Number Combining

Cary Cermak-Rudolf

Goals and Purpose

- Have a deeper sense of the properties of operation
- Have an understanding of the different meanings of addition and subtraction
- Realize the power these ideas hold for you and your students to be able to enjoy mathematics!!!

Quote

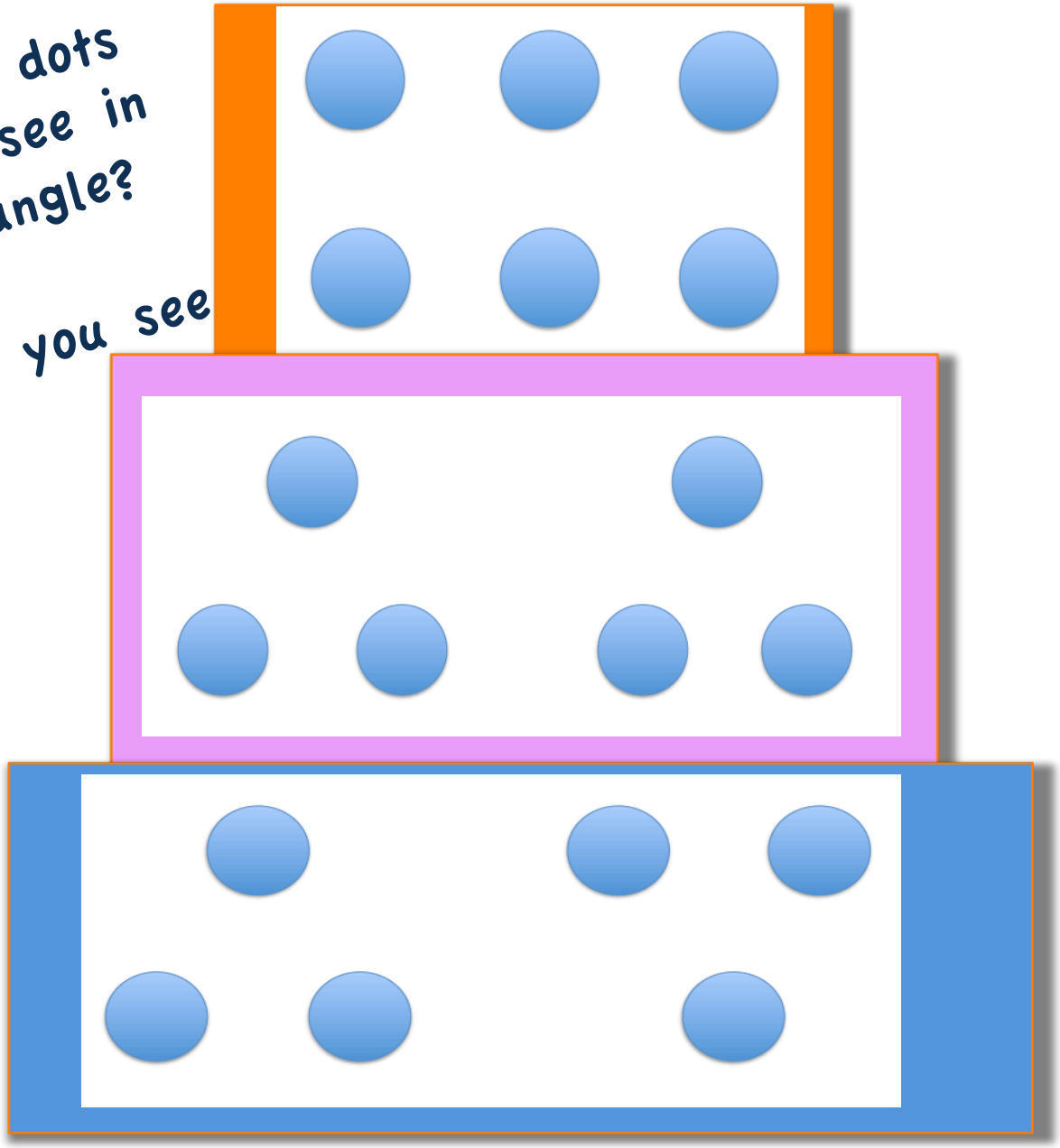
- "The properties lean into the meanings of the operations."

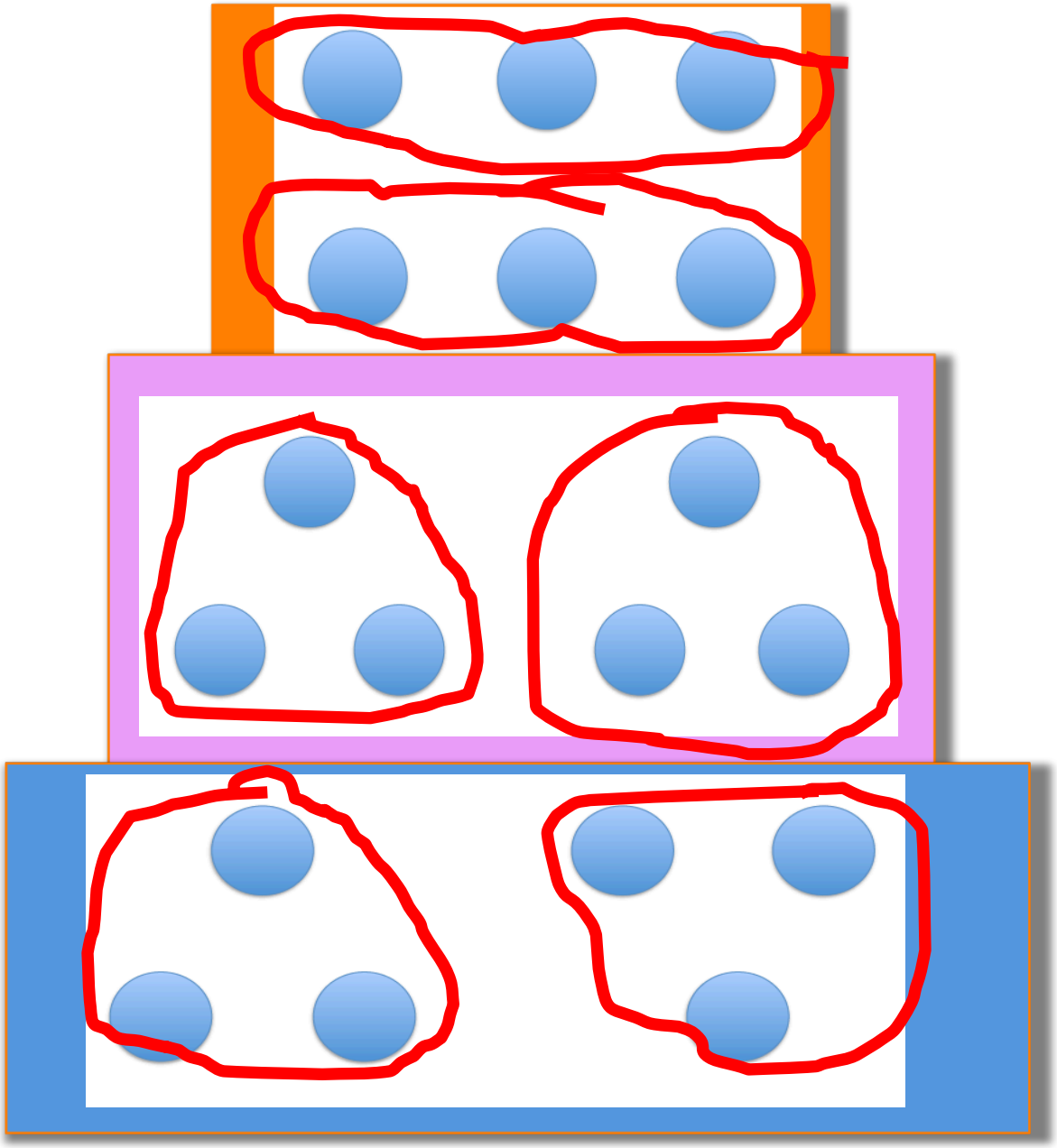
  -Carter Stedman-5th grader at Eastwood

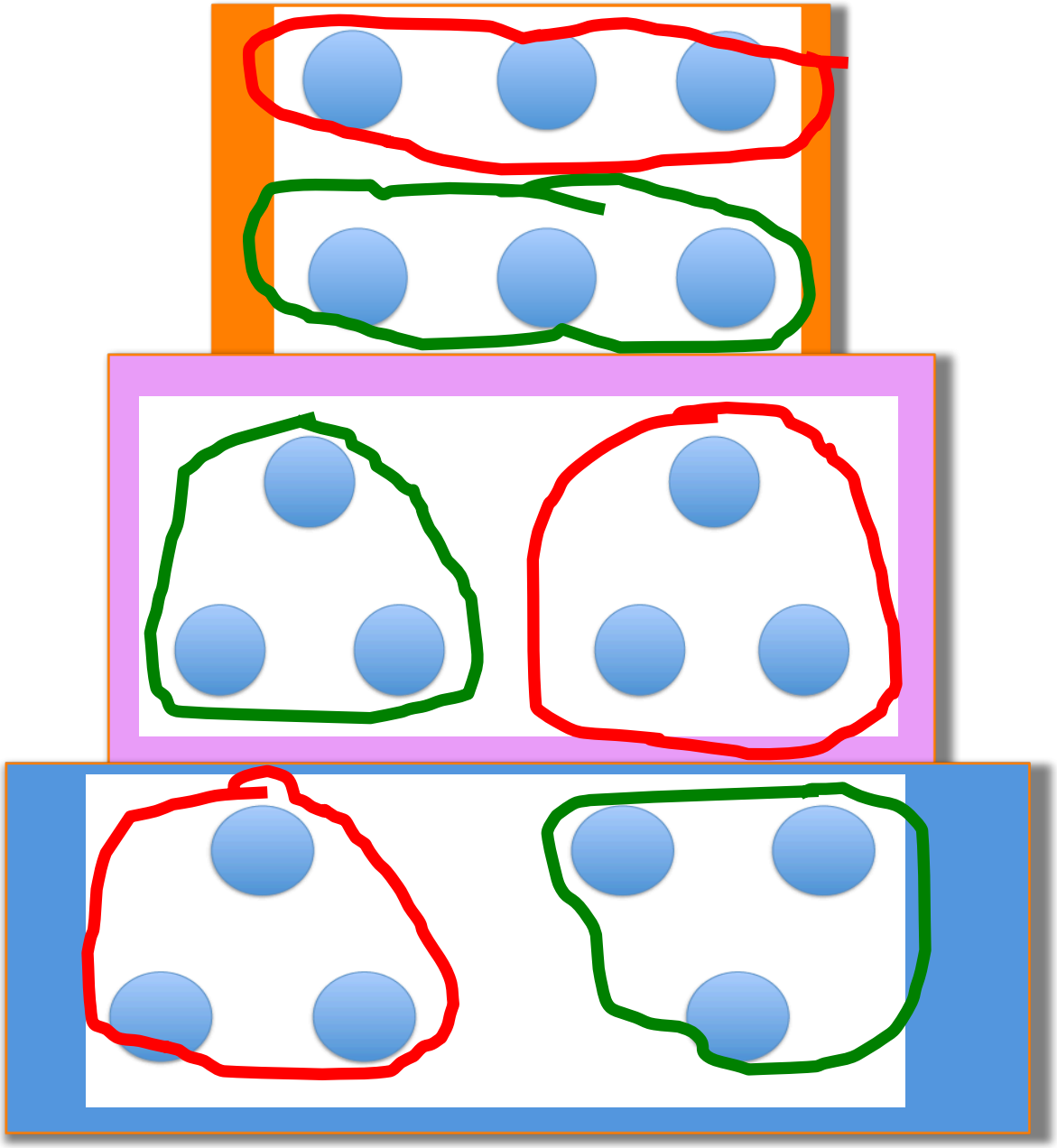
- What does Carter mean?

+How many dots to do you see in each rectangle?

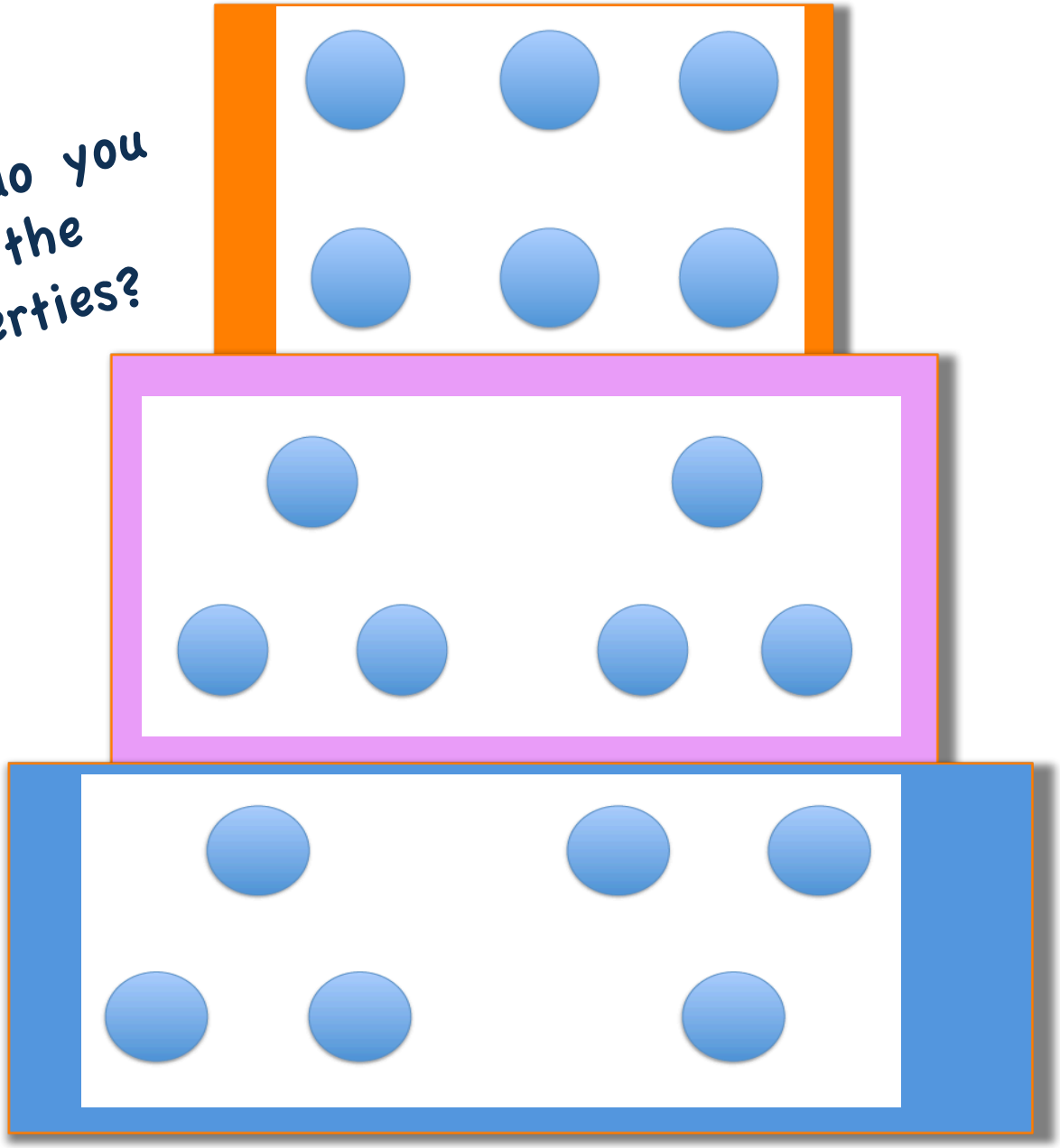
+How do you see them?





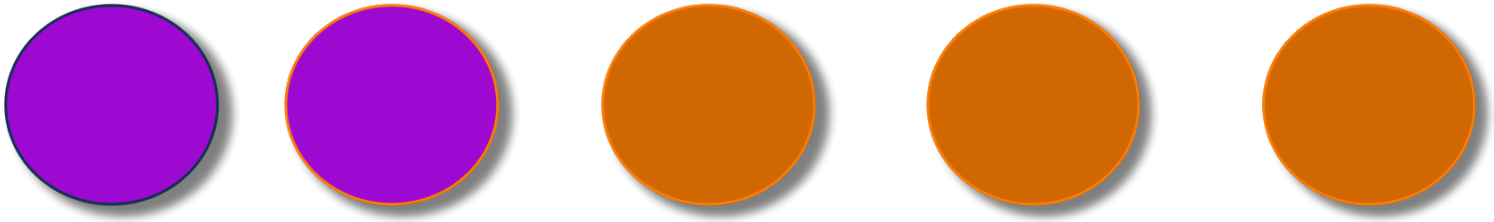


Where do you see the properties?

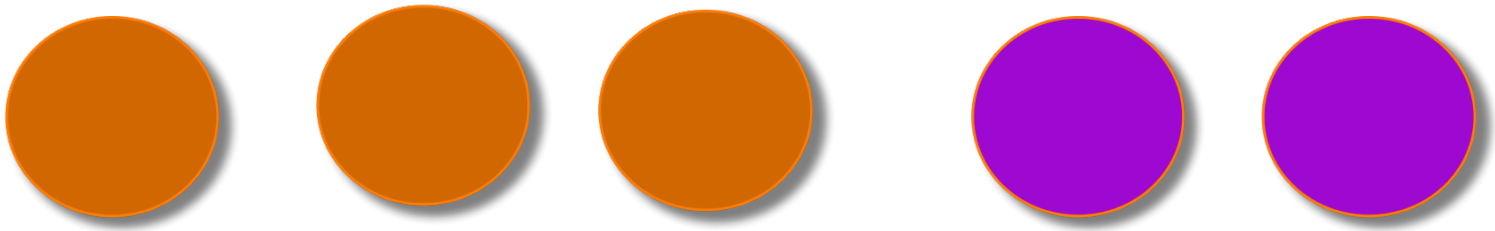


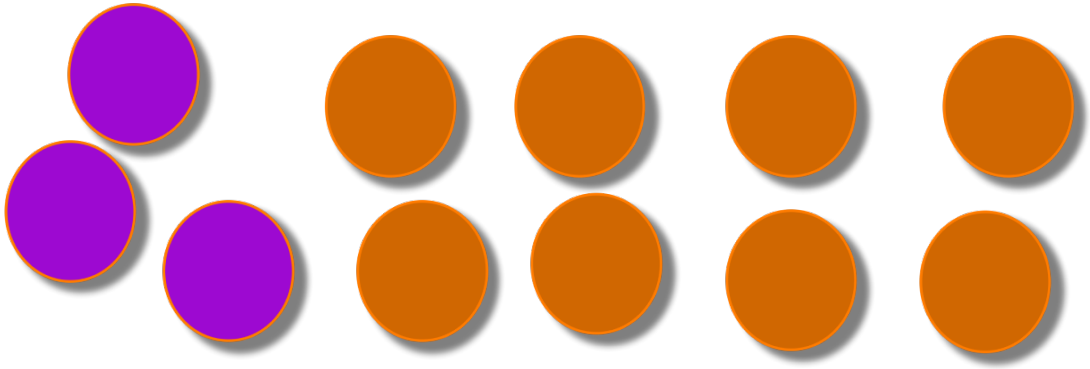
Commutative Property of Addition

the order of the addends doesn't matter because I will get the same sum



$$2 + 3 = 3 + 2$$

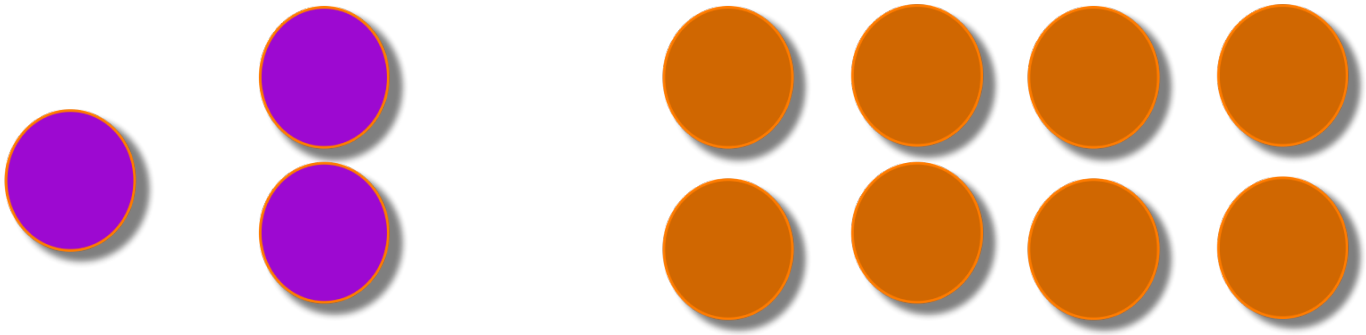




$3 + 8 = 11$

The Associative Property of Addition

I don't have to add from left to right. I can start wherever I want and get the same sum.



$3 + 8 = (1 + 2) + 8 = 11$

The Associative Property of Addition

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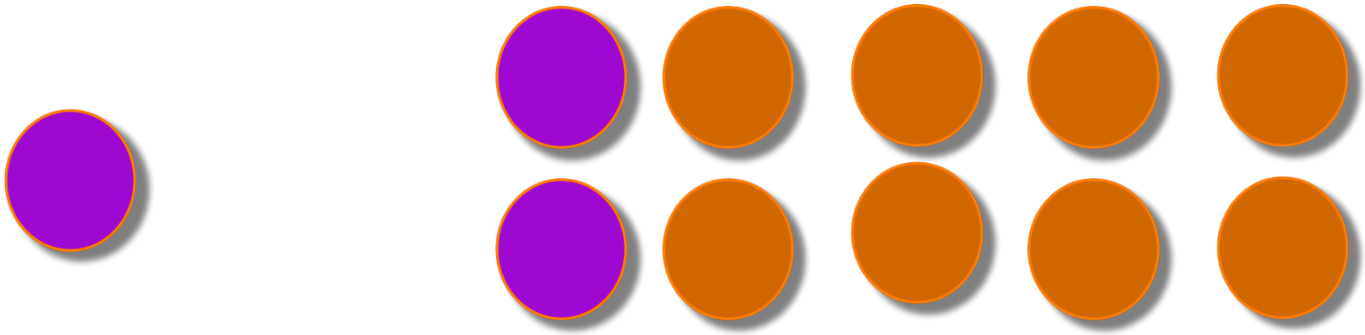

$3 + 8 = (1 + 2) + 8 = 1 + (2 + 8) = 1 + 10 = 11$

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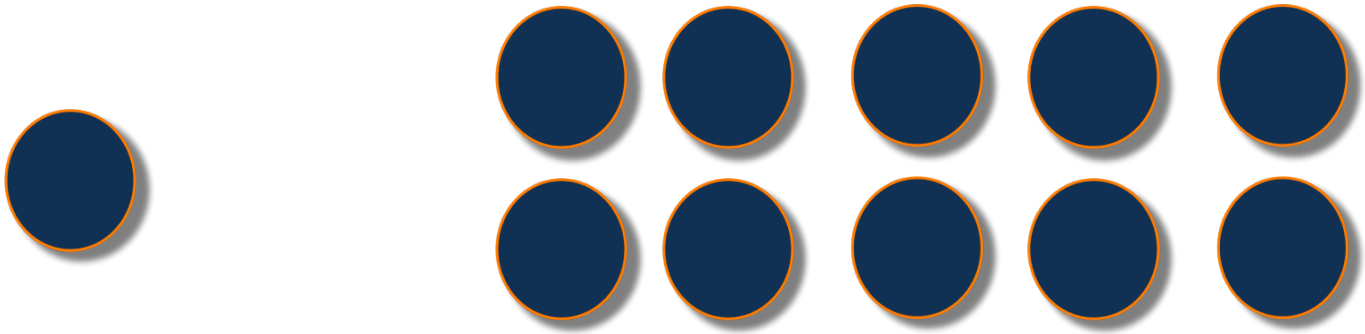

$3 + 8 = (1 + 2) + 8 = 1 + (2 + 8) = 1 + 10 = 11$

The Associative Property of Addition

I don't have to add from left to right. I can start wherever I want and get the same sum.

Why is this important?

- If I gave you any three digits to add together, what would be your strategy?
- Is your strategy always the most efficient? How do you know?
- What do you do in your mind to mentally add numbers that we want *all* students to do?

How would you combine these addends?

- 5 + 7 + 2
- 5 + 6 +2
- 1 + 2 + 1
- 3 + 4 + 5

Video

- Please excuse the background teaching
- Please focus on what does Kira understand?
- Please think about what does Kira know about numbers that supports her?
- How will this thinking help her when she is doing math for years to come?

Debrief

- What does Kira understand?
- What does Kira know about numbers that supports her?
- How will thinking help her when she is doing math for years to come?
- What teachers moves can we make to help our students' thinking?

How would you combine these addends?

- 5 + 7 + 2
- 5 + 6 +2
- 1 + 2 + 1
- 3 + 4 + 5

Video

- Please excuse the background teaching
- Please focus on what does Fernando understand?
- Please think about what does Fernando know about numbers that supports her?
- How will this thinking help him when he is doing math for years to come?

Debrief

- What does Fernando understand?
- What does Fernando know about numbers that supports her?
- How will this thinking help him when he is doing math for years to come?
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Meaning of the operations

	Result Unknown
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?
	Total Unknown
Put Together/ Take Apart[2]	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?
	Difference Unknown
Compare[3]	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? ("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?

Apples…… How would you represent these problems differently?

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Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?

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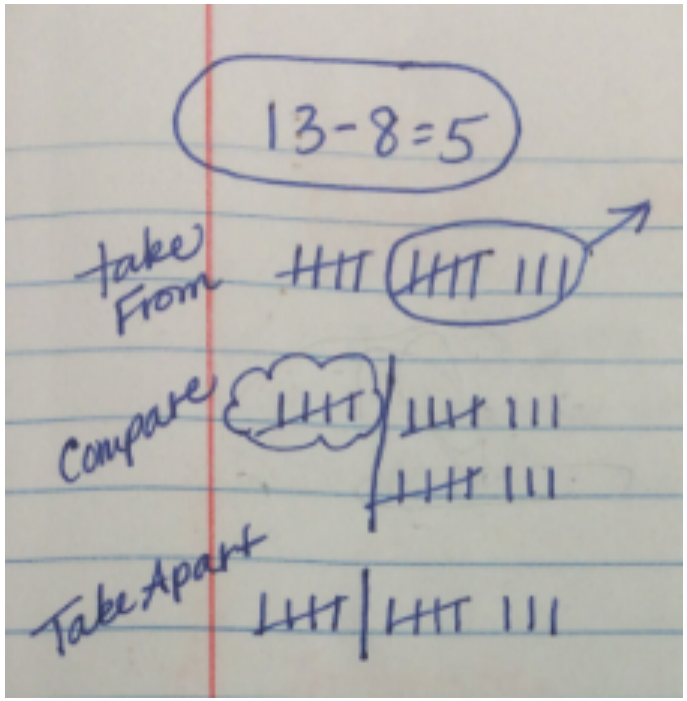
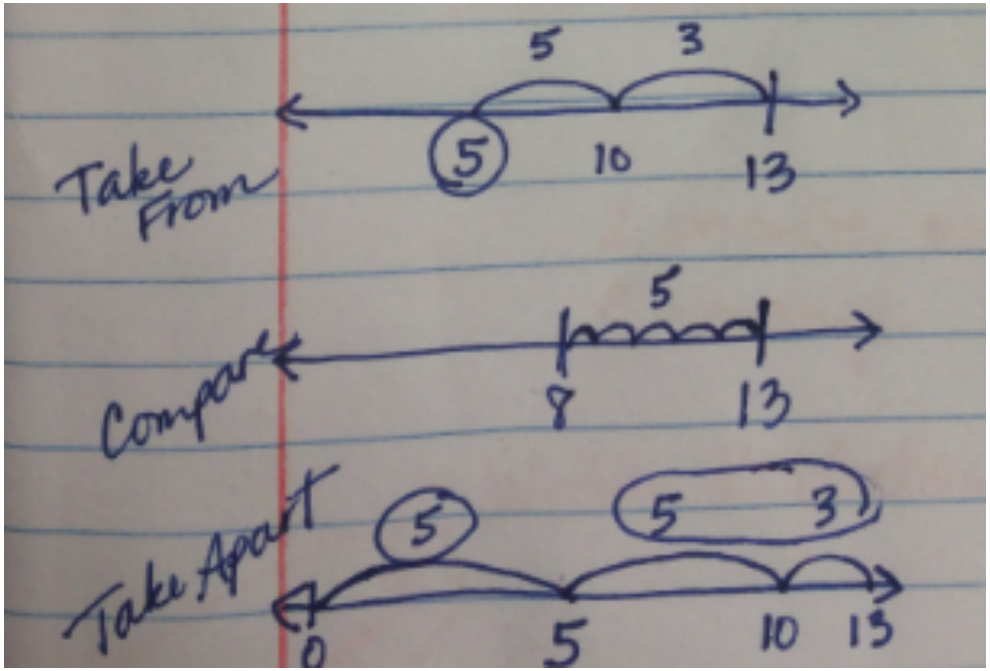
13-8=5

- How would you represent this problem with tally marks with the three different meanings of addition?



13-8=5

- How would you represent this problem with number lines with the three different meanings of addition?



What does the mean to you?

- What is your action?
- Where do think you will be able to slide this into your work?
- How will you help students think about the meaning of the operation? The property of operation?