Unit 5 · Linear Functions and Graphing Cheat Sheet

Unit 5 focus: slope, rate of change, slope-intercept form and graphing lines

1 KEY VOCABULARY

slope	Steepness: vertical change ÷ horizontal change.	$m = 2$
rate of change	Change in y for each 1 unit change in x.	\$3 per hour
x-intercept	Where the line crosses the x-axis ($y = 0$).	$(4, 0)$
y-intercept	Where the line crosses the y-axis ($x = 0$).	$(0, -3)$
linear	Constant rate of change; graph is a line.	$y = 2x - 5$

2 SLOPE FROM TWO POINTS

$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$. Keep the points in the same order.

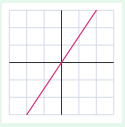
Example: Slope through $(-2, 3)$ and $(4, -1)$.

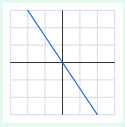
Substitute: $m = \frac{-1 - 3}{4 - (-2)} = \frac{-4}{6}$

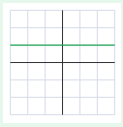
Answer: $m = -\frac{2}{3}$

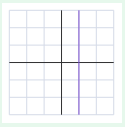
3 TYPES OF SLOPE

Rises left to right: **positive**. Falls: **negative**. Horizontal: **zero** ($y = b$). Vertical: **undefined** ($x = a$).


positive


negative


zero


undefined

4 SLOPE-INTERCEPT FORM

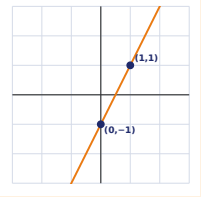
$y = mx + b$: m is the slope, b is the y-intercept $(0, b)$.

Example: Graph $y = 2x - 1$.

Plot: the y-intercept $(0, -1)$

Slope 2: up 2, right 1 to $(1, 1)$

Answer: draw the line



5 SLOPE FROM A TABLE

x	0	1	2	3
y	1	4	7	10

y goes up 3 each time x goes up 1, so $m = 3$ and $b = 1$: $y = 3x + 1$.

6 QUICK REMINDERS & COMMON MISTAKES

✔ Do remember

- Slope = rise over run = change in y over change in x.
- The y-intercept is $(0, b)$.
- Check by plotting points or using a table.

✘ Common mistakes

- $\frac{y_2 - y_1}{x_1 - x_2}$: mixed order: keep both differences the same way
- run over rise: it is rise over run
- b is the x-intercept: b is the y-intercept

Unit 5 · Linear Functions and Graphing Cheat Sheet

More practice: writing equations of lines, intercepts, parallel and perpendicular lines

1 FORMS OF A LINE

Form	Equation	Use it when…
Slope-intercept	$y = mx + b$	you know m and b
Point-slope	$y - y_1 = m(x - x_1)$	you know m and a point
Standard	$Ax + By = C$	finding intercepts

Standard form: integers, $A \geq 0$. $y = 2x - 4 \rightarrow 2x - y = 4$.

2 SLOPE AND A POINT

Use point-slope form, then simplify.

Example: Slope 3 through $(2, -1)$.
Point-slope: $y + 1 = 3(x - 2)$
Simplify: $y = 3x - 7$
Answer: $y = 3x - 7$

3 TWO POINTS

Find the slope first, then use one point.

Example: Through $(1, 2)$ and $(4, -1)$.
Slope: $m = \dfrac{-1 - 2}{4 - 1} = -1$
Point $(1, 2)$**:** $y - 2 = -1(x - 1)$
Answer: $y = -x + 3$

4 FINDING INTERCEPTS

x-intercept: set $y = 0$. y-intercept: set $x = 0$.

Example: $2x - 3y = 12$
$y = 0$**:** $2x = 12,\ x = 6$
$x = 0$**:** $-3y = 12,\ y = -4$
Answer: $(6, 0)$ **and** $(0, -4)$

5 PARALLEL & PERPENDICULAR

Lines	Slopes	Example (m = 4)
parallel	equal: $m_1 = m_2$	4
perpendicular	opposite reciprocals: $m_1 \cdot m_2 = -1$	$-\frac{1}{4}$

Parallel lines never meet; perpendicular lines meet at a right angle.

6 SLOPE & INTERCEPT IN CONTEXT

Slope = rate (with units); y-intercept = starting value.

Example: A bike rental costs $5 plus $3 per hour.
Model: $y = 3x + 5$
Slope 3: $3 more for each hour
Intercept 5: the $5 fee when $x = 0$
Answer: $y = 3x + 5$