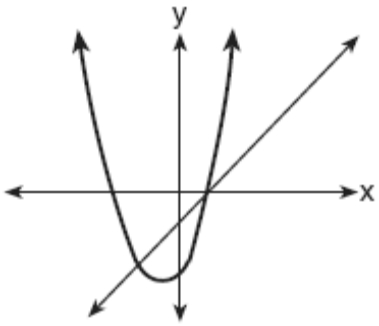
New York Additional Topics Lesson 6 NY P.752: Systems of Linear and Quadratic Equations

Part 1: Solving Systems Using Graphing

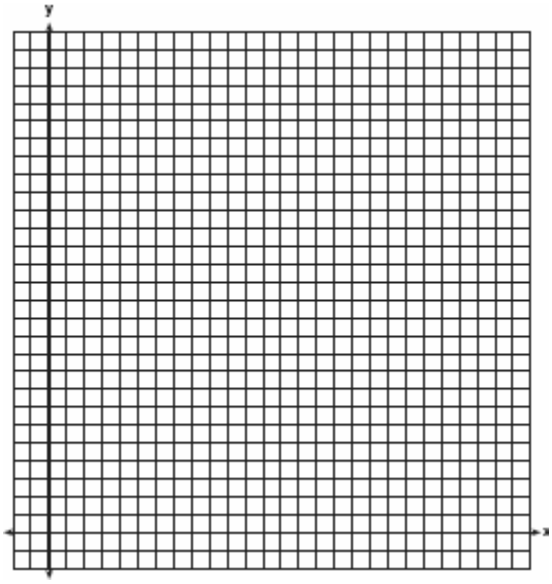
1. 060507a
The accompanying diagram shows the graphs of a linear equation and a quadratic equation.



How many solutions are there to this system of equations?

[A] 2 [B] 1 [C] 3 [D] 0

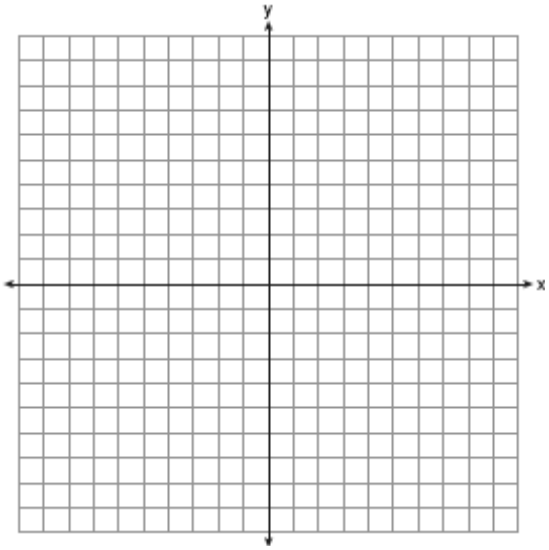
2. 060235a, P.I. A.G.9
A rocket is launched from the ground and follows a parabolic path represented by the equation $y = -x^2 + 10x$. At the same time, a flare is launched from a height of 10 feet and follows a straight path represented by the equation $y = -x + 10$. Using the accompanying set of axes, graph the equations that represent the paths of the rocket and the flare, and find the coordinates of the point or points where the paths intersect.



3. fall0738ia, P.I. A.G.9

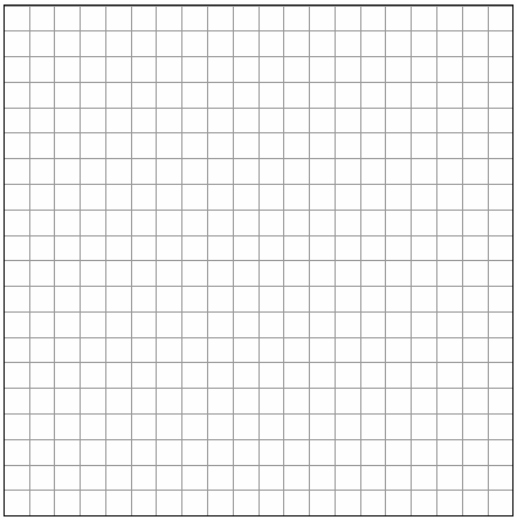
Solve the following systems of equations graphically, on the set of axes below, and state the coordinates of the point(s) in the solution set.

$$y = x^2 - 6x + 5$$
$$2x + y = 5$$



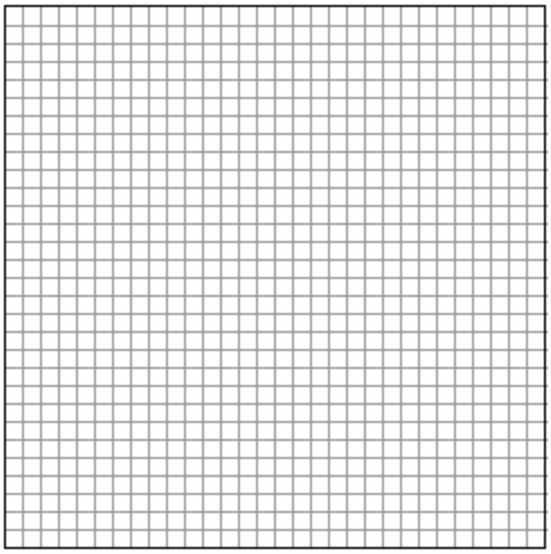
4. 060328b, P.I. G.G.70

The price of a stock, $A(x)$, over a 12-month period decreased and then increased according to the equation $A(x) = 0.75x^2 - 6x + 20$, where x equals the number of months. The price of another stock, $B(x)$, increased according to the equation $B(x) = 2.75x + 1.50$ over the same 12-month period. Graph and label both equations on the accompanying grid. State all prices, to the *nearest dollar*, when both stock values were the same.

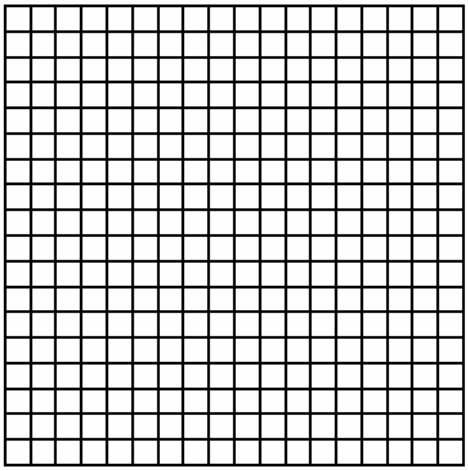


Part 2: Solving Systems Using Algebraic Methods

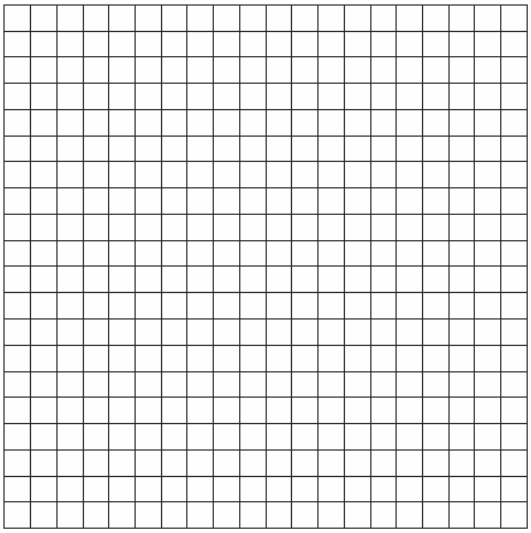
5. 080538a, P.I. A.A.11
Solve the following system of equations:
$$y = x^2 + 4x + 1$$
$$y = 5x + 3$$
[The use of the grid is optional.]



6. 069935a, P.I. A.A.11
Solve the following system of equations algebraically or graphically for x and y:
$$y = x^2 + 2x - 1$$
$$y = 3x + 5$$



7. 060228b, P.I. A.A.11
A pelican flying in the air over water drops a crab from a height of 30 feet. The distance the crab is from the water as it falls can be represented by the function $h(t) = -16t^2 + 30$, where t is time, in seconds. To catch the crab as it falls, a gull flies along a path represented by the function $g(t) = -8t + 15$. Can the gull catch the crab before the crab hits the water? Justify your answer. [The use of the accompanying grid is optional.]



8. 060018a, P.I. A.A.11
The graphs of the equations $y = x^2 + 4x - 1$ and $y + 3 = x$ are drawn on the same set of axes. At which point do the graphs intersect?

[A] (-2, 1) [B] (1, 4)

[C] (1, -2) [D] (-2, -5)

9. 080135a, P.I. A.A.11
Solve the following system of equations algebraically:
$$y = x^2 + 4x - 2$$
$$y = 2x + 1$$

[1] A

[2]
[4] (10,0) and (1,9), and both graphs are drawn correctly.
[3] Both graphs are drawn correctly, but only one solution is stated correctly.
or [3] One graph of equal difficulty is drawn incorrectly, but the solutions are appropriate, based on the graphs.
[2] (10,0) and (1,9), but the problem is solved algebraically instead of graphically.
or [2] One graph of equal difficulty is drawn incorrectly, and only one solution is appropriate, based on the graphs.
[1] Both the parabola and the line are graphed incorrectly, but the solutions are appropriate, based on the graphs.
or [1] Incorrect solutions result from an algebraic method.
or [1] (10,0) and (1,9), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[3]
[4] Correct graphs are drawn, and (0,5) and (4,–3) are stated.
[3] Both equations are graphed, but one graphing error is made, but appropriate solutions are stated.
or [3] Both graphs are drawn correctly, but only one solution is stated.
[2] Both graphs are drawn correctly, but no solutions are stated.
or [2] Both equations are graphed, but two or more graphing errors are made, but appropriate solutions are stated.
or [2] Appropriate work is shown to find (0,5) and (4,–3), but a method other than graphing is used.
or [2] Both equations are graphed, but one conceptual error is made.
[1] Both equations are graphed, but one conceptual error and one graphing error are made.
or [1] (0,5) and (4,–3) are stated, but no work is shown.
[0] (0,5) or (4,–3) is stated, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] 9 and 26, and appropriate work is shown, such as graphing and labeling the equations and identifying the points of intersection.
[3] Both functions are graphed correctly, and the points of intersection are indicated, but the prices are not stated.
or [3] The parabola is graphed correctly, but the line is graphed incorrectly, but appropriate prices are stated.
[2] The line and the parabola are graphed and labeled, but a conceptual error is made, such as only one price is found because the graph of the parabola is incomplete.
or [2] The line is graphed correctly, but the parabola is graphed incorrectly, but appropriate prices are stated.
or [2] 9 and 26, but only an algebraic solution is shown.
[1] Both the line and the parabola are graphed incorrectly, but appropriate prices are stated.
or [1] 9 and 26, but no work is shown.
[0] 9 or 26, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4]

[4] (-1,-2) and (2,13), and appropriate work is shown, such as an algebraic or graphic solution or trial and error with at least three trials and appropriate checks.
[3] Appropriate work is shown, but one computational or graphing error is made.
or [3] Appropriate work is shown, but only one solution is found or only the x- or the y-values are found.
[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The trial-and-error method is used to find the correct solutions, but only two trials and appropriate checks are shown.
or [2] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.
or [2] Both equations are graphed correctly, but neither ordered pair is identified.
or [2] Only one equation is graphed correctly, but an appropriate solution is found.
or [2] An incorrect quadratic equation of equal difficulty is solved appropriately, and appropriate solutions are found.
[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [1] One equation is graphed correctly, but no further correct work is shown.
or [1] An incorrect equation of a lesser degree of difficulty, such as a linear equation, is solved appropriately.
or [1] A correct substitution is made and the system of equations is simplified to a single quadratic equation set equal to zero, but no further correct work is shown.
or [1] (-l,-2) and (2,13), but no work or only one trial with an appropriate check is shown.
[0] (-1,-2) or (2,13), but no work or only one trial with an appropriate check is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a

[5]

correct response that was obtained by an obviously incorrect procedure.

[6]

[4] (3,14) and (–2,–1) and either an algebraic or a graphic solution is shown.
[3] An appropriate method is shown, but only one correct ordered pair is identified.
or [3] An appropriate method is shown, but one computational mistake is made.
or [3] An appropriate method is shown, but values are given only for x.
[2] The substitution is correct, but the quadratic produced is not factored correctly.
or [2] Both equations are graphed correctly, but neither ordered pair is identified.
[1] Only one equation is graphed correctly.
or [1] The substitution is incorrect, but it produces a linear equation that is solved correctly.
or [1] Only the substitution is correct.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[7]

[4] Yes, and appropriate work is shown, and an appropriate justification is given.
[3] Appropriate work is shown, and an appropriate justification is given, but one computational error is made, or the negative value of t is not rejected.
[2] An appropriate graph or equation is shown, such as $16t^2 - 8t - 15 = 0$.
[1] An incorrect graph or equation of equal difficulty is used, but an appropriate solution is found.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[8] D

[9]

[4] (–3,–5) and (1,3), and appropriate algebraic work is shown.
[3] Appropriate algebraic work is shown, but $x = -3$ and $x = 1$ are given as the solution.
or [3] Appropriate algebraic work is shown, but only one correct solution is given, such as (1,3).
[2] (–3,–5) and (1,3), but a graphic solution is shown.
or [2] Correct substitution and an algebraic equation set equal to zero are shown, but the result is not factored, such as $x^2 + 2x - 3 = 0$.
[1] Any correct substitution is shown, such as $2x + 1 = x^2 + 3x - 2$.
or [1] (–3,–5) and (1,3), but no algebraic work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.