

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.



Want Even More Algebra 1 Practice?



Pennsylvania Keystone Algebra I Preparation Bundle

18 full-length practice tests across three books
Fresh test practice, detailed explanations, and organized review



18 Tests
3 Books
One Bundle

Important: These Algebra 1 resources are made for extra practice after the worksheet. Use the QR code for the state or program bundle connected with this worksheet.

Skill Review

- ✓ Strengthens equations, functions, systems, and modeling
- ✓ Supports steady review before tests
- ✓ Good for tutoring, homework, and independent practice

Build the foundation.

Test Practice

- ✓ Full-length practice tests for realistic pacing
- ✓ Detailed answer explanations for every test
- ✓ Useful after students finish topic worksheets

Practice with purpose.

Confidence

- ✓ Turns mistakes into targeted review
- ✓ Helps students see progress over time
- ✓ Keeps preparation organized and calm

Move forward prepared.