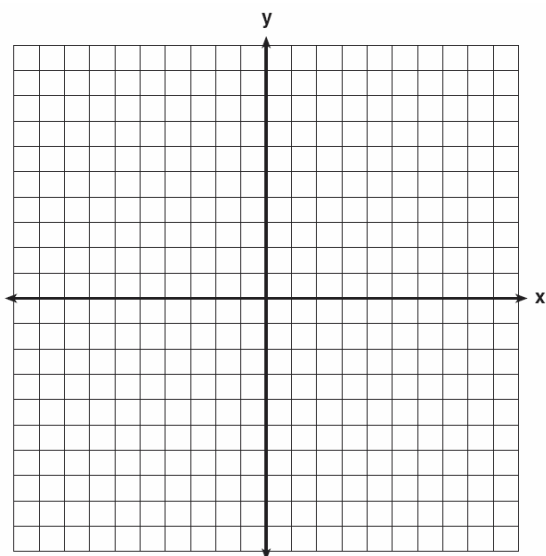


NAME: \_\_\_\_\_

1. 010029a

On the set of axes provided below, sketch a circle with a radius of 3 and center at (2,1) and also sketch the graph of the line  $2x + y = 8$ .



*b* What is the total number of points of intersection of the two graphs?

2. 060119a, P.I. A2.A.3

What is the total number of points of intersection in the graphs of the equations  $x^2 + y^2 = 16$  and  $y = 4$ ?

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

3. 080625a, P.I. A2.A.3

What is the total number of points of intersection of the graphs of the equations  $x^2 + y^2 = 16$  and  $y = x$ ?

[A] 4      [B] 3      [C] 1      [D] 2

4. 010920a, P.I. A2.A.3

The graphs of the equations  $x^2 + y^2 = 4$  and  $y = x$  are drawn on the same set of axes. What is the total number of points of intersection?

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

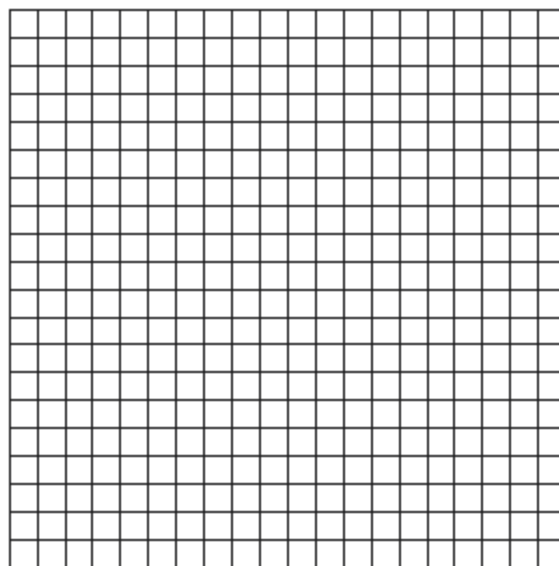
5. 060439a, P.I. A2.A.3

Solve the following system of equations algebraically or graphically:

$$x^2 + y^2 = 25$$

$$3y - 4x = 0$$

[The use of the accompanying grid is optional.]



6. 060627b, P.I. A2.A.3

Solve the following system of equations algebraically:

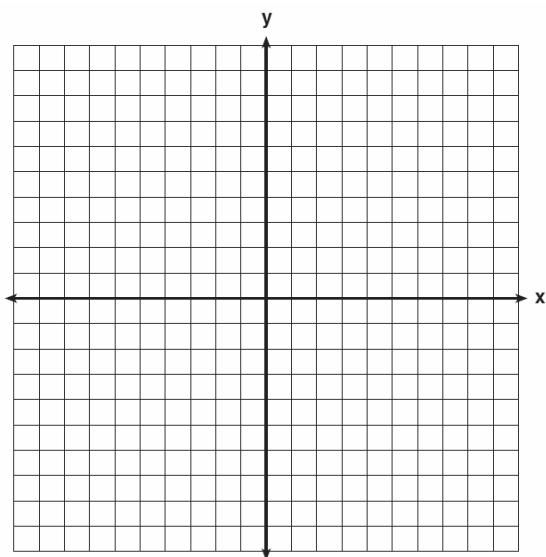
$$9x^2 + y^2 = 9$$

$$3x - y = 3$$

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7. 010839a

On the accompanying set of axes, graph the parabola whose equation is  $y = x^2 - 2x - 8$  over the interval  $-3 \leq x \leq 5$  and graph the circle whose center is at  $(1, -5)$  and whose radius is 4. Using your graphs, determine how many points of intersection the two graphs have.



8. 080611b

What is the total number of points of intersection for the graphs of the equations  $y = x^2$  and  $y = -x^2$ ?

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

9. 060706b

What is one solution of the accompanying system of equations?

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

$$y = -0.5x^2 + 3$$

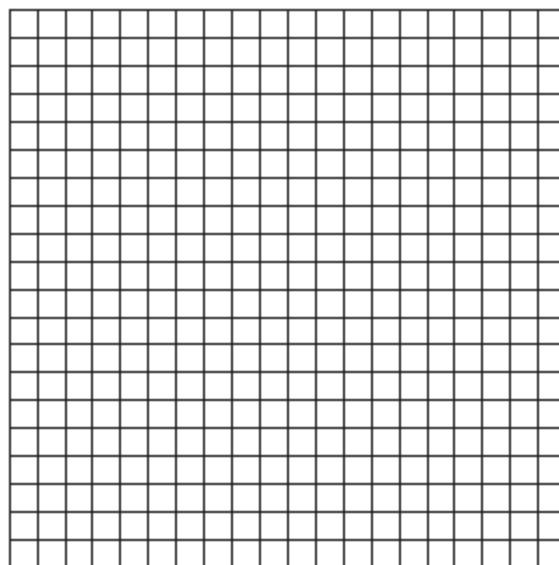
- [A]  $(-2, 1)$       [B]  $(0, 3)$   
 [C]  $(0, 5)$       [D]  $(3, 5)$

10. 080831b

A landscape architect's designs for a town park call for two parabolic-shaped walkways. When the park is mapped on a Cartesian coordinate plane, the pathways intersect at two points. If the equations of the curves of the walkways are  $y = 11x^2 + 23x + 210$  and  $y = -19x^2 - 7x + 390$ , determine the coordinates of the two points of intersection. [Only an algebraic solution can receive full credit.]

11. 080732b

Two circles whose equations are  $(x - 3)^2 + (y - 5)^2 = 25$  and  $(x - 7)^2 + (y - 5)^2 = 9$  intersect in two points. What is the equation of the line passing through these two points? [The use of the accompanying grid is optional.]



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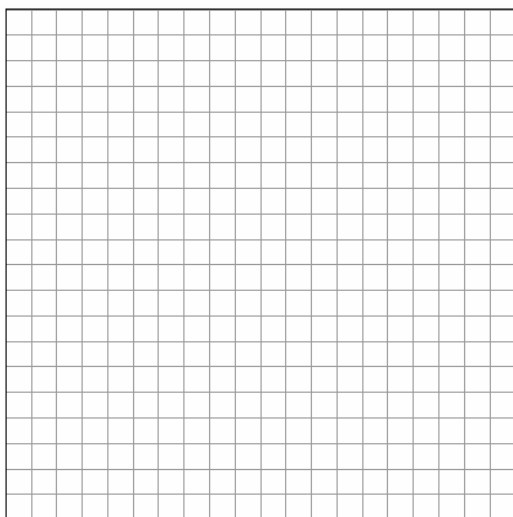
12. 010932b, P.I. A.G.9

On the accompanying grid, graph the following system of equations over the interval  $-6 \leq x \leq 6$ .

$$x^2 + y^2 = 25$$

$$xy = 12$$

State the points of intersection.



13. 010704b

What is the total number of points of intersection of the graphs of the equations  $xy = 12$  and  $y = -x^2 + 3$ ?

[A] 1      [B] 3      [C] 4      [D] 2

14. 060519b

The graphs of the equations  $y = 2^x$  and  $y = -2x + a$  intersect in Quadrant I for which values of  $a$ ?

[A]  $0 < a < 1$       [B]  $a < 1$   
 [C]  $a \geq 1$       [D]  $a > 1$

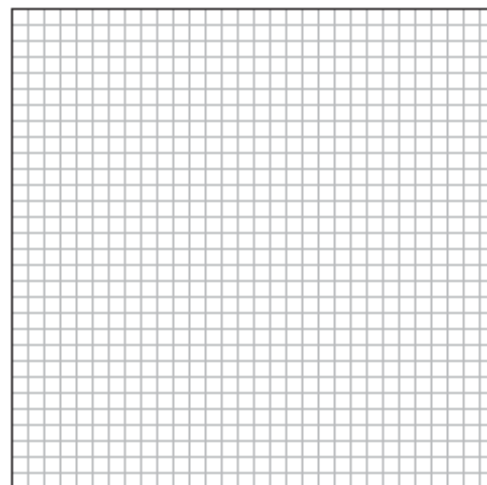
15. 080705b

The flight paths of two Thunderbird jets are plotted on a Cartesian coordinate plane, and the equations of the jets' flight paths are represented by  $y = 2^x + 3$  and  $y = 0.5^x$ . The best approximation of the intersection of the flight paths is

[A] (-1.50, 2.82)      [B] (0, 1)  
 [C] (-1.72, 3.3)      [D] (-2, -1)

16. 010628b

On the accompanying grid, sketch the graphs of  $y = 2^x$  and  $3y = 7x + 3$  over the interval  $-3 \leq x \leq 4$ . Identify and state the coordinates of all points of intersection.



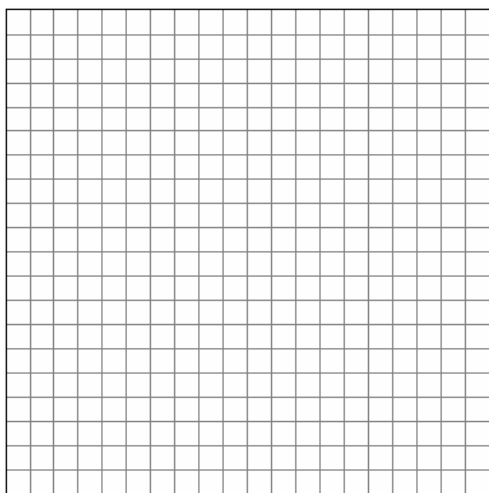
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17. 010527b

On the accompanying grid, solve the following system of equations graphically:

$$y = -x^2 + 2x + 1$$

$$y = 2^x$$



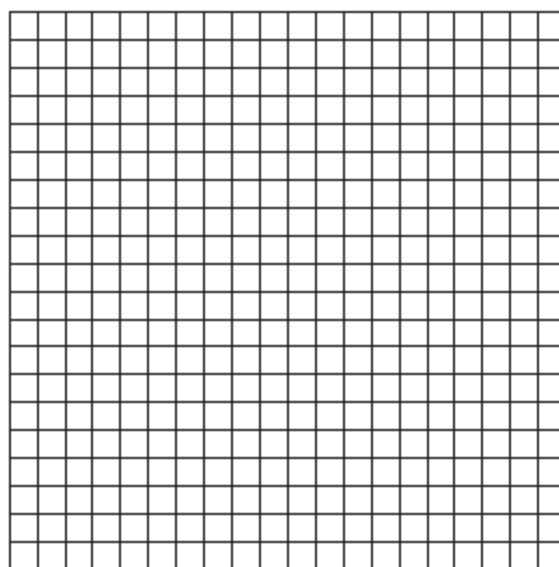
18. 060205b

The path of a rocket is represented by the equation  $y = \sqrt{25 - x^2}$ . The path of a missile designed to intersect the path of the rocket is represented by the equation  $x = \frac{3}{2}\sqrt{y}$ . The value of  $x$  at the point of intersection is 3. What is the corresponding value of  $y$ ?

- [A] 4      [B] -2      [C] 2      [D] -4

19. 060329b

A pair of figure skaters graphed part of their routine on a grid. The male skater's path is represented by the equation  $m(x) = 3\sin\frac{1}{2}x$ , and the female skater's path is represented by the equation  $f(x) = -2\cos x$ . On the accompanying grid, sketch both paths and state how many times the paths of the skaters intersect between  $x = 0$  and  $x = 4\pi$ .



20. 060233b

On a monitor, the graphs of two impulses are recorded on the same screen, where  $0^\circ \leq x < 360^\circ$ . The impulses are given by the following equations:

$$y = 2\sin^2 x$$

$$y = 1 - \sin x$$

Find all values of  $x$ , in degrees, for which the two impulses meet in the interval  $0^\circ \leq x < 360^\circ$ . [Only an algebraic solution will be accepted.]

a [2] A correct circle is sketched with its center at (2,1) and a radius of 3 and the line  $2x + y = 8$  is drawn.

[1] Only one of the graphs is sketched correctly.

b [1] 2

or [1] The correct number of intersections is found, based on the incorrect graphs drawn in part a.

a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[1] obviously incorrect procedure.

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[2] A

[3] D

[4] D

[4] (3,4) and (−3,−4), and a correct algebraic or graphic solution is shown.

[3] Appropriate work is shown, but one computational or graphing error is made.

or [3] Appropriate work is shown for an algebraic or graphic solution, but only one correct ordered pair is found or the correct values are found only for  $x$  or for  $y$ .

[2] Appropriate work is shown, but two or more computational or graphing errors are made.

or [2] Both equations are graphed correctly, but neither ordered pair is identified.

or [2] The line is graphed correctly, but the circle is graphed as a semicircle, and only one correct solution is identified.

or [2] An incorrect quadratic equation of equal difficulty is solved appropriately, and an appropriate solution or solutions are found.

or [2] The linear equation is graphed correctly and correct points of the circle are graphed, but the points are connected to form a quadrilateral, but appropriate ordered pairs are identified.

[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, and an appropriate solution or solutions are found.

or [1] A correct quadratic equation is set equal to zero, but no further correct work is shown.

or [1] (3,4) and (−3,−4), but no work is shown.

[0] (3,4) or (−3,−4), 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

[5] obviously incorrect procedure.

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- [4] (0,-3) and (1,0) or an equivalent answer, and appropriate algebraic work is shown.  
[3] Appropriate work is shown, but one computational error is made.  
or [3] Appropriate work is shown, but only one correct solution is found or only the  $x$ - or the  $y$ -values are found correctly.  
[2] Appropriate work is shown, but two or more computational errors are made.  
or [2] Appropriate work is shown, but one conceptual error is made.  
or [2] (0,-3) and (1,0), but a method other than an algebraic solution is used.  
or [2] A correct quadratic equation is written in standard form, such as  $18x^2 - 18x = 0$ , but no further correct work is shown.  
or [2] An incorrect quadratic equation of equal difficulty is solved appropriately.  
[1] Appropriate work is shown, but one conceptual error and one computational error are made.  
or [1] An incorrect equation of a lesser degree of difficulty is solved appropriately.  
or [1]  $y = 3x - 3$  is found and substituted into the second equation, but no further correct work is shown.  
or [1] (0,-3) and (1,0), but no work is shown.  
[0] Only one correct solution is found or only the  $x$ - or the  $y$ -values are found correctly, and 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.
- [6] \_\_\_\_\_

- [4] Both the parabola and the circle are graphed correctly and the number of points of intersection is stated as three.  
[3] Appropriate work is shown, but one graphing error is made, but an appropriate number of points of intersection is stated.  
or [3] Both graphs are drawn correctly, but the number of points of intersection is missing or is incorrect.  
[2] Appropriate work is shown, but two or more graphing errors are made, but an appropriate number of points of intersection is stated.  
[1] Both graphs are drawn incorrectly, but an appropriate number of points of intersection is stated.  
or [1] Either the parabola or the circle is graphed correctly, but no further correct work is shown.  
or [1] Three points of intersection, but no work is shown and no graphs are drawn.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [7] \_\_\_\_\_
- [8] B \_\_\_\_\_
- [9] A \_\_\_\_\_

[4] (2,300) and (-3,240), and appropriate algebraic work is shown.

[3] Appropriate work is shown, but one computational or factoring error is made.

or [3] The  $x$ -values of 2 and -3 are found correctly, but only one  $y$ -value is found, correctly.

[2] Appropriate work is shown, but two or more computational or factoring errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The  $x$ -values of 2 and -3 are found correctly, but no further correct work is shown.

or [2] (2,300) or (-3,240), and appropriate algebraic work is shown.

or [2] (2,300) and (-3,240), but a method other than an algebraic solution is used.

[1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.

or [1] A method other than an algebraic solution is used, and one error is made.

or [1] (2,300) and (-3,240), but no work is shown.

[0] (2,300) or (-3,240), 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

[10] obviously incorrect procedure.

[4]  $x = 7$ , and appropriate algebraic work is shown or a correct sketch of the graph of the circles is drawn.

[3] Appropriate work is shown, but one computational or graphing error is made, but an appropriate equation is written.

or [3] The two points of intersection are correctly identified, but the equation is missing or is incorrect.

[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] Both circles are graphed correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

or [1] One circle is graphed correctly, but no further correct work is shown.

or [1]  $x = 7$ , but no work or sketch is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[11] incorrect procedure.

[4] (3,4), (4,3), (-3,-4), and (-4,-3), and appropriate graphs are drawn.

[3] Appropriate work is shown, but one computational or graphing error is made.

or [3] Appropriate graphs are drawn, but only two or three points of intersection are identified.

[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, such as only graphing half of the hyperbola and finding two points of intersection.

or [2] Appropriate graphs are drawn, but no points of intersection are identified.

[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

or [1] Either the circle or the hyperbola is graphed correctly, but no further correct work is shown.

or [1] (3,4), (4,3), (-3,-4), and (-4,-3), 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

[12] incorrect procedure.

[13] A

[14] D

[15] C

[4] (0,1) and (3,8), and both graphs are sketched correctly.

[3] Appropriate work is shown, but one graphing error is made, but all appropriate points of intersection are identified.

[2] Appropriate work is shown, but two or more graphing errors are made, but all appropriate points of intersection are identified.

or [2] Appropriate work is shown, but one conceptual error is made, such as failing to draw the graph over the specified interval, resulting in only one point of intersection.

or [2] Both graphs are sketched correctly, and the two points of intersection are indicated, but the coordinates are not stated or are stated incorrectly.

[1] Only the graph of the exponential function is sketched correctly, and no further correct work is shown.

or [1] (0,1) and (3,8), but no graph is sketched.

[0] (0,1) or (3,8), but no graph is sketched.

or [0] Only the line is graphed correctly.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[16] obviously incorrect procedure.



- [4] (0,1) and (1,2), and a correct graph is drawn with at least one function labeled.
- [3] Appropriate work is shown, but one graphing error is made, such as plotting one point incorrectly or not labeling either function.
- or [3] The graphs are drawn correctly, but only one correct solution is found or only the x- or the y-values are found correctly.
- [2] Appropriate work is shown, but two or more graphing errors are made.
- or [2] (0,1) and (1,2), but the solution is found by a nongraphic method.
- or [2] The graphs are drawn correctly, but no correct solutions are found.
- [1] The graph of only one equation is drawn correctly, and no further correct work is shown.
- or [1] (0,1) and (1,2), but no work is shown.
- [0] (0,1) or (1,2), 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.
- [17] \_\_\_\_\_
- [18] A

- [4] Two, and the paths are sketched and labeled correctly, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational or graphing error is made, but the appropriate number of points of intersection is stated.
- or [3] Only one path is sketched correctly, but the correct interval is used, and an appropriate number of points of intersection is stated.
- or [3] The paths are sketched correctly, but an incorrect interval is used, but the appropriate number of points of intersection is stated.
- or [3] The paths are sketched correctly in the correct interval, but the number of points of intersection is not stated or is stated incorrectly.
- [2] Appropriate work is shown, but more than one computational or graphing error is made, but the appropriate number of points of intersection is stated.
- or [2] Only one path is sketched correctly in the correct interval, and the number of points of intersection is not stated or is stated incorrectly.
- or [2] Only one path is sketched appropriately in an incorrect interval, but an appropriate number of points of intersection is stated.
- [1] A basic sine and cosine curve are sketched, but they do not have the correct traits of the equation, but an appropriate number of points of intersection is stated.
- or [1] One path is sketched correctly in the correct interval, but the second graph is not sketched.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [19] \_\_\_\_\_

[6] 30, 150, and 270, and appropriate work is shown.

[5] Appropriate work is shown, but one computational error is made.

[4] The correct equation is shown, but only two correct solutions are found.

[3] The correct equation is shown, but only one correct solution is found.

[2] The correct equation is solved for  $x$ , but no further work is shown.

[1] The correct equation is shown, but no further work is shown.

or [1] 30, 150, and 270, 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

[20] incorrect procedure.

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