Parallel Lines Share a Slope

Parallel lines never cross: same slope, different y-intercept. Same m, different b. To write a parallel line through a point, keep m and use the point to find b.

1 THE VOCABULARY
Words we use

Parallel never cross, always the same distance apart: same m, different b.

Slope, m steepness and direction, rise over run. Parallel lines share it.

y-intercept, b where the line crosses the y-axis. Parallel lines differ here.

Same line same m and same b: one line written twice.

Vertical, horizontal any two vertical lines are parallel (by sight); any two horizontal lines are parallel (slope 0).

- Watch out for these.
- Calling lines with the same b parallel. Same starting point is not the same tilt. Parallel is same m.
- Comparing slopes before rewriting. 2x - y = 3 has slope 2, not 2x.
- Changing m when writing the parallel line. Keep it; only b changes.
- Thinking close slopes are parallel. 1 and 5/4 are not the same; the lines cross somewhere.

2 THE METHOD
A parallel line through a point

1. **KEEP THE SLOPE** parallel means the same m. Read it off y = mx + b (rewrite first if needed).
2. **PUT THE POINT IN** y = mx + b with the kept m and the point's x and y. One unknown left: b.
3. **SOLVE FOR b, WRITE IT** add the opposite of the mx part to both sides. Then y = mx + b.
4. **CHECK** the point makes it true, and the new line has the same tilt as the old one.

WHY SAME SLOPE MEANS NEVER CROSSING

Two lines with the same m climb at the same rate. The gap between them at x = 0 is the difference of their b values, and every step to the right adds the same m to both, so the gap never changes. They never meet.

3 PARALLEL THROUGH A POINT
Parallel to y = 2x – 5 through (3, 4)

m = 2	keep the slope of the given line
4 = 2 × 3 + b	put the point (3, 4) into y = mx + b
4 = 6 + b	multiply
b = –2	add –6 to both sides
y = 2x – 2	the parallel line: same tilt, slid up 3 from the original
check: 2 × 3 – 2 = 4	the point is on it

ON THE GRID

Plot both lines. They run side by side, the same distance apart everywhere, and the new one passes through (3, 4).

SAY IT OUT LOUD

Same m, different b. Keep the slope, use the point to find b.

Unit 4, Lesson 1 in one line: parallel lines have the same slope and different y-intercepts; keep m, use the point to find b.