LESSON MAKER PRO

Shade the Overlap

Graph inequalities and test points

HIGH SCHOOL · FA.F.23

FA.F.23 "With accuracy, graph the solutions to a linear inequality in two variables as a half-plane, and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes on the same..."

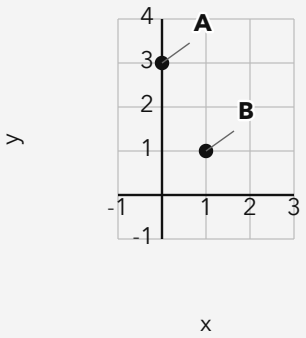
NAME _____ DATE _____

LINES AND REGIONS

A line divides a coordinate plane into two half-planes. Use a solid boundary for ≤ or ≥ and a dashed boundary for < or >. Test a point off the line to choose the shaded side, then shade only the overlap for a system.

WORKED EXAMPLE

Use A and B on the grid to graph y > -2x + 3.



1. Draw the boundary line through A and B.
2. Make it dashed because > does not include the line.
3. Test (0,0): 0 > 3 is false, so shade the side away from (0,0).

Answer: Dashed line y = -2x + 3; shade above it.

PRACTICE 4 problems

1 Sketch y ≤ x + 1. Is (0,0) included?

ANSWER _____

2 Sketch y > -x + 4. Is (4,0) included?

ANSWER _____

3 Sketch x + y < 5. Is (5,1) included?

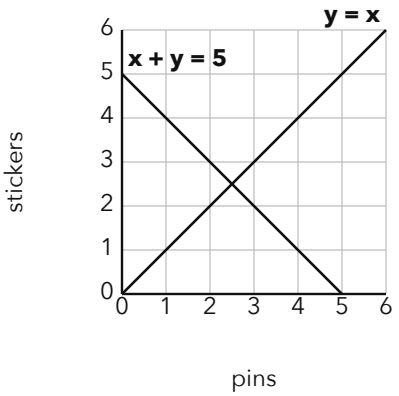
ANSWER _____

4 Sketch y ≥ x - 1 and y < -x + 5. Is (1,1) in the overlap?

ANSWER _____

APPLY IT Show your work

1 A merch bag holds at most 5 items and at least as many stickers as pins. Let x = pins and y = stickers. The grid shows the limit lines. Shade the feasible region in the first quadrant. Is (1,4) possible?



ANSWER _____

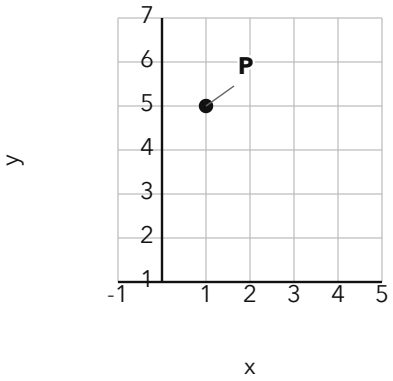
2 A student has $6 for $1 songs and $4 game rentals. They want at least 1 song. Let x = songs and y = rentals. Sketch the feasible region in the first quadrant. Is (1,1) possible?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Graph $y > x + 4$ and $y \leq -x + 6$ on the grid. Is P in the overlap? Explain.



WORK SPACE AND ANSWER

ANSWER KEY

Shade the Overlap

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Sketch $y \le x + 1$. Is (0,0) included?	**Solid line $y = x + 1$; shade below it. Yes, $0 \le 1$.**
2	Sketch $y > -x + 4$. Is (4,0) included?	**Dashed line $y = -x + 4$; shade above it. No, $0 > 0$ is false.**
3	Sketch $x + y < 5$. Is (5,1) included?	**Dashed line $x + y = 5$; shade below it. No, $5 + 1 < 5$ is false.**
4	Sketch $y \ge x - 1$ and $y < -x + 5$. Is (1,1) in the overlap?	**Shade above the solid line $y = x - 1$ and below the dashed line $y = -x + 5$. Yes, $1 \ge 0$ and $1 < 4$.**

PART 2 · APPLY IT

1. **Shade the triangle with vertices (0,0), (0,5), and (5/2,5/2), including its edges. Yes, (1,4) is possible.** Use $x \ge 0$, $y \ge 0$, $x + y \le 5$, and $y \ge x$. At (1,4), the total is 5 and $4 \ge 1$.
2. **Shade the triangle with vertices (1,0), (6,0), and (1,5/4), including its edges. Yes, (1,1) is possible.** Graph $x \ge 1$, $y \ge 0$, and $x + 4y \le 6$. One song and one rental cost $5.

CHALLENGE

Shade above the dashed line $y = x + 4$ and at or below the solid line $y = -x + 6$. The overlap lies to the left of P. P is excluded because $5 > 1 + 4$ is false.

Accept hand-sketched boundaries and shading that show the correct half-planes. For the real contexts, whole-number points in the shaded regions represent actual purchases.