LESSON 11-3 Ready to Go On? Skills Intervention

Solving Equations with Variables on Both Sides

When solving multi-step equations, combine like terms or clear fractions before isolating the variable.

Solving Equations with Variables on Both Sides

Solve.

A. $5a + 6 = 6a$

$-5a \quad -5a$ — To get the variable on the same side of the equation,

$6 = a$ — subtract $5a$ from each side.

B. $7x - 9 = 6 + 2x$ — What is the first step? Get the variable on one side.

$-2x \quad -2x$ — Subtract $2x$ from both sides.

$5x - 9 = 6$ — Combine like terms.

$+9 \quad +9$ — Undo the -9.

$5x = 15$ — Add.

$\frac{5x}{5} = \frac{15}{5}$ — Isolate x.

$x = 3$ — What does x equal?

C. $2a - 6 = 2a + 8$ — How do you get $2a$ to one side?

$-2a \quad -2a$ — Subtract $2a$ from both sides.

$-6 = 8$ — Is this a true statement? no

There is no solution to the equation since there is no number that when substituted for the variable a, would make the equation true.

Solving Multistep Equations with Variables on Both Sides

Solve. $x + 9 + 6x = 2 + x + 1$

$7x + 9 = x + 3$ — What is the first step? Combine like terms.

$-x \quad -x$ — Get x to one side of the equation.

$6x + 9 = 3$ — Subtract.

$-9 \quad -9$ — What is the next step? Subtract 9 from each side.

$6x = -6$

$\frac{6x}{6} = \frac{-6}{6}$ — How do you isolate x? Divide both sides by 6.

$x = -1$ — Solve for x.

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LESSON 11-3 Ready to Go On? Problem Solving Intervention

Solving Equations with Variables on Both Sides

Jiffy Gym offers two plans. With Plan A, you pay a one-time membership fee of $145 and then $39 every month. With Plan B, you pay no membership fee but you pay $54 every month. After how many months does Plan A become a better deal?

Understand the Problem

1. With Plan A, how often do you pay the $145 membership fee?

   once

2. With Plan A, how much do you pay for 1 month? 2 months?

   $184; $223

3. With Plan B, how much do you pay for 1 month? 2 months?

   $54; $108

Make a Plan

4. With n as the number of months, write expressions for the cost of both plans.

   Plan A: $145 + 39n$, Plan B: $54n$

5. Set the two expressions from Exercise 4 equal to each other. How would solving this equation for n help you solve the problem?

   $145 + 39n = 54n$; It tells the point at which both plans are equal.

Solve

6. Solve the equation you wrote in Exercise 5.

   $145 = 15n$, $n = \frac{145}{15}$, $n = 9\frac{2}{3}$

7. Why should the answer be a whole number of months?

   Sample response: You pay a whole month at a time.

8. After how many months does Plan A become a better deal?

   after 9 months

Check

9. Complete the table to check your answer.

$n - 1$, n, $n + 1$

months	Plan A	Plan B
9	$496	$486
10	$535	$540
11	$574	$594

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SECTION 11A Ready to Go On? Quiz

11-1 Simplifying Algebraic Expressions

Simplify.

1. $2x + 7x$ — $9x$
2. $6y - 5y$ — y
3. $8z + 4 - 3z$ — $5z + 4$
4. $4m - 3 + 7m$ — $11m - 3$
5. $4 + n + 5n - 3 - 2n$ — $4n + 1$
6. $3k - 3 - 4k + 5 + 6k$ — $5k + 2$
7. $3p + 8q + 6p - q$ — $9p + 7q$
8. $3(f + 2) + f$ — $4f + 6$
9. $7a + 4b - 5b + 4a$ — $11a - b$
10. $-3c - 2 + 4d + 7c + 7d$ — $4c + 11d - 2$
11. $6s - 3t + 9$ — $6s - 3t + 9$
12. $5(2g - 1) - 4g$ — $6g - 5$

Solve.

13. $3m + 2m = 15$ — $m = 3$
14. $10p - 7p = 18$ — $p = 6$
15. $4r + 5r = 45$ — $r = 5$
16. $2a + 9a = 88$ — $a = 8$
17. $-12z + 13z = 17$ — $z = 17$
18. $11x - x = 90$ — $x = 9$
19. $44b - 33b + 4b = 60$ — $b = 4$
20. $20s + 30s + 10s = 120$ — $s = 2$

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SECTION 11A Ready to Go On? Quiz continued

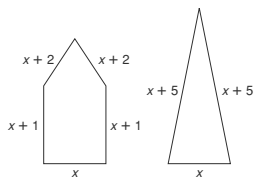
11-2 Solving Multi-Step Equations

Solve.

21. $5y + 4y - 11 = 16$ — $y = 3$
22. $\frac{7x}{9} - \frac{2x}{9} = \frac{10}{9}$ — $x = 2$
23. $\frac{r}{3} - \frac{r}{5} = \frac{4}{15}$ — $r = 2$
24. $\frac{3b}{8} + \frac{b}{4} = \frac{5}{2}$ — $b = 4$
25. $\frac{1}{5}s + \frac{2}{3}s = 6$ — $s = \frac{90}{13}$ or $6\frac{12}{13}$
26. $\frac{2}{3}t + 1 + \frac{1}{4}t = -5$ — $t = -\frac{72}{11}$ or $-6\frac{6}{11}$
27. $\frac{7c}{10} - \frac{c}{5} = \frac{9}{2}$ — $c = 9$
28. $-6 - \frac{2}{3}d + \frac{13}{6}d = -4$ — $d = \frac{4}{3}$ or $1\frac{1}{3}$
29. The Sunday newspaper sells for $2. Corner News had a supply of them worth $50 but has already sold 14. How many more Sunday newspapers remain to be sold? — 11

11-3 Solving Equations with Variables on Both Sides

30. $3a + 13 = 5a + 5$ — $a = 4$
31. $8b + 14 = 4b + 38$ — $b = 6$
32. $7h + 34 = 4 - 3h$ — $h = -3$
33. $-p + 9 = 10p - 35$ — $p = 4$
34. $-3w + 4 + w = 4w + 28$ — $w = -4$
35. $\frac{5}{6}x - \frac{1}{3} = x - \frac{3}{2}$ — $x = 7$
36. The pentagon and the triangle have the same perimeter. What is the measure of this perimeter? — 16



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LESSON 11-5 Ready to Go On? Problem Solving Intervention
Solving Two-Step Inequalities

You decide to buy and sell wallets. How many wallets can you buy from this catalog for $28?

Wallets: $3.75 each + $5.95 for shipping and handling per order

Understand the Problem

1. If you order 3 wallets, what will you be charged for shipping and handling?

$5.95

2. What amounts would you add to find the total cost for one wallet?

$3.75 + $5.95

Make a Plan

3. Write an expression for the total cost for x wallets.

$3.75x + 5.95$

4. Which of these inequalities would make sense for this problem? Explain.

total cost < $28 total cost ≤ $28

total cost > $28 total cost ≥ $28

total cost ≤ $28; Sample explanation: I want to find the most I can buy for $28.

5. Use your answers to Exercises 3 and 4 to write an inequality you can use to solve the problem.

$3.75x + 5.95 \le 28$

Solve

6. Solve the inequality you wrote in Exercise 5.

$3.75x \le 28 - 5.95$, $3.75x \le 22.05$, $x \le \frac{22.05}{3.75}$

7. How many wallets can you buy from this catalog for $28? 5

Check

8. Complete the table to check your answer.

$x - 1$, x, $x + 1$

wallets	cost
4	$20.95
5	$24.70
6	$28.45

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LESSON 11-6 Ready to Go On? Skills Intervention
Systems of Equations

A **system of equations** is a set of two or more equations. The **solution of a system** is a set of values that satisfy both equations.

Vocabulary
- system of equations
- solution of a system of equations

Solving Systems of Equations

Solve the system of equations.

$y = -x + 6$
$y = x - 2$

What are both equations equal to? y

$-x + 6 = x - 2$ Set the equations equal to each other.

$+x \quad +x$ Get x on one side of the equation.

$6 = 2x - 2$ Combine like terms.

$8 = 2x$ Get the constant terms to one side of the equation.

$\frac{8}{2} = \frac{2x}{2}$ How do you isolate x? Divide by 2.

$4 = x$ Solve for x.

$y = x - 2$ Choose one of the original equations to solve for y.

$y = 4 - 2$ To find y, substitute 4 for x into the original equation.

$y = 2$

The solution to the system is (4, 2).

Solving Systems of Equations by Solving for a Variable

$2x - y = 4$
$6x + 3y = 12$

Solve each equation for y.

$2x - y = 4$: $-y = -2x + 4$; $y = 2x - 4$

$6x + 3y = 12$: $3y = -6x + 12$; $y = -2x + 4$

$-2x + 4 = 2x - 4$ Set the equations equal to each other.

$4 = 4x - 4$ Get x to one side of the equation.

$8 = 4x$ Add 4 to both sides.

$\frac{8}{4} = \frac{4x}{4}$ Divide both sides by 4.

$2 = x$ Solve for x.

Substitute x into either original equation: $y = 2x - 4 = 2(2) - 4 = 0$

The solution set is (2, 0).

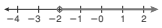
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SECTION 11B Ready to Go On? Quiz

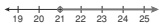
11-4 Solving Inequalities by Multiplying or Dividing

Solve and graph.

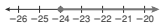
1. $-7x < 14$ $x > -2$



2. $\frac{p}{3} > 7$ $p > 21$



3. $-\frac{k}{6} \le 4$ $k \ge -24$



4. Mildred has 35 ounces of hamburger meat for a small picnic. What are the possible numbers of 4-ounce hamburger patties she can make from this meat?

0, 1, 2, 3, 4, 5, 6, 7, 8

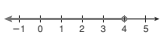
5. A chemist has prepared 151 mL of a certain liquid. What are the possible numbers of 20-mL beakers that she can fill with this liquid?

0, 1, 2, 3, 4, 5, 6, 7

11-5 Solving Two-Step Inequalities

Solve and graph.

6. $3m + 7 < 19$ $m < 4$



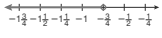
7. $0.5n + 1.5 \ge 6.5$ $n \ge 10$



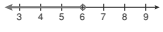
8. $\frac{1}{6} + \frac{r}{9} \le -\frac{1}{2}$ $r \le -6$



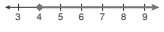
9. $-\frac{1}{3}x + \frac{1}{4} > \frac{1}{2}$ $x < -\frac{3}{4}$



10. $-2 + 1.5y < 7$ $y < 6$



11. $-13 \ge -7z + 15$ $z \ge 4$



12. Veronica wants to average at least 140 points whenever she bowls. The first two games she scores 148 and 130. What scores can Veronica get in her third game and still meet her goal?

142, 143, 144,..., 300

13. Hans wants to average at least 7 baskets out of every 10 shots he attempts. The first three games he scores 9, 3, and 8 baskets. What numbers of baskets can Hans make the fourth time and still meet his goal?

8, 9, 10

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SECTION 11B Ready to Go On? Quiz continued

11-6 Systems of Equations

Solve each system of equations.

14. $y = 2x + 5$, $y = 3x + 3$: (2, 9)

15. $y = 6x - 8$, $y = 2x + 4$: (3, 10)

16. $y = 2x - 1$, $y = -2x + 3$: (1, 1)

17. $y = 5x - 5$, $y = 2x + 7$: (4, 15)

18. $y = -3x - 1$, $y = -4x + 1$: (2, −7)

19. $y = -5x + 7$, $y = -x - 1$: (2, −3)

20. $y = 4x + 3$, $y = -x + 3$: (0, 3)

21. $y = -6x - 6$, $y = -8x - 7$: $(-\frac{1}{2}, -3)$

22. $y = 10x - 46$, $y = 7x - 31$: (5, 4)

23. $y = 2x - 7$, $y = -x + 8$: (5, 3)

24. $y = x - 7$, $y = -11x - 7$: (0, −7)

25. $y = -x$, $y = 5x - 12$: (2, −2)

26. $x + y = 6$, $x + 3y = 8$: (5, 1)

27. $2x - y = 2$, $3x - y = 5$: (3, 4)

28. $-x + y = -6$, $-x - y = -2$: (4, −2)

29. $x + 3y = -4$, $-x + y = 0$: (−1, −1)

30. $3x + y = 10$, $2x - y = -10$: (0, 10)

31. $3x + y = 15$, $x = -2y + 10$: (4, 3)

32. In a baseball game, two teams have a combined score of 11 runs. The difference in their scores is 5 runs. If the two run totals are x and y, write a system of equations to describe their sum and their difference. Solve this system to find the score of the game.

$x + y = 11$, $x - y = 5$; 8 to 3

33. The sum of two winter temperatures is −10 degrees. Their difference is 34 degrees. Write a system of equations to describe the sum and the difference. Solve this system to find the two temperatures.

$x + y = -10$, $x - y = 34$; 12° and −22°

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