LESSON MAKER PRO

Crossing Paths

Find where a line and parabola meet.

HIGH SCHOOL · AI-A.REI.7.a

AI-A.REI.7.a "Solve a system, with rational solutions, consisting of a linear equation and a quadratic equation (parabolas only) in two variables algebraically and graphically."

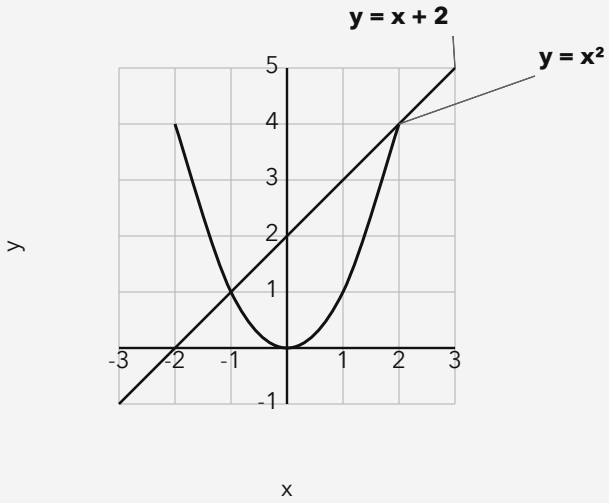
NAME _____ DATE _____

MATCH THE EQUATIONS

Rewrite the linear equation as y = … . Substitute it into the quadratic equation, solve for x, then use either equation to find y. Each ordered pair is an intersection, and it should match where the line and parabola cross on a graph.

WORKED EXAMPLE

Solve the system algebraically. Check the intersections on the graph.



1. Set $x^2 = x + 2$.
2. $x^2 - x - 2 = 0$.
3. $(x - 2)(x + 1) = 0$, so $x = 2$ or $x = -1$.
4. Use $y = x + 2$: $y = 4$ or $y = 1$.

Answer: (-1, 1) and (2, 4)

PRACTICE 4 problems

1 Solve the system. Give both intersections. $y = x^2 - 4$; $y = 3x - 4$

ANSWER _____

_____

2 Solve the system. Give both intersections. $y = x^2 + x$; $y = 5x$

ANSWER _____

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3 Solve the system. Give both intersections. $y = x^2$; $y = 3/2x$

ANSWER _____

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4 Solve the system. Give both intersections. $y = x^2 - 6x + 5$; $y = -x + 5$

ANSWER _____

_____

APPLY IT Show your work

1 A school club sells x snack packs. Revenue R and cost C, in dollars, are $R = -x^2 + 12x$ and $C = 4x$. For what values of x are revenue and cost equal? Give the dollar amount for each.

WORK SPACE

ANSWER _____

2 A robotics club models a drone's height h, in feet, by $h = -t^2 + 9t$. A camera platform rises at $h = 3t$, where t is time in seconds. When are they at the same height? Give each time and height.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Solve the system. Then explain how your factors show that there are two intersections. $y = 2x^2 - 5x + 1$; $y = -x + 7$

WORK SPACE AND ANSWER

ANSWER KEY

Crossing Paths

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve the system. Give both intersections. $y = x^2 - 4$; $y = 3x - 4$	**(0, -4) and (3, 5)**
2	Solve the system. Give both intersections. $y = x^2 + x$; $y = 5x$	**(0, 0) and (4, 20)**
3	Solve the system. Give both intersections. $y = x^2$; $y = 3/2x$	**(0, 0) and (3/2, 9/4)**
4	Solve the system. Give both intersections. $y = x^2 - 6x + 5$; $y = -x + 5$	**(0, 5) and (5, 0)**

PART 2 · APPLY IT

1. **(0, $0) and (8, $32)** Set $-x^2 + 12x = 4x$. Factor $-x^2 + 8x = 0$, then use $C = 4x$ for each dollar amount.
2. **(0 seconds, 0 feet) and (6 seconds, 18 feet)** Set $-t^2 + 9t = 3t$. Factor $-t^2 + 6t = 0$, then substitute each time into $h = 3t$.

CHALLENGE

(-1, 8) and (3, 4). Setting the equations equal gives $2(x - 3)(x + 1) = 0$. The two different factors give two x-values, so the graphs intersect twice.

Accept ordered pairs in either order. Accept equivalent algebraic work, including substitution followed by factoring.