Lesson 6.2.4 – Multi-Step Equations With Distributive Property

Lesson: 6.2.4 - Supplement
Solving Multi-Step Equations

CC Standards
7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.EE.B.4a Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a) Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

Objective
The students will solve multi-step equations that involve the distributive property and combining like terms.

Mathematical Practices
#1 Make sense of problems and persevere in solving them.
#5 Use appropriate tools strategically.
#6 Attend to precision.
#7 Look for and make use of structure.

Teacher Input
Bellwork: Review bellwork.
Homework: Review important problems assigned the previous night.
Introduction: Introduce as directed on the PowerPoint.
Lesson: Teach as directed in the PowerPoint. Be sure to look at the notes on each slide for additional instruction and answers.

Classwork
Page 5

Homework
Page 6

Extra Practice
Page 7-10

Closure
Summarize as directed on last 3 slides of PowerPoint.
Remember These?

(1) \(-3(x + 4)\)  
(2) \(-2a - 3 + 4a + 8\)  
(3) \(-4a - 3(a + 8)\)

Steps for solving any Equation
1) Distribute if you can.  
2) Combine the like terms.  
3) Solve the simplified equation by undoing in reverse.  
4) Check your answer.

Examples of what Multi-step Equations look like.

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<td>(3(x + 12) - x = 8)</td>
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Section 1: Multi-Step Equations w/Combining Like Terms

Guided Practice #1
\[7x - 3x - 8 = 24\]

You Try #1
\[8x - 3x - 10 = 20\]
### Section 2: Multi-Step Equations w/Distributive Property

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### Section 3: Multi-Step Equations w/Fractions and Decimals

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Guided Practice #5
0.75(6 + d) = 12

You Try #5
0.2(c - 3) = -10

Always More than One Way

Which steps can be used to solve for the value of y?

3(y + 5) = 45

A  divide both sides by 3, then subtract 5 from both sides
B  subtract 5 from both sides, then divide both sides by 3
C  multiply both sides by 3, then subtract 5 from both sides
D  subtract 3 from both sides, then subtract 5 from both sides

Which steps can be used to solve for the value of y?

\[
\frac{2}{3}(y + 57) = 178
\]

A  divide both sides by \( \frac{2}{3} \), then subtract 57 from both sides
B  subtract 57 from both sides, then divide both sides by \( \frac{2}{3} \)
C  multiply both sides by \( \frac{2}{3} \), then subtract 57 from both sides
D  subtract \( \frac{2}{3} \) from both sides, then subtract 57 from both sides
Lesson 6.2.4 – Multi-Step Equations With Distributive Property

Classwork

Name_____________________________________
Date___________   Period_____

Solve each equation.

(1) \(6x - 2x + 11 = -5\)  \hfill (2) \(3(x - 2) = 18\)

(3) \(3c - 3(6 - 2c) = 27\)  \hfill (4) \(3(y - 1) + 2(y + 3) = 13\)

(5) \(0.25(3 + a) = 0.5\)  \hfill (6) \(\frac{3}{4}(x + 5\frac{1}{2}) = \frac{5}{8}\)
Solve each equation.

1. $-6 = 3(2z + 8)$

2. $6x + 12 - 3x = 51$

3. $2(3x + 4) = 35$

4. $2(3x + 7) + x = 70$

5. $15 - 4(x + 3) = 19$

6. $2(3x - 1) + 2(4x + 5) = 8$

7. $\frac{5}{9}(y + 3) = 40$

8. $0.4(x + 2) = 2$
Lesson 6.2.4 – Multi-Step Equations With Distributive Property

Extra Practice

Name__________________________  Date__________  Period: ____

Solve each equation.

1. \(4(x - 3) = 20\)          2. \(6(x + 5) = 12\)          3. \(3(2n - 7) = 9\)

4. \(6(x - 2) = -36\)          5. \(-7(x + 8) = -14\)          6. \(-(2n - 8) = -2\)

7. \(3x + 2x + 4 = 39\)          8. \(4x + 3x + 5 = 47\)          9. \(10x + 8 - 7x = 23\)

10. \(3x + 2(x - 5) = 35\)       11. \(6(x - 3) + 2x = 38\)       12. \(8(x - 2) + 3x = 61\)

13. \(4(5 - 2x) + 3 = 7\)       14. \(5x + 3(x - 4) = 60\)       15. \(2(p + 6) - 10 = 12\)
Solve each equation by using the distributive property and combining like terms.

1. \(2(x + 7) + x = 20\)

2. \(2(x - 1) + 3x = 3\)

3. \(3(m + 1) - 2m = 0\)

4. \(z + 4(2z + 3) = 15\)

5. \(-\frac{1}{2}(b + 2) + 3b = -1\)

6. \(4(n + 2) - 2n = 0\)

7. \(4 + 2(1 + x) = 12\)

8. \(-(x + 3) + \frac{3}{4}x + 5 = 0\)

9. \(2(2x + 3) - 2 = 5\)

10. \(2(3x - 1) + 2(4x + 5) = 8\)
Lesson 6.2.4 – Multi-Step Equations With Distributive Property

Extra Practice

Name_______________________________ Date___________ Period: ____

1) \( x + 8(x + 2) = 52 \)  2) \( 2y + 6(y + 3) = 34 \)

3) \( 4y + 2(y - 2) = 8 \)  4) \( 9y + 3(y - 6) = 30 \)

5) \( 6(x + 2) - 4x = 30 \)  6) \( 4(a + 3) - 2(a + 6) = 20 \)

7) \( 6(x + 2) - 4x + 6 = 36 \)  8) \( -9(x + 3) + 4x = -2 \)

9) \( -4(y + 3) - 2y = 24 \)  10) \( 4(a + 2) - 9 = 11 \)

11) \( -8(y + 2) - 16 = 16 \)  12) \( 5(a + 4) - 6a + 1 = 12 \)

13) \( x + 3x + 2x + 3(x + 1) = 30 \)  14) \( 2x + 4x + 6x - 2(x + 3) = 34 \)
Lesson 6.2.4 – Multi-Step Equations With Distributive Property

Extra Practice

Name__________________________  Date__________  Period: ____

1) \( \frac{3}{5}(1 + p) = \frac{21}{20} \)

2) \( -\frac{1}{2} = \frac{3}{2}k + \frac{3}{2} \)

3) \( 0 = -\frac{5}{4}(x - \frac{6}{5}) \)

4) \( \frac{3}{2}n - \frac{8}{3} = -\frac{29}{12} \)

5) \( \frac{3}{4} - \frac{5}{4}m = \frac{113}{24} \)

6) \( \frac{11}{4} + \frac{3}{4}r = \frac{163}{32} \)

7) \( \frac{635}{72} = -\frac{5}{2}(-\frac{11}{4} + x) \)

8) \( -\frac{16}{9} = -\frac{4}{3}(\frac{5}{3} + n) \)

9) \( 2b + \frac{9}{5} = -\frac{11}{5} \)

10) \( \frac{3}{2} - \frac{7}{4}v = -\frac{9}{8} \)

11) \( \frac{3}{2}(\frac{7}{3}n + 1) = \frac{3}{2} \)

12) \( \frac{41}{9} = \frac{5}{2}(x + \frac{2}{3}) - \frac{1}{3}x \)
Lesson 6.2.4 – Multi-Step Equations With Distributive Property

Remember These?

(1) \(-3(x + 4) - 3x - 12\)  
(2) \(-2a - 3 + 4a + 8 = 2a + 5\)  
(3) \(-4a - 3(a + 8) - 7a - 24\)

Steps for solving any Equation

5) Distribute if you can.  
6) Combine the like terms.  
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Examples of what Multi-step Equations look like.

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Classwork

Solve each equation.

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2. $3(x - 2) = 18$  
3. $3c - 3(6 - 2c) = 27$  
4. $3(y - 1) + 2(y + 3) = 13$  
5. $0.25(3 + a) = 0.5$  
6. $\frac{3}{4}(x + 5) = \frac{5}{8}$

**Step 1** Distribute  
**Step 2** Combine like terms  
**Step 3** Solve by undoing in reverse.  
**Step 4** Check
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Homework

Solve each equation.

1. \(-6 = 3(2z + 8)\) \(-5\)
2. \(6x + 12 - 3x = 51\) \(13\)

3. \(2(3x + 4) = 35\) \(4.5\)
4. \(2(3x + 7) + x = 70\) \(8\)

5. \(15 - 4(x + 3) = 19\) \(-4\)
6. \(2(3x - 1) + 2(4x + 5) = 8\) \(0\)

7. \(\frac{5}{9}(y + 3) = 40\) \(69\)
8. \(0.4(x + 2) = 2\) \(3\)
Lesson 6.2.4 – Multi-Step Equations With Distributive Property

Extra Practice

Name__________________________ Date__________ Period: ____

1) \(\frac{3}{5}(1 + p) = \frac{21}{20}\) \[\quad \frac{3}{4}\]

2) \(-\frac{1}{2} = \frac{3}{2}k + \frac{3}{2}\) \[\quad -\frac{4}{3}\]

3) \(0 = -\frac{5}{4}(x - \frac{6}{5})\) \[\quad \frac{6}{5}\]

4) \(\frac{3}{2}n - \frac{8}{3} = -\frac{29}{12}\) \[\quad \frac{1}{6}\]

5) \(\frac{3}{4} - \frac{5}{4}m = \frac{113}{24}\) \[\quad -\frac{19}{6}\]

6) \(\frac{11}{4} + \frac{3}{4}v = \frac{163}{32}\) \[\quad \frac{25}{8}\]

7) \(\frac{635}{72} = -\frac{5}{2}(-\frac{11}{4} + x)\) \[\quad -\frac{7}{9}\]

8) \(-\frac{16}{9} = -\frac{4}{3}(\frac{5}{3} + n)\) \[\quad -\frac{1}{3}\]

9) \(2b + \frac{9}{5} = -\frac{11}{5}\) \[\quad -2\]

10) \(\frac{3}{2} - \frac{7}{4}v = -\frac{9}{8}\) \[\quad \frac{3}{2}\]

11) \(\frac{3}{2}(\frac{7}{3}n + 1) = \frac{3}{2}\) \[\quad 0\]

12) \(\frac{41}{9} = \frac{5}{2}(x + \frac{2}{3}) - \frac{1}{3}x\) \[\quad \frac{4}{3}\]