Other Forms of a Line

An optional short lesson. Students meet standard form (for fast intercepts) and point-slope form (a shortcut from a slope and a point), and practice the one move that matters: rewriting into y = mx + b.

TIME	30 minutes (one student with a parent or tutor, or a small group)
WHO	Math 1 (algebra readiness), about age 12. Follows Unit 3, Lesson 5. Optional: skip or fold into Lesson 4 if the unit runs long.
MATERIALS	Student worksheet (PDF), the Deep Dive 5 interactive page for this lesson, pencil
PRIOR KNOWLEDGE	Solving for a letter by adding the opposite and multiplying by the reciprocal (Unit 1). y = mx + b, intercepts, and put-the-point-in (Lessons 2 and 4).
STANDARDS	NC Math 1 NC.M1.A-CED.4 (rearrange formulas to highlight a quantity), NC.M1.F-IF.7. Standard and point-slope forms as alternate representations.
KEEP OUT	No new graphing method. Everything ends in y = mx + b.

Learning goals

1. Find both intercepts of a line in standard form by setting x = 0 and then y = 0.
2. Rewrite standard form and point-slope form into y = mx + b using the Unit 1 moves, and read m and b.
3. Explain why y = mx + b stays the workhorse.

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
Standard form	$Ax + By = C$	Good for intercepts.
Point-slope form	$y - y_1 = m(x - x_1)$	A shortcut from a slope and a point.
Slope-intercept form	$y = mx + b$	Shows m and b; the workhorse.
Rewrite	get y alone	Add the opposite, multiply by the reciprocal.

> **THE ONE SENTENCE TO SAY OUT LOUD**
> $x = 0$ for the y-intercept, $y = 0$ for the x-intercept. Then get y alone: $y = mx + b$.

Lesson timeline (30 minutes)

0:00 to 0:04	**Warm-up.** Hand the student 2x + 3y = 12 and ask for m. Let them notice they cannot read it yet. That is the lesson.
0:04 to 0:14	**Mini-lesson.** Intercepts from standard form (x = 0, then y = 0), then the rewrite: add the opposite of 2x, multiply by 1/3, read m and b, and check b against the y-intercept. Then point-slope: distribute, add the opposite, done.
0:14 to 0:26	**Practice.** The practice problems or Worksheet Parts A to C. Same buttons: Hint, Show next step, Reveal answer, Hide help. Check every rewrite against an intercept.
0:26 to 0:30	**Exit ticket.** Worksheet Part D. Success looks like: (0, 5) and (2, 0); y = −5/2 x + 5; y = 4x + 9.

Misconceptions to listen for

- **Reading A as the slope.** Standard form hides m. Rewrite first.
- **Dividing only part of the right side.** Multiply the whole side by the reciprocal.
- **Sign slips with y − (−3).** It is y + 3.
- **Thinking three forms means three methods.** One method: get to y = mx + b.

Support and stretch

Support

Do the rewrite as a two-line template with the moves written in words beside each line. Use standard forms whose B divides evenly at first.

Stretch

Ask for the standard form of y = −2/3 x + 4 (clear the fraction). Ask what happens to the intercept trick when C = 0.

Where this goes next

Unit 4: parallel and perpendicular lines. Same slope means parallel; perpendicular slopes are negative reciprocals. The family idea and the meaning of m carry straight over.

> THE HABIT TO BUILD
> When a line is not in y = mx + b, get y alone first. Then read the two numbers.