Unit 6 · Graphing Linear Inequalities Cheat Sheet

Unit 6 focus: graphing linear inequalities in two variables

1 KEY VOCABULARY

boundary line	The line from replacing the symbol with =.	$y = 2x - 1$
half-plane	The region on one side of the boundary.	shaded side
test point	A point not on the line used to pick the side.	$(0, 0)$
solution region	All points (x, y) that make it true.	the shading

2 SOLID OR DASHED?

Symbol	Boundary	Points on the line
$<$ **or** $>$	**dashed**	not solutions
$\leq$ **or** $\geq$	**solid**	solutions

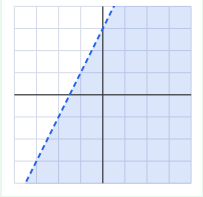
In $y = mx + b$ form: $y >$ or $y \geq$ shades **above**; $y <$ or $y \leq$ shades **below**.

3 GRAPH A LINEAR INEQUALITY

1. Write in $y = mx + b$ form. 2. Draw the boundary (solid or dashed). 3. Test a point. 4. Shade.

Example: $y < 2x + 3$
Boundary: dashed $y = 2x + 3$
Test $(0, 0)$**:** $0 < 3$ true
Shade: the side with $(0, 0)$ (below)

Answer: dashed line, shade below



4 REWRITE FIRST

Solve for y. Flip the sign if you divide by a negative.

Example: $3x - y \geq 6$
Subtract $3x$**:** $-y \geq -3x + 6$
Divide by -1**, flip:** $y \leq 3x - 6$

Answer: solid line, shade below

5 USING A TEST POINT

$y > 2x - 1$ with $(0, 0)$: $0 > -1$	**true: shade its side**
$3x - y \geq 6$ with $(0, 0)$: $0 \geq 6$	**false: shade the other side**
If the line passes through $(0, 0)$	**test** $(1, 0)$ **instead**

6 QUICK REMINDERS & COMMON MISTAKES

✓ Do remember

- Dashed for $<$, $>$; solid for $\leq$, $\geq$.
- Use a test point to choose the side.
- Check one point from the shading in the inequality.

✗ Common mistakes

- Solid line for $<$: use dashed
- Forgetting to flip: when dividing by a negative
- Testing a point on the line: pick one off the line

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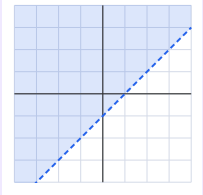
More practice: systems of inequalities and feasible regions

1 WRITE AN INEQUALITY FROM A GRAPH

Find the boundary line, then read solid/dashed and the shading.

Example: Dashed line through $(0, -1)$ with slope 1, shaded above.
Boundary: $y = x - 1$
Dashed, above: $>$

Answer: $y > x - 1$

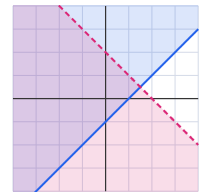


2 SYSTEMS OF INEQUALITIES

Graph each inequality. The solution is where the shadings **overlap**.

Example: $y \geq x - 1$ and $y < -x + 2$
Line 1: solid, shade above
Line 2: dashed, shade below

Answer: the overlap (left wedge)



3 IS A POINT A SOLUTION?

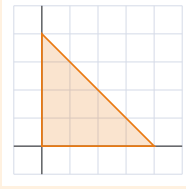
$(0, 0)$ in $y \geq x - 1$: $0 \geq -1$ ✔ and $y < -x + 2$: $0 < 2$ ✔	**yes**
$(3, 0)$: $0 \geq 2$ ✘	**no**
A point on a dashed line	**not a solution**

4 FEASIBLE REGION

The region that meets every constraint (often $x \geq 0$, $y \geq 0$ in context).

Example: $x \geq 0$, $y \geq 0$, $x + y \leq 4$
Corners: $(0, 0)$, $(4, 0)$, $(0, 4)$

Answer: the shaded triangle



5 IN CONTEXT

Define variables, write a constraint, then keep points that make sense (whole numbers, not negative).

Example: Pens cost \$2, notebooks \$5; spend at most \$30.
Constraint: $2p + 5n \leq 30$
Try $(5, 4)$**:** $10 + 20 = 30 \leq 30$ ✔

Answer: 5 pens and 4 notebooks works

6 CHECK YOURSELF

- Did I solve for y (and flip if I divided by a negative)?
- Is each boundary solid or dashed correctly?
- Did a test point decide the shading?
- For a system, is my answer the overlap, not everything shaded?