LESSON MAKER PRO

Where Paths Meet

Find where a line and a parabola have the same coordinates.

HIGH SCHOOL · A2.A.1.8

A2.A.1.8 "Use tools to solve systems of equations containing one linear equation and one quadratic equation. Graphing calculators or other appropriate technology may be used."

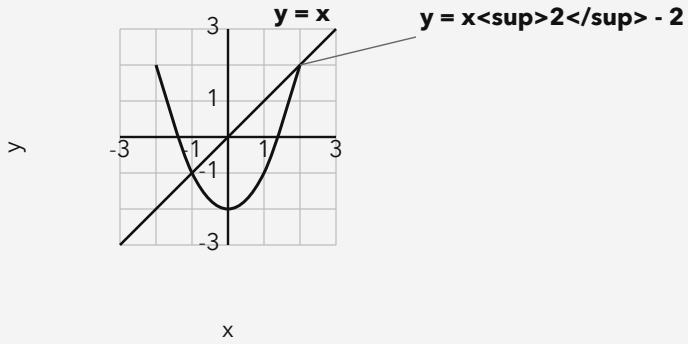
NAME _____ DATE _____

INTERSECTION POINTS

A solution to a system lies on both graphs. Set the two expressions for y equal, solve for x, then substitute each x-value to find its y-value.

WORKED EXAMPLE

Use the graph to find both solutions. Show how you can check them with the equations.



1. Set the expressions equal: $x^2 - 2 = x$.
2. Factor: $(x - 2)(x + 1) = 0$, so $x = 2$ or $x = -1$.
3. Use $y = x$. The points are (2, 2) and (-1, -1).

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

PRACTICE 4 problems

1 Find both solutions: $y = x^2 - 9$ and $y = 0$.

ANSWER _____

2 Find both solutions: $y = x^2 + 3x$ and $y = 4x + 6$.

ANSWER _____

3 Find both solutions: $y = -x^2 + 5x$ and $y = x + 3$.

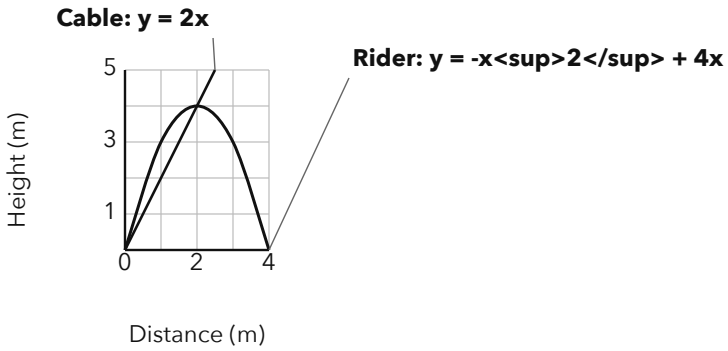
ANSWER _____

4 How many real solutions does this system have? Explain briefly: $y = x^2 + 4$ and $y = 2x + 1$.

ANSWER _____

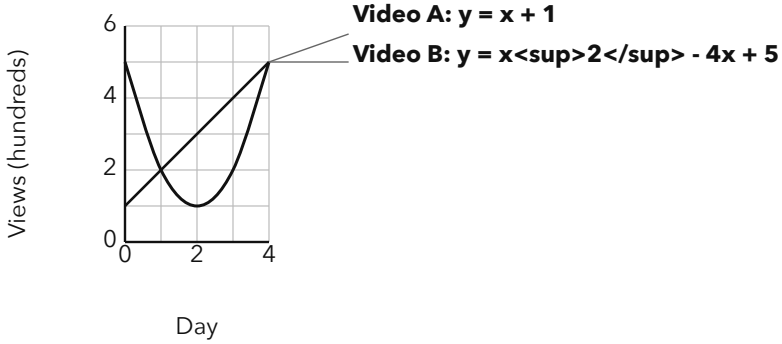
APPLY IT Show your work

1 A stunt rider's height and a camera cable's height are shown against horizontal distance. At which distances are they the same height? Give the height at each distance.



ANSWER _____

2 The graph predicts daily views for two videos, in hundreds. On which days do they get the same number of views? How many views do they each get on those days?



ANSWER _____

CHALLENGE One step up

The line $y = 4x - 4$ touches the parabola $y = x^2$ at just one point. Find it and explain why there is only one solution.

WORK SPACE AND ANSWER

ANSWER KEY

Where Paths Meet

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find both solutions: $y = x^2 - 9$ and $y = 0$.	**(-3, 0) and (3, 0)**
2	Find both solutions: $y = x^2 + 3x$ and $y = 4x + 6$.	**(-2, -2) and (3, 18)**
3	Find both solutions: $y = -x^2 + 5x$ and $y = x + 3$.	**(1, 4) and (3, 6)**
4	How many real solutions does this system have? Explain briefly: $y = x^2 + 4$ and $y = 2x + 1$.	**Zero. Setting the equations equal gives $(x - 1)^2 + 2 = 0$, which has no real solution.**

PART 2 · APPLY IT

1. **At 0 m, both are 0 m high. At 2 m, both are 4 m high.** Set $-x^2 + 4x = 2x$ to get $x = 0$ or $x = 2$. Substitute into $y = 2x$.
2. **Day 1: 200 views each. Day 4: 500 views each.** Set $x + 1 = x^2 - 4x + 5$ to get $x = 1$ or $x = 4$. The matching y-values are 2 and 5 hundreds.

CHALLENGE

The point is (2, 4). Setting the equations equal gives $(x - 2)^2 = 0$, so $x = 2$ is the only x-value.

Accept solutions in either order. For the word problems, require units and the conversion from hundreds to individual views.