

Meet at One Point

Find where two linear rules have the same output.

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 _____

THE BIG IDEA

The solution to a system is an ordered pair that makes both equations true. On a graph, that pair is where the two lines meet, because it lies on both lines.

WORKED EXAMPLE

Solve the system: $y = 11x + 13$ and $y = 14x + 13$.

1. Set the y-expressions equal: $11x + 13 = 14x + 13$.
2. Subtract $11x$: $13 = 3x + 13$.
3. Subtract 13 : $0 = 3x$, so $x = 0$.
4. Use $x = 0$ in either equation: $y = 13$.

Answer: (0, 13)

PRACTICE 6 problems

- 1** Solve the system: $y = 4x + 8$ and $y = -x + 28$.

ANSWER _____

- 2** How many solutions does this system have?
 $y = 8x + 4$ and $y = 8x + 9$.

ANSWER _____

- 3** How many solutions does this system have?
 $y = 9x - 4$ and $4y = 36x - 16$.

ANSWER _____

- 4** Does (4, 24) solve both equations? $y = 4x + 8$ and $y = 8x - 8$.

ANSWER _____

- 5** The tables list points on two lines. What ordered pair is on both lines? Line M x: 4, 8, 12 y: 12, 16, 20 Line N x: 4, 8, 12 y: 12, -4, -20

ANSWER _____

- 6** Line A passes through (4, 24) and (8, 40). Line B passes through (4, 24) and (8, 8). What is the solution to the system represented by the lines?

ANSWER _____

APPLY IT Show your work

- 1** A music app has Plan A, which charges a \$36 sign-up fee and \$4 each month. Plan B has no sign-up fee and charges \$8 each month. After how many months do the plans cost the same amount? What is that cost? Give your answer as an ordered pair, (months, dollars).

WORK SPACE

ANSWER _____

- 2** An art club has \$32 already donated and earns \$8 for each bracelet it sells. Another club has no starting donation and earns \$12 for each bracelet it sells. How many bracelets must each club sell to have the same total amount? What is that amount? Give your answer as an ordered pair, (bracelets, dollars).

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Solve the system: $y = x + 4$ and $8x + 4y = 50$. Then explain in a complete sentence why your ordered pair represents the intersection of the graphs.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Solve the system: $y = 4x + 8$ and $y = -x + 28$.	(4, 24)
2	How many solutions does this system have? $y = 8x + 4$ and $y = 8x + 9$.	No solution
3	How many solutions does this system have? $y = 9x - 4$ and $4y = 36x - 16$.	Infinitely many solutions
4	Does (4, 24) solve both equations? $y = 4x + 8$ and $y = 8x - 8$.	Yes, (4, 24) satisfies both equations.
5	The tables list points on two lines. What ordered pair is on both lines? Line M x: 4, 8, 12 y: 12, 16, 20 Line N x: 4, 8, 12 y: 12, -4, -20	(4, 12)
6	Line A passes through (4, 24) and (8, 40). Line B passes through (4, 24) and (8, 8). What is the solution to the system represented by the lines?	(4, 24)

PART 2 • APPLY IT

1. **(9, 72)** Model the costs with $y = 4x + 36$ and $y = 8x$. Set the costs equal to find $x = 9$, then substitute to get $y = 72$.
2. **(8, 96)** Model the totals with $y = 8x + 32$ and $y = 12x$. Set the totals equal to find $x = 8$, then substitute to get $y = 96$.

CHALLENGE

The solution is (17/6, 41/6). This is the intersection because the ordered pair makes both equations true.

Accept equivalent wording for no solution and infinitely many solutions. For the challenge explanation, accept statements that the point is on both lines or that it satisfies both equations.