LESSON MAKER PRO

Line Meets Curve

Solve systems by matching equations and checking intersections.

HIGH SCHOOL · AII-A.REI.7.b

AII-A.REI.7.b "Solve a system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically."

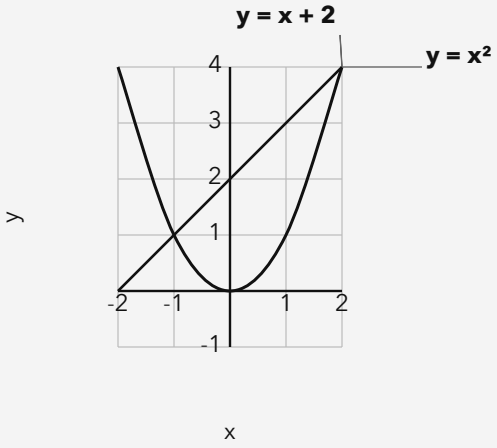
NAME _____ DATE _____

MATCH THE OUTPUTS

A solution to a line and parabola system is a point that makes both equations true. Set the two y-expressions equal, solve for x, then substitute to find y. On a graph, the solutions are the intersection points.

WORKED EXAMPLE

Solve $y = x^2$ and $y = x + 2$ algebraically. Check the points on the graph.



1. Set $x^2 = x + 2$.
2. Rewrite: $x^2 - x - 2 = 0$.
3. Factor: $(x - 2)(x + 1) = 0$.
4. Substitute $x = 2$ and $x = -1$ to find y.

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

PRACTICE 4 problems

1 Solve $y = x^2$ and $y = 9x - 18$. Give the intersection points.

ANSWER _____

2 Solve $y = x^2$ and $y = 7x - 12$. Give the intersection points.

ANSWER _____

3 Solve $y = x^2$ and $y = 3x + 28$. Give the intersection points.

ANSWER _____

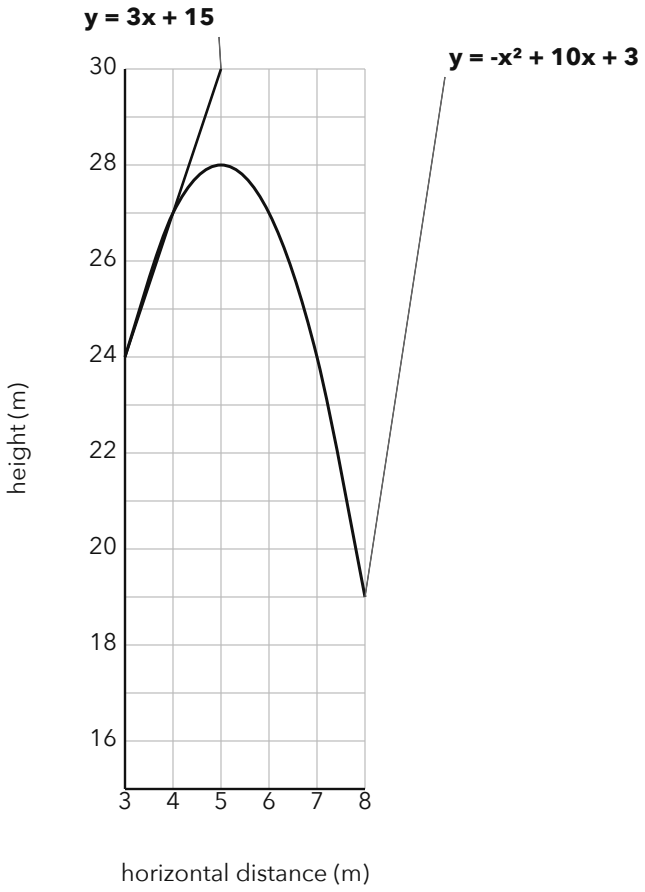
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4 Solve $y = x^2 + 40$ and $y = 8x + 20$.

ANSWER _____

APPLY IT Show your work

1 In a drone-video simulation, height y meters after horizontal distance x meters follows $y = -x^2 + 10x + 3$. A safety guide follows $y = 3x + 15$. Use the graph and algebra to find both meeting points.



ANSWER _____

2 The drama club compares two poster-printing cost models, where x is the number of batches and y is cost in dollars. Company A uses $y = x^2 - 6x + 70$. Company B uses $y = 7x + 30$. Find the batch counts and costs where the models match.

WORK SPACE

ANSWER _____

CHALLENGE One step up

For which values of k does the system $y = x^2 + kx + 36$ and $y = 18x + 20$ have exactly one real solution? Explain your reasoning.

WORK SPACE AND ANSWER

Line Meets Curve

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve $y = x^2$ and $y = 9x - 18$. Give the intersection points.	**(3, 9) and (6, 36)**
2	Solve $y = x^2$ and $y = 7x - 12$. Give the intersection points.	**(3, 9) and (4, 16)**
3	Solve $y = x^2$ and $y = 3x + 28$. Give the intersection points.	**(-4, 16) and (7, 49)**
4	Solve $y = x^2 + 40$ and $y = 8x + 20$.	**No real solution**

PART 2 · APPLY IT

1. **(3, 24) and (4, 27)** Set $-x^2 + 10x + 3$ equal to $3x + 15$. This gives $x^2 - 7x + 12 = 0$, so $x = 3$ or $x = 4$, then substitute for the heights.
2. **(5, 65) and (8, 86)** Set $x^2 - 6x + 70$ equal to $7x + 30$. Factor $x^2 - 13x + 40 = 0$ to get $x = 5$ or $x = 8$, then use Company B's equation for cost.

CHALLENGE

$k = 10$ or $k = 26$, because $x^2 + (k - 18)x + 16 = 0$ must have a discriminant of 0.

Accept intersection points in either order. Accept equivalent algebraic work, including use of a discriminant to identify no real solution or one real solution.