

Where Lines Meet

Find the point that makes both equations true.

GRADE 8 • 8.EE.C.8a

CCSS.Math.Content.8.EE.C.8a "Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously."

NAME _____

DATE _____

INTERSECTION MEANS SOLUTION

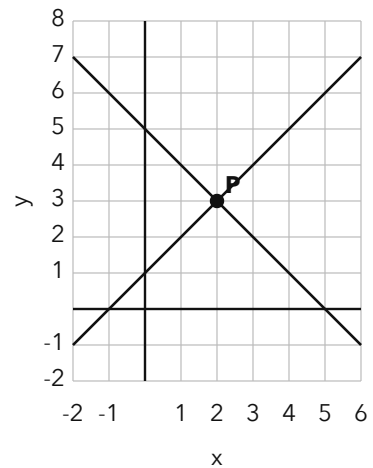
A point on a line makes that line's equation true. Where two lines intersect, the SAME x and y make BOTH equations true. Reading a crossing gives a candidate solution; substitution into both equations checks it. Distinct parallel lines have no shared point. Equations for the same line share every point.

WORKED EXAMPLE

The graph shows $y = x + 1$ and $y = -x + 5$. Read their intersection and check both equations.

1. The lines cross at $P(2, 3)$.
2. First equation: $3 = 2 + 1$. Second equation: $3 = -2 + 5$. Both are true.

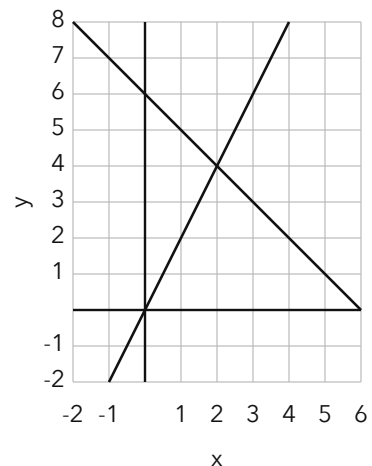
Answer: (2, 3) solves the system because it belongs to BOTH lines.



PRACTICE 4 problems

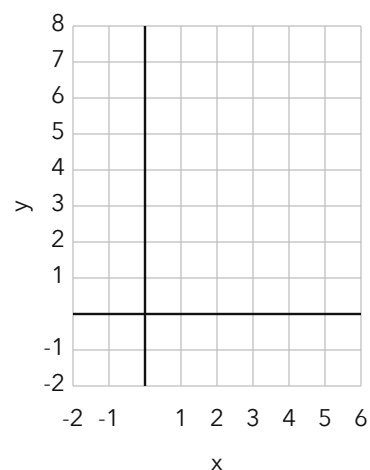
- 1 These lines are $y = 2x$ and $y = -x + 6$. Mark their intersection, read its coordinates, and check both equations.

ANSWER _____



- 2** On the grid, draw $y = x$ and $y = 4 - x$. Use at least two points per line. Mark the intersection and check it in BOTH equations.

ANSWER _____

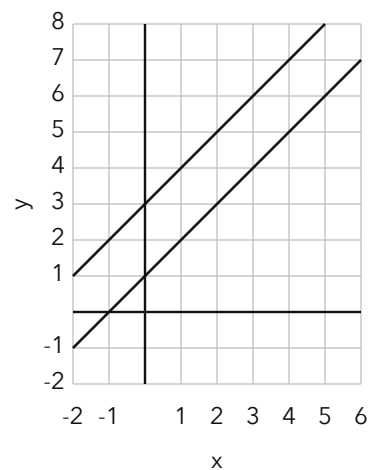


- 3** A student says $(3, 3)$ solves $y = x$ and $y = 4 - x$ because it is on the first line. Explain the error using your Practice 2 graph and both equations.

ANSWER _____

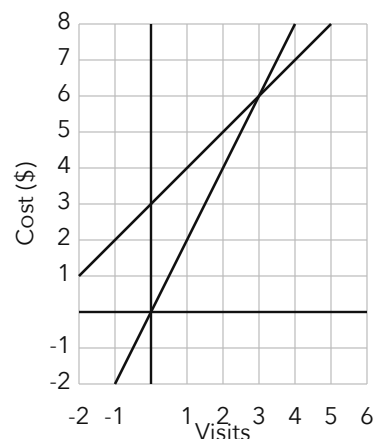
- 4** The graph shows $y = x + 1$ and $y = x + 3$. How many solutions are there? Explain using both the graph and the equations.

ANSWER _____

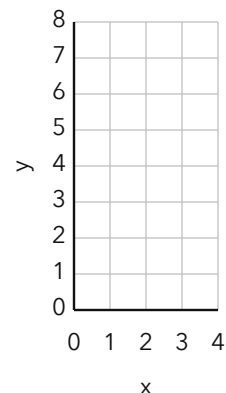


APPLY IT Show your work**1**

A fictional art club has two payment plans. A costs \$2 per visit; B costs \$1 per visit plus a \$3 fee. The graph shows $y = 2x$ and $y = x + 3$. At how many visits do costs match? Read the graph and check both costs.

**2**

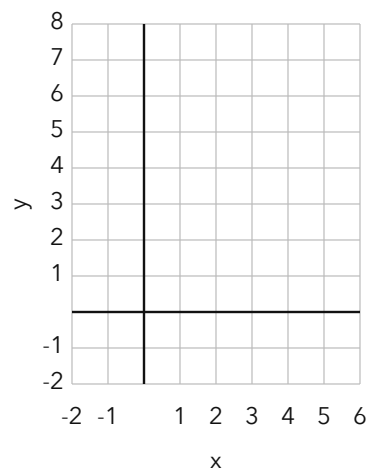
Two toy cars move along a track. Their distance models are $y = x + 2$ and $y = 2x$, with x seconds and y meters. Graph both for x from 0 to 4. When and where do they meet? Check both equations.



CHALLENGE One step up

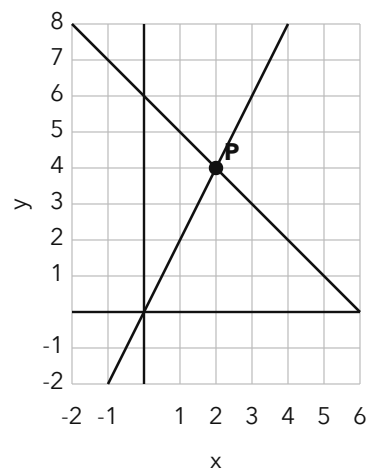
Do $y = x + 1$ and $2y = 2x + 2$ have one solution, none, or infinitely many? Draw their graphs together. Give TWO shared points and check BOTH equations for each.

WORK SPACE AND ANSWER

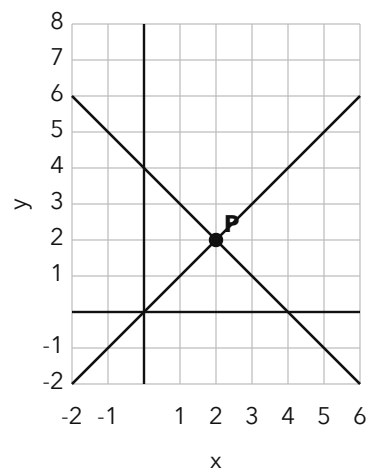


PRACTICE 1

(2, 4): $4 = 2(2)$ and $4 = -2 + 6$.

**PRACTICE 2**

(2, 2): $2 = 2$ and $2 = 4 - 2$.

**PRACTICE 3**

$3 = 3$ is true, but $3 = 4 - 3$ is false. (3, 3) is not on the second line or at the intersection.

PRACTICE 4

No solution. Distinct parallel lines never meet. For the same x , their y -values always differ by 2.

APPLY IT 1

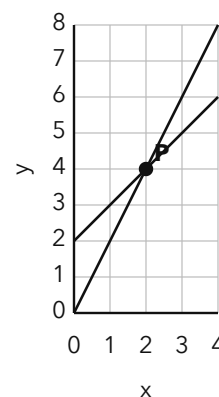
3 visits; both cost \$6.

The shared point is (3, 6). Plan A: $2(3) = 6$. Plan B: $3 + 3 = 6$.

APPLY IT 2

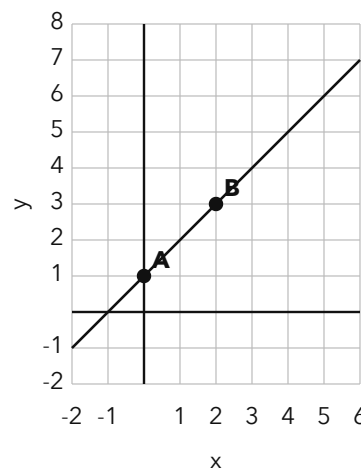
At 2 seconds and 4 meters.

The graphs share (2, 4): $4 = 2 + 2$ and $4 = 2(2)$. Time is x ; position is y .



CHALLENGE

Infinitely many solutions: both describe $y = x + 1$. Examples
(0,1): $1 = 0 + 1$ and $2 = 0 + 2$; (2,3): $3 = 2 + 1$ and $6 = 4 + 2$.



Two drawn lines may be unlabeled when the task explicitly identifies their equations; students can distinguish them by slope/intercept and substitution. Require a shared ordered pair, not separate solutions with different y -values. For car graphs the model domain is 0-4 seconds; do not extend the physical interpretation to negative time. Coincident equations draw as one line, not two offset lines.