

Line Form Lab

Use equations and graphs to reveal the same line.

GRADE 8 • 8.FGR.5.5

8.FGR.5.5 "Write and explain the equations $y = mx + b$ (slope-intercept form), $Ax + By = C$ (standard form), and $(y - y_1) = m(x - x_1)$ (point-slope form) as defining a linear function whose graph is a straight line to reveal and explain different..."

NAME _____

DATE _____

CONNECT THE REPRESENTATIONS

Slope-intercept form $y = mx + b$ reveals slope m and y -intercept b . Standard form $Ax + By = C$ helps find intercepts; here B is nonzero so y is a function of x . Point-slope form $y - y_1 = m(x - x_1)$ reveals a slope and a point. Equivalent forms describe the same straight line.

WORKED EXAMPLE

The graph shows a window of $y = -x + 5$. Write standard form and point-slope form using $(2, 3)$.

1. Move x to the left: $x + y = 5$.
2. Use $m = -1$ and $(2, 3)$: $y - 3 = -(x - 2)$.

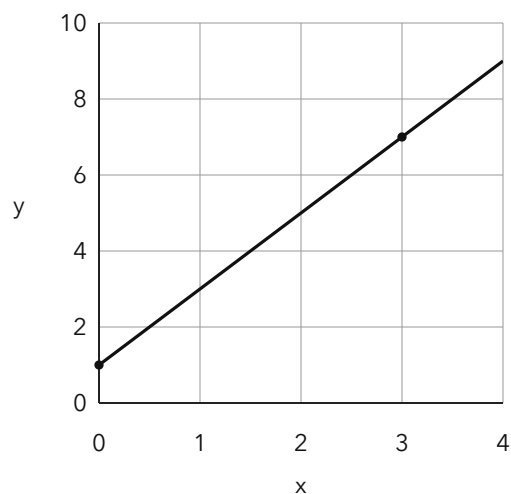
Answer: $x + y = 5$; $y - 3 = -(x - 2)$.



PRACTICE 4 problems

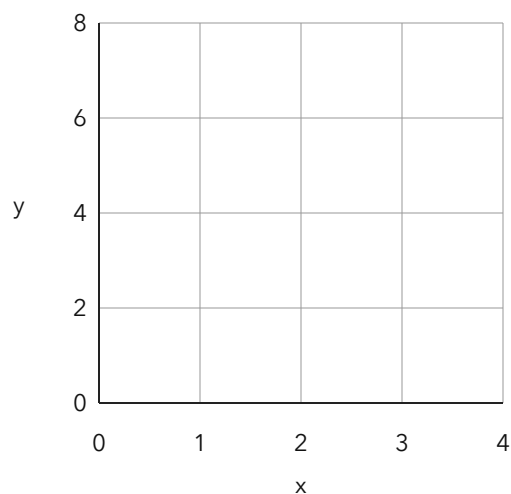
- 1** Read the graph of this line. Write slope-intercept form and explain the slope and y-intercept.

ANSWER _____



- 2** For $2x + y = 6$, find both intercepts and graph the line within the window. Rewrite it in slope-intercept form.

ANSWER _____

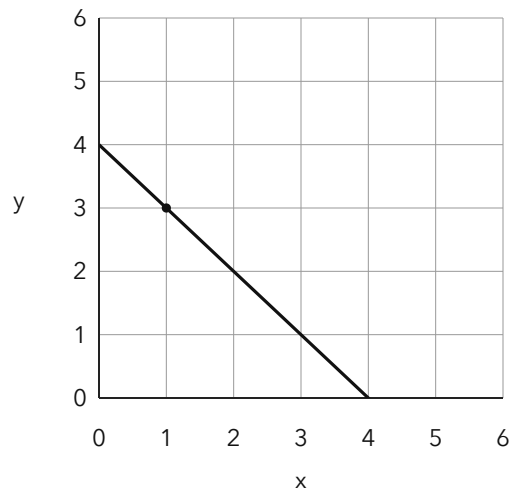


- 3** A line has slope $\frac{1}{2}$ through $(2, 3)$. Write point-slope form, then slope-intercept and standard forms. State the point and slope revealed directly by point-slope form.

ANSWER _____

- 4** The graphed line passes through (1, 3) with slope -1. Write point-slope and standard forms. Name the x-intercept that standard form helps you find.

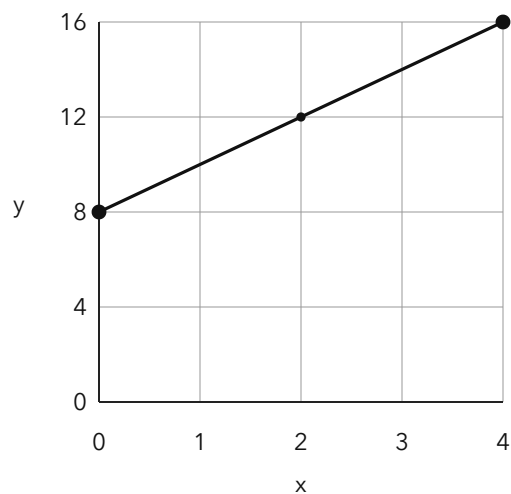
ANSWER _____



APPLY IT Show your work

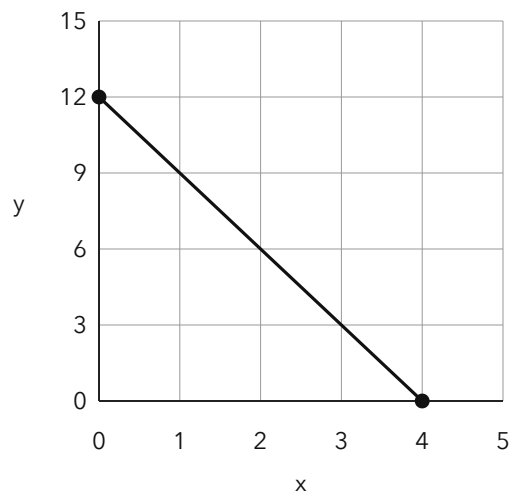
- 1** A tank starts with 8 liters and gains 2 liters each minute. Here x is minutes and y is liters. Write all three equation forms using the point after 2 minutes. Explain what m and b mean.

REASONING AND ANSWER



- 2** A tank drains steadily. Its complete graph uses x minutes and y liters. Write slope-intercept and standard forms. Explain the x-intercept and write point-slope form using that point.

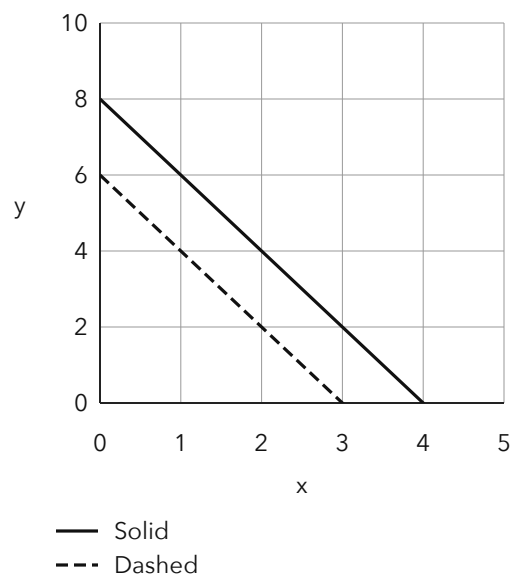
REASONING AND ANSWER



CHALLENGE One step up

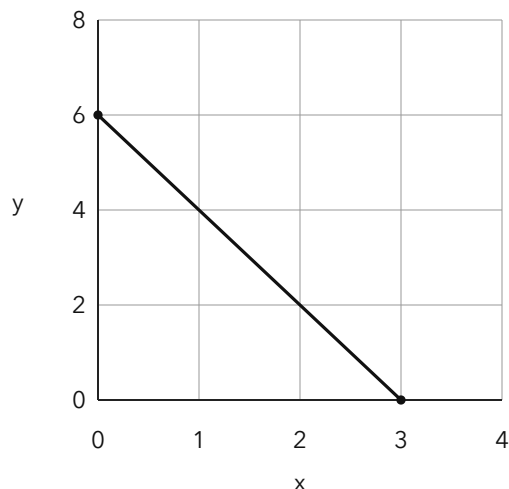
A is $2x + y = 8$. B is $y - 2 = -2(x - 2)$. Do they describe the same line? Rewrite both, then identify which is solid and which is dashed in this graph.

WORK SPACE AND ANSWER



PRACTICE 2

Intercepts $(3, 0)$, $(0, 6)$; $y = -2x + 6$. Straight line through both.

**PRACTICE 1**

$y = 2x + 1$. Slope 2 means y rises 2 for each increase of 1 in x . The y -intercept is $(0, 1)$.

PRACTICE 3

$y - 3 = (1/2)(x - 2)$; $y = (1/2)x + 2$; $x - 2y = -4$. Point $(2, 3)$, slope $1/2$.

PRACTICE 4

$y - 3 = -(x - 1)$; $x + y = 4$. Setting $y = 0$ gives x -intercept $(4, 0)$.

APPLY IT 1

$y = 2x + 8$; $2x - y = -8$; $y - 12 = 2(x - 2)$. Slope 2 is 2 L/min; intercept 8 is the starting 8 L. After 2 minutes $y = 12$. Substitute $(2, 12)$ and slope 2 into point-slope form.

APPLY IT 2

$y = -3x + 12$; $3x + y = 12$; $y - 0 = -3(x - 4)$. The x -intercept $(4, 0)$ means the tank is empty after 4 minutes. Slope $= (0 - 12)/(4 - 0) = -3$. Use $(4, 0)$ for point-slope form.

CHALLENGE

A: $y = -2x + 8$ (solid). B: $y = -2x + 6$ (dashed). They have equal slopes but different y-intercepts, so they are distinct parallel lines.

Accept equivalent standard equations with integer coefficients and valid point-slope forms through the requested point. Non-contextual graphs show a window of an entire line; tank segments show their stated time intervals.