

Meet at One Point

Explain why an intersection solves both equations.

GRADE 8 • 8.FGR.7.2

8.FGR.7.2 "Show and explain that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because the points of intersection satisfy both equations simultaneously."

NAME _____

DATE _____

REASON WITH THE MODEL

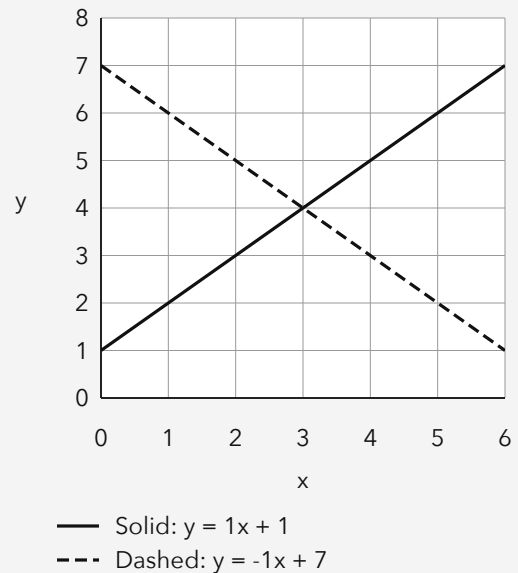
Each point on a line makes its equation true. A point shared by two graphs therefore makes both equations true at once. Distinct parallel lines share no points; equivalent equations have the same line and share infinitely many points. These grids show windows of lines that continue beyond the edges.

WORKED EXAMPLE

Read the intersection of $y = x + 1$ and $y = -x + 7$. Explain why it solves the system.

1. The lines meet at $(3, 4)$.
2. First equation: $4 = 3 + 1$. Second equation: $4 = -3 + 7$.

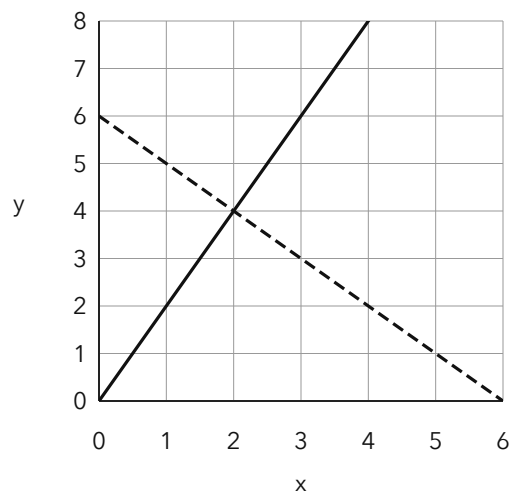
Answer: $(3, 4)$ lies on both lines because both equations are true.



PRACTICE 4 problems

- 1** Read the intersection of $y = 2x$ and $y = -x + 6$. Verify the ordered pair in both equations and explain its graph meaning.

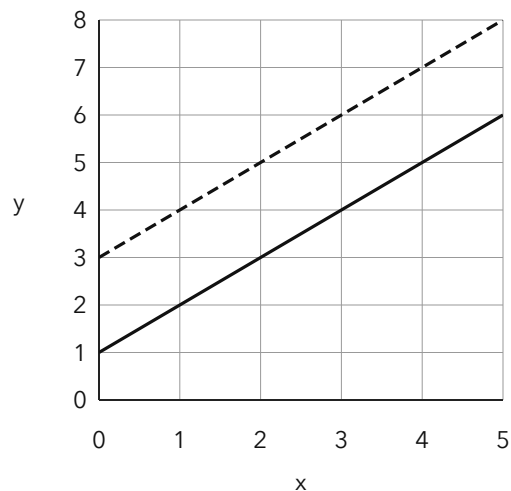
ANSWER _____



— Solid: $y = 2x + 0$
- - Dashed: $y = -1x + 6$

- 2** These graphs represent $y = x + 1$ and $y = x + 3$. How many simultaneous solutions are there? Explain using both the lines and the equations.

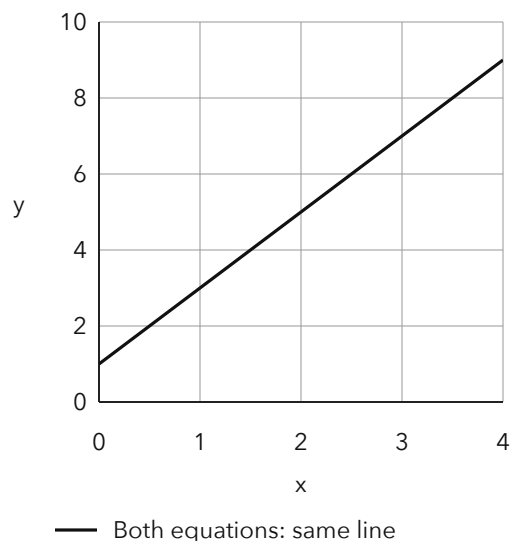
ANSWER _____



— Solid: $y = 1x + 1$
- - Dashed: $y = 1x + 3$

- 3** The single line shown represents both $y = 2x + 1$ and $2y = 4x + 2$. Explain how many solutions the system has. Verify $(2, 5)$ in both equations.

ANSWER _____



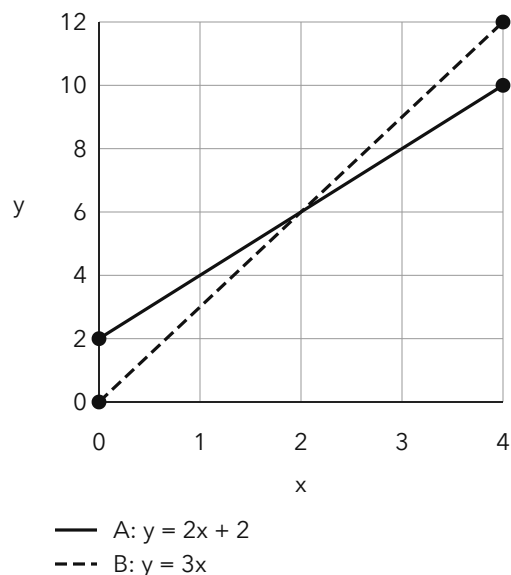
- 4** A student chooses $(1, 3)$ for $y = x + 2$ and $y = -x + 8$ because it is on the first line. Use substitution to explain why this is not a system solution.

ANSWER _____

APPLY IT Show your work

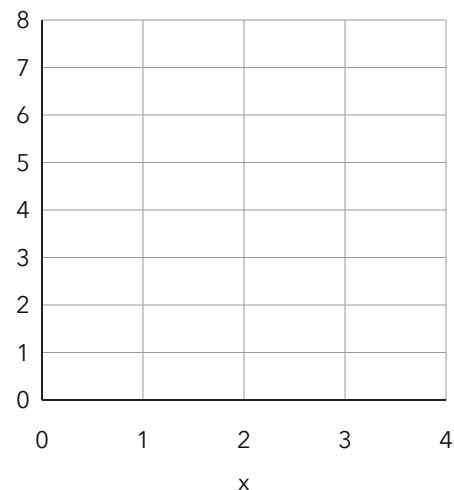
- 1** Two pumps fill separate tanks. For $0 \leq x \leq 4$ minutes, Tank A has $y = 2x + 2$ liters and Tank B has $y = 3x$ liters. Read their intersection. Explain what both coordinates mean and check both amounts.

REASONING AND ANSWER



2

During a 4-hour trip, a cyclist is $x + 2$ km from a trail marker and a walker is $2x$ km from it, where x is hours. Graph both distance rules. Mark the intersection and explain why it solves both equations.

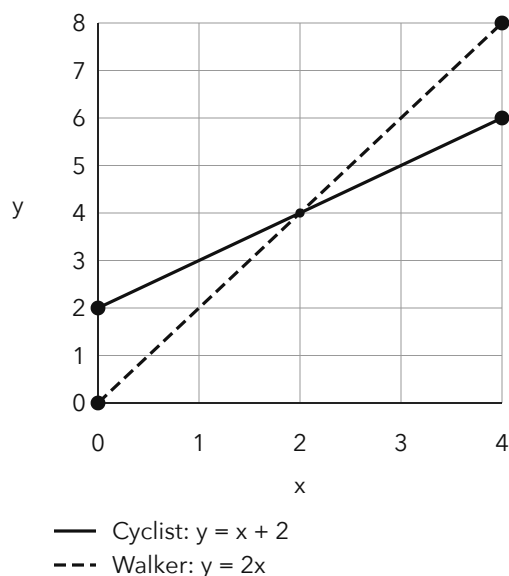
REASONING AND ANSWER y **CHALLENGE** One step up

Two straight-line graphs share $(1, 3)$ and $(2, 5)$. Can those be their only two shared points? Explain what this means for the number of solutions.

WORK SPACE AND ANSWER

APPLY IT 2

Lines $y = x + 2$ and $y = 2x$ meet at $(2, 4)$. At 2 hours, both are 4 km from the marker: $2 + 2 = 4$ and $2(2) = 4$. Each equation describes distance from the marker, not necessarily travel speed or the same side of the marker.

**PRACTICE 1**

$(2, 4)$. First: $4 = 2(2)$. Second: $4 = -2 + 6$. The same point belongs to both graphs.

PRACTICE 2

None. The lines are parallel and distinct. For every x , the second y -value is 2 greater, so one ordered pair cannot satisfy both.

PRACTICE 3

Infinitely many: dividing the second equation by 2 gives the first, so every point on the line is shared. $5 = 2(2) + 1$ and $2(5) = 4(2) + 2$.

PRACTICE 4

$3 = 1 + 2$ is true, but $3 = -1 + 8$ is false (the right side is 7). A solution must lie on both lines.

APPLY IT 1

(2, 6): after 2 minutes, each tank has 6 liters. A: $2(2) + 2 = 6$; B: $3(2) = 6$. The shared point describes equal amounts at the same time.

CHALLENGE

No. Two distinct points determine one straight line, so both graphs are the same line. They share infinitely many points and the system has infinitely many solutions.

Require both substitutions when requested, plus graph or context explanations. A shared x-value alone is insufficient: both coordinates must agree. Coincident equations are deliberately represented by one labeled line.