LESSON MAKER PRO

Shade the Solution

Graph half-planes and find where they overlap.

HIGH SCHOOL · A1P.AF.F.20

A1P.AF.F.20 "Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality)..."

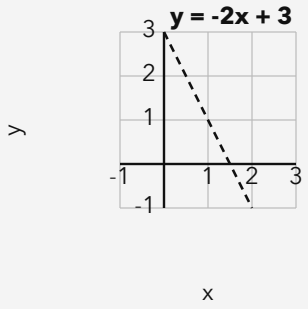
NAME _____ DATE _____

BOUNDARY AND SHADE

Use a dashed boundary for < or > because points on the line are not solutions. Use a solid boundary for ≤ or ≥. Test a point not on the line to choose which side to shade; for a system, shade only the overlap.

WORKED EXAMPLE

The boundary is shown. Finish the graph of $y < -2x + 3$.



1. The dashed line excludes points on the boundary.
2. Test (0, 0): 0 < 3 is true.
3. Shade the side containing (0, 0).

Answer: Shade below the dashed line.

PRACTICE 4 problems

1 Graph $y > x - 1$. State the line type and shaded side.

ANSWER _____

2 Graph $y \leq -x + 4$. State the line type and shaded side.

ANSWER _____

3 Graph $y \geq 0$ and $y < x + 4$. State which boundaries are included.

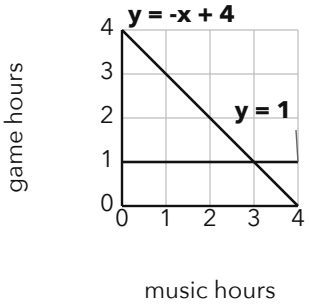
ANSWER _____

4 Graph $x \leq 0$ and $y \geq -x - 1$. State which boundaries are included.

ANSWER _____

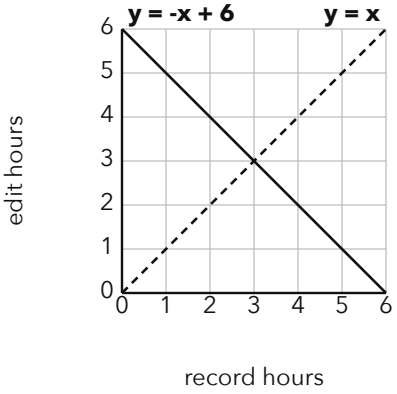
APPLY IT Show your work

1 You have up to 4 hours for music (x) and games (y). You want at least 1 hour of games. Shade the possible times on the graph.



ANSWER _____

2 You have up to 6 hours to record (x) and edit (y) a podcast. You want to edit longer than you record. Shade the possible times on the graph.



ANSWER _____

CHALLENGE One step up

For which x-values can both $y \geq -x + 6$ and $y < x - 1$ be true? Explain.

WORK SPACE AND ANSWER

ANSWER KEY

Shade the Solution

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Graph $y > x - 1$. State the line type and shaded side.	**Dashed line $y = x - 1$; shade above it.**
2	Graph $y \le -x + 4$. State the line type and shaded side.	**Solid line $y = -x + 4$; shade on or below it.**
3	Graph $y \ge 0$ and $y < x + 4$. State which boundaries are included.	**Shade the overlap on or above $y = 0$ and below $y = x + 4$. Include $y = 0$; exclude $y = x + 4$.**
4	Graph $x \le 0$ and $y \ge -x - 1$. State which boundaries are included.	**Shade the overlap on or left of $x = 0$ and on or above $y = -x - 1$. Include both boundaries.**

PART 2 · APPLY IT

1. **Shade the first-quadrant region on or above $y = 1$ and on or below $y = -x + 4$. Include both lines.** The time limit gives $x + y \le 4$, and the games goal gives $y \ge 1$. Their overlapping half-planes show the possible times.
2. **Shade the first-quadrant region above $y = x$ and on or below $y = -x + 6$. Exclude $y = x$; include $y = -x + 6$ where it borders the shaded region.** The time limit gives $x + y \le 6$, while editing longer gives $y > x$. Shade only the overlap.

CHALLENGE

$x > 7/2$. A y-value can meet both conditions only when the lower bound is less than the upper bound: $-x + 6 < x - 1$, so $7 < 2x$.

Accept any correctly shaded graph with the specified solid and dashed boundaries. For the word problems, accept shading limited to nonnegative times.