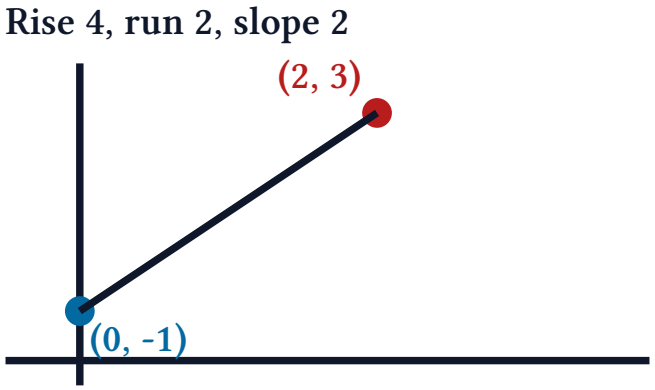
Mathematics 10C

Unit RF: Relations and functions

Equations of a line

Equation from a graph

- The line passes through (0, −1) and (2, 3).
- The rise is 4 and the run is 2, so the slope is 2.
- The equation is $y = 2x - 1$.



Writing an equation

- From slope 2 and the point (1, 4), write $y - 4 = 2(x - 1)$.
- A parallel line keeps that slope. A perpendicular line uses the slope that multiplies with it to -1.

Key terms

slope-intercept equation

The equation of a line written so the slope and the y-intercept are the two numbers you can see. (y = mx + b)

two-point slope

The slope you get by subtracting the coordinates of two points on the line. (m = (y2 - y1)/(x2 - x1))

parallel slope

The slope you copy from a line when the new line must run in the same direction. (same m)

perpendicular slope

The slope that multiplies the given slope to make −1, so the lines meet at a right angle. (m1 times m2 = -1)

Two points on a pay line

- The pay is $50 at 2 hours and $90 at 6 hours.
- The slope is $(90 - 50)/(6 - 2) = 10$ dollars per hour.
- Using $(2, 50)$: $y - 50 = 10(x - 2)$, so $y = 10x + 30$.

Checking a pay equation

- At x = 2, y = 10 × 2 + 30 = 50.
- At x = 6, y = 10 × 6 + 30 = 90.
- At x = 0, the pay is $30.

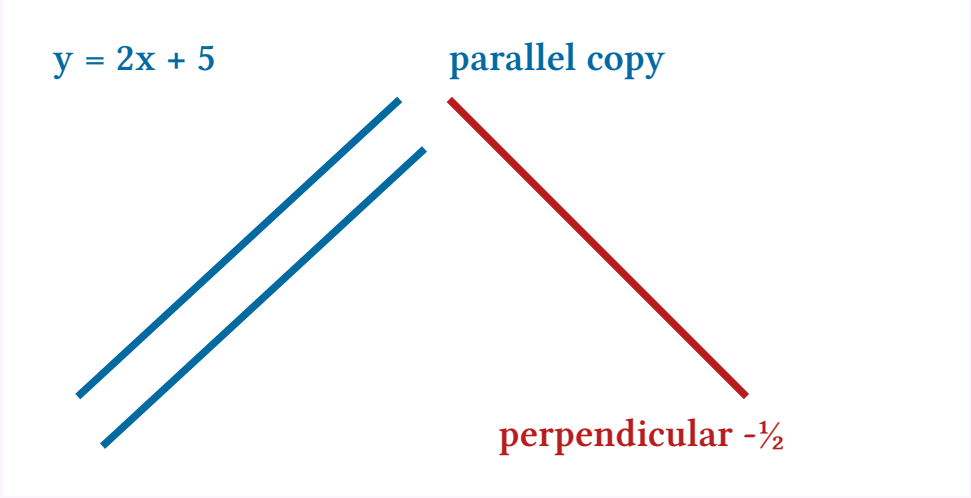
y = 10x + 30

x=2 ⟶ y=50

x=6 ⟶ y=90

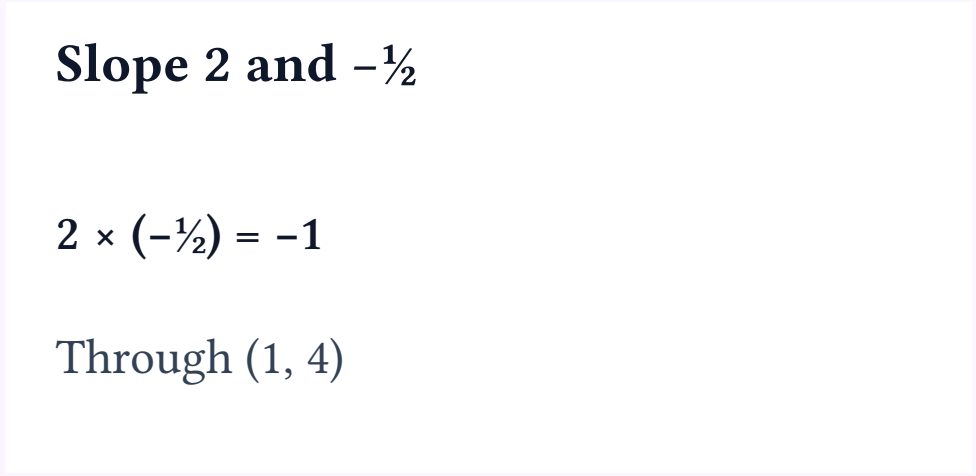
A parallel line through (1, 4)

- The line $y = 2x + 5$ has slope 2.
- The parallel line through (1, 4) keeps slope 2.
- The equation $y - 4 = 2(x - 1)$ simplifies to $y = 2x + 2$.



A perpendicular line through (1, 4)

- The slope perpendicular to 2 is $-\frac{1}{2}$.
- Check: $2 \times (-\frac{1}{2}) = -1$.
- The equation is $y - 4 = (-\frac{1}{2})(x - 1)$.



Writing and testing

- The line through (0, 1) and (3, 7) has slope 2.
- The equation is $y = 2x + 1$.
- At $x = 3$, $y = 7$.

Quick check

- A line through $(0, -1)$ with slope 4 has equation $y = 4x - 1$.
- A line parallel to it through $(2, 3)$ has equation $y - 3 = 4(x - 2)$.

Testing an equation

- Build the slope, then anchor a point.
- Substitute a known point as a check.