Other Forms of a Line

Standard form Ax + By = C finds both intercepts fast. Point-slope form is a shortcut from a slope and a point. Rewrite either into y = mx + b, the workhorse, to read m and b.

1 THE VOCABULARY
Words we use

Standard form Ax + By = C. Intercepts: x = 0 for the y-intercept, y = 0 for the x-intercept.

Point-slope form $y - y_1 = m(x - x_1)$: slope m, point (x_1, y_1).

Slope-intercept form y = mx + b: shows the two numbers with the two jobs.

Rewrite get y alone: add the opposite of the x term, multiply by the reciprocal of the number on y.

Intercepts two points, enough to draw the line.

- **Watch out for these.**
- Reading m off standard form. 2x + 3y = 12 does not have slope 2. Rewrite first.
- Forgetting to divide the whole right side by B: 3y = −2x + 12 gives y = −2/3 x + 4, not −2x + 4.
- Sign slips in point-slope: y − (−3) is y + 3.
- Thinking the new forms replace y = mx + b. They do not; they get rewritten into it.

2 THE METHOD
Rewrite into y = mx + b

1. **FROM STANDARD FORM** add the opposite of the x term to both sides, then multiply both sides by the reciprocal of the number on y.
2. **FROM POINT-SLOPE FORM** distribute m, then add the opposite of the number next to y to both sides.
3. **READ AND GRAPH** m and b as always: plot b, step by m.
4. **INTERCEPTS THE FAST WAY** in standard form, put x = 0 and solve; put y = 0 and solve.

> **WHY STANDARD FORM IS GOOD FOR INTERCEPTS**
> Setting one letter to 0 wipes out its whole term, leaving a one-step equation in the other letter. That is what makes both crossings quick to find.

3 STANDARD FORM
2x + 3y = 12

x = 0: 3y = 12, y = 4	the y-intercept, (0, 4)
y = 0: 2x = 12, x = 6	the x-intercept, (6, 0)
2x + 3y + (−2x) = 12 + (−2x)	add the opposite of 2x to both sides: 3y = −2x + 12
13 × 3y = 13 × (−2x + 12)	multiply both sides by the reciprocal of 3; distribute on the right
y = −23x + 4	m = −2/3, b = 4. b matches the y-intercept found above

> **CHECK WITH THE X-INTERCEPT**
> Put x = 6 into y = −2/3 x + 4: −4 + 4 = 0. The point (6, 0) is on the line.

> **SAY IT OUT LOUD**
> x = 0 for the y-intercept, y = 0 for the x-intercept. Then get y alone and read m and b.

Unit 3, Lesson 6 in one line: other forms are fine to meet, but the move is always the same: rewrite into y = mx + b and read the two numbers.