

Understanding Graphs as Solution Sets

Algebra 1 • Section 5.8

Name: _____

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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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