

Associative Property of Addition

Student Probe

Give students the following three numbers and ask them to add the numbers together to get the sum using mental math.

56, 25, 75

Ask the student how he solved it.

If he added $56 + 25$ first and got 81, then added 75 to 81 and got 156, ask him if there is another way to do it. If he says no, he needs to do this lesson.

If he adds $25 + 75$ to get 100, then adds 56 to get 156, ask him to compare the 2 ways. If he thinks that adding $25 + 75$ first is easier, give him the problem $84 + 60 + 40 = \square$, and see if he adds $60 + 40$ first, then 84 to get 184. If he does, he does not need to do this lesson. If he adds $84 + 60$ first, he needs to do this lesson.

Lesson Description

This lesson is intended to help students understand and apply the associative property of addition.

Rationale

The Associative Property of Addition is an important strategy because it encourages students to use flexible thinking about combinations and to use the combinations (doubles, doubles plus or minus one, sum of 10, sum of 100, etc.) they already know as building blocks. Children may know that they can change the grouping of small numbers when they add them, but not be sure that they can do the same for larger numbers. This becomes critical when they start manipulating algebraic expressions and must apply this understanding to expressions and equations that have numbers and variables.

Preparation

None

At a Glance

What: Understanding and applying the associative property for addition.

Common Core State Standard:

CC.1.OA.2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.

Mathematical Practices:

Make sense of problems and persevere in solving them.

Reason abstractly and quantitatively.

Look for and express regularity in repeated reasoning.

Who: Students who don't understand that when adding more than two numbers, it does not matter whether the first pair is added first or if you start with any other pair of addends.

Grade Level: 2

Prerequisite Vocabulary: equal to, sum, add, order, parenthesis

Prerequisite Skills: equality, addition

Delivery Format: small group, individual

Lesson Length: 15 – 20 minutes

Materials, Resources, Technology: None

Student Worksheets: None

Lesson

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
1. Give students the following problem and ask them to solve it: $6 + 4 + 9$.	19	Give students counters to model the problem and solve. Refer to Adding Three or More Addends .
2. Ask students to explain how they solved the problem.	Add $6 + 4$ to get 10, then add 9 more to get 19.	See Step 1.
3. Ask students to solve the problem $9 + 6 + 4$.	19	See Step 1.
4. Ask students if they could use the problem in Step 1 to help them solve the problem in Step 3.	Yes, you can still add $6 + 4$ to get 10 first, then add 9 more to get 19.	Use counters to direct model each expression. Have students find the total for each.
5. Ask students to solve the problem $64 + 90 + 10$ two different times, each time using mental math. The first time add $64 + 90$, then add the 10. The second time add $90 + 10$, then add the 64. Ask students if they got the same answer both times.	Yes, the answer is 164 both times.	See Step 1.
6. Ask students which way is easier, adding $64 + 90$ first or adding $90 + 10$ first.	$90 + 10$ is easier because it equals 100. Then it is easier to add 64 to 100 to get 164.	See Step 1.

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>7. Show students the notation for using parentheses to show which numbers are grouped together to add first.</p> <p>If you add $64 + 90$ first, the problem is written $(64 + 90) + 10$.</p> <p>The parentheses show that $64 + 90$ is added first to get 154 then 10 is added to get 164.</p> <p>If you add $90 + 10$ first, the problem is written $64 + (90 + 10)$.</p> <p>The parentheses show that $90 + 10$ is added first to get 100, then 64 is added to get 164.</p>		<p>Refer to Adding Three or More Addends.</p>
<p>8. Solve the problem using mental math: $86 + 70 + 30$. Which is easier to add first: $86 + 70$ or $70 + 30$?</p>	$70 + 30$	<p>See Step 1.</p>
<p>9. Will you get the same answer if you add $86 + 70$ first, then add 30 that you get when you add $70 + 30$ first, then add 86?</p>	<p>Yes, you will get 186 both times.</p>	
<p>10. If you add $70 + 30$ first, how would the expression be written?</p>	$86 + (70 + 30) = 186$	<p>Refer to Adding Three or More Addends.</p>
<p>11. If you add $86 + 70$ first, how would the expression be written?</p>	$(86 + 70) + 30 = 186$	<p>Refer to Adding Three or More Addends.</p>

Teacher Notes

Give additional practice as needed.

Variations

Have students work problems with doubles or near doubles to see if they apply the associative property of addition. Examples: $6 + 9 + 9$ (do students add $9 + 9$ first?)

Formative Assessment

Is $(40 + 60) + 58$ the same as $40 + (60 + 58)$? Tell why.

Is $(83 + 70) + 30 = 83 + (70 + 30)$? Tell why.

Given 3 groups of numbers, which two would you add first and why?

$(85, 15, 76)$ $(48, 40, 60)$ $(30, 30, 92)$ $(84, 75, 25)$

References

Van de Walle, John A., Karp, Karen S., and Bay-Williams, Jennifer M., (2010), *Elementary and Middle School Mathematics: Teaching Developmentally*, Boston, Allyn & Bacon

Russell Gersten, P. (n.d.). *RTI and Mathematics IES Practice Guide - Response to Intervention in Mathematics*. Retrieved 2 25, 2011, from rti4sucess.