NAME _____ DATE _____

9–5 Multiplication with the Addition-or-Subtraction Method

Objective: To use multiplication with the addition-or-subtraction method to solve systems of linear equations.

Example 1 Solve: $3x - y = 9$
$2x + 5y = -11$

Solution

1. Multiply both sides of the first equation by 5 so that the y-terms are opposites.

$$5(3x - y) = 5(9) \rightarrow 15x - 5y = 45$$
$$2x + 5y = -11 \rightarrow \underline{2x + 5y = -11}$$

2. Add similar terms.
$$17x = 34$$

3. Solve the resulting equation.
$$x = 2$$

4. Substitute 2 for x in either original equation to find the value of y.
$$3(2) - y = 9$$
$$6 - y = 9$$
$$-y = 3$$
$$y = -3$$

5. The check is left for you.

The solution is $(2, -3)$.

CAUTION Check your solution in the original equations as a transformed equation could contain an error.

Solve each system by using multiplication with the addition-or-subtraction method.

1. $2x + y = 7$
$3x - 4y = 5$

2. $3a + 5b = 1$
$a + 2b = 0$

3. $2x - y = 8$
$x - 4y = -3$

4. $m + 2n = 9$
$3m - 5n = 5$

5. $a - 2b = 1$
$3a + b = -4$

6. $3x - 2y = -1$
$x + y = 3$

7. $5x - y = -4$
$4x - 3y = -1$

8. $2m + 3n = 6$
$m + 2n = 5$

9. $2x - y = 8$
$x - 8y = 4$

10. $x + 3y = -2$
$4x + 7y = 7$

11. $x + 3y = 5$
$3x + 2y = -6$

12. $5x - 2y = -3$
$x + 3y = -4$

13. $3x - 2y = 5$
$x - 4y = -5$

14. $5x - y = 14$
$4x - 3y = 20$

15. $3x + 2y = 2$
$-7x + y = -16$

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9–5 *Multiplication with the Addition-or-Subtraction Method* *(continued)*

Example 2 Solve: $3a + 2b = 4$
$11a + 5b = 3$

Solution

1. Transform both equations by multiplication so that the b-terms are the same.
$5(3a + 2b) = 5(4) \rightarrow 15a + 10b = 20$
$2(11a + 5b) = 2(3) \rightarrow \underline{22a + 10b = 6}$
2. Subtract similar terms. $-7a = 14$
3. Solve the resulting equation. $a = -2$
4. Substitute for a in either original equation to find the value of b.
$3(-2) + 2b = 4$
$-6 + 2b = 4$
$2b = 10$
$b = 5$
5. The check is left for you. The solution is $(-2, 5)$.

Solve each system by using multiplication with the addition-or-subtraction method.

16. $3t - 8z = -2$
$7t + 4z = 18$

17. $6a + 7c = 8$
$2a + 5c = 8$

18. $4x + 9y = 3$
$-7x + 3y = -24$

19. $2x - 3y = 18$
$3x + 4y = -7$

20. $4x + 3y = -14$
$6x - 2y = -8$

21. $3a + 4b = 4$
$2a - 3b = 14$

22. $5m - 2n = -1$
$4m + 5n = -14$

23. $2x + 7y = 5$
$3x - 5y = 23$

24. $4x - 3y = 10$
$5x + 6y = -7$

25. $2x + 3y = 9$
$3x + 5y = 16$

26. $5x - 4y = 5$
$2x + 3y = 25$

27. $5a - 2c = 1$
$4a + 5c = 47$

28. $6x - 5y = 12$
$8x - 3y = 16$

29. $7x - 5y = 20$
$3x + 2y = 21$

30. $6x + 5y = 13$
$5x + 9y = 6$

31. $3x + 2y = 4$
$11x + 5y = 3$

32. $2x + 7y = -3$
$3x + 5y = 1$

33. $4x - 5y = 3$
$3x + 2y = -15$

Mixed Review Exercises

Factor completely.

1. $4 - 16x + 16x^2$

2. $6m^2n - 18mn^3$

3. $9c^2 - 16d^2$

4. $x^2 + 7x + 10$

5. $2y^2 + 7y + 3$

6. $p^2 - 5p - 14$

Find the constant of variation.

7. y varies directly as x, and $y = 63$ when $x = 9$.

8. t varies directly as s, and $t = -24$ when $s = 96$.

9. p is directly proportional to n, and $p = 27$ when $n = 36$.

10. h is directly proportional to k, and $h = 30$ when $k = 6$.