students' ideas about how they knew the value of the red hash mark.

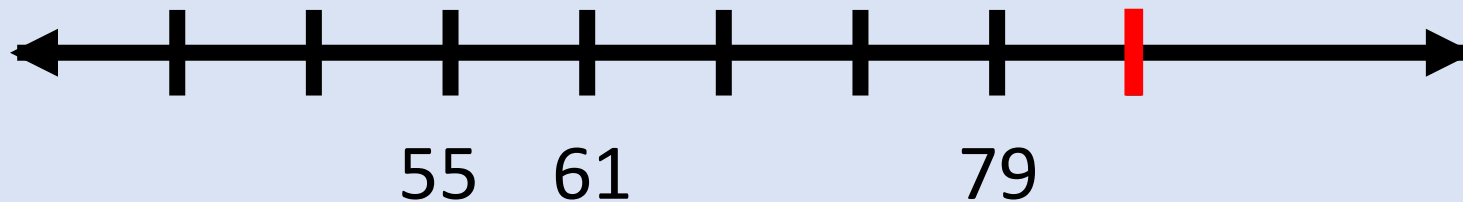
Once several students have shared their strategy, be sure to talk about more efficient ways.

Efficient method: If students recognize that the intervals are 6 since $55 + 6 = 61$, then they can simply add 6 to 79 to get 85.

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



What do you NOTICE about this number line?



What number would go on the **RED** hash mark?
How do you know?

How else could you know? What would be an efficient way to find the value of the **RED** mark?

Use the NEXT SLIDE with students.

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



Possible Responses:

Three of the sets of coins are on heads. The nickels are not showing the heads side of the coin.

Three of the sets of coins are silver-colored. The pennies are not silver-colored.

Three of the sets of coins equal 25 cents. The dimes do not equal 25 cents.

Three of the sets of coins show more than one coin. The quarter shows only one coin.



“Three of the sets of coins...”

About the SAME BUT DIFFERENT Routine

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

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

Source: www.samebutdifferent.net.com/about

Facilitating the SAME BUT DIFFERENT Routine

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



Use the NEXT SLIDE with students.

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

Additional ideas encouraged!

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



POSSIBLE RESPONSES

- Both sets of coins have a total value of 45 cents, but the types of coins are not identical
- Both sets of coins contain dimes, but the green set has a quarter and the yellow set has a nickel
- Both sets of coins contain dimes, but the green set has 2 dimes and the yellow set has 4 dimes

How are these the SAME but DIFFERENT?

Day
108

SAME BUT DIFFERENT



Directions for SPLAT! routines



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

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

To learn more about Steve Wyborney's Splat activity, click this link
<http://www.stevewyborney.com/?p=893>

Splat!

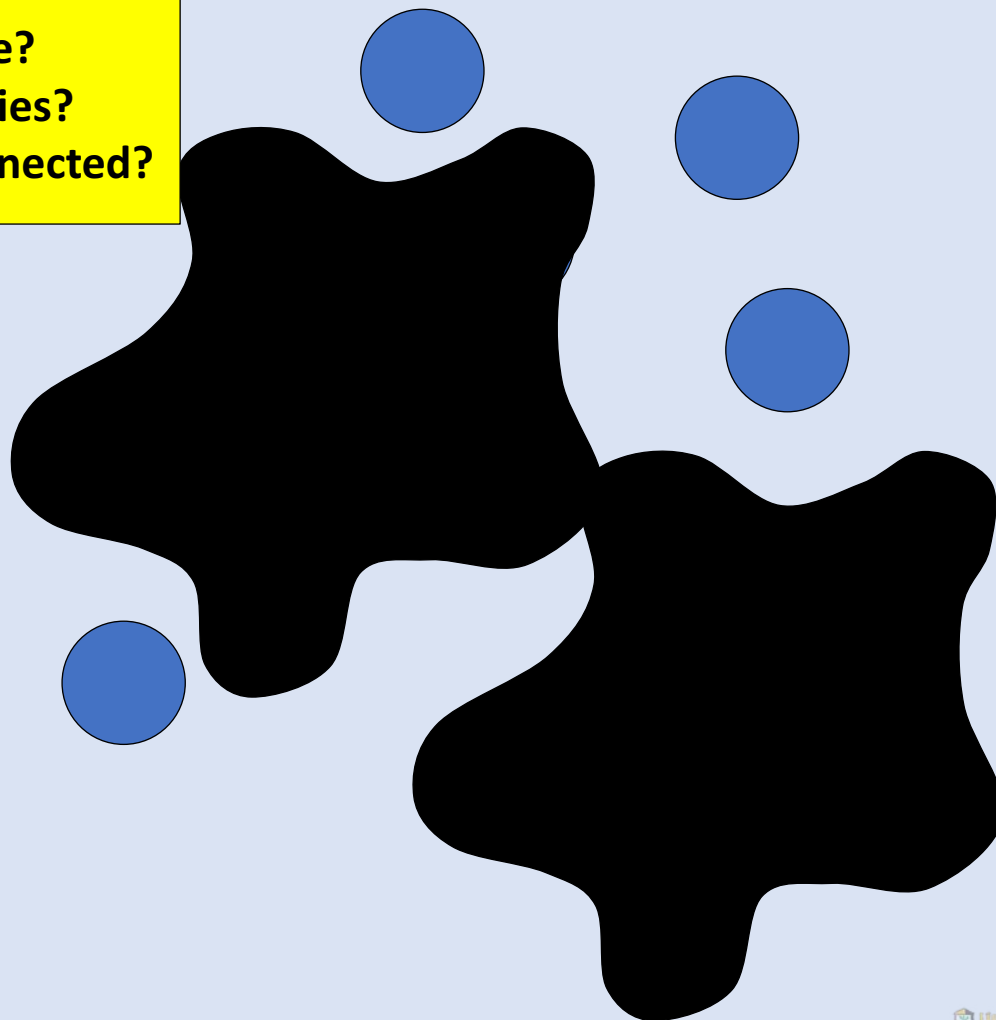
**What could the total be?
What are some possibilities?
How are the possibilities connected?**

**How is the list of
possible totals like total
types.**

Let's look under

What is the total?

**because
the
just
ber
m.**



SPLAT!

Use the NEXT SLIDE with students.

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

$42 - 10$	$32 + 0$
$67 + 10$	$10 + 19 + 3$

"Three of these math expressions..."

Possible Responses:

- Three of these math expressions are addition expressions. $42 - 10$ is not an addition expression.
- Three of these math expressions have a solution that is different than the original values. $32 + 0$ has a sum that is not different than the original value.
- Three of these math expressions have a solution of 32. $67 + 10$ is not equal to 32
- Three of these math expressions have 2 values added/subtracted. $10 + 19 + 3$ does not have just 2 values added/subtracted

$$42 - 10$$

$$32 + 0$$

$$67 + 10$$

$$10 + 19 + 3$$

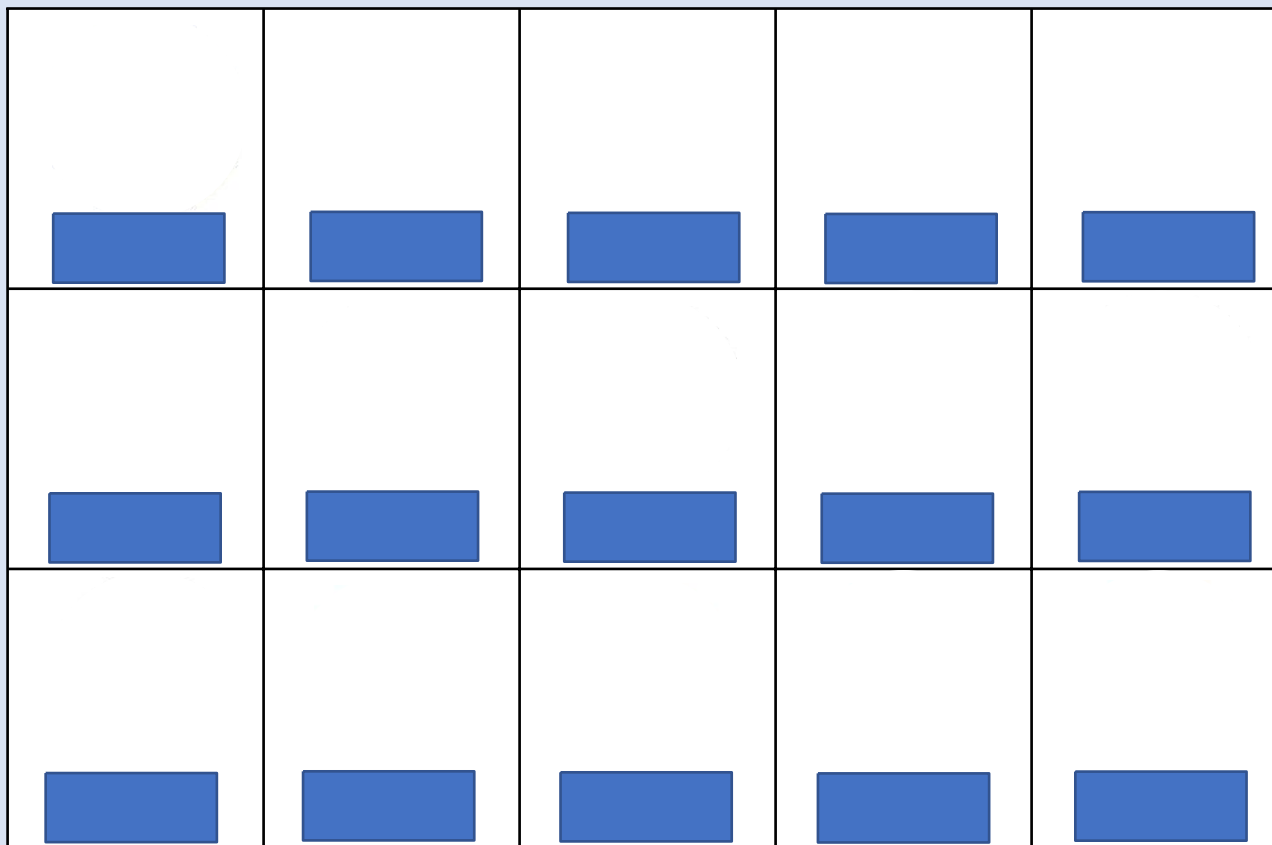
“Three of these math expressions...”

Counting Money

- Today we are going to count money.
- As we count, we will switch between different types of coins.
- We will use choral counting and we'll go slowly so everyone can help count the money.
- As we count, look for PATTERNS that occur.
- We will discuss some of the mathematical patterns at the end of the choral counting.
- Use the next slide to facilitate the count.
- **NOTE: This slide has animation and MUST be run in PowerPoint using the Slide Show feature** (see page 4 of this slide deck for more directions if needed)

As the coins appear, count on to tell the total amount.

Let's count the MONEY!



NOTE: Today's activity must be run in **PowerPoint** using the **Slide Show mode** (see slide 4 for directions)

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.**



How many Lifesaver candies?

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.



Adapted from a template by Steve Wyborney

Clue #1

**Because the candy is piled,
we cannot see them all**

Clue #2

4 of the candies are not green

Clue #3

The total is an even number

Clue #4

**The total of the green candy
has a 0 in the ones place**

Clue #5

**If you add the digits of the
answer, you will get 6**



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

The Reveal
Click to see the answer.

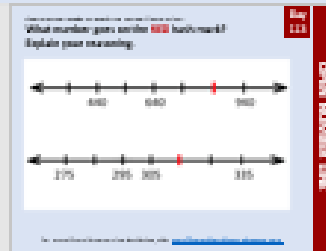


Use the NEXT SLIDES with students.

Teacher Reference Page

Day
113

OPEN NUMBER LINE



840

315

Encourage students to look for patterns and to think about the intervals between each number and the hash marks.

The reasoning and math required for this task will be rigorous – allow plenty of time for students to develop their ideas and to discuss their ideas with classmates.

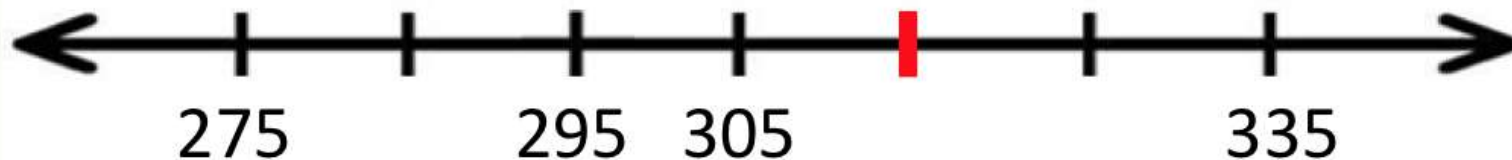
For more Open Number Line Activities, visit <http://www.MathSnack.blogspot.com>



Use the screen shade to reveal one number line at a time.

What number goes on the RED hash mark?

Explain your reasoning.



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 decide which solution is correct (note: partners may not agree and that is fine provided they can justify their own thinking).
- **DRAFT:** Students draft a statement about their ideas (either as a group or individually and it can be written or oral – teacher’s choice)
- **DEFEND:** Students share their ideas and defend their reasoning with the whole group. Encourage active listening and [accountable talk](#).
- **RELECT:** To further develop comprehension, have students use ONE of the sentence starters on the “Reflect on Learning” slide after they have discussed and listened to new ideas with classmates.

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



Use the NEXT SLIDE with students.

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



There is more than one way to model the value 261.

Build in time for students to discuss their ideas with each other before a whole class discussion.
Encourage quick finishers to try to think of two ways that 261 could be represented.

Accept and discuss all correct solutions.

Remember, they only have 4 tens rods.

- 261 unit cubes
- 2 hundreds flats, 4 tens rods, and 21 unit cubes



Use
Numbered
Heads

READ to
Understand

Decide

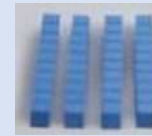
Draft

Defend

Reflect

Lamar and Jose want to model the number **261** with base ten blocks.

They have plenty of hundreds flats and plenty of unit cubes, but they only have 4 tens rods.



Lamar says they cannot model the number 261 with the blocks they have. Jose knows a way to model 261 with the base ten blocks they have.

What is a way that Jose could have modeled the number 261 with the blocks they have?

Reflect on Learning

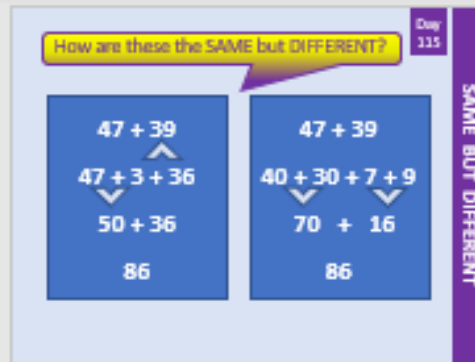
- A new math idea I learned today is...

Use the NEXT SLIDE with students.

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

Additional ideas encouraged!

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



Possible Responses:

- Both begin with $47 + 39$ and end with a sum of 86, but the strategy used is not the same
- The first one decomposed the second number to make a multiple of ten. The second one decomposed both values add based on place value tens+tens and ones+ones

How are these the SAME but DIFFERENT?

Day
115

$$47 + 39$$

$$47 + 3 + 36$$

$$50 + 36$$

86

$$47 + 39$$

$$40 + 30 + 7 + 9$$

$$70 + 16$$

86

SAME BUT DIFFERENT

Use the NEXT SLIDE with students.

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



Possible Responses:

- PINK: Three of the numbers are 2-digit numbers. 120 is not a 2-digit number
- YELLOW: Three of the numbers have a 0 in the ones place value. 25 does not have a 0 in the ones place.
- GREEN: Three of the numbers are greater than (21 or some other stated number). 20 is not greater than 21.
- BLUE: Three of the numbers have the number 2 in the tens place. 70 does not have a 2 in the tens place.

120

25

20

70

“Three of the numbers...”

$$100 - 90$$

$$100 - 89$$

$$100 - 49$$

$$100 - 24$$

TEACHER NOTES**BEFORE**

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DURING**Using Friendly Numbers**

- Use the screen shade to show one expression at a time.

Possible reasonings:

- Student will recognize that $100-89$ is very close to $100-90$ and use the previous fact to solve by subtracting 90 then adding back the 1 that should not have been subtracted. Think $100-90=10$ but since I am subtracting one less than 90, I will have 1 more than 10, so the solution is 11.
- For $100-49$, student may know that $100-50=50$ and use that fact to know that $100-49$ is one MORE than $100-50$ since you are taking away one less.
- For $100-24$, students may know that $100-25=75$ (as related to money/quarters) and determine that $100-24$ is one more than 75.

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

After finding the differences, have students generalize that we can subtract more difficult pairs of values by using friendly pairs that we know.

100 – 90

Day
117

NUMBER TALK

The total number
of shapes is...

How did you
count them?

place.

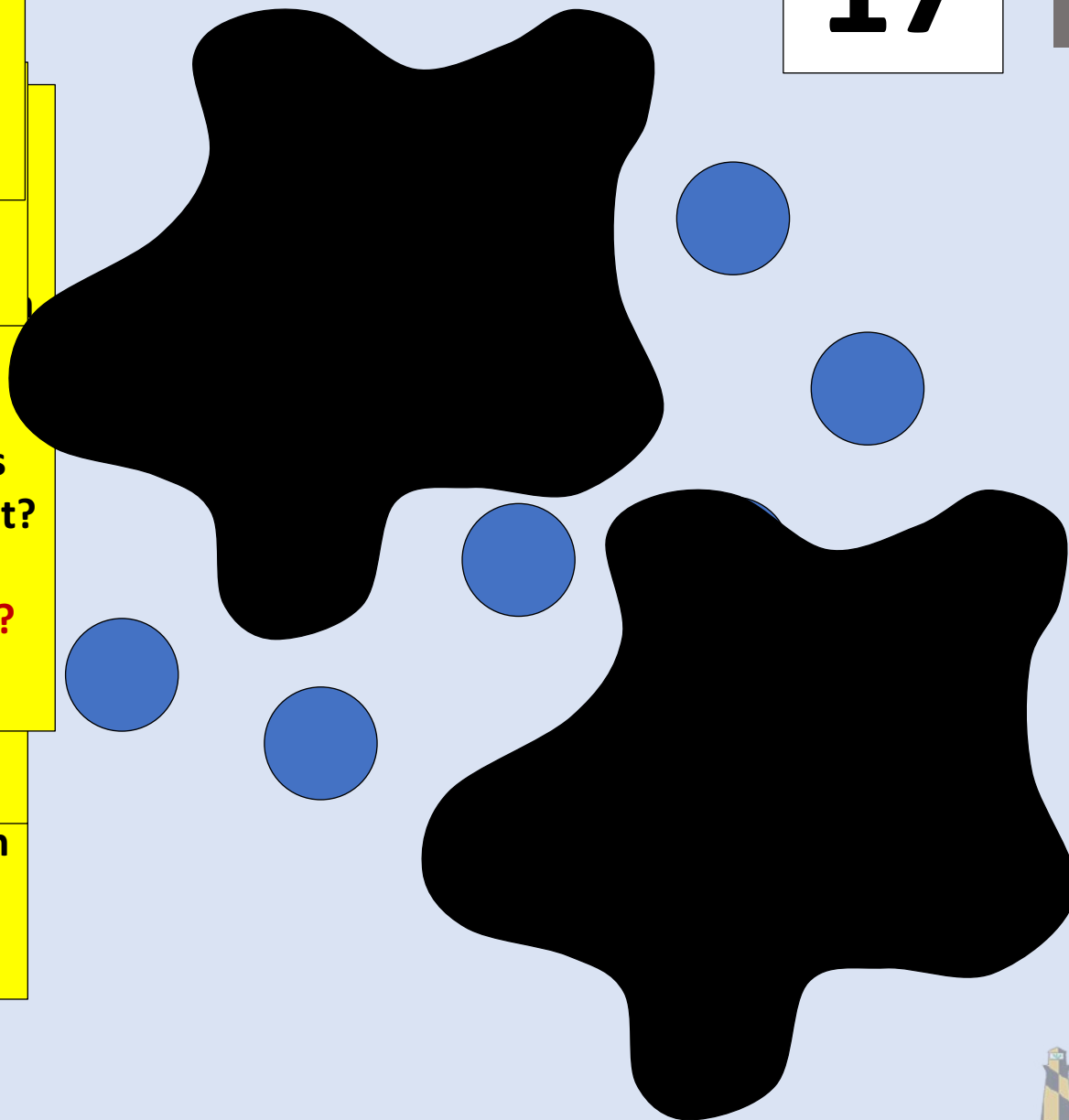
under each one.

How many shapes
are under each splat?

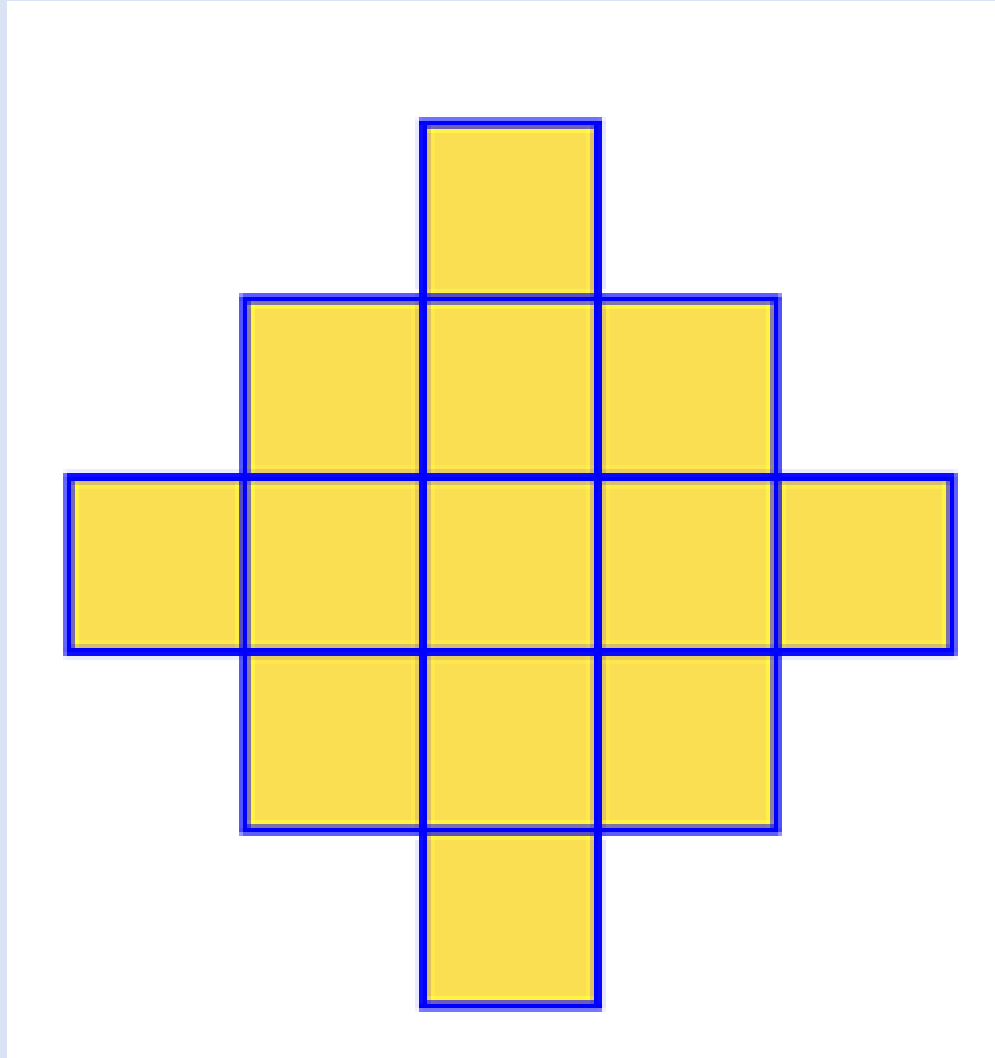
How do you know?

are there.

can we learn
from this picture?



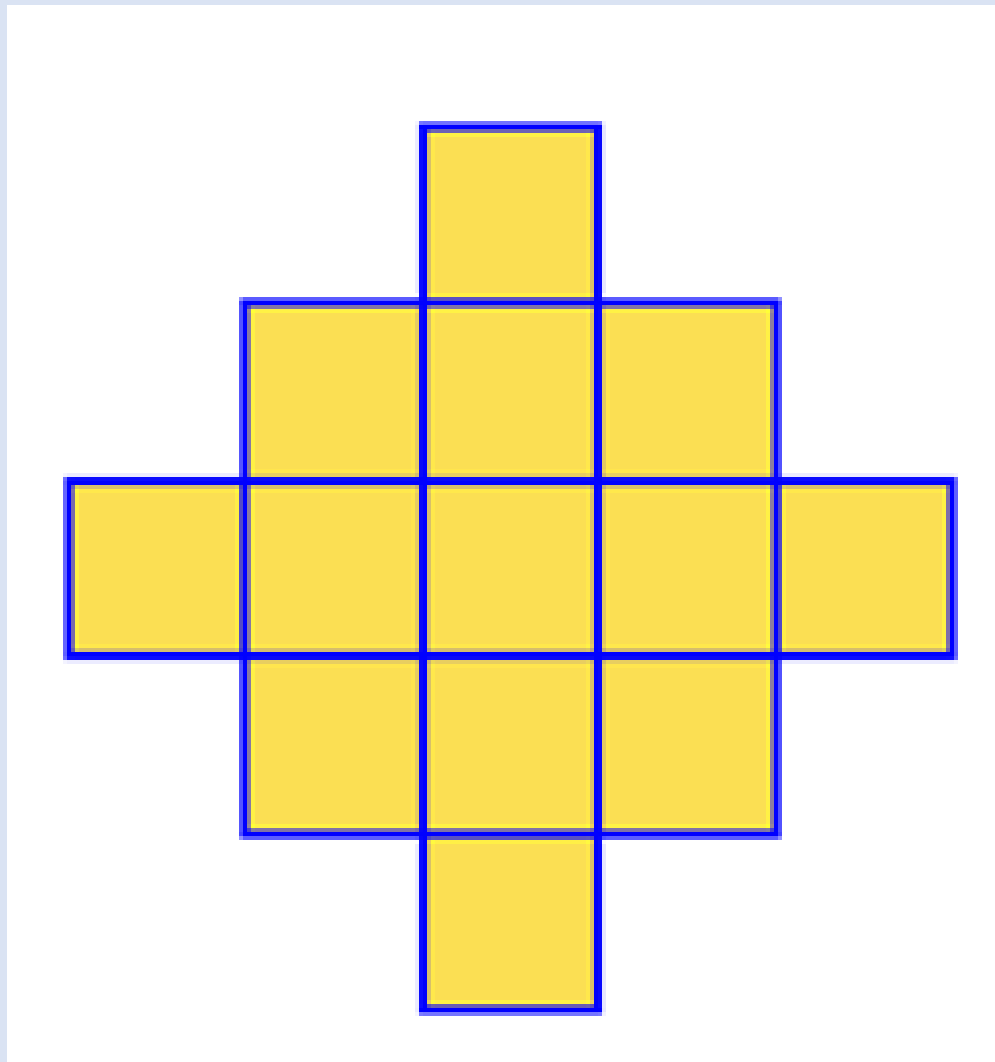
What do you NOTICE?



**What did you
NOTICE?**

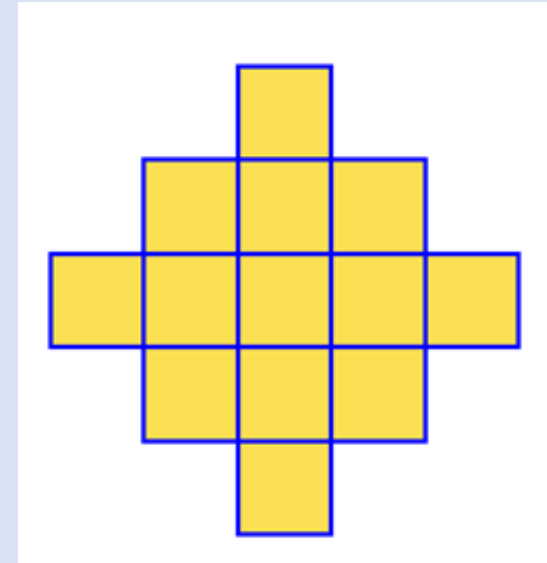
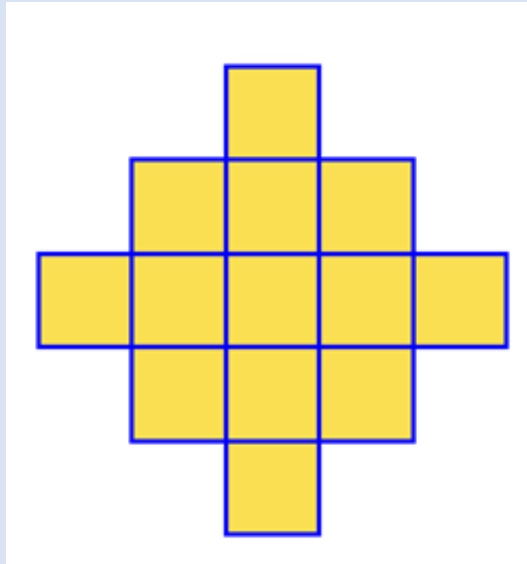
**What visual pattern can you use
as a counting shortcut?**

Day
119

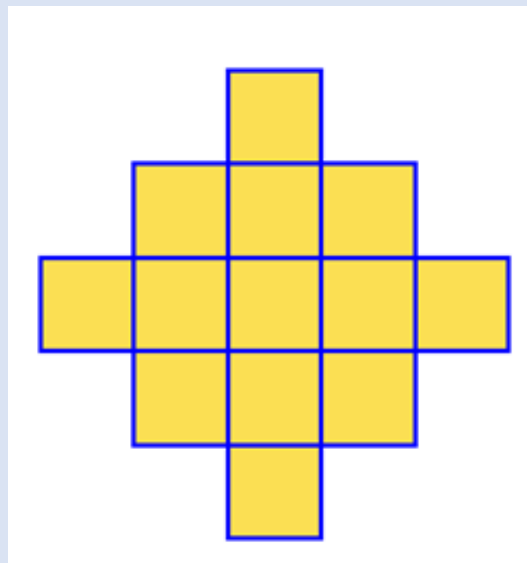


quick count

I noticed ____
so I ____



(They) noticed ____
so they ____



Reflect

**What was
mathematically
important?**

quick count

$43 - 10$

$43 - 15$

$56 - 10$

$56 - 19$

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**Using Mental Strategies to Subtract**

Reminder: Use the Number Talk protocols for thinking, indicating readiness, and responding (see Days 1-20 for more complete details)

- Ask students to offer solutions. Write the solutions on the board without discussion. Three solutions work well provide one of the three is the correct solution.
- Ask students to defend a solution of their choice from the ones written on the board. Typically, have a student who did not offer the solution volunteer to explain how they arrived at that solution.
- Once the correct solution is discovered, do not have students explain incorrect solution; instead, ask if anyone found the correct solution in a different way. Have that student explain his/her reasoning process.
- Discuss the various methods presented.
- Guide students to recognize when a method is inefficient and that not all strategies are efficient in all mathematical situations.

Possible Reasoning:

- 43-10 (students should know how to fluently add/subtract multiples of 10 from any number and this one should not require much discussion, but instead sets the stage for the expressions that follow.
- 43-15 students may use what they know about 43-10 and then subtract 5 more. Some may subtract 20 and then add back 5.
- 56-19 one of the most efficient methods will be to subtract 20 then to add back 1.

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

Help students to recognize efficient strategies. For these expressions, it was generally more efficient to subtract a multiple of 10 and then add back or subtract additional quantities. For 56-19, students might have wanted to decompose the 19 and begin by subtracting the 10 and then subtracting the 9 – this will likely prove to be less efficient than subtracting groups of 10s and then adding back the 1



$$43 - 10$$

Day
120

NUMBER TALK