LESSON MAKER PRO

Shade the Solution

Graph inequalities and find where their solutions overlap.

GRADE 8 · 8A.AF.G.21

8A.AF.G.21 "Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality)..."

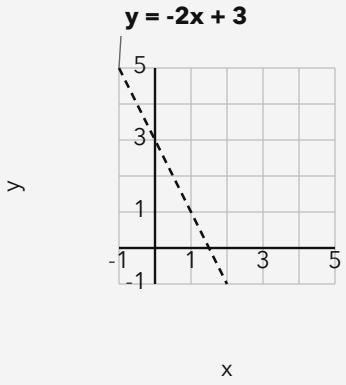
NAME _____ DATE _____

LINES AND HALF-PLANES

Use a dashed boundary for < or > because points on the line do not count. Use a solid boundary for <= or >=. Test a point to choose which side to shade. For a system, keep only the region that satisfies every inequality.

WORKED EXAMPLE

The dashed line is the boundary of y < -2x + 3. Which half-plane should you shade?



1. Test (0, 0): 0 < 3 is true.
2. Shade the side containing (0, 0).
3. Leave the dashed line out of the solution.

Answer: Shade below the dashed line.

PRACTICE 4 problems

1 For y >= x + 1, name the boundary line, its style, and the side to shade.

ANSWER _____

2 For y < -x + 4, name the boundary line, its style, and the side to shade.

ANSWER _____

3 Describe the shaded overlap for y > -x + 4 and y <= x + 4. Include both boundary styles.

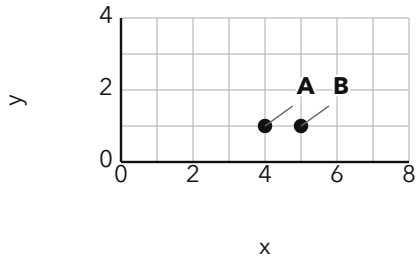
ANSWER _____

4 Describe the shaded overlap for y <= 4 and x > -1. Include both boundary styles.

ANSWER _____

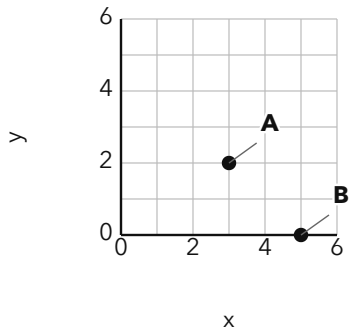
APPLY IT Show your work

1 You have $8 for $1 sticker packs and $4 wristbands. Let x be packs and y be wristbands. On the grid, graph the affordable region for x, y >= 0. Which labeled point is affordable?



ANSWER _____

2 For a gaming stream, x is play hours and y is editing hours. You have at most 5 hours total and need at least 1 editing hour. On the grid, graph possible times for x, y >= 0. Which labeled point works?



ANSWER _____

CHALLENGE One step up

A student says y > x + 4 and y < x + 1 have an overlapping shaded region. Explain why no point can be in both regions.

WORK SPACE AND ANSWER

ANSWER KEY

Shade the Solution

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	For y >= x + 1, name the boundary line, its style, and the side to shade.	**Draw a solid line at y = x + 1. Shade above it.**
2	For y < -x + 4, name the boundary line, its style, and the side to shade.	**Draw a dashed line at y = -x + 4. Shade below it.**
3	Describe the shaded overlap for y > -x + 4 and y <= x + 4. Include both boundary styles.	**Shade above the dashed line y = -x + 4 and on or below the solid line y = x + 4. The overlap is to the right of (0, 4); that crossing point is excluded.**
4	Describe the shaded overlap for y <= 4 and x > -1. Include both boundary styles.	**Shade on or below the solid line y = 4 and to the right of the dashed line x = -1.**

PART 2 · APPLY IT

1. **Shade the triangle on and below x + 4y = 8 in the first quadrant, including its boundaries. A is affordable; B is not.** At A, 4 + 4(1) = 8. At B, 5 + 4(1) = 9, which exceeds the budget.
2. **Shade the triangle where x >= 0, y >= 1, and x + y <= 5, including its boundaries. A works; B does not.** A has 5 total hours and 2 editing hours. B has no editing hours.

CHALLENGE

The lines have the same slope, so they never cross. At every x-value, x + 4 is greater than x + 1, so y cannot be above the first line and below the second.

Accept equivalent descriptions of each half-plane or overlap. In the sticker context, only whole-number points represent purchases.