Mathematics 10C

Unit RF: Relations and functions

Forms of a line

One line, three equations

- The equation y = $-3x + 6$ has slope −3 and y-intercept 6.
- The equation $3x + y - 6 = 0$ rearranges to that same line.
- The equation y − 6 = −3(x − 0) is the same line again.

Three forms

- Slope-intercept form shows m and b, as in $y = -3x + 6$.
- General form sets one side to 0, as in $3x + y - 6 = 0$.
- Slope-point form starts from a known point, as in $y - 6 = -3(x - 0)$.

Key terms

slope-intercept form

A linear equation that shows the slope m and the y-intercept b. (y = mx + b)

general form

A linear equation written as a sum of terms equal to 0. (Ax + By + C = 0)

slope-point form

A linear equation built from the slope and one point on the line. (y - y1 = m(x - x1))

Two slope-point versions

- Using $(0, 6)$: $y - 6 = -3(x - 0)$.
- Using $(2, 0)$: $y - 0 = -3(x - 2)$.
- Both simplify to $y = -3x + 6$.

Slope −3

$y - 6 = -3(x - 0)$

$y = -3(x - 2)$

From general form to slope and intercept

- Start with $2x - 4y + 8 = 0$.
- Then $4y = 2x + 8$, so $y = (\frac{1}{2})x + 2$.
- The slope is $\frac{1}{2}$ and the y-intercept is 2.

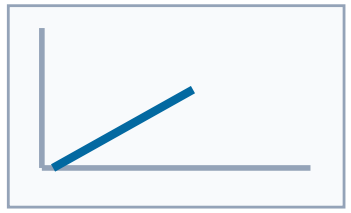
Graphing from any form

- For $y = (\frac{1}{2})x + 2$, start at (0, 2) and rise 1 across a run of 2.
- For $2x - 4y + 8 = 0$, the intercepts are (−4, 0) and (0, 2).
- For $y - 2 = (\frac{1}{2})(x - 4)$, plot (4, 2) and use the slope.



Stair

(0, 2), rise 1 run 2



Intercepts

(−4, 0) and (0, 2)

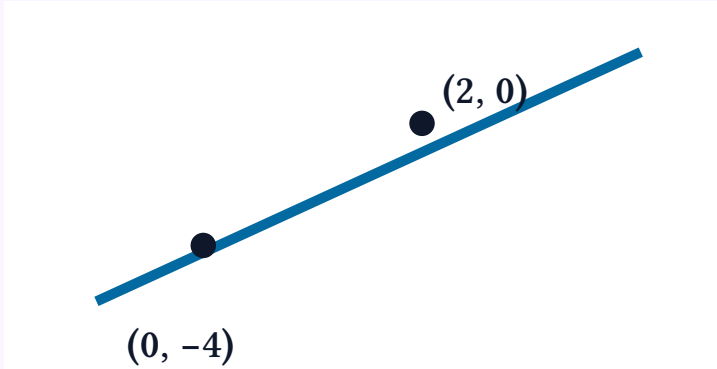


Point

(4, 2), slope ½

Matching three equations

- The set is $y = 2x - 4$.
- The set includes $x - (\frac{1}{2})y - 2 = 0$.
- The set includes $y - 0 = 2(x - 2)$.
- All three simplify to $y = 2x - 4$.



$y = 2x - 4$

$x - \frac{1}{2}y - 2 = 0$

$y = 2(x - 2)$

Rewriting $y - 1 = 4(x - 2)$

- Expand to $y - 1 = 4x - 8$.
- Then $y = 4x - 7$.
- The slope is 4 and the y-intercept is -7.

Quick check

- The equation $3x + y - 6 = 0$ rewrites as y = $-3x + 6$.
- The graph starts at (0, 6) and falls 3 for a run of 1.

Choosing a form

- Use slope-intercept form when you want m and b.
- Use slope-point form when you already know a point and a slope.