

Core Content

Cluster Title: Understand and apply properties of operations and the relationship between addition and subtraction.

Standard 3: Apply properties of operations as strategies to add and subtract. (Note: Students need not use formal terms for these properties.) Examples: If $8 + 3 = 11$ is known, then $3 + 8 = 11$ is also known (commutative property of addition). To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$ (associative property of addition).

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand the commutative property of addition (e.g., $8 + 3 = 11$ and $3 + 8 = 11$).

Students will understand the associative property of addition (e.g., $2 + 6 + 4 = 2 + 10 = 12$).

Students will understand the identity property of addition (e.g., $8 + 0 = 8$).

Students will understand the identity property of subtraction (e.g., $8 - 0 = 8$).

Students will understand that there is no commutative property of subtraction (e.g., $8 - 3 = 5$ but $3 - 8 \neq 5$).

Procedural:

Students can add numbers using the commutative property of addition (number bonds, fact families).

Students can add numbers using the associative property of addition (e.g., ten frames, abacuses).

Students can show why the commutative property does not apply to subtraction.

Students can add numbers using the identity property of addition.

Students can subtract numbers using the identity property of subtraction.

Representational:

Students can use objects or drawings to represent the commutative property of addition.

Students can use objects or drawings to represent the associative property of addition.

Students can use objects or drawings to explore why the commutative property doesn't apply to subtraction.

Supports for Teachers

Critical Background Knowledge

Conceptual:

Students will know patterns in an equation and recognize that switching the parts within the addition problem does not change the sum.

Students will know the math facts that equal 10.

Students will know how to add on to the number 10 to get a new sum of a 3 numeral, whole number problem.

Procedural:

Students can combine two parts to make a whole.

Students can separate two parts from the whole.

Students can practice math facts that add up to 10.

Representational:

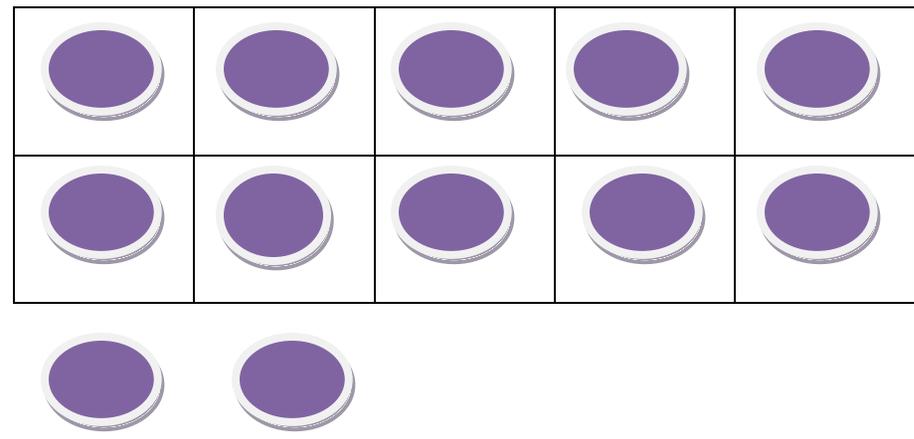
Represent addition and subtraction number equations (e.g., number bonds, ten frames, abacuses).

Academic Vocabulary and Notation

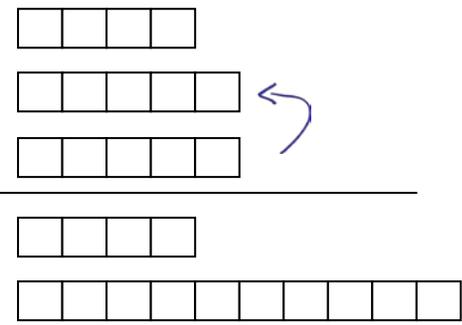
part, whole, fact family, number bonds, add, subtract, equation, sum, difference, equals to, add on, combine, switch, separate

Instructional Strategies Used	Resources Used
<p>Teacher may begin instruction by modeling a guided practice for number equations using manipulatives. Continue guided practice by using students to solve the number equations using manipulatives. Next, allow the students to practice and solve the number equations independently using manipulatives.</p> <p>For example, ask the students to put a group of 6 manipulatives out on their desks or table. Then ask them to put out a group of 5 manipulatives. Ask them to write the equation that would add the two groups, using a box for the unknown answer. Then have them solve the equation. Next, ask them to switch the two groups (put the 5 first and then the 6). Ask them to write the equation and solve it. Why is the sum the same? Have the students to do the same with 3 other groups of numbers. Then discuss what they have learned. Tell them that this works for all addition problems.</p> <p>Then have the students explore the same way with subtraction. Be careful not to get into a discussion about negative numbers. Simply ask the students if the answers are the same. For example, $10 - 5 = 5$. Does $5 - 10 = 5$? Do several others. Tell the students that when they are older they will find out ways to solve subtraction problems where the subtrahend is larger than the minuend.</p>	<p>Introduction to fact families—Addition (commutative property): http://www.learnnc.org/lp/pages/3223</p> <p>CatherineKuhns.com: http://www.catherinekuhns.com/index.html</p>

Activity 1:
Using a ten frame
 $2 + 6 + 4 = 10 + 2 = 12$



Assessment Tasks Used	
<p>Skill-Based Task: Commutative property of addition: Example: $4 + 2 = 6$ $2 + 4 = 6$</p> <p>Associative property of addition: Example: $5 + 5 + 2 = 10 + 2$</p>	<p>Problem Task: Find three ways to solve this problem: Jenny has 4 toy cars, 5 teddy bears, and 5 dolls. How many toys does Jenny have?</p> <p>Possible solutions:</p> <p>Use objects</p> <p>Draw the groups and add them.</p> <p>Addition: $4 + 5 + 5 = 14$</p> <p>Associative property of addition: $4 + 5 + 5 = ☆$ $4 + 10 = 14$</p> <p>Commutative property of addition: $4 + 5 + 5 = ☆$ $5 + 5 + 4 = ☆$ $10 + 4 = 14$</p>

	<p>Bar model with associative property:</p>  <p>The diagram illustrates the associative property of multiplication using bar models. It shows three rows of boxes: the first row has 4 boxes, the second row has 5 boxes, and the third row has 5 boxes. A blue arrow points from the second row to the third row. Below these is a horizontal line. Under the line, there are two rows of boxes: the first row has 4 boxes and the second row has 10 boxes.</p>
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