DAY 4: What 's the Solution? Part 2

Materials

Copies: 4.1 Distributive Review
4.2 Solve My Problem Part 2
Ticket Out the Door Day 4

Supplies: Equation Mat (students made this is in day 3)
Algebra tiles (one pile per pair of students)

Objective

Students will continue to practice distributive property using algebra tiles and will begin to record solving equations by drawing pictures, writing words, and using algebra tiles & equation mats to model the algebraic steps.

Student Talk Strategy

Numbered Heads – 4.1
Think-Pair-Share – 4.2
Report to a Partner – 4.2

Academic Language Use

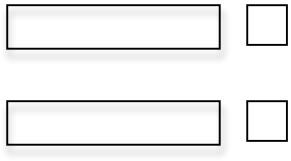
Zero Pair: One positive and one negative tile together form a zero pair.
This language should be introduced by the teacher (see notes) and modeled throughout by the teacher and all students.
Expression: An expression is a mathematical term or a sum or difference of mathematical terms that may use numbers, variables, or a combination of both.
Commutative Property of Addition - Changing the order of addends does not change the sum.
Distributive Property: $a(b + c) = ab + ac$
Equal – Having the same or identical value.
Solving Equations – Finding the value that satisfies or makes the equation true.

Activity Notes

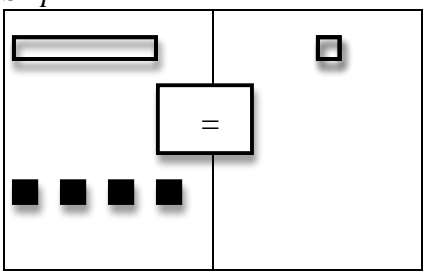
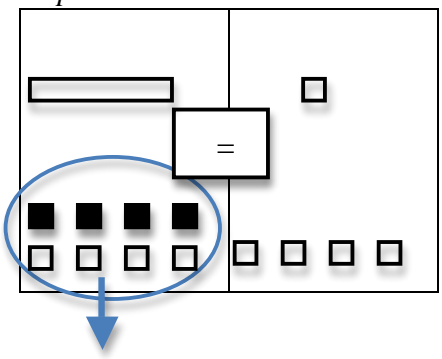
10 minutes: Review of Distributive Property

Put students in groups of 4 and have each group number off from 1-4.
Write the following sentence frame on the board: $2(x + 1)$ is the same as _____.
Give the students 30 seconds to think about the answer silently and then have them share with their group. Use numbered heads to select a student from the groups to share their answers (have all the number 3's share) with the goal of hearing what 2 groups of $(x + 1)$ would look like on one side of the equation mat and have them re-write after simplifying as $2x + 2$. Show them on the document camera (using a table – see below) what is actually happening (i.e. x is being multiplied by 2 and the one is being multiplied by two as well). Pass out activity sheet 4.1 and give the students time to

solve the problems. Circulate to assess and provide guided instruction while they are working. Use numbered heads to check answers.

Expression	Picture	Distribute & Simplified Expression
$2(x+1)$		$2(x+1)$ $2(x)+2(1)$ $2x+2$

40 minutes: Solving Equations
Students will now solve equations with tiles and their equation mat, but this time they will begin to record the same way the teacher did in Day 3. Pass out page 4.2, an equation mat and tiles to each student. Students will work with an elbow partner to solve #1 or complete through guided practice with the teacher. Ask leading questions such as, "Do we need to distribute?", "How do I write the equation simplified after distributing?", "Can we take anything away from both sides?" etc. Be sure students model with tiles first on equation mat, then complete the table on 4.2. Have students model #2. Using the think-pair-share student talk strategy, ask, "What do you notice about this problem that is different from #1? " Some follow up questions could be, "What is the first step in getting x alone?", "Can we take the same thing away from both sides of the equation this time?", "Why or why not?". Give students 30 seconds to silently think to themselves; then allow them to share their ideas with a partner, and then share out to the whole class. Next have students report to a partner with the question, "Who remembers what we can we do to get x alone in this case?" Randomly call on some students to share out answers making sure someone comes up with the idea of using zero pairs. Remind students that we **must** do the same operation to both sides of the equal sign or equation mat. Also clarify that we are always looking for what will get x alone and in this case we are adding positive four to each side. Guide students through the example using 4.2 (seen below). *Note there are two pictures to distinguish the steps, but this will be all one picture for students.

Picture	Words	Algebraically	Check
2. $-4 + x = 1$ *Step 1 with tiles:*  *Step 2 with tiles:* 	1) add four positive tiles to both sides of the equation 2) remove the zero pairs on the left side of the equation 3) x is equal to positive 5	$-4 + x = 1$ $+4 \quad +4$ $x = 5$	$-4 + x = 1$ $-4 + (5) = 1$ $1 = 1$ ✓ *Alternative option: Have students plug in 5 positive tiles for x in the original problem on the equation mat to also check with tiles.

Go through #3 as a whole group if needed or allow students to work with their partner to solve #3 on their own. Plus and minus signs can be used instead of boxes to represent integers to save time when students draw the pictures. Go through each problem together stopping to ask questions of the class as you go. See guiding questions for each equation below.

3) $-2 = 3 + x$

Guiding questions:

- Do we need to distribute?
- What is with the x? (ans: positive three) How can we get x alone? What can we do to both sides? (ans: add negative three to both sides)
- Now, what can we eliminate? (ans: zero pairs on right side)
- What's my solution? Or what is x equal to? $(x = -5)$

4) $6 + 2x = -1 + x$

Guiding questions:

- Do we need to distribute?
- Let's start with the x's first - can we take the same thing (number of x's) away from both sides of the equation? (ans: yes, we can take away one positive x from each side)
- Now we have x on one side of the equation, what is with the x? How can we get x alone? What can we do to both sides? (ans: add negative six to both sides)

- Now, what can we eliminate? (ans: zero pairs on the left side of the equation)
- What's my solution? Or what is x equal to? $(x = -7)$

5) $3(-x + 2) = 2(2x + 1)$

Guiding questions:

- Do we need to distribute? How many groups of $(-x + 2)$ do I have?
- How do I write the equation simplified after distributing?
- Let's start with the x's first - can we take the same thing away from both sides of the equation? (ans: no) Why or why not? (left side has negative x's and the right side has positive x's)
- What can we do to both sides? (ans: add positive three x OR add negative four x to both sides)
- Now we have x on one side of the equation, what can we do to get that x alone?...

6) $2(-x - 1) = 5x - 9$

Guiding questions:

- Can I rewrite $(-x - 1)$ as adding the opposite?
- Do we need to distribute? How many groups of $(-x - 1)$ do I have?
- How do I write the equation simplified after distributing?
- Now, let's deal with the x's first - can we take the same thing away from both sides of the equation? (ans: no) Why or why not? (left side has negative x's and the right side has positive x's)
- What can we do to both sides? (ans: add positive two x OR add negative four x to both sides)
- Now we have x on one side of the equation, what can we do to get that x alone?...

7) $-4 + 2x = -5x + 5$

Guiding questions:

- Do we need to distribute?
- Let's start with the x's first - can we take the same thing away from both sides of the equation? (ans: no) Why or why not? (left side has positive x's and the right side has negative x's)
- What can we do to both sides? (ans: add negative two x OR add positive five x to both sides)
- Now we have x on one side of the equation, what can we do to get that x alone?...

10 minutes: Ticket out the Door

Pass out the Ticket out the Door and have the students raise their hands when finished (so that you can check it and then dismiss them).