LESSON MAKER PRO

Find the Overlap

Graph systems of inequalities and interpret their solutions.

HIGH SCHOOL · A2.A.1.9

A2.A.1.9 "Solve systems of linear inequalities in two variables, with a maximum of three inequalities; graph and interpret the solutions on a coordinate plane. Graphing calculators or other appropriate technology may be used."

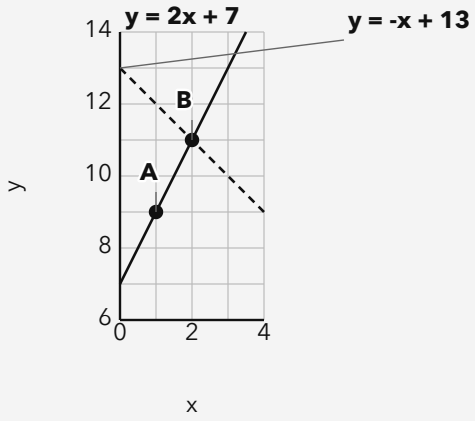
NAME _____ DATE _____

THE BIG IDEA

Draw a solid boundary for ≤ or ≥ and a dashed boundary for < or >. Shade the side that makes each inequality true. The solution is where all shaded regions overlap.

WORKED EXAMPLE

Which plotted point satisfies both $y \geq 2x + 7$ and $y < -x + 13$?



1. At A, $9 \geq 2(1) + 7$ and $9 < -1 + 13$.
2. At B, $11 \geq 2(2) + 7$, but $11 < -2 + 13$ is false.

Answer: A satisfies both inequalities.

PRACTICE 4 problems

1 Graph $y \geq x + 2$ and $y < -x + 6$. Describe the overlap.

ANSWER _____

2 Graph $x \geq 0$, $y \geq 0$, and $x + y \leq 4$. Give the region's vertices.

ANSWER _____

3 Graph $y > 2x - 3$ and $y \leq -x + 3$. Is (1, 1) a solution?

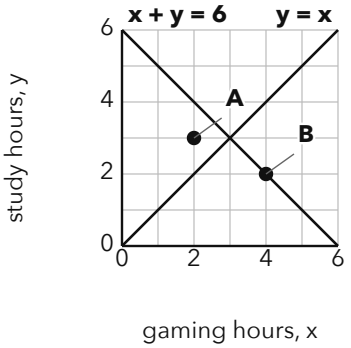
ANSWER _____

4 Graph $x > 1$, $y \geq 0$, and $x + y < 5$. Which boundaries are included?

ANSWER _____

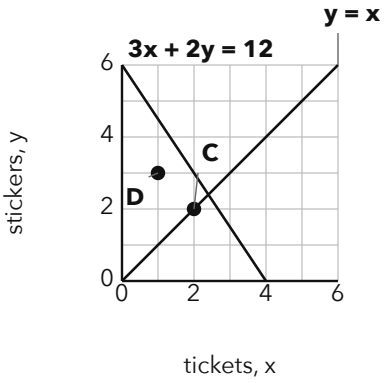
APPLY IT Show your work

1 You have at most 6 hours for gaming (x) and studying (y). You plan to study at least as long as you game. Which plotted plan works, and what does it mean?



ANSWER _____

2 At a school show, x tickets cost $3 each and y stickers cost $2 each. You can spend at most $12 and buy no more stickers than tickets. Which plotted purchase works?



ANSWER _____

CHALLENGE One step up

Graph $y \geq x - 2$, $y \leq -x + 4$, and $y > 0$. Are (3, 1) and (2, 0) solutions? Explain using the boundaries.

WORK SPACE AND ANSWER

Find the Overlap

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Graph $y \geq x + 2$ and $y < -x + 6$. Describe the overlap.	**Draw $y = x + 2$ solid and $y = -x + 6$ dashed. Shade above or on the solid line and below the dashed line.**
2	Graph $x \geq 0$, $y \geq 0$, and $x + y \leq 4$. Give the region's vertices.	**The solution is the triangle on and between the three solid boundaries. Its vertices are (0, 0), (4, 0), and (0, 4).**
3	Graph $y > 2x - 3$ and $y \leq -x + 3$. Is (1, 1) a solution?	**Draw $y = 2x - 3$ dashed and $y = -x + 3$ solid; shade above the dashed line and below or on the solid line. Yes, (1, 1) is a solution.**
4	Graph $x > 1$, $y \geq 0$, and $x + y < 5$. Which boundaries are included?	**Shade right of $x = 1$, above or on $y = 0$, and below $x + y = 5$. Only $y = 0$ is included where it lies in the overlap.**

PART 2 · APPLY IT

1. **A works: 2 hours of gaming and 3 hours of studying.** The limits are $x + y \leq 6$ and $y \geq x$. A meets both; B has fewer study hours than gaming hours.
2. **C works: 2 tickets and 2 stickers.** The limits are $3x + 2y \leq 12$ and $y \leq x$. C costs $10 and meets both limits; D has more stickers than tickets.

CHALLENGE

(3, 1) is a solution: it lies on both solid boundaries and above $y = 0$. (2, 0) is not a solution because it lies on the excluded boundary $y = 0$.

Accept accurately shaded hand-drawn graphs without drawing tools. For the practice graphs, accept equivalent descriptions of the overlap and its included or excluded boundaries.