

8-2 Points, Lines, and Their Graphs

Objective: To graph ordered pairs and linear equations in two variables.

Vocabulary

Plot a point Locate the graph of an ordered pair in a number plane.

Horizontal axis The horizontal number line in a number plane; the x -axis.

Origin The intersection of the axes on a number plane. The zero point on each axis.

Vertical axis The vertical number line in a number plane; the y -axis.

Graph of an ordered pair The point in a number plane associated with an ordered pair.

Abscissa The first coordinate in an ordered pair of numbers; the x -coordinate.

Ordinate The second coordinate in an ordered pair of numbers; the y -coordinate.

Coordinates of a point The abscissa and ordinate of the point, written as an ordered pair.

Coordinate axes The x - and y -axes in a number plane.

Coordinate plane A number plane; a plane in which a coordinate system has been set up.

Quadrant One of the four regions into which the coordinate axes separate a number plane.

Graph of an equation in two variables All the points that are the graphs of the solutions of the equation.

Linear equation An equation whose graph is a line.

Standard form of a linear equation The form $ax + by = c$, where a , b , and c are integers and a and b are not both zero.

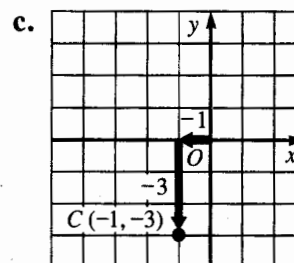
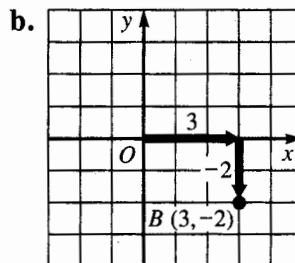
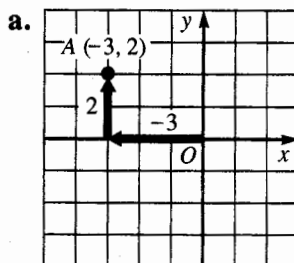
Example 1 Plot each point in a number plane.

a. $A(-3, 2)$

b. $B(3, -2)$

c. $C(-1, -3)$

Solution



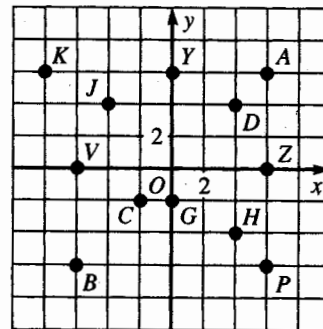
8-2 Points, Lines, and Their Graphs (continued)

Plot each point in a coordinate plane.

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|---------------|---------------|----------------|----------------|
| 1. $A(4, 2)$ | 2. $B(6, 3)$ | 3. $C(-4, -2)$ | 4. $D(-5, -1)$ |
| 5. $E(-5, 0)$ | 6. $F(0, -5)$ | 7. $G(-3, 2)$ | 8. $H(3, -2)$ |

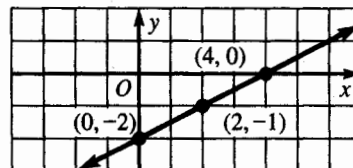
Refer to the diagram at the right. Name the point(s) described.

- The point on the positive x -axis.
- The point on the negative y -axis.
- The points on the vertical line through Z.
- The points on the horizontal line through Y.
- The x -coordinate is zero.
- The y -coordinate is zero.
- The points have equal x - and y -coordinates.
- The points have opposite x - and y -coordinates.



Example 2 Graph $x - 2y = 4$ in a coordinate plane.

Solution Let $y = 0$: $x - 2(0) = 4$ Let $x = 0$: $0 - 2y = 4$
 $x = 4$ $-2y = 4$
 Solution $(4, 0)$ $y = -2$
 Solution $(0, -2)$



A third solution, such as $(2, -1)$ can be used as a check.

Graph each equation. You may wish to verify your graphs on a computer or a graphing calculator.

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|------------------|------------------|-------------------|-------------------|
| 17. $x - y = 4$ | 18. $x + y = 5$ | 19. $y = 2x + 6$ | 20. $y = -2x + 2$ |
| 21. $2x + y = 4$ | 22. $x - 3y = 6$ | 23. $2x - 3y = 6$ | 24. $2x + 3y = 6$ |

Mixed Review Exercises

State whether each ordered pair is a solution of the given equation.

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|---------------------------------------|---------------------------------------|--|---------------------------------------|
| 1. $2x + y = 7$
$(4, -1), (-1, 9)$ | 2. $3a + 2b = 6$
$(2, -6), (2, 0)$ | 3. $x + 3y = 11$
$(2, 3), (-3, -2)$ | 4. $2m + 3n = 7$
$(2, 1), (-1, 3)$ |
|---------------------------------------|---------------------------------------|--|---------------------------------------|

Solve.

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|----------------------------|-----------------------|-------------------------|
| 5. $x^2 + 5x + 6 = 0$ | 6. $-z + 9 = 3$ | 7. $2b^2 - 6b - 8 = 0$ |
| 8. $\frac{10 - 5y}{3} = 5$ | 9. $5x + 9 = 3x - 11$ | 10. $10 = \frac{2}{5}n$ |