Match It and Write It

Students read a graphed half-plane and write its inequality from three clues (boundary, line style, shaded side), and match an inequality to its graph by elimination in the same order, extending the Unit 3 elimination habit.

TIME	40 minutes (one student with a parent or tutor, or a small group)
WHO	Math 1 (algebra readiness), about age 12. Follows Unit 5, Lessons 1 and 2.
MATERIALS	Student worksheet (PDF), the Deep Dive 5 interactive page for this lesson, pencil, graph paper
PRIOR KNOWLEDGE	Reading m and b off a graph (Unit 3, Lesson 2). Match by elimination for lines (Unit 3). The edge rule and shading (Lessons 1 and 2).
STANDARDS	NC Math 1 NC.M1.A-REI.12; NC.M1.A-CED.3 (represent constraints by inequalities and interpret solutions).
KEEP OUT	Systems (Unit 6). Plugging in points as the method.

Learning goals

1. Write the inequality of a graphed region from the three clues: boundary (m and b), style (dashed or solid), side (above or below), including vertical and horizontal boundaries.
2. Match an inequality to its graph by elimination in the order boundary, style, side, and name the clue that ruled out each wrong graph.
3. Use a point only as a final check, never as the way to decide.

Vocabulary: say both, every time

The rule for the whole lesson: whenever the adult or the student says a math word, they follow it with the plain-English version. Proper term first, plain English second, until the student does it without being asked.

TERM	LOOKS LIKE	PLAIN ENGLISH
Strict, inclusive	dashed, solid	< or > versus ≤ or ≥.
Boundary	m and b	Clue 1.
Side	above or below	Greater or less: clue 3.
Eliminate	cross out with a reason	Boundary, style, side.

> THE ONE SENTENCE TO SAY OUT LOUD
>
> Three clues: boundary, style, side. Dashed is strict, solid is inclusive. Above is greater, below is less. Boundary first when eliminating.

Lesson timeline (40 minutes)

0:00 to 0:05	Warm-up: Lesson 2 backward. Show a shaded region. Ask what three things you decided when you drew one in Lesson 2 (the boundary, dashed or solid, the side). Those are the clues.
0:05 to 0:15	Mini-lesson: read and write. Two worked regions: read m and b, then the style, then the side, and write the inequality. Then the vertical and horizontal cases. Check one with (0, 0) and say the check is optional.
0:15 to 0:27	Eliminate. One inequality, four graphs. Boundary first: cross out. Style: cross out. Side: cross out. Say the clue each time. Then the three interactive match sets and the Read these regions grids.
0:27 to 0:36	Practice. The practice problems or Worksheet Parts A to C. Same buttons: Hint, Show next step, Reveal answer, Hide help.
0:36 to 0:40	Exit ticket. Worksheet Part E. Success looks like $y \geq 3x - 2$, and the dashed graph because the sign is strict.

Misconceptions to listen for

- **Side before boundary.** A wrong boundary rules a graph out no matter what. Boundary first.
- **Dashed means less than.** Dashed means strict, in either direction.
- **Reading above as greater on a non-solved form.** When you read a graph you get $y = mx + b$, so above is greater; the trap is only when eliminating from a form like $2x + y > 5$ (solve for y first).
- **Plugging in points to decide.** The clues decide; a point only checks.
- **Forgetting the vertical case has no m and b.** Read $x = a$ and the side.

Support and stretch

Support

Give the three clues as a card in order. Have the student write the three answers (boundary, style, side) before assembling the inequality. Use two colors: one for the boundary, one for the shading.

Stretch

Give a region whose boundary passes through (0, 0), so the test point must change. Ask for two different inequalities that produce the same region (e.g. $y > 2x - 3$ and $2y > 4x - 6$). Ask for the inequality of the unshaded side.

Where this goes next

Lesson 4: inequalities in the real world. A constraint becomes an inequality, the region is every combination allowed, and whole-number cases become dots. Then a preview of Unit 6, where two regions overlap.

> THE HABIT TO BUILD
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> Boundary, style, side, in that order, both when reading a graph and when eliminating graphs.