

Algebra 1 - Writing Linear Equations and Functions - Lesson

Common Core F-LE.A.2, F-BF.A.1a, A-CED.A.2 · maths-pdf.fr/en/

To write the equation of a line, find the slope m and the y-intercept b , then write $y = mx + b$. From two points, compute the slope as rise over run and substitute a point to find b . Parallel lines share a slope, and perpendicular lines have slopes that are negative reciprocals.

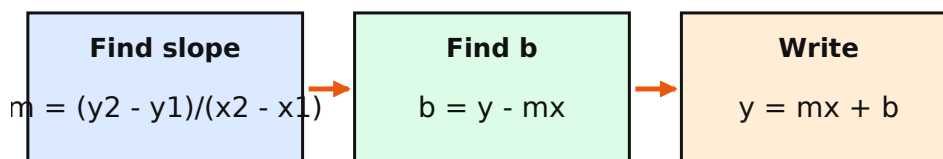
Algebra 1 · Common Core State Standards: **F-LE.A.2, F-BF.A.1a, A-CED.A.2**

Key facts

- Slope from two points: $m = (y_2 - y_1)/(x_2 - x_1)$.
- Find b by substituting a point into $y = mx + b$.
- Point-slope form: $y - y_1 = m(x - x_1)$.
- Parallel lines have equal slopes; perpendicular slopes are negative reciprocals.
- In a model, the rate is the slope and the starting amount is the y-intercept.

How do you write the equation of a line?

Every non-vertical line can be written as $y = mx + b$. You need the slope m and the y-intercept b . Which information you start with decides the method.



Three steps for writing the equation of a line.

1. Find the slope from two points: $m = \frac{y_2 - y_1}{x_2 - x_1}$.
2. Substitute the slope and one point into $y = mx + b$ and solve for b .
3. Write the equation using the slope and y-intercept.

Example: Write the line through $(1,3)$ and $(3,9)$. The slope is $\frac{9-3}{3-1} = 3$. Using $(1,3)$, $3 = 3(1) + b$, so $b = 0$. The equation is $y = 3x$.

Point-slope form

If a line has slope m and passes through (x_1, y_1) , then $y - y_1 = m(x - x_1)$. You can leave the answer in this form or solve for y .

How do you write an equation from a table?

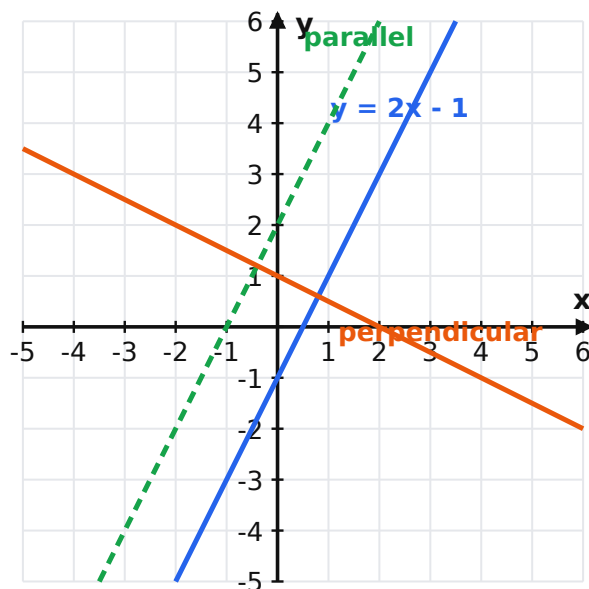
Check that the change in y is the same for equal steps in x . That change per step is the slope. Then find b .

x	1	2	3	4
y	7	10	13	16

Each step of 1 in x adds 3 to y , so the slope is 3. Then $b = 7 - 3(1) = 4$.

How do parallel and perpendicular lines relate?

Parallel lines have the same slope and never meet. Perpendicular lines meet at a right angle, and their slopes are negative reciprocals, such as 2 and $-\frac{1}{2}$.



Parallel lines have equal slopes. Perpendicular lines have slopes that are negative reciprocals.

How do you write a linear model from a situation?

A linear model has a constant rate and a starting amount. The rate is the slope and the starting amount is the y-intercept. A plumber who charges a \$45 trip fee and \$60 per hour has the function $C = 60h + 45$.

Total	\$45 fee	\$60 per hour x h
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Total cost = fixed fee + rate $\times$ hours, so $C = 60h + 45$.

In function notation, you can write $f(x) = mx + b$ for the line. If $f(0) = -4$ and $f(3) = 5$, the slope is $\frac{5 - (-4)}{3 - 0} = 3$ and $f(x) = 3x - 4$.

Questions about writing linear equations and functions

How do you write an equation from two points?

Find the slope with rise over run, then substitute the slope and one point into $y = mx + b$ to solve for b . Write the equation with m and b .

When do you use point-slope form?

Use it when you know the slope and one point that is not the y -intercept. Write $y - y_1 = m(x - x_1)$, then simplify if needed.

How can you tell if a table is linear?

If the x -values change by a constant step and the y -values change by a constant amount, the function is linear and that amount per step gives the slope.

What is the slope of a perpendicular line?

It is the negative reciprocal of the original slope. A line with slope 2 has a perpendicular line with slope $-1/2$.

How do you write a linear function from a word problem?

Identify the rate of change and the starting value. For a \$45 fee plus \$60 per hour, the function is $C = 60h + 45$.