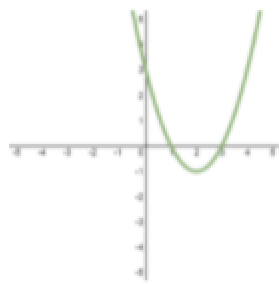
Solving a Quadratic-Quadratic System Graphically Practice

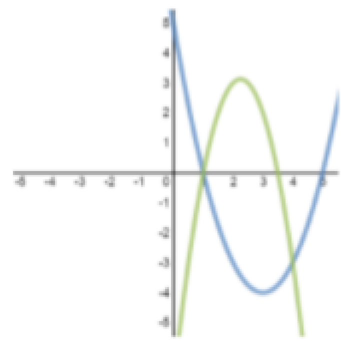
Use the following information to answer the first question.

Consider the following quadratic-quadratic systems.

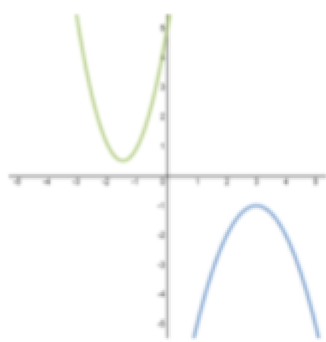
A.



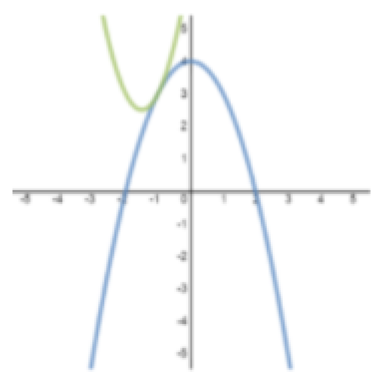
B.



C.



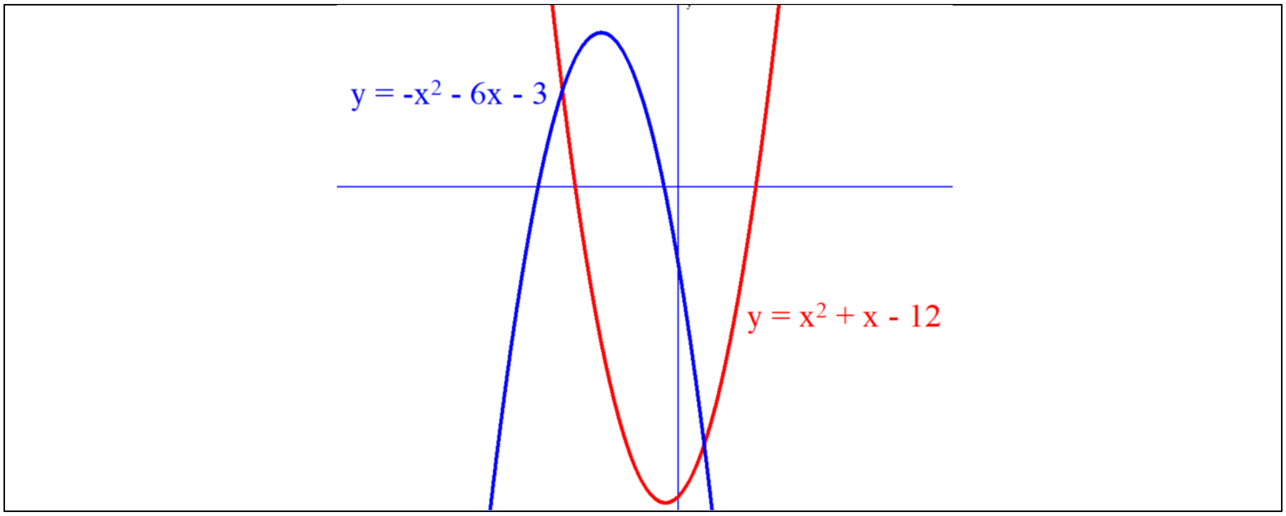
D.



1. Which graph represents a system with an infinite number of solutions?

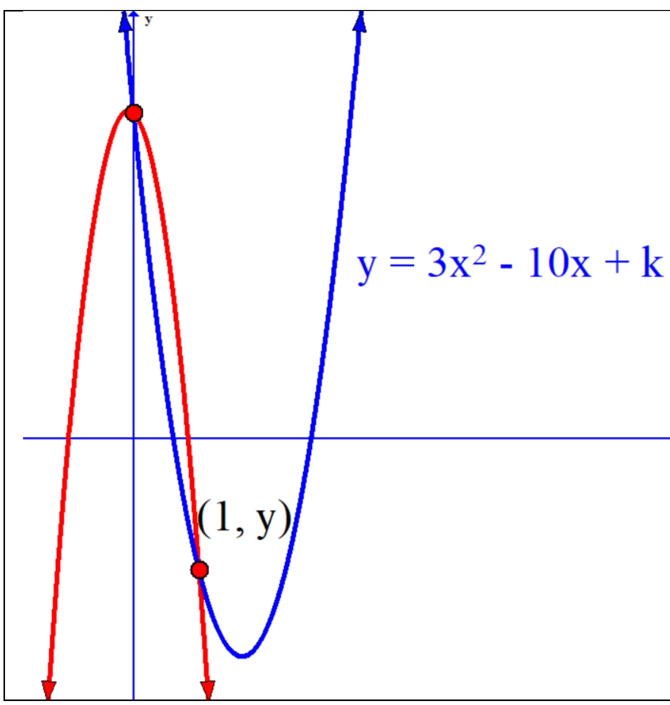
   A) A B) B C) C D) D

Use the graph below to answer the next question.



2. The solution in quadrant 4 is _____.

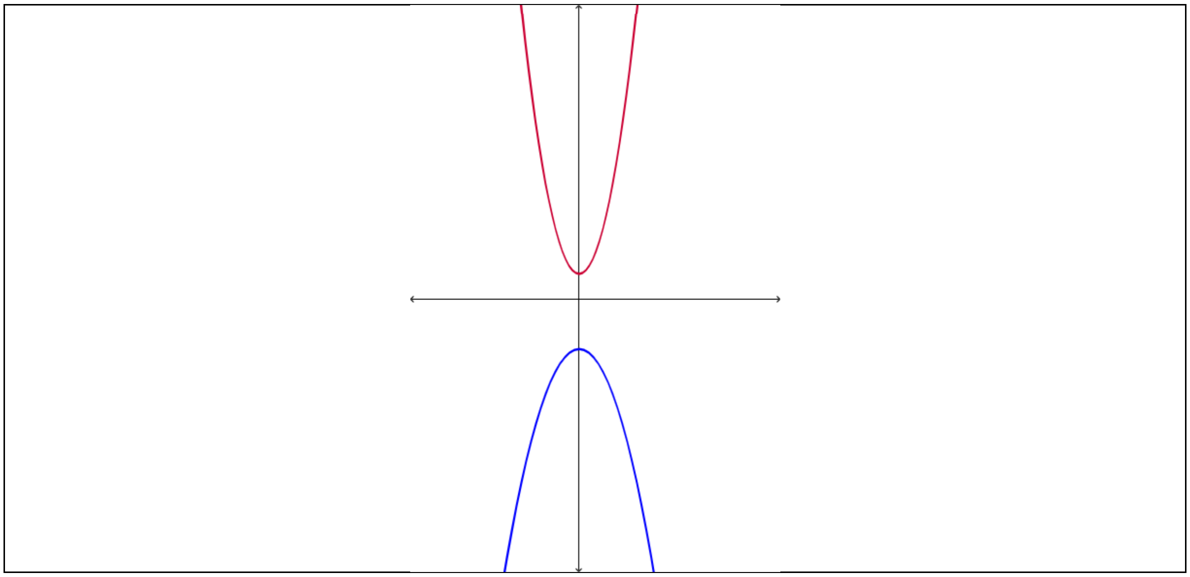
Use the graph below to answer the next question.



This system shares a common y-intercept of 5. The equation $y = 3x^2 - 10x + k$, is given for the parabola opening up.

3. The value of y is ____.

4. If the parabola opening down was shifted up such that the vertex was at its highest point on the origin,



then the number of solutions for this quadratic-quadratic system would be

A) 0 B) 1 C) 2 D) infinite

Use the following information to answer the next question.

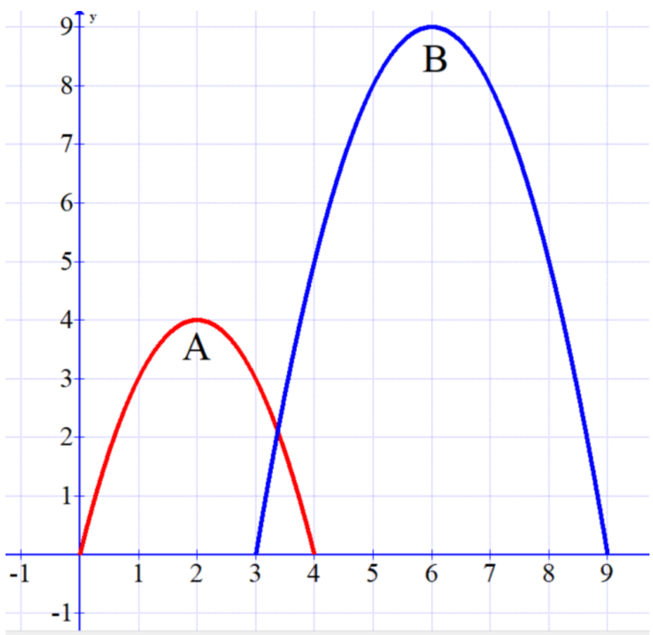
Consider the system of quadratic-quadratic equations.
$y - 15 = -x^2 - 2x$
$-2x^2 + 18x - y - 36 = 0$

5. The solution(s) is/are

A) (3, 0) B) (2, 1) C) (3,0) and (17, -308) D) (2, 1) and (20, -432)

Use the following information to answer the next question.

The water at a spray park shoots water up and then it falls in a parabolic shape. There are two different heights the water reaches; 4 feet and 9 feet. The smaller parabola, A, begins first, and then the larger parabola B starts 3 seconds after the first parabola. When the water from the second parabola hits the ground, no water is shot into the air for 5 seconds. The process then repeats itself.



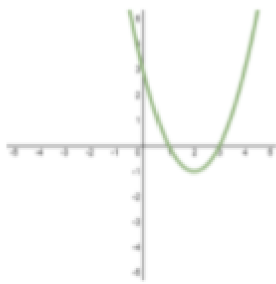
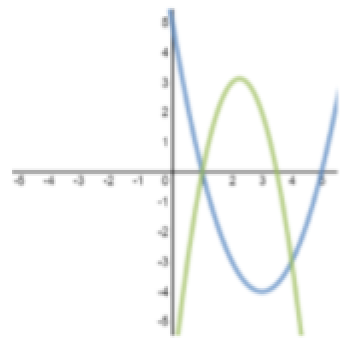
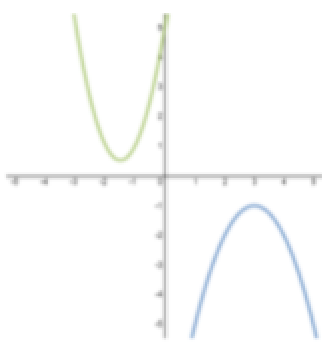
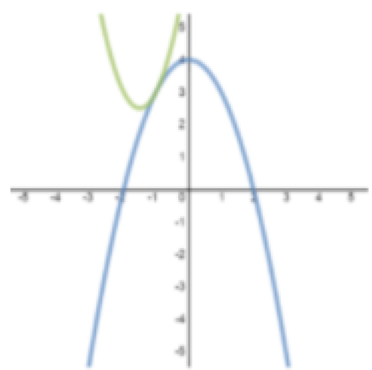
6. a) Determine the equation of each parabola.

b) To the nearest thousandth, how many seconds after parabola B begins, will the heights of both parabolas be the same?

Solving a Quadratic-Quadratic System Graphically Practice Solutions

Use the following information to answer the first question.

Consider the following quadratic-quadratic systems.

A.	B.
	
C.	D.
	

1. Which graph represents a system with an infinite number of solutions?

A) A B) B C) C D) D

Solution

Option B has 2 intersection points, indicating that there are two solutions.

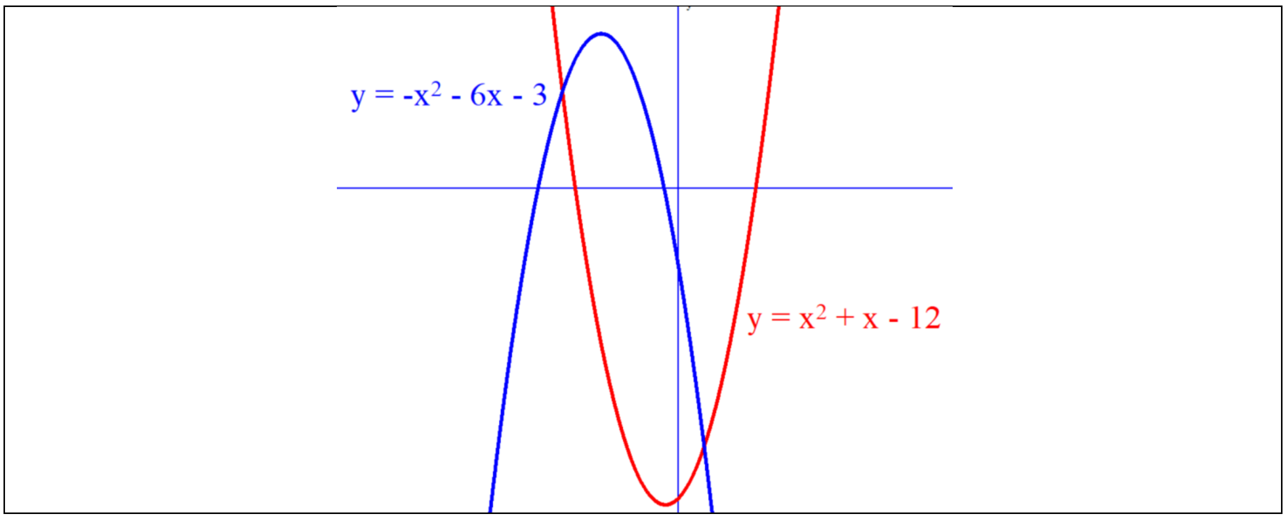
Option C has no intersection points, indicating that there are no solutions.

Option D has 1 intersection point, indicating that there is one solution.

Option A seems to only indicate one parabola. But since we know that the graphs indicate a system, we know that one parabola must lie directly on top of the other parabola. Essentially, there are two quadratic equations that are the same. This situation indicates that there is an infinite number of solutions.

The correct answer is A.

Use the graph below to answer the next question.



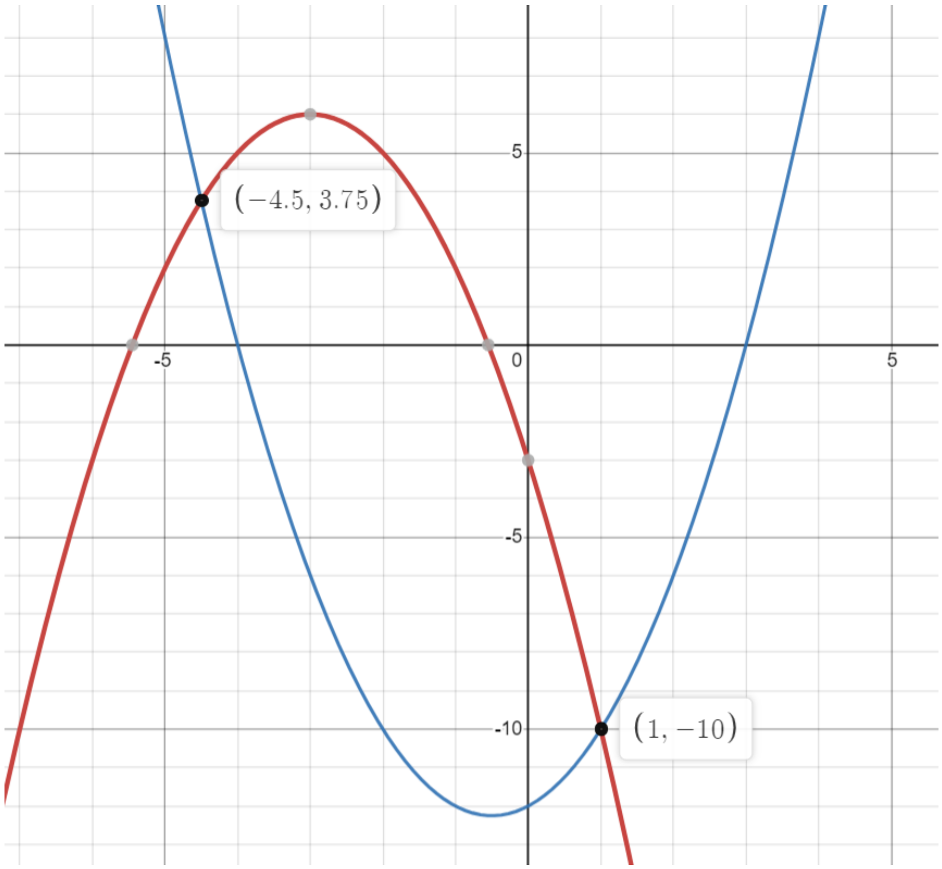
2. The solution in quadrant 4 is _(1, -10)_.

Solution

Graph the two quadratic equations and determine the intersection points.

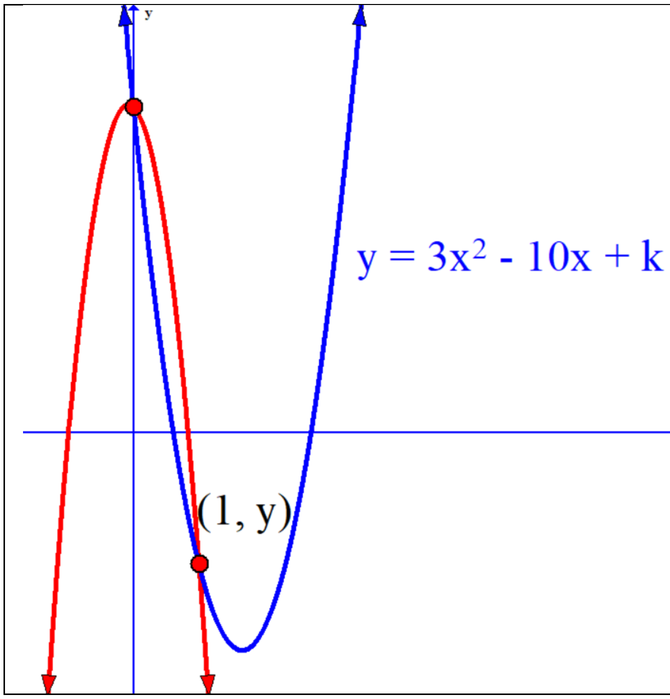
As displayed in the graph below, the intersection points are (-4.5, 3.75) and (1, -10). These points represent the solutions to the system.

The solution in quadrant 4 is (1, -10).



5
0
-5
-10
-5
5
(−4.5, 3.75)
(1, −10)

Use the graph below to answer the next question.



This system shares a common y-intercept of 5. The equation $y = 3x^2 - 10x + k$, is given for the parabola opening up.

3. The value of y is __-2__.

Solution

Find the value of k by substituting the common y-intercept (0,5) into the given equation.

$5 = 3(0)^2 - 10(0) + k$

$5 = k$

Use the point (1, y) with the equation $y = 3x^2 - 10x + 5$, to solve for y.

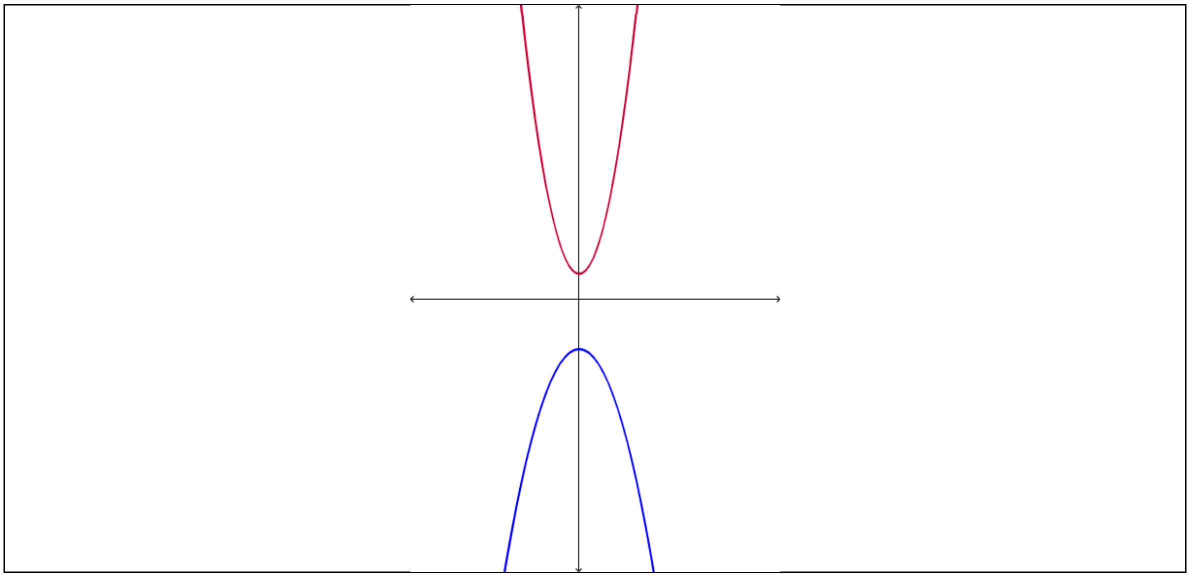
$y = 3(1)^2 - 10(1) + 5$

$y = 3 - 10 + 5$

$y = -2$.

The value of y is __-2__.

4. If the parabola opening down was shifted up such that the vertex was at its highest point on the origin,



then the number of solutions for this quadratic-quadratic system would be

A) 0 B) 1 C) 2 D) infinite

Solution

Shifting the parabola up, such that the vertex is at its highest point at the origin, means that all the points of this parabola will still be below the upper parabola. There will be no points of intersection, meaning that there will be no solutions.

Use the following information to answer the next question.

Consider the system of quadratic-quadratic equations.

$$y - 15 = -x^2 - 2x$$
$$-2x^2 + 18x - y - 36 = 0$$

5. The solution(s) is/are

A) (3, 0) B) (2, 1) C) (3,0) and (17, -308) D) (2, 1) and (20, -432)

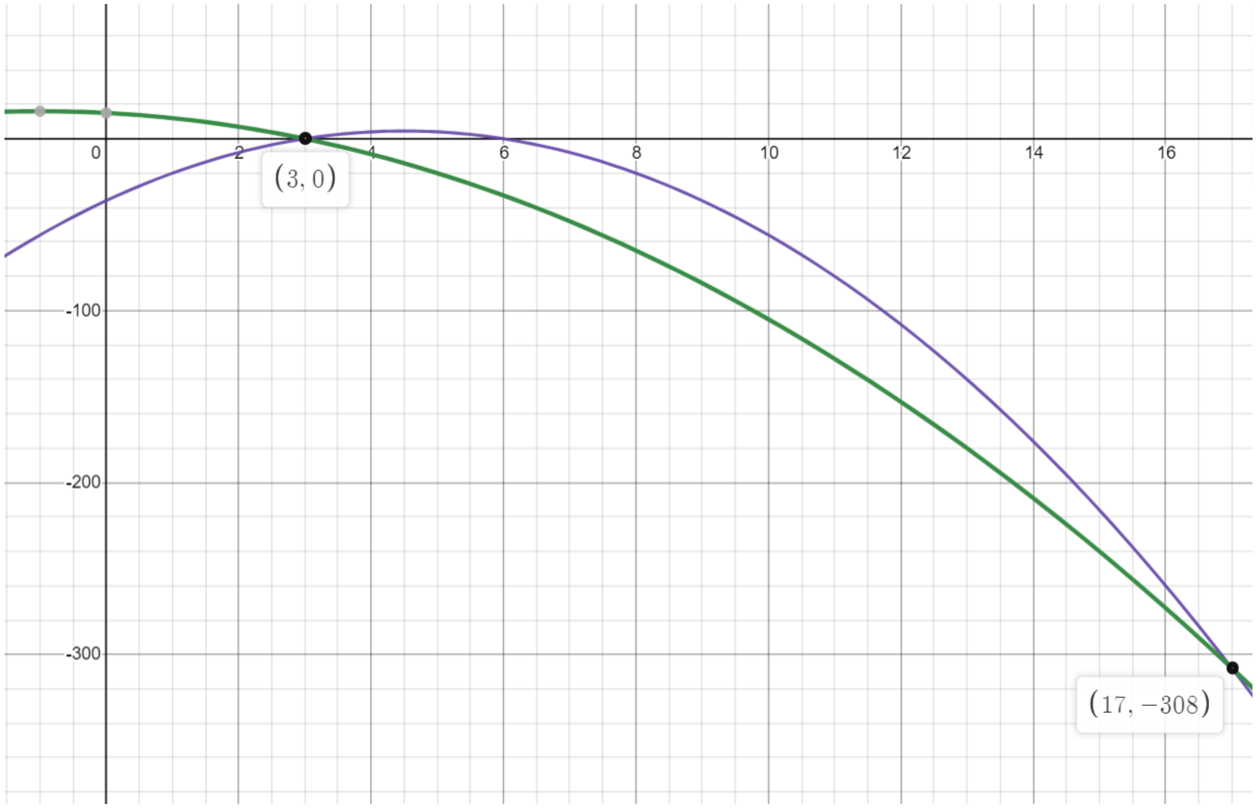
Solution

Isolate y in each equation, and then graph.

$y = -x^2 - 2x + 15$

$y = -2x^2 + 18x - 36$

Adjust the window settings in order to see both intersection points.

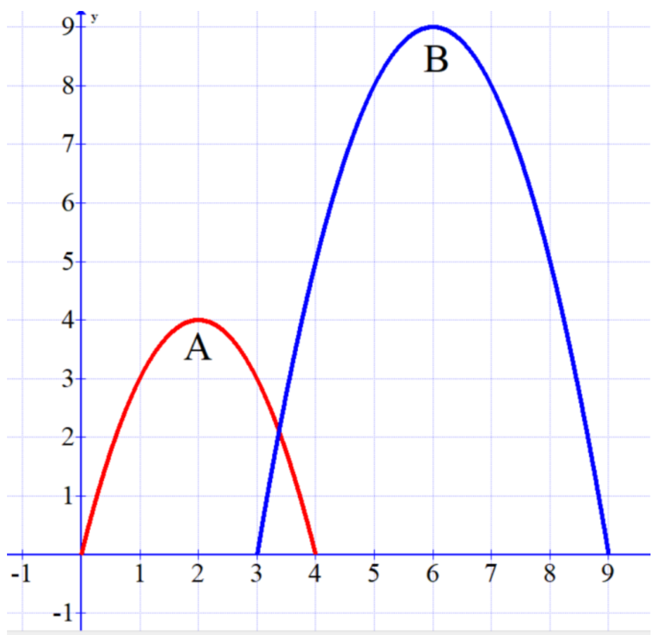


The solutions are (3,0) and (17, -308).

The correct answer is C.

Use the following information to answer the next question.

The water at a spray park shoots water up and then it falls in a parabolic shape. There are two different heights the water reaches; 4 feet and 9 feet. The smaller parabola, A, begins first, and then the larger parabola B starts 3 seconds after the first parabola. When the water from the second parabola hits the ground, no water is shot into the air for 5 seconds. The process then repeats itself.



6. a) Determine the equation of each parabola.

Solution

The vertex of parabola A is (2,4). The equation can be written in the form,

$y = a(x - 2)^2 + 4$

Substitute a point on the parabola, for example (0,0) to find *a*.

$(0) = a((0) - 2)^2 + 4$

$-4 = 4a$

$a = -1$

The equation for parabola A is $y = -(x - 2)^2 + 4$

The vertex of parabola B is (6,9). The equation can be written in the form,

$y = a(x - 6)^2 + 9$

Substitute a point on the parabola, for example (3,0) to find *a*.

$(0) = a((3) - 6)^2 + 9$

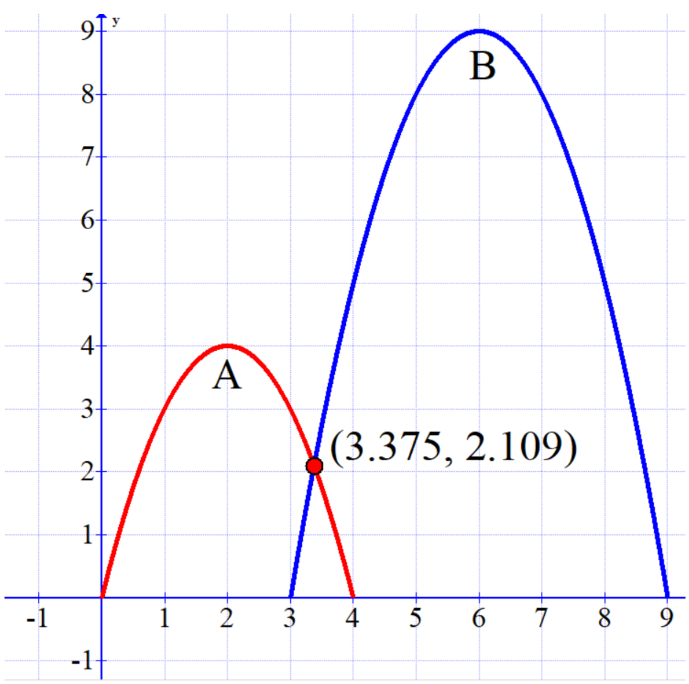
$-9 = 9a$

$a = -1$

The equation for parabola B is $y = -(x - 6)^2 + 9$

b) To the nearest thousandth, how many seconds after parabola B begins, will the heights of both parabolas be the same?

Solution



Since parabola begins at 3 seconds, and the two parabolas intersect in 3.375 seconds, the difference, or 0.375 seconds is the time after parabola B begins, that the heights will be the same (2.109 feet).