From a Line to a Region

An equation gives a line. An inequality gives a whole region, one side of that line. The boundary comes from m and b. Dashed for strict, solid for or-equal. A point is a solution when the sentence is true.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Solution	A point that makes the inequality true.	Put its x and y in and read the sentence.
Half-plane	One whole side of a line: the region of solutions.	Shade it. Every point in it is a solution.
Boundary line	The edge of the region: the line you get if the sign were an equals sign.	Graph it from m and b, exactly as in Unit 3.
Dashed line	The edge is not included. Used for the strict signs < and >.	Points on the line are not solutions.
Solid line	The edge is included. Used for the or-equal signs ≤ and ≥.	Points on the line are solutions.
Region	All the solutions at once, the way a line was all the solutions of an equation.	Same boundary line, a whole region of answers.

Part A Dashed or solid?

Read the sign. Write the boundary line and dashed or solid.

INEQUALITY	BOUNDARY LINE	DASHED OR SOLID
$y > 3x - 2$		
$y \leq \frac{1}{2}x + 4$		
$y < -x$		
$y \geq 5$		
$y \geq -2x + 7$		

Part B Is it a solution?

Put the point in and write the sentence you checked, then yes or no.

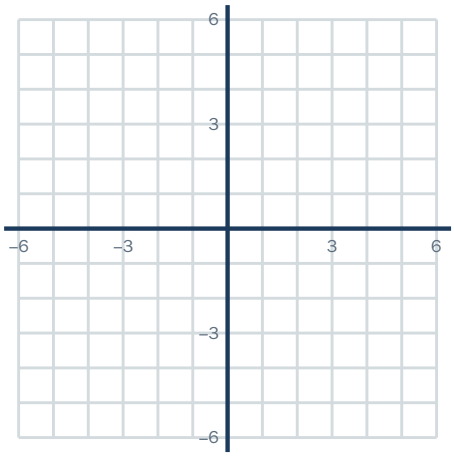
INEQUALITY	POINT	THE SENTENCE	YES OR NO
$y > 2x + 1$	(1, 5)		
$y > 2x + 1$	(2, 5)		
$y \geq 2x + 1$	(2, 5)		

$y \leq -x + 3$	(0, 0)
	(3, 0)

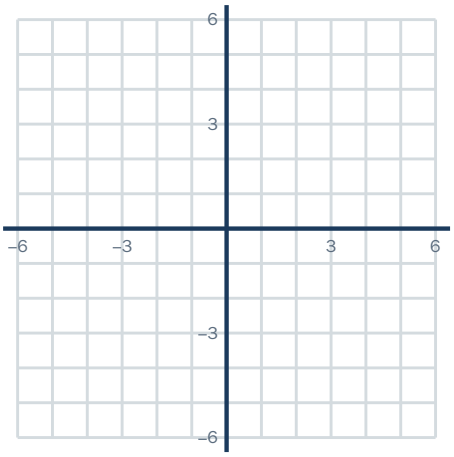
Part C · Draw the boundary

Draw each boundary line from m and b, dashed or solid as the sign says. Then mark the two points and write S (solution) or N next to each.

1. $y > x - 2$. Points (0, 0) and (4, 2).



2. $y \leq -1/2\ x + 1$. Points (2, 0) and (–2, 4).



Part D In your own words

1. How are the solutions of $y = x + 2$ different from the solutions of $y > x + 2$?

2. Why does a strict sign get a dashed line? Connect it to the open circle from Unit 1.

3. What is a half-plane, and what is a boundary line?

Part E Exit ticket

1. Is $(2, 7)$ a solution of $y > 2x + 1$? Is $(2, 5)$?

2. For $y \leq -x + 3$: boundary line, and dashed or solid?

Answer key

Part A. $y = 3x - 2$ dashed; $y = 1/2\ x + 4$ solid; $y = -x$ dashed; $y = 5$ solid; $y = -2x + 7$ solid.

Part B. $5 > 3$ yes. $5 > 5$ no (dashed edge). $5 \geq 5$ yes (solid edge). $0 \leq 3$ yes. $0 < 0$ no (dashed edge).

Part C. 1. Dashed line through (0, –2) with slope 1; (0, 0) S, (4, 2) N (on the dashed edge). 2. Solid line through (0, 1) with slope –1/2; (2, 0) S (on the solid edge), (–2, 4) N.

Part D. 1. Only the line, versus the whole half-plane above it with the line left out. 2. Strict means the boundary values do not count, like an open circle. 3. One whole side of a line; the edge of the region, the line with an equals sign.

Part E. 1. Yes; no. 2. $y = -x + 3$, solid.