Writing the Equation of a Line

Whatever you are given, find m (the slope, rise over run) and b (the y-intercept, the value when x is 0), and write y = mx + b. Then find the x-intercept by putting y = 0.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Slope-intercept form	y = mx + b: the form that shows the slope and the y-intercept.	Find m, find b, write it.
Slope (m)	The rate of change: rise over run, how much y changes per step of x.	From a graph, count. From a table, the constant change. From two points, subtract.
y-intercept (b)	Where the line crosses the y-axis: the value of y when x is 0. The starting value.	Read it off the graph or the x = 0 row, or put a point into y = mx + b and solve.
x-intercept	Where the line crosses the x-axis: the value of x when y is 0. When the story hits zero.	Put y = 0 in and solve for x. Write it as (x, 0).
Put the point in	A point on the line makes y = mx + b true, so its x and y can be substituted.	With m known, solve the one-step equation for b.
Walk the table back	If a table skips x = 0, step backward using the constant change until you reach it.	Or just put one row into y = mx + b.

Part A From a graph

Each line is described by where it crosses the y-axis and one more grid corner. Write the equation.

1. Crosses at (0, 1), passes through (2, 7).

2. Crosses at (0, 5), passes through (4, 3).

3. Crosses at (0, –3), passes through (3, –3).

Part B From a table

Find m from the constant change and b from the x = 0 row. If there is no x = 0 row, walk back or put a row in.

TABLE	M	B	EQUATION
x: 0, 1, 2, 3 y: 2, 6, 10, 14			
x: 0, 2, 4 y: 9, 8, 7			

x: 4, 5, 6 y: 13, 16, 19

Part C From two points

m first, then put one point in and solve for b. Check with the other point.

1. (1, 3) and (4, 12)

2. (–2, 8) and (2, 0)

3. (3, 1) and (9, 4)

Part D From a slope and a point

1. Slope 2 through (3, 1)

2. Slope –3 through (–1, 5)

3. Slope 1/4 through (8, 0)

Part E Both intercepts

Write each intercept as a point. For the story, say what each means.

1. $y = 4x - 8$

2. $y = -2x + 10$

3. A pool has 800 gallons and drains 50 a minute: $y = -50x + 800$.

Part F Exit ticket

1. Line through (1, 4) and (3, 10):

2. Slope 4 through (2, 3):

3. Intercepts of $y = -5x + 20$:

Answer key

Part A. 1. $y = 3x + 1$. 2. $y = -1/2\ x + 5$. 3. $y = -3$ (flat).

Part B. m 4, b 2, $y = 4x + 2$. m $-1/2$, b 9, $y = -1/2\ x + 9$. m 3, b 1 (walk back: 10, 7, 4, 1), $y = 3x + 1$.

Part C. 1. m 3, b 0, $y = 3x$. 2. m -2, b 4, $y = -2x + 4$. 3. m 1/2, b $-1/2$, $y = 1/2\ x - 1/2$.

Part D. 1. $y = 2x - 5$. 2. $y = -3x + 2$. 3. $y = 1/4\ x - 2$.

Part E. 1. (0, –8), (2, 0). 2. (0, 10), (5, 0). 3. (0, 800): starts full at 800 gallons; (16, 0): empty at 16 minutes.

Part F. 1. $y = 3x + 1$. 2. $y = 4x - 5$. 3. (0, 20) and (4, 0).