

Line Shift Lab

Connect equations, tables, graphs and situations

GRADE 8 • 8.PFA.3

8.PFA.3 "The student will represent and solve problems, including those in context, by using linear functions and analyzing their key characteristics (the value of the y-intercept (b) and the coordinates of the ordered pairs in graphs will be..."

NAME _____

DATE _____

BUILD UNDERSTANDING

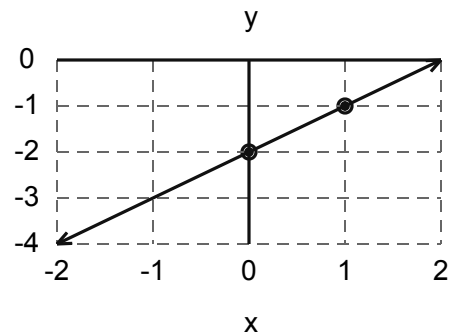
In $y = mx + b$, m is change in y divided by change in x , and b is y at $x = 0$. Adding b to $y = mx$ shifts the line vertically without changing its slope. Use a ruler. Abstract functions extend in both directions; context graphs here use only the stated interval.

WORKED EXAMPLE

Read the graphed line. Find m and b , then write its equation.

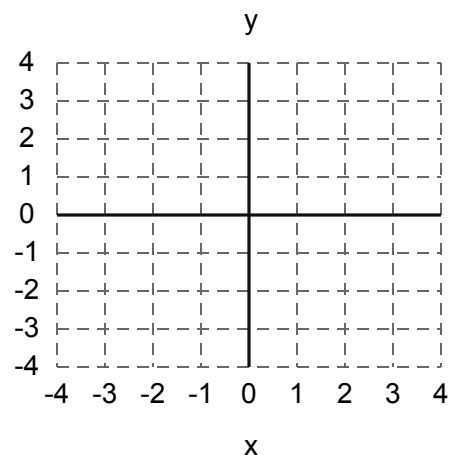
- From $(0, -2)$ to $(1, -1)$, $\text{rise/run} = 1/1 = 1$.
- The y -intercept is -2 , so $y = x - 2$.

Answer: $m = 1$; $b = -2$; $y = x - 2$.

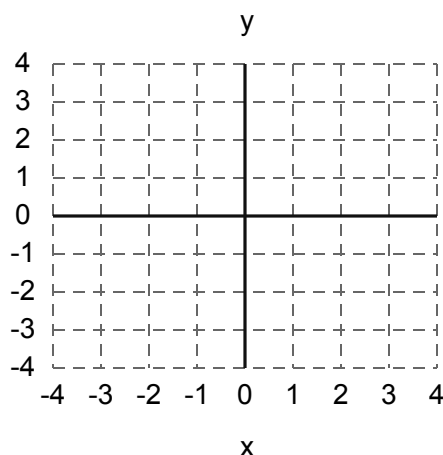


PRACTICE 4 problems

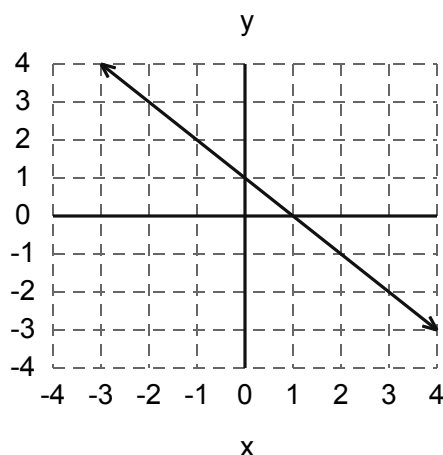
- 1** Graph $y = -x + 2$. Make a table for $x = -1, 0, 2$ and plot the three pairs. Draw the full line with arrows.



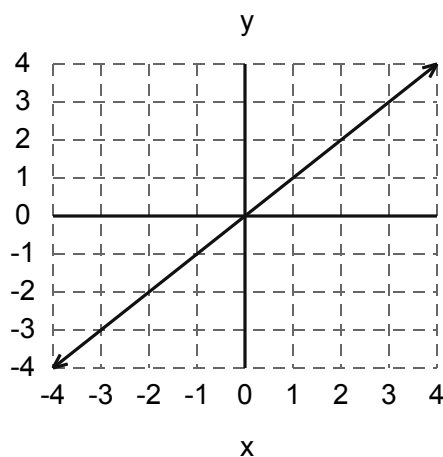
- 2** This table gives a linear function: $x = -2, 0, 2$; $y = -3, -1, 1$. Graph it, write its equation and identify the slope and y-intercept.



- 3** Read this graph. Make a table for $x = -2, 0, 2$. Then write $y = mx + b$ and explain how you found m .



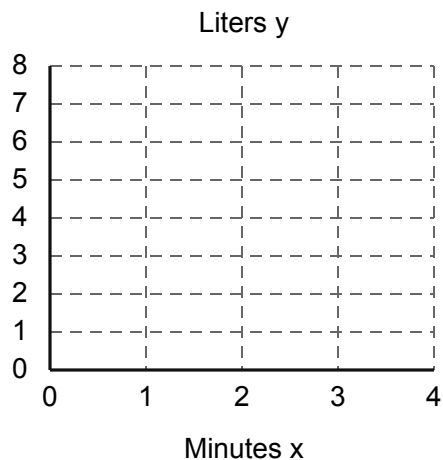
- 4** The solid line is $y = x$. Add $y = x - 3$ as a dashed line. Describe the vertical translation and what stays the same.



APPLY IT Show your work

A tank starts with 2 liters and fills at 1 liter per minute.

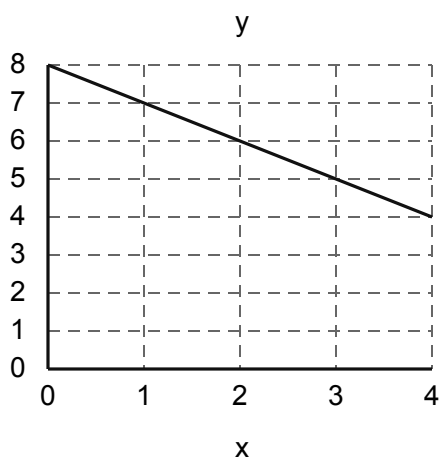
- 1** Let x be minutes and y be liters. Write the equation and a table for $x = 0, 2, 4$. Graph only 0-4 minutes; name the independent and dependent variables.



- 2** Create a realistic context for $y = 2x + 5$. Define x and y with units, explain 2 and 5, and find y when $x = 3$.

CHALLENGE One step up

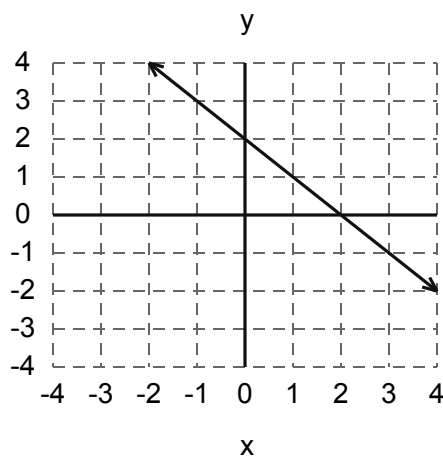
Create a context for this graph on 0-4. Define the variables and interpret its slope and intercept. Use your context to explain the value at $x = 3$.



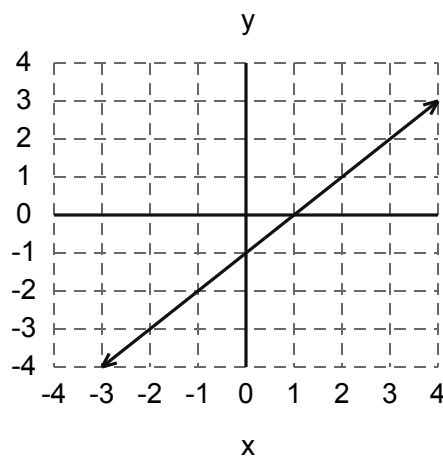
Check all requested representations. Require student-drawn lines for Practices 1, 2, 4 and Apply It 1. The table in Practice 2 has skipped x-values. Accept mathematically consistent original contexts. Grid intervals are one unit; all plotted coordinates and intercepts are integers.

PRACTICE 1

Table: $(-1, 3)$, $(0, 2)$, $(2, 0)$; the line is $y = -x + 2$.

**PRACTICE 2**

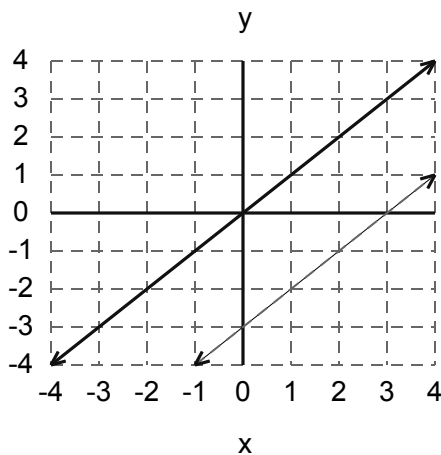
$y = x - 1$; $m = 1$; $b = -1$.

**PRACTICE 3**

$(-2, 3)$, $(0, 1)$, $(2, -1)$; $y = -x + 1$; rise/run = $-2/2 = -1$.

PRACTICE 4

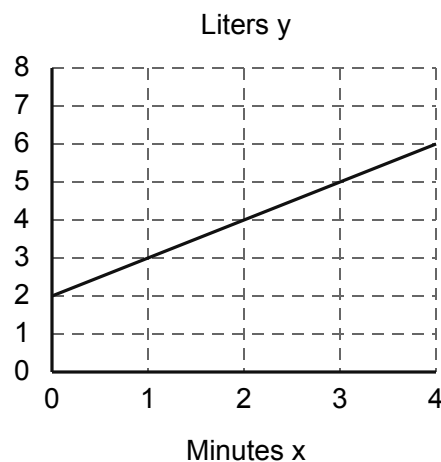
Shift down 3 units; slope stays 1. The dashed line is $y = x - 3$.



APPLY IT 1

$y = x + 2$; (0, 2), (2, 4), (4, 6). Independent: time; dependent: volume.

The starting volume is $b = 2$; the rate is $m = 1$ liter per minute.



APPLY IT 2

Example: total cost y dollars for x meters of ribbon, at \$2 per meter plus a \$5 fee; $y = 11$ at $x = 3$. The independent variable is ribbon length; the dependent variable is total cost. Other consistent contexts are valid.

CHALLENGE

Example: a container starts at 8 liters and loses 1 liter per minute. $y = -x + 8$; at 3 minutes, 5 liters remain.