Systems of Inequalities

Shade each inequality the Unit 5 way in its own color. The solution of the system is the overlap. Test a point in both.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
System of inequalities	Two or more inequalities that must all be true at once.	Shade each one; keep the overlap.
Overlap	The region shaded by every inequality: where the solutions are.	A point is a solution only if it is in the overlap.
Feasible region	Another name for the overlap: the allowed combinations (Unit 5).	The answer to a two-constraint problem.
Test a point in both	Put its x and y into each inequality.	All true: in the overlap. Any false: not.
Edges of the overlap	Each boundary keeps its own style: dashed where strict, solid where inclusive.	A point on a dashed edge is not a solution.

Part A In the overlap?

System: $y \le x + 1$ and $y > -x + 3$. Check each point in both and decide.

POINT	$Y \le X + 1$	$Y > -X + 3$	IN THE OVERLAP?
(4, 2)			
(0, 0)			
(1, 4)			
(1, 2)			
(5, 0)			

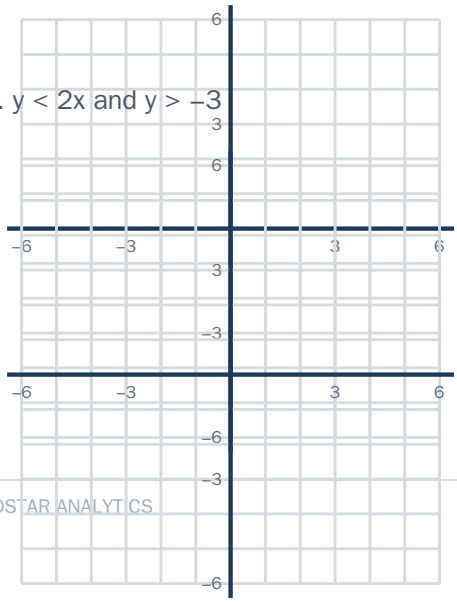
Part B Graph the system

Shade each in its own color (or hatch one), mark the overlap, and label each edge dashed or solid.

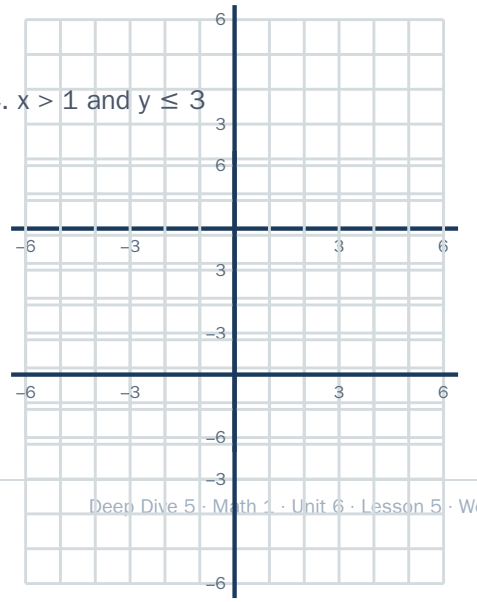
1. $y \le x + 1$ and $y > -x + 3$

2. $y \ge 2x - 4$ and $y > -1/2\, x + 1$

3. $y < 2x$ and $y > -3$



4. $x > 1$ and $y \leq 3$



Part C Describe and explain

1. System: $y \geq x - 2$ and $y \leq -x + 4$. Describe the overlap in words.

2. System: $y > x + 2$ and $y < x - 1$. What is the solution, and why?

Part D In your own words, and the exit ticket

1. Why is the overlap the solution of the system?

2. What happens to a point on a dashed edge of the overlap?

3. Is (2, 2) a solution of $y \leq x + 1$ and $y > -x + 3$? Is (0, 0)?

Answer key

Part A. (4, 2): true, true, yes. (0, 0): true, false, no. (1, 4): false, true, no. (1, 2): true, false (dashed edge), no. (5, 0): true, true, yes.

Part B. 1. Wedge to the right of (1, 2), solid lower-left edge, dashed upper-left edge. 2. Wedge opening upward above both lines. 3. Wedge to the right of (–3/2, –3), both edges dashed. 4. Corner right of $x = 1$ (dashed) and below $y = 3$ (solid).

Part C. 1. Above $y = x - 2$ and below $y = -x + 4$: the wedge to the left of (3, 1), edges included. 2. No solution: parallel boundaries with the shadings facing away, so no point is in both.

Part D. 1. Both must be true, and each is true only in its own shading. 2. Not a solution. 3. Yes; no.