Slope-Intercept Form: y = mx + b

Every line is y = mx + b. b is the y-intercept, where the line crosses the y-axis, the value when x is 0. m is the slope, the steepness and direction. Read them, graph from them, read them off a graph.

1 THE VOCABULARY
Words we use

Slope-intercept form — y = mx + b: the form that shows the slope and the y-intercept.

b, the y-intercept — where the line crosses the y-axis, the value when x = 0, the starting value.

m, the slope — rise over run: how much y changes for each step of x. Steepness and direction.

Invisible 1 — y = x + 3 has m = 1; y = –x has m = –1.

Missing b — y = –2x has b = 0: through the origin.

Missing x — y = 5 has m = 0: a flat line.

- Watch out for these.
- Reading the wrong number as m. m is the number on the x, wherever it sits: y = 3 + 2x has m = 2.
- Losing the sign of b: y = 4x – 7 has b = –7.
- Starting the graph anywhere. Plot b first, at (0, b).
- Stepping the run up and the rise right. Rise is up or down, run is to the right.

2 THE METHOD
Graph from the equation

1. PLOT b a dot on the y-axis at (0, b). The starting dot.
2. STEP BY m read m as rise over run. From the dot, up (or down) the rise, right the run, new dot. Repeat once more.
3. DRAW THE LINE through the dots, arrows on both ends.
4. TO READ A GRAPH, REVERSE IT b is where it crosses the y-axis; m is rise over run between two grid corners.
5. TO MATCH AN EQUATION TO A GRAPH eliminate: the sign of m first (falls, climbs, flat), then b (where it crosses the y-axis), then the size of m (steep or gentle). Cross out, do not plug in.

WHY B IS ON THE Y-AXIS

The y-axis is the line where x = 0. Put x = 0 into y = mx + b: the mx part is m × 0 = 0, so y = b. Every line in this form passes through (0, b), whatever m is.

3 FROM EQUATION TO GRAPH
y = –34x + 2

y = –34x + 2	read it: m = –34 (the number on x), b = 2 (standing alone)
b = 2: plot (0, 2)	the y-intercept, where it crosses the y-axis. The starting dot
m = –34: down 3, right 4	rise –3, run 4. From (0, 2) to (4, –1)
again: (8, –4)	or step the other way, up 3 and left 4, to (–4, 5)
draw the line	through (–4, 5), (0, 2), (4, –1): a gentle falling line

CHECK WITH THE TABLE

x = 0 gives 2 (that is b). x = 4 gives –3 + 2 = –1. The dots agree with the rule.

SAY IT OUT LOUD

b is the starting point on the y-axis. m is the steepness and direction. Plot b, step by m, draw the line.