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Teaching Basic Addition Strategies to First Graders Using Operational Properties

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First grade is a critical time for students to build the foundation for later operational fluency. By the end of first grade, students are expected to use place value concepts and addition properties to add within 100. This level of skill may sound daunting; however, these skills can be broken down into simple concepts that can allow students to achieve mastery.

Operational Properties are used in mathematical fields to describe fundamental rules for operations such as addition, subtraction, and multiplication. Understanding that we can generalize the way that numbers and operations "behave" empowers students to see patterns and apply what they know to unfamiliar problems.

There are three major addition properties: the Commutative Property, the Identity Property, and the Associative Property.

Commutative Property of Addition

Using concrete models, such as math manipulatives (or even household items such as colored erasers), is key in helping first graders understand one of the most important operation properties: the Commutative Property of Addition. Sometimes referred to as the "Order Property," this rule states that the order of the addends (the numbers being added) has no effect on the sum (total). In short, you can flip-flop the addends and the sum stays the same!

Students may see evidence of this idea by using concrete models with examples. Consider using small manipulatives to show a group of 4 items and a group of 3 items. Change the order of the groups, and the total stays the same! Students can be guided to understand that 4 + 3 = 7, and 3 + 4 = 7, so 4 + 3 = 3 + 4.

If students are comfortable with writing numbers and operations, consider using a resource such as this Commutative Property of Addition Worksheet to practice and/or check for understanding. You may also want to incorporate this Boomerang Addition Worksheet, which relates the math concept to the real-life example of a boomerang that returns after it is thrown.

Commutative Property of Addition

If you change the order of addends, the sum will not change. For example, if 3 + 4 = 7, then 4 + 3 = 7.

Complete the following sentences using this rule. Check the correct answer.

If 2 + 8 = 10, then 8 + 2 = __

8 ☐ 12 ☐ 10 ☐

If 3 + 2 = 5, then 2 + __ = 5

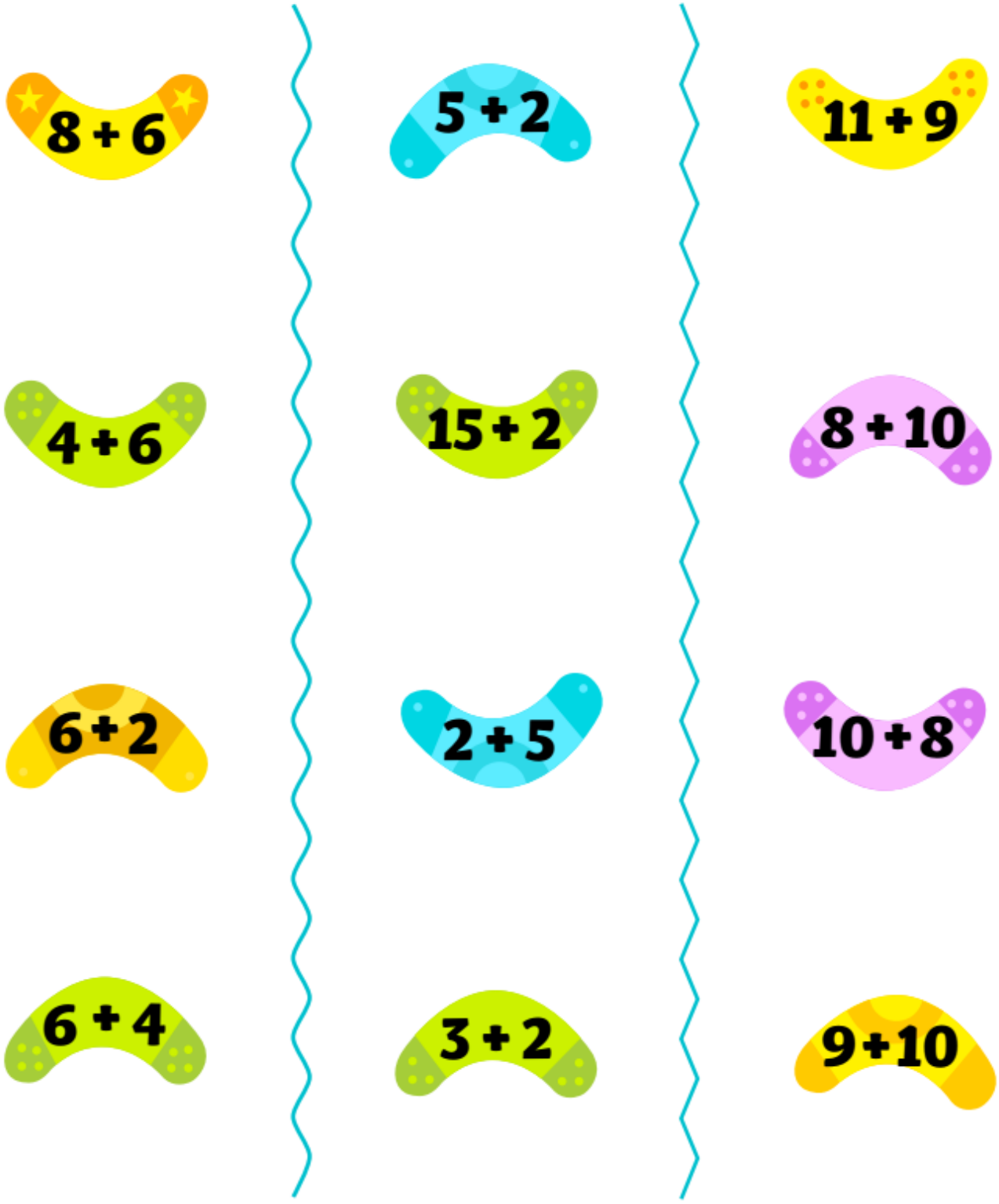
5 ☐ 3 ☐ 2 ☐

If 4 + 5 = 9, then __ + 4 = 9

4 ☐ 5 ☐ 6 ☐

Boomerang Addition: Commutative Property Practice

In each column circle two boomerangs that have the same sum. Use the commutative property to find them.



Identity Property of Addition

Another important concept for first graders is the idea of zero – a powerful representation of nothing! While this may seem intuitive, understanding that adding zero to a number does not change its value can feel abstract or confusing. The Identity Property of Addition simply states any number plus zero equals the original number – the original addend maintains its identity. Students may see this property referred to as the “Zero Property.”

Again, concrete, hands-on experiences are key when helping students understand this rule. Representing a problem with one addend that is zero can be shown using objects; for example, if showing 8 + 0 = 8, group 8 small objects together in a cup or drawn circle and represent the zero with an empty cup or circle. Students can see clearly that adding zero is the same as adding nothing.

Once students are comfortable with their concrete understanding and are ready to move to pencil and paper, consider using this resource: Identity Property of Addition Worksheet. To further practice with a fun and engaging resource, use Space Addition: Identity Property Practice.

Identity Property of Addition

Adding zero to any number does not change the number. For example, 7+0=7.

Circle the number sentences that show the identity property.

5 + 5 = 10

5 + 0 = 5

20 + 0 = 20

4 + 1 = 5

10 + 1 = 11

0 + 17 = 17

0 + 11 = 11

Space Addition: Identity Property Practice

Find the missing number for each equation.
Check the correct answer.

$2 + 0 = \_\_$

2 ☐ 0 ☐ 4 ☐

$11 + \_\_ = 11$

10 ☐ 1 ☐ 0 ☐

$\_\_ + 0 = 16$

1 ☐ 6 ☐ 16 ☐

$0 + 14 = \_\_$

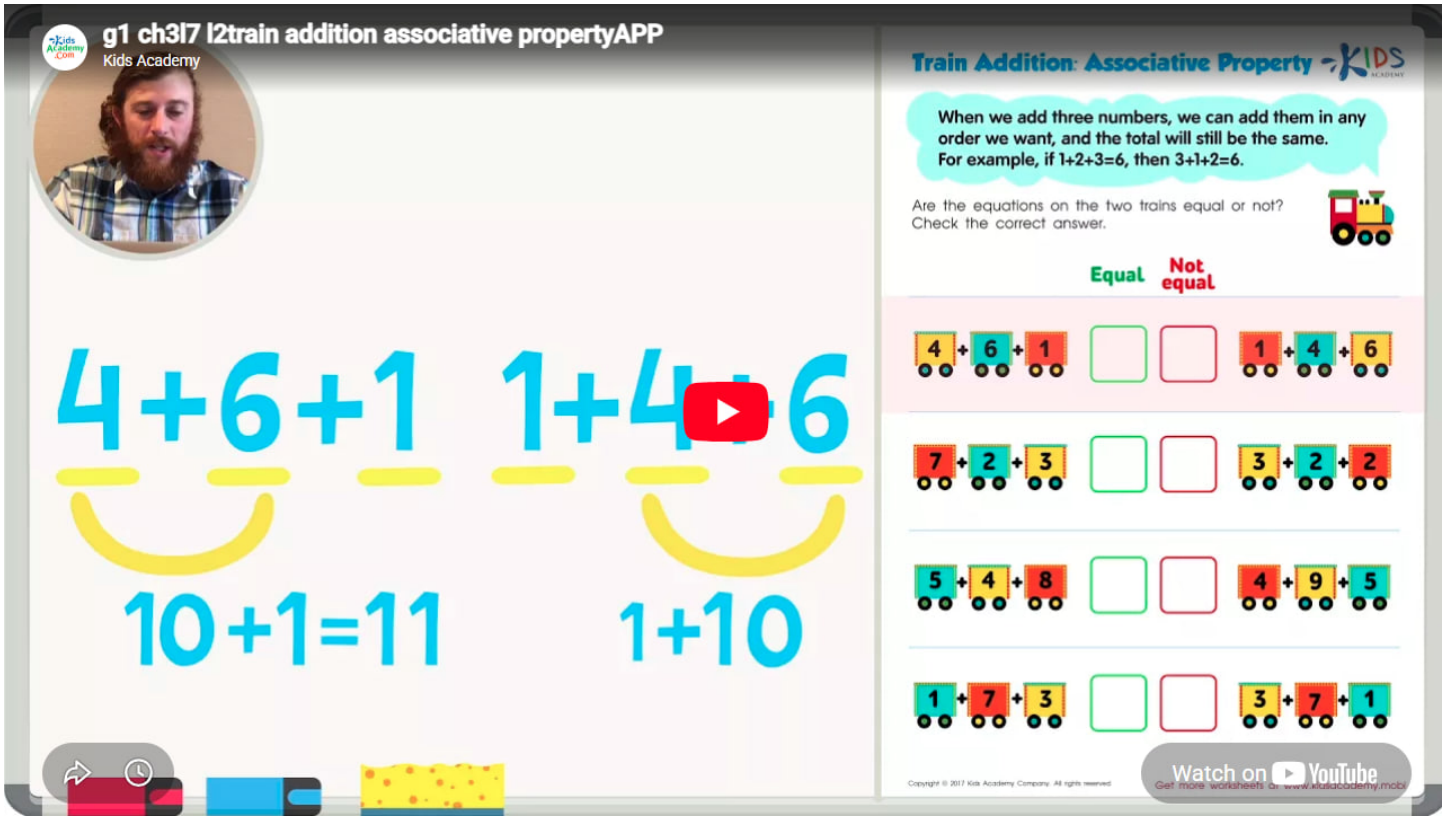
12 ☐ 14 ☐ 18 ☐

Associative Property of Addition

As students begin to add more than two addends, they can be introduced to the Associative Property of Addition. This property states that the addends in a problem can be grouped in different ways without affecting the sum; predictably, this property is often referred to as the “Grouping Property.”

As always, begin with concrete exploration and understanding before moving to visual representations or abstract notation. Using math manipulatives (or any small, similarly sized objects), show students three clear, separate addends. For example, 3 + 6 + 2 can be shown as a group of 3 erasers, a group of 6 erasers, and a group of 2 erasers. Have students count the total number of erasers and then have them try adding the groups in different ways. For example, a student might start with 3 + 6 and then add 2, or a student might begin with 3 + 2 and then add 6. No matter how the addends are grouped, the total number of erasers does not change.

As students begin to show mastery using the concrete models, consider using this video resource to reinforce the concept: Associative Property of Addition. Once students show understanding through concrete examples and guided practice, use a resource such as this one to check for understanding:

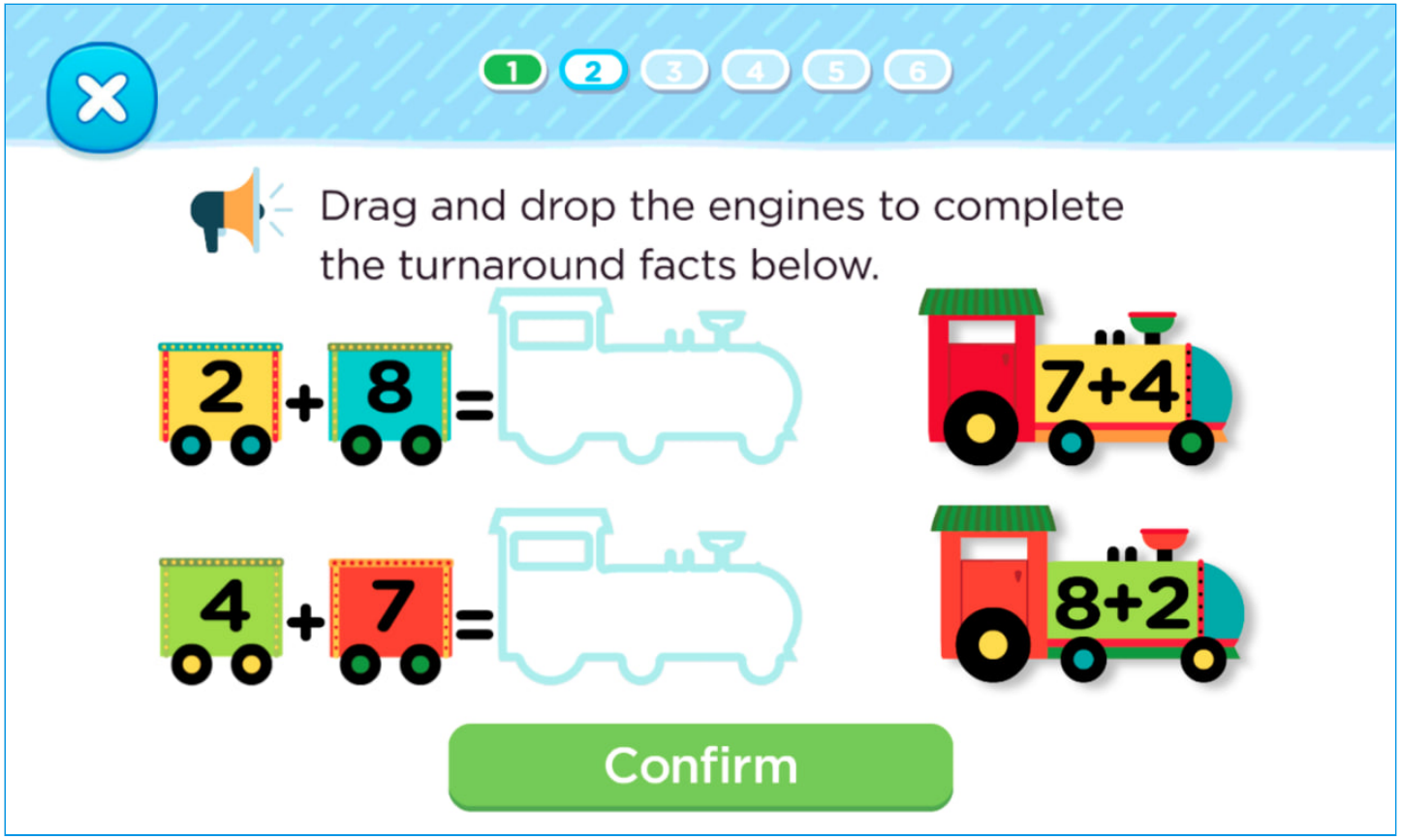


Bringing It All Together

Being able to name and/or apply each of these properties in isolation is a great first step for young learners; however, it is just as important for students to flexibly move between

these properties. Practicing them together once they are mastered individually helps stretch student thinking and provides meaningful learning.

After teaching each of these properties, pull the concepts together in a final lesson that combines practice with all three. Use a quiz, such as Properties of Addition – Learning Quiz for Kids to assess understanding and application.



Why Do These Concepts Matter?

As students progress through grades and begin practicing more complex skills, they must be fluent and flexible in their thinking. Understanding these three properties of addition helps them move more confidently and quickly through a problem. Without this foundational knowledge, discrepancies occur between what a student is expected to know already versus what they actually understand. Building basic understanding of how numbers in addition problems “behave” now will have a positive impact on how students approach multi-digit addition problems with regrouping later.

Most importantly, teaching students fundamental rules for operations allows them to feel self-assured in their math skills. There is no gatekeeping in the mathematical world, and once students can confidently apply these properties to unfamiliar problems, they can take on anything.