

# Understanding Graphs as Solution Sets

Algebra 1 • Section 5.8

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 12

## Quick Review and Helpful Hints

Linear relationships have a constant rate of change. Use slope, intercepts, points, and context to move between equations, tables, graphs, and real-world meanings.

▷ **Example:** Write the line with slope 2 through (3, 11).

**Work:** Use  $y = 2x + b$ . Substitute the point:  $11 = 2(3) + b$ , so  $b = 5$ .

★ **Answer:**  $y = 2x + 5$

## ◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

- |                                             |       |                                                       |       |
|---------------------------------------------|-------|-------------------------------------------------------|-------|
| 1. Does (2, 5) satisfy $y = 2x + 1$ ?       | _____ | 6. Describe the graph of $y = 3x - 2$ .               | _____ |
| 2. Does (3, 4) satisfy $x + y = 10$ ?       | _____ | 7. Which side is shaded for $y > x + 1$ ?             | _____ |
| 3. Find one solution to $y = -x + 6$ .      | _____ | 8. Is the boundary solid or dashed for $y < 2x - 5$ ? | _____ |
| 4. Is (1, 3) a solution of $y > 2x$ ?       | _____ | 9. Find the $y$ value when $x = 2$ in $2x + y = 9$ .  | _____ |
| 5. Is (4, 1) a solution of $x + y \leq 5$ ? | _____ | 10. Does (0, 0) satisfy $3x - 2y \geq 1$ ?            | _____ |

## ◆ Word Problems

11. A budget is  $4x + 2y \leq 40$ . Does buying 6 of  $x$  and 5 of  $y$  fit? \_\_\_\_\_
12. A parking lot model is  $c + t \leq 120$ . What does the solution set represent? \_\_\_\_\_



## Answer Keys

- Yes
- No
- Example:  $(0, 6)$
- Yes
- Yes
- A line
- Above the line
- Dashed
- 5
- No
- Yes
- All car/truck combinations with at most 120 vehicles

### Step-by-Step Explanations

- Try it out:  $2(2) + 1 = 5$  matches the  $y$ -value, so the point really is a solution.
- Add the coordinates:  $3 + 4 = 7$ , which misses 10, so this point doesn't work.
- Pick any  $x$  you like — choosing  $x = 0$  makes  $y = 6$ , giving the easy point  $(0, 6)$ .
- Check the inequality:  $3 > 2(1)$  is true, so this point lands in the solution region.
- Here  $4 + 1 = 5$ , and the  $\leq$  sign welcomes equality, so the point counts.
- Any linear equation with  $x$  and  $y$  to the first power draws out as a straight line.
- Since you want  $y$  bigger than the boundary, shade upward where the  $y$ -values are higher.
- A strict  $<$  leaves the boundary out, so draw it dashed to show it's not included.
- Plug in  $x = 2$  for  $4 + y = 9$ , then subtract to find  $y = 5$ .
- The origin gives 0 on the left, and  $0 \geq 1$  is false, so  $(0, 0)$  is not a solution.
- Tally the cost:  $4(6) + 2(5) = 34$ , which stays under the 40 limit, so it fits the budget.
- Each point in the shaded region is a car-and-truck mix that stays within the lot's capacity.



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