NAME _____ DATE _____

9 Systems of Linear Equations

9–1 The Graphing Method

Objective: To use graphs to solve systems of linear equations.

Vocabulary

System of equations Two or more equations in the same variables. Also called a *system of simultaneous equations.*

To solve a system of equations To find all ordered pairs (x, y) that make *both* equations true.

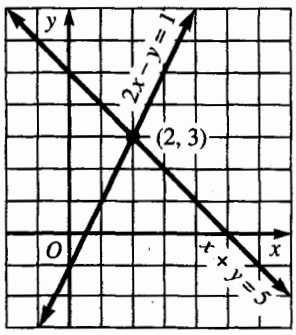
Solution of a system of equations An ordered pair that satisfies both equations at the same time.

Coincide Two lines coincide if their graphs are the same. The equations are equivalent.

Example 1 Solve the system by graphing:

$$2x - y = 1$$
$$x + y = 5$$

Solution Graph $2x - y = 1$ and $x + y = 5$ in the same coordinate plane. The only point on *both* lines is the *intersection point* (2, 3). The only solution of *both* equations is (2, 3).



Check: You can check that (2, 3) is a solution of the system by substituting $x = 2$ and $y = 3$ in both equations.

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

The system has the solution (2, 3).

Solve each system by the graphing method.

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

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

3. $x + y = 9$
$x - y = 3$

4. $y = x + 2$
$y = 2x - 1$

5. $2x - y = 0$
$x + y = 3$

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

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

8. $x + 2y = 5$
$x - y = -1$

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

10. $-2x + y = -1$
$2x + y = 7$

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

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

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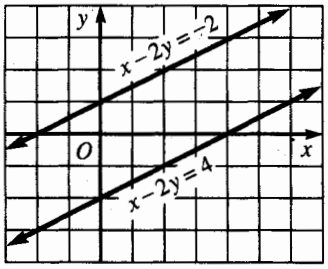
9–1 The Graphing Method *(continued)*

Example 2 Solve the system by graphing: $x - 2y = 4$
$x - 2y = -2$

Solution When you graph the equations in the same coordinate plane, you see that the lines have the same slope but different y-intercepts. The graphs are parallel lines. Since the lines do not intersect, there is no point that represents a solution of both equations.

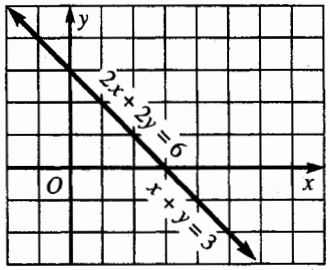
The system has *no solution.*



Example 3 Solve the system by graphing: $x + y = 3$
$2x + 2y = 6$

Solution When you graph the equations in the same coordinate plane, you see that the graphs coincide. The equations are equivalent. Every point on the line represents a solution of both equations.

The system has *infinitely many solutions.*



Solve each system by the graphing method.

13. $3x - y = 8$
$x + y = 4$

14. $2x + 3y = 5$
$y = x$

15. $2x - 3y = 4$
$2x - y = 0$

16. $3x + 3y = 9$
$x + y = 3$

17. $x + 2y = -4$
$x + 2y = 8$

18. $3x + y = 6$
$2x - y = -1$

19. $x - y = -6$
$x - y = 2$

20. $y - x = -3$
$y - 2x = -5$

21. $2x + y = 5$
$2x + y = -1$

22. $2x - y = 7$
$x + 2y = 11$

23. $4x + y = -14$
$3x = y$

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

Mixed Review Exercises

Simplify. Give your answers using positive exponents.

1. $\frac{16a^2b}{8ab^2}$

2. $(a^{-2}b^3)^3$

3. $\frac{15m^5n}{25m^2n^3}$

4. $(x^3y^2)^{-2}$

5. x^4y^{-3}

6. $\frac{x^3y^2}{x^{-2}y}$