

**Regents Review Session 1**

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

1. A gardener is planting two types of trees:
- Type A is three feet tall and grows at a rate of 15 inches per year.
- Type B is four feet tall and grows at a rate of 10 inches per year.

Algebraically determine exactly how many years it will take for these trees to be the same height.

2. Janice is asked to solve  $0 = 64x^2 + 16x - 3$ . She begins the problem by writing the following steps:

Line 1  $0 = 64x^2 + 16x - 3$   
 Line 2  $0 = B^2 + 2B - 3$   
 Line 3  $0 = (B + 3)(B - 1)$

Use Janice's procedure to solve the equation for  $x$ .

Explain the method Janice used to solve the quadratic equation.

3. The method of completing the square was used to solve the equation  $2x^2 - 12x + 6 = 0$ . Which equation is a correct step when using this method?

- (1)**  $(x - 3)^2 = 6$       **(2)**  $(x - 3)^2 = -6$   
**(3)**  $(x - 3)^2 = 3$       **(4)**  $(x - 3)^2 = -3$

4. Given that  $a > b$ , solve for  $x$  in terms of  $a$  and  $b$ :

$$b(x - 3) \geq ax + 7b$$

5. The solution of the equation  $(x + 3)^2 = 7$  is

- (1)**  $3 \pm \sqrt{7}$       **(2)**  $7 \pm \sqrt{3}$   
**(3)**  $-3 \pm \sqrt{7}$       **(4)**  $-7 \pm \sqrt{3}$

6. Solve the equation for  $y$ .

$$(y - 3)^2 = 4y - 12$$

7. Which trinomial is equivalent to  $3(x - 2)^2 - 2(x - 1)$ ?

- (1)**  $3x^2 - 2x - 10$       **(2)**  $3x^2 - 2x - 14$   
**(3)**  $3x^2 - 14x + 10$       **(4)**  $3x^2 - 14x + 14$

8. If  $f(x) = x^2 - 2x - 8$  and  $g(x) = \frac{1}{4}x - 1$ , for which values of  $x$  is  $f(x) = g(x)$ ?

- (1)**  $-1.75$  and  $-1.438$   
**(2)**  $-1.75$  and  $4$   
**(3)**  $-1.438$  and  $0$   
**(4)**  $4$  and  $0$

9. A typical cell phone plan has a fixed base fee that includes a certain amount of data and an overage charge for data use beyond the plan. A cell phone plan charges a base fee of \$62 and an overage charge of \$30 per gigabyte of data that exceed 2 gigabytes. If  $C$  represents the cost and  $g$  represents the total number of gigabytes of data, which equation could represent this plan when more than 2 gigabytes are used?

- (1)**  $C = 30 + 62(2 - g)$   
**(2)**  $C = 30 + 62(g - 2)$   
**(3)**  $C = 62 + 30(2 - g)$   
**(4)**  $C = 62 + 30(g - 2)$

10. New Clarendon Park is undergoing renovations to its gardens. One garden that was originally a square is being adjusted so that one side is doubled in length, while the other side is decreased by three meters.

The new rectangular garden will have an area that is 25% more than the original square garden. Write an equation that could be used to determine the length of a side of the original square garden.

Explain how your equation models the situation.

Determine the area, in square meters, of the new rectangular garden.

11. What are the roots of the equation  $x^2 + 4x - 16 = 0$ ?

- (1)  $2 \pm 2\sqrt{5}$                       (2)  $-2 \pm 2\sqrt{5}$   
 (3)  $2 \pm 4\sqrt{5}$                       (4)  $-2 \pm 4\sqrt{5}$

12. The inequality  $7 - \frac{2}{3}x < x - 8$  is equivalent to

- (1)  $x > 9$                               (2)  $x > -\frac{3}{5}$   
 (3)  $x < 9$                               (4)  $x < -\frac{3}{5}$

13. The formula for the volume of a cone is  $V = \frac{1}{3}\pi r^2 h$ . The radius,  $r$ , of the cone may be expressed as

- (1)  $\sqrt{\frac{3V}{\pi h}}$                               (2)  $\sqrt{\frac{V}{3\pi h}}$   
 (3)  $3\sqrt{\frac{V}{\pi h}}$                               (4)  $\frac{1}{3}\sqrt{\frac{V}{\pi h}}$

14. Albert says that the two systems of equations shown below have the same solutions.

First System	Second System
$8x + 9y = 48$	$8x + 9y = 48$
$12x + 5y = 21$	$-8.5y = -51$

Determine and state whether you agree with Albert. Justify your answer.

15. Write an equation that defines  $m(x)$  as a trinomial where  $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$ .

Solve for  $x$  when  $m(x) = 0$ .

16. Factor the expression  $x^4 + 6x^2 - 7$  completely.

17. Natasha is planning a school celebration and wants to have live music and food for everyone who attends. She has found a band that will charge her \$750 and a caterer who will provide snacks and drinks for \$2.25 per person. If her goal is to keep the average cost per person between \$2.75 and \$3.25, how many people,  $p$ , must attend?

- (1)  $225 < p < 325$   
 (2)  $325 < p < 750$   
 (3)  $500 < p < 1000$   
 (4)  $750 < p < 1500$

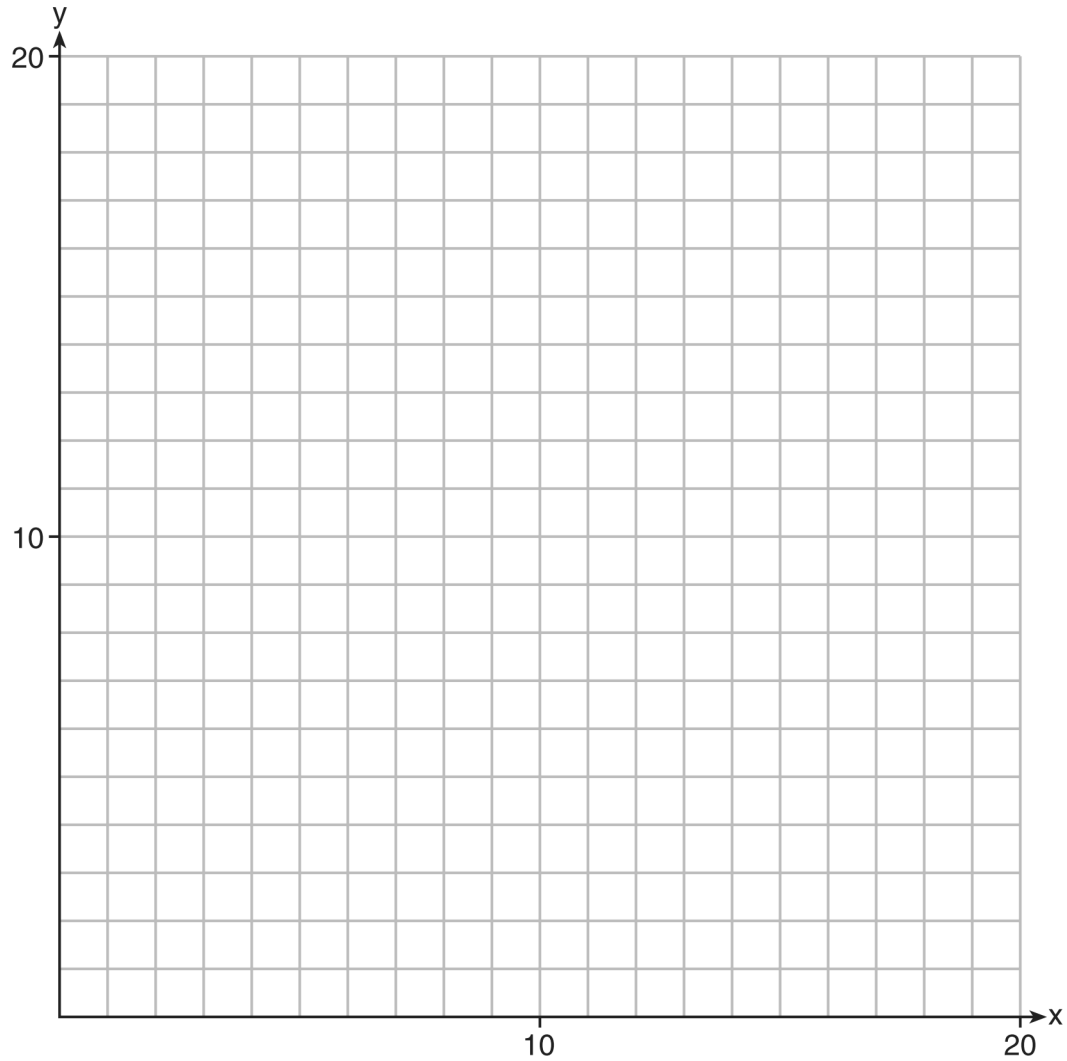
18. When directed to solve a quadratic equation by completing the square, Sam arrived at the equation  $(x - \frac{5}{2})^2 = \frac{13}{4}$ . Which equation could have been the original equation given to Sam?

- (1)  $x^2 + 5x + 7 = 0$   
 (2)  $x^2 + 5x + 3 = 0$   
 (3)  $x^2 - 5x + 7 = 0$   
 (4)  $x^2 - 5x + 3 = 0$

19. Edith babysits for  $x$  hours a week after school at a job that pays \$4 an hour. She has accepted a job that pays \$8 an hour as a library assistant working  $y$  hours a week. She will work both jobs. She is able to work *no more than* 15 hours a week, due to school commitments. Edith wants to earn *at least* \$80 a week, working a combination of both jobs.

Write a system of inequalities that can be used to represent the situation.

Graph these inequalities on the set of axes below.

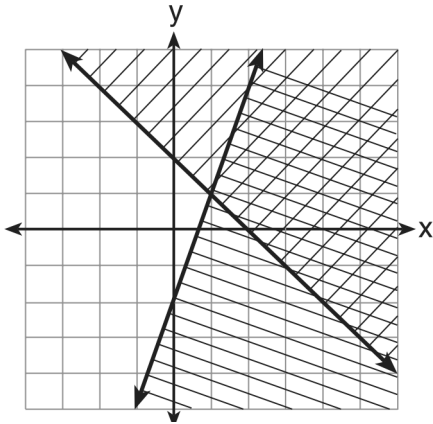


Determine and state one combination of hours that will allow Edith to earn *at least* \$80 per week while working *no more than* 15 hours.

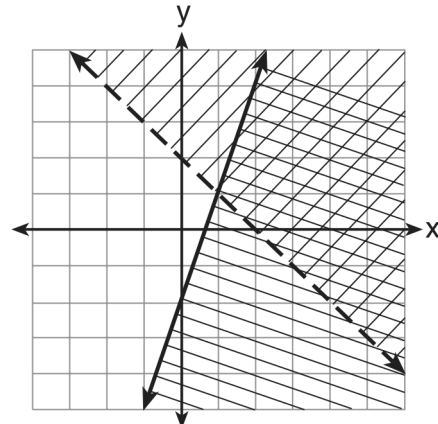
20. Given:  $y + x > 2$   
 $y \leq 3x - 2$

Which graph shows the solution of the given set of inequalities?

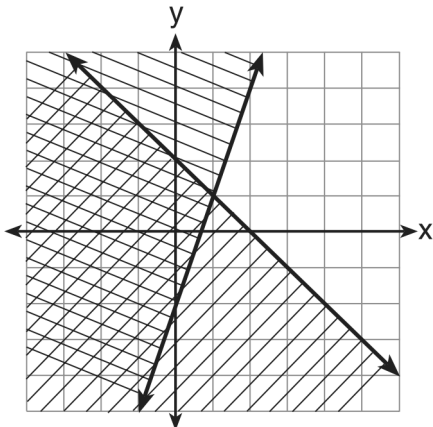
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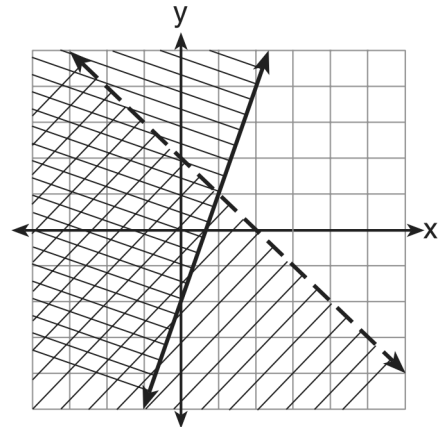
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(4)



21. When solving the equation  $4(3x^2 + 2) - 9 = 8x^2 + 7$ , Emily wrote  $4(3x^2 + 2) = 8x^2 + 16$  as her first step. Which property justifies Emily's first step?

- (1) addition property of equality
- (2) commutative property of addition
- (3) multiplication property of equality
- (4) distributive property of multiplication over addition

22. If  $A = 3x^2 + 5x - 6$  and  $B = -2x^2 - 6x + 7$ , then  $A - B$  equals

- (1)  $-5x^2 - 11x + 13$
- (2)  $5x^2 + 11x - 13$
- (3)  $-5x^2 - x + 1$
- (4)  $5x^2 - x + 1$

23. Which value of  $x$  satisfies the equation  $\frac{7}{3}\left(x + \frac{9}{28}\right) = 20$ ?

- (1) 8.25
- (2) 8.89
- (3) 19.25
- (4) 44.92

24. Which equation has the same solution as  $x^2 - 6x - 12 = 0$ ?

**(1)**  $(x + 3)^2 = 21$     **(2)**  $(x - 3)^2 = 21$

**(3)**  $(x + 3)^2 = 3$     **(4)**  $(x - 3)^2 = 3$

25. Keith determines the zeros of the function  $f(x)$  to be  $-6$  and  $5$ . What could be Keith's function?

**(1)**  $f(x) = (x + 5)(x + 6)$

**(2)**  $f(x) = (x + 5)(x - 6)$

**(3)**  $f(x) = (x - 5)(x + 6)$

**(4)**  $f(x) = (x - 5)(x - 6)$

26. Which system of equations has the same solution as the system below?

$$2x + 2y = 16$$

$$3x - y = 4$$

**(1)**  $2x + 2y = 16$     **(2)**  $2x + 2y = 16$   
 $6x - 2y = 4$              $6x - 2y = 8$

**(3)**  $x + y = 16$         **(4)**  $6x + 6y = 48$   
 $3x - y = 4$               $6x + 2y = 8$

27. John has four more nickels than dimes in his pocket, for a total of \$1.25. Which equation could be used to determine the number of dimes,  $x$ , in his pocket?

**(1)**  $0.10(x + 4) + 0.05(x) = \$1.25$

**(2)**  $0.05(x + 4) + 0.10(x) = \$1.25$

**(3)**  $0.10(4x) + 0.05(x) = \$1.25$

**(4)**  $0.05(4x) + 0.10(x) = \$1.25$

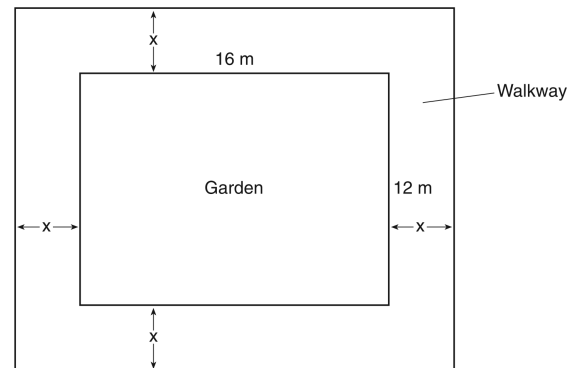
28. A cell phone company charges \$60.00 a month for up to 1 gigabyte of data. The cost of additional data is \$0.05 per megabyte. If  $d$  represents the number of additional megabytes used and  $c$  represents the total charges at the end of the month, which linear equation can be used to determine a user's monthly bill?

**(1)**  $c = 60 - 0.05d$     **(2)**  $c = 60.05d$

**(3)**  $c = 60d - 0.05$     **(4)**  $c = 60 + 0.05d$

29. Given  $2x + ax - 7 > -12$ , determine the largest integer value of  $a$  when  $x = -1$ .

30. A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of  $x$  meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find  $x$ , the width of the walkway.

Describe how your equation models the situation.

Determine and state the width of the walkway, in meters.

31. If  $4x^2 - 100 = 0$ , the roots of the equation are

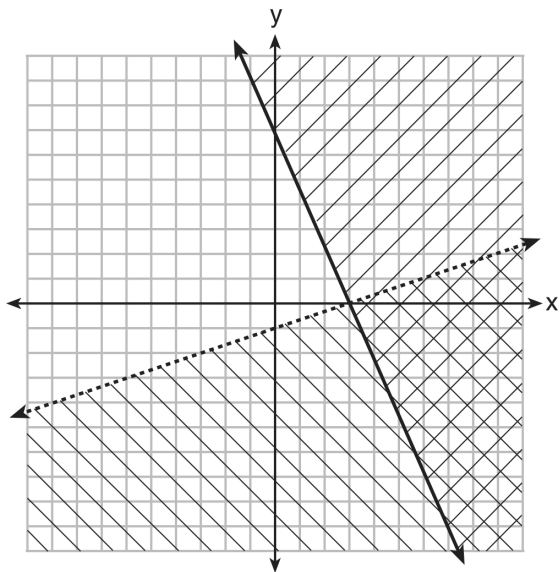
**(1)**  $-25$  and  $25$     **(2)**  $-25$ , only

**(3)**  $-5$  and  $5$         **(4)**  $-5$ , only

32. Which point is *not* on the graph represented by  $y = x^2 + 3x - 6$ ?

- (1)  $(-6, 12)$                       (2)  $(-4, -2)$   
 (3)  $(2, 4)$                             (4)  $(3, -6)$

33. What is one point that lies in the solution set of the system of inequalities graphed below?



- (1)  $(7, 0)$                             (2)  $(3, 0)$   
 (3)  $(0, 7)$                             (4)  $(-3, 5)$

34. Sam and Jeremy have ages that are consecutive odd integers. The product of their ages is 783. Which equation could be used to find Jeremy's age,  $j$ , if he is the younger man?

- (1)  $j^2 + 2 = 783$                       (2)  $j^2 - 2 = 783$   
 (3)  $j^2 + 2j = 783$                       (4)  $j^2 - 2j = 783$

35. Which expression is equivalent to  $x^4 - 12x^2 + 36$ ?

- (1)  $(x^2 - 6)(x^2 - 6)$   
 (2)  $(x^2 + 6)(x^2 + 6)$   
 (3)  $(6 - x^2)(6 + x^2)$   
 (4)  $(x^2 + 6)(x^2 - 6)$

36. The zeros of the function  $f(x) = (x + 2)^2 - 25$  are

- (1)  $-2$  and  $5$                       (2)  $-3$  and  $7$   
 (3)  $-5$  and  $2$                       (4)  $-7$  and  $3$

37. During the 2010 season, football player McGee's earnings,  $m$ , were 0.005 million dollars more than those of his teammate Fitzpatrick's earnings,  $f$ . The two players earned a total of 3.95 million dollars. Which system of equations could be used to determine the amount each player earned, in millions of dollars?

- (1)  $m + f = 3.95$   
 $m + 0.005 = f$   
 (2)  $m - 3.95 = f$   
 $f + 0.005 = m$   
 (3)  $f - 3.95 = m$   
 $m + 0.005 = f$   
 (4)  $m + f = 3.95$   
 $f + 0.005 = m$

38. What is the value of  $x$  in the equation  $\frac{x-2}{3} + \frac{1}{6} = \frac{5}{6}$ ?

- (1) 4                      (2) 6                      (3) 8                      (4) 11

39. In the equation  $x^2 + 10x + 24 = (x + a)(x + b)$ ,  $b$  is an integer. Find algebraically *all* possible values of  $b$ .

40. Guy and Jim work at a furniture store. Guy is paid \$185 per week plus 3% of his total sales in dollars,  $x$ , which can be represented by  $g(x) = 185 + 0.03x$ . Jim is paid \$275 per week plus 2.5% of his total sales in dollars,  $x$ , which can be represented by  $f(x) = 275 + 0.025x$ . Determine the value of  $x$ , in dollars, that will make their weekly pay the same.

41. Express the product of  $2x^2 + 7x - 10$  and  $x + 5$  in standard form.

42. Solve the inequality below to determine and state the smallest possible value for  $x$  in the solution set.

$$3(x + 3) \leq 5x - 3$$

43. A student was given the equation  $x^2 + 6x - 13 = 0$  to solve by completing the square. The first step that was written is shown below.

$$x^2 + 6x = 13$$

The next step in the student's process was  $x^2 + 6x + c = 13 + c$ .

State the value of  $c$  that creates a perfect square trinomial.

Explain how the value of  $c$  is determined.

44. The formula for the area of a trapezoid is  $A = \frac{1}{2}h(b_1 + b_2)$ . Express  $b_1$  in terms of  $A$ ,  $h$ , and  $b_2$ .

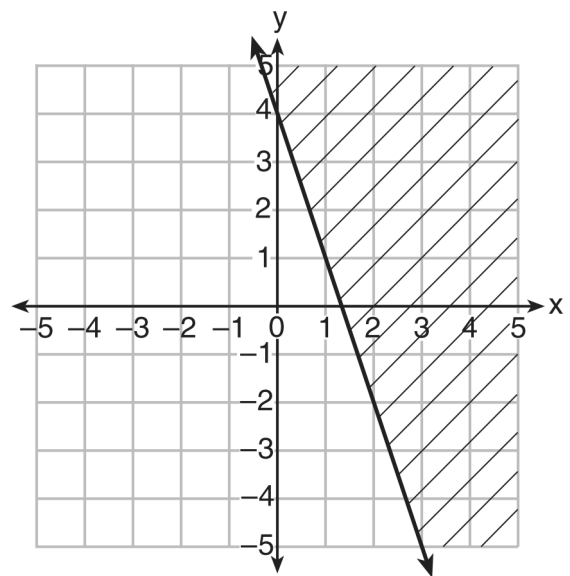
The area of a trapezoid is 60 square feet, its height is 6 ft, and one base is 12 ft. Find the number of feet in the other base.

45. A school is building a rectangular soccer field that has an area of 6000 square yards. The soccer field must be 40 yards longer than its width. Determine algebraically the dimensions of the soccer field, in yards.

46. If the area of a rectangle is expressed as  $x^4 - 9y^2$ , then the product of the length and the width of the rectangle could be expressed as

- (1)  $(x - 3y)(x + 3y)$
- (2)  $(x^2 - 3y)(x^2 + 3y)$
- (3)  $(x^2 - 3y)(x^2 - 3y)$
- (4)  $(x^4 + y)(x - 9y)$

47. Which inequality is represented in the graph below?



- (1)  $y \geq -3x + 4$
- (2)  $y \leq -3x + 4$
- (3)  $y \geq -4x - 3$
- (4)  $y \leq -4x - 3$

48. Mo's farm stand sold a total of 165 pounds of apples and peaches. She sold apples for \$1.75 per pound and peaches for \$2.50 per pound. If she made \$337.50, how many pounds of peaches did she sell?

- (1) 11
- (2) 18
- (3) 65
- (4) 100

49. What are the zeros of the function  $f(x) = x^2 - 13x - 30$ ?

- (1) -10 and 3      (2) 10 and -3  
(3) -15 and 2      (4) 15 and -2

50. The distance a free falling object has traveled can be modeled by the equation  $d = \frac{1}{2}at^2$ , where  $a$  is acceleration due to gravity and  $t$  is the amount of time the object has fallen. What is  $t$  in terms of  $a$  and  $d$ ?

- (1)  $t = \sqrt{\frac{da}{2}}$       (2)  $t = \sqrt{\frac{2d}{a}}$   
(3)  $t = \left(\frac{da}{d}\right)^2$       (4)  $t = \left(\frac{2d}{a}\right)^2$

51. A student is asked to solve the equation  $4(3x - 1)^2 - 17 = 83$ . The student's solution to the problem starts as

$$4(3x - 1)^2 = 100$$
$$(3x - 1)^2 = 25$$

A correct next step in the solution of the problem is

- (1)  $3x - 1 = \pm 5$   
(2)  $3x - 1 = \pm 25$   
(3)  $9x^2 - 1 = 25$   
(4)  $9x^2 - 6x + 1 = 5$

52. What are the solutions to the equation  $x^2 - 8x = 24$ ?

- (1)  $x = 4 \pm 2\sqrt{10}$       (2)  $x = -4 \pm 2\sqrt{10}$   
(3)  $x = 4 \pm 2\sqrt{2}$       (4)  $x = -4 \pm 2\sqrt{2}$

53. Alex is selling tickets to a school play. An adult ticket costs \$6.50 and a student ticket costs \$4.00. Alex sells  $x$  adult tickets and 12 student tickets. Write a function,  $f(x)$ , to represent how much money Alex collected from selling tickets.

54. John and Sarah are each saving money for a car. The total amount of money John will save is given by the function  $f(x) = 60 + 5x$ . The total amount of money Sarah will save is given by the function  $g(x) = x^2 + 46$ . After how many weeks,  $x$ , will they have the same amount of money saved? Explain how you arrived at your answer.

55. If the difference  $(3x^2 - 2x + 5) - (x^2 + 3x - 2)$  is multiplied by  $\frac{1}{2}x^2$ , what is the result, written in standard form?

56. Determine the smallest integer that makes  $-3x + 7 - 5x < 15$  true.

57. A landscaper is creating a rectangular flower bed such that the width is half of the length. The area of the flower bed is 34 square feet. Write and solve an equation to determine the width of the flower bed, to the *nearest tenth of a foot*.

58. Which equation has the same solutions as  $2x^2 + x - 3 = 0$ ?

- (1)  $(2x - 1)(x + 3) = 0$   
(2)  $(2x + 1)(x - 3) = 0$   
(3)  $(2x - 3)(x + 1) = 0$   
(4)  $(2x + 3)(x - 1) = 0$

59. Fred is given a rectangular piece of paper. If the length of Fred's piece of paper is represented by  $2x - 6$  and the width is represented by  $3x - 5$ , then the paper has a total area represented by

- (1)  $5x - 11$       (2)  $6x^2 - 28x + 30$   
(3)  $10x - 22$       (4)  $6x^2 - 6x - 11$



60. Connor wants to attend the town carnival. The price of admission to the carnival is \$4.50, and each ride costs an additional 79 cents. If he can spend at most \$16.00 at the carnival, which inequality can be used to solve for  $r$ , the number of rides Connor can go on, and what is the maximum number of rides he can go on?

- (1)  $0.79 + 4.50r \leq 16.00$ ; 3 rides
- (2)  $0.79 + 4.50r \leq 16.00$ ; 4 rides
- (3)  $4.50 + 0.79r \leq 16.00$ ; 14 rides
- (4)  $4.50 + 0.79r \leq 16.00$ ; 15 rides

61. The equation for the volume of a cylinder is  $V = \pi r^2 h$ . The positive value of  $r$ , in terms of  $h$  and  $V$ , is

- (1)  $r = \sqrt{\frac{V}{\pi h}}$
- (2)  $r = \sqrt{V\pi h}$
- (3)  $r = 2V\pi h$
- (4)  $r = \frac{V}{2\pi}$

62. Which equation has the same solutions as  $x^2 + 6x - 7 = 0$ ?

- (1)  $(x + 3)^2 = 2$
- (2)  $(x - 3)^2 = 2$
- (3)  $(x - 3)^2 = 16$
- (4)  $(x + 3)^2 = 16$

63. When factored completely, the expression  $p^4 - 81$  is equivalent to

- (1)  $(p^2 + 9)(p^2 - 9)$
- (2)  $(p^2 - 9)(p^2 - 9)$
- (3)  $(p^2 + 9)(p + 3)(p - 3)$
- (4)  $(p + 3)(p - 3)(p + 3)(p - 3)$

64. Subtract  $5x^2 + 2x - 11$  from  $3x^2 + 8x - 7$ . Express the result as a trinomial.

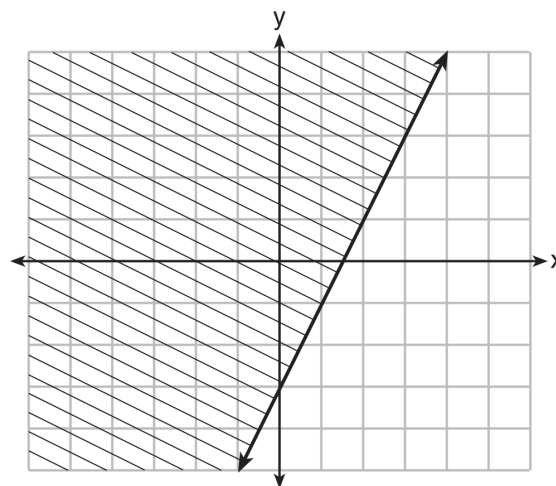
65. Solve the equation  $4x^2 - 12x = 7$  algebraically for  $x$ .

66. Jacob and Zachary go to the movie theater and purchase refreshments for their friends. Jacob spends a total of \$18.25 on two bags of popcorn and three drinks. Zachary spends a total of \$27.50 for four bags of popcorn and two drinks.

Write a system of equations that can be used to find the price of one bag of popcorn and the price of one drink.

Using these equations, determine and state the price of a bag of popcorn and the price of a drink, to the *nearest cent*.

67. The graph of an inequality is shown below.



- a) Write the inequality represented by the graph.
- b) On the same set of axes, graph the inequality  $x + 2y < 4$ .
- c) The two inequalities graphed on the set of axes form a system. Oscar thinks that the point  $(2, 1)$  is in the solution set for this system of inequalities. Determine and state whether you agree with Oscar. Explain your reasoning.

68. Rowan has \$50 in a savings jar and is putting in \$5 every week. Jonah has \$10 in his own jar and is putting in \$15 every week. Each of them plots his progress on a graph with time on the horizontal axis and amount in the jar on the vertical axis. Which statement about their graphs is true?

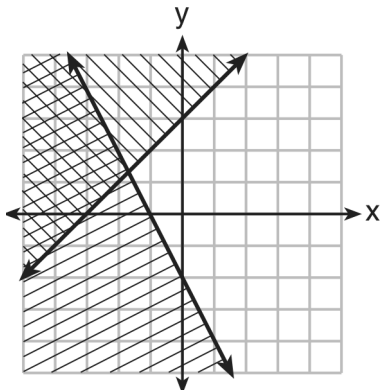
- (1) Rowan's graph has a steeper slope than Jonah's.
- (2) Rowan's graph always lies above Jonah's.
- (3) Jonah's graph has a steeper slope than Rowan's.
- (4) Jonah's graph always lies above Rowan's.

69. To watch a varsity basketball game, spectators must buy a ticket at the door. The cost of an adult ticket is \$3.00 and the cost of a student ticket is \$1.50. If the number of adult tickets sold is represented by  $a$  and student tickets sold by  $s$ , which expression represents the amount of money collected at the door from the ticket sales?

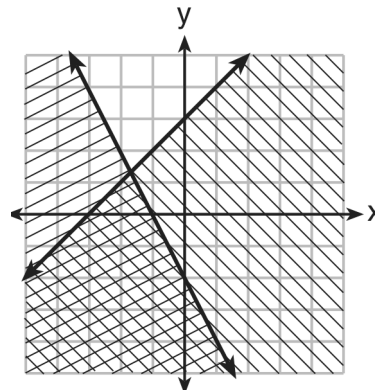
- (1)  $4.50as$                       (2)  $4.50(a + s)$
- (3)  $(3.00a)(1.50s)$         (4)  $3.00a + 1.50s$

70. Which graph represents the solution of  $y \leq x + 3$  and  $y \geq -2x - 2$ ?

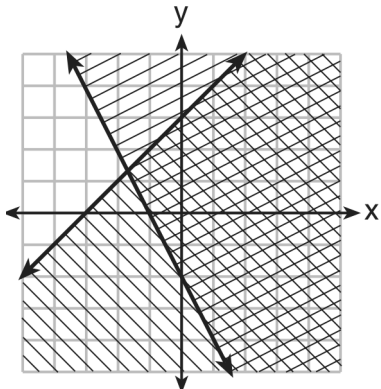
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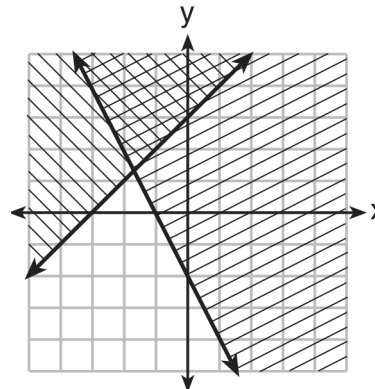
(2)



(3)



(4)



71. Four expressions are shown below.

- I.  $2(2x^2 - 2x - 60)$
- II.  $4(x^2 - x - 30)$
- III.  $4(x + 6)(x - 5)$
- IV.  $4x(x - 1) - 120$

The expression  $4x^2 - 4x - 120$  is equivalent to

- (1) I and II, only      (2) II and IV, only
- (3) I, II, and IV      (4) II, III, and IV

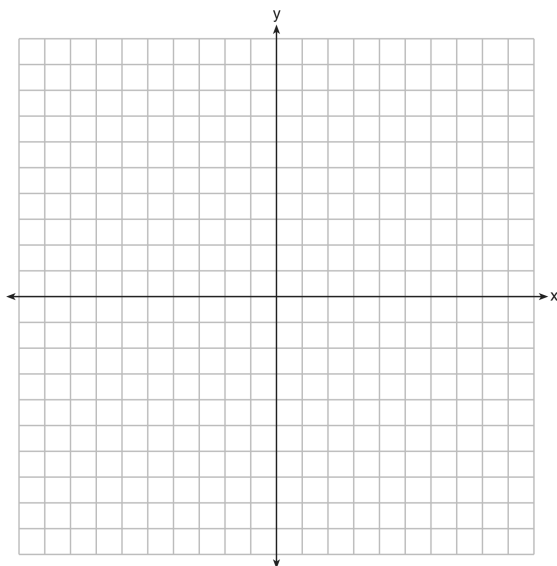
72. Last week, a candle store received \$355.60 for selling 20 candles. Small candles sell for \$10.98 and large candles sell for \$27.98. How many large candles did the store sell?

- (1) 6      (2) 8      (3) 10      (4) 12

73. The zeros of the function  $f(x) = 3x^2 - 3x - 6$  are

- (1) -1 and -2      (2) 1 and -2
- (3) 1 and 2      (4) -1 and 2

74. On the set of axes below, graph the inequality  $2x + y > 1$ .



75. How many real solutions does the equation  $x^2 - 2x + 5 = 0$  have? Justify your answer.

76. Solve for  $x$  algebraically:  
 $7x - 3(4x - 8) < 6x + 12 - 9x$

If  $x$  is a number in the interval  $[4, 8]$ , state all integers that satisfy the given inequality. Explain how you determined these values.

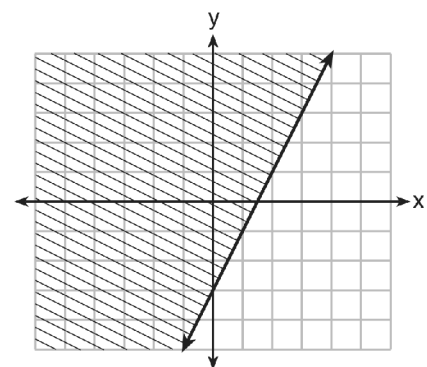
77. A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create.

Explain how your equation or inequality models the situation.

Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the nearest tenth of an inch.

78. Which inequality is represented by the graph below?



- (1)  $y \leq 2x - 3$       (2)  $y \geq 2x - 3$
- (3)  $y \leq -3x + 2$       (4)  $y \geq -3x + 2$

79. Michael borrows money from his uncle, who is charging him simple interest using the formula  $I = Prt$ . To figure out what the interest rate,  $r$ , is, Michael rearranges the formula to find  $r$ . His new formula is  $r$  equals

- (1)  $\frac{I - P}{t}$                       (2)  $\frac{P - I}{t}$   
 (3)  $\frac{I}{Pt}$                         (4)  $\frac{Pt}{I}$

80. Which equation is equivalent to  $y - 34 = x(x - 12)$ ?

- (1)  $y = (x - 17)(x + 2)$   
 (2)  $y = (x - 17)(x - 2)$   
 (3)  $y = (x - 6)^2 + 2$   
 (4)  $y = (x - 6)^2 - 2$

81. The zeros of the function  $f(x) = 2x^2 - 4x - 6$  are

- (1) 3 and -1                      (2) 3 and 1  
 (3) -3 and 1                      (4) -3 and -1

82. When  $(2x - 3)^2$  is subtracted from  $5x^2$ , the result is

- (1)  $x^2 - 12x - 9$                 (2)  $x^2 - 12x + 9$   
 (3)  $x^2 + 12x - 9$                 (4)  $x^2 + 12x + 9$

83. Joe has a rectangular patio that measures 10 feet by 12 feet. He wants to increase the area by 50% and plans to increase each dimension by equal lengths,  $x$ . Which equation could be used to determine  $x$ ?

- (1)  $(10 + x)(12 + x) = 120$   
 (2)  $(10 + x)(12 + x) = 180$   
 (3)  $(15 + x)(18 + x) = 180$   
 (4)  $(15)(18) = 120 + x^2$

84. When factored completely,  $x^3 - 13x^2 - 30x$  is

- (1)  $x(x + 3)(x - 10)$   
 (2)  $x(x - 3)(x - 10)$   
 (3)  $x(x + 2)(x - 15)$   
 (4)  $x(x - 2)(x + 15)$

85. When solving the equation  $x^2 - 8x - 7 = 0$  by completing the square, which equation is a step in the process?

- (1)  $(x - 4)^2 = 9$                 (2)  $(x - 4)^2 = 23$   
 (3)  $(x - 8)^2 = 9$                 (4)  $(x - 8)^2 = 23$

86. Which pair of equations could *not* be used to solve the following equations for  $x$  and  $y$ ?

$$\begin{aligned} 4x + 2y &= 22 \\ -2x + 2y &= -8 \end{aligned}$$

- (1)  $4x + 2y = 22$   
 $2x - 2y = 8$   
 (2)  $4x + 2y = 22$   
 $-4x + 4y = -16$   
 (3)  $12x + 6y = 66$   
 $6x - 6y = 24$   
 (4)  $8x + 4y = 44$   
 $-8x + 8y = -8$

87. Fred's teacher gave the class the quadratic function  $f(x) = 4x^2 + 16x + 9$ .

- a) State two different methods Fred could use to solve the equation  $f(x) = 0$ .  
 b) Using one of the methods stated in part a, solve  $f(x) = 0$  for  $x$ , to the nearest tenth.

88. A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by  $x$ , and the area of the garden is 108 square meters.

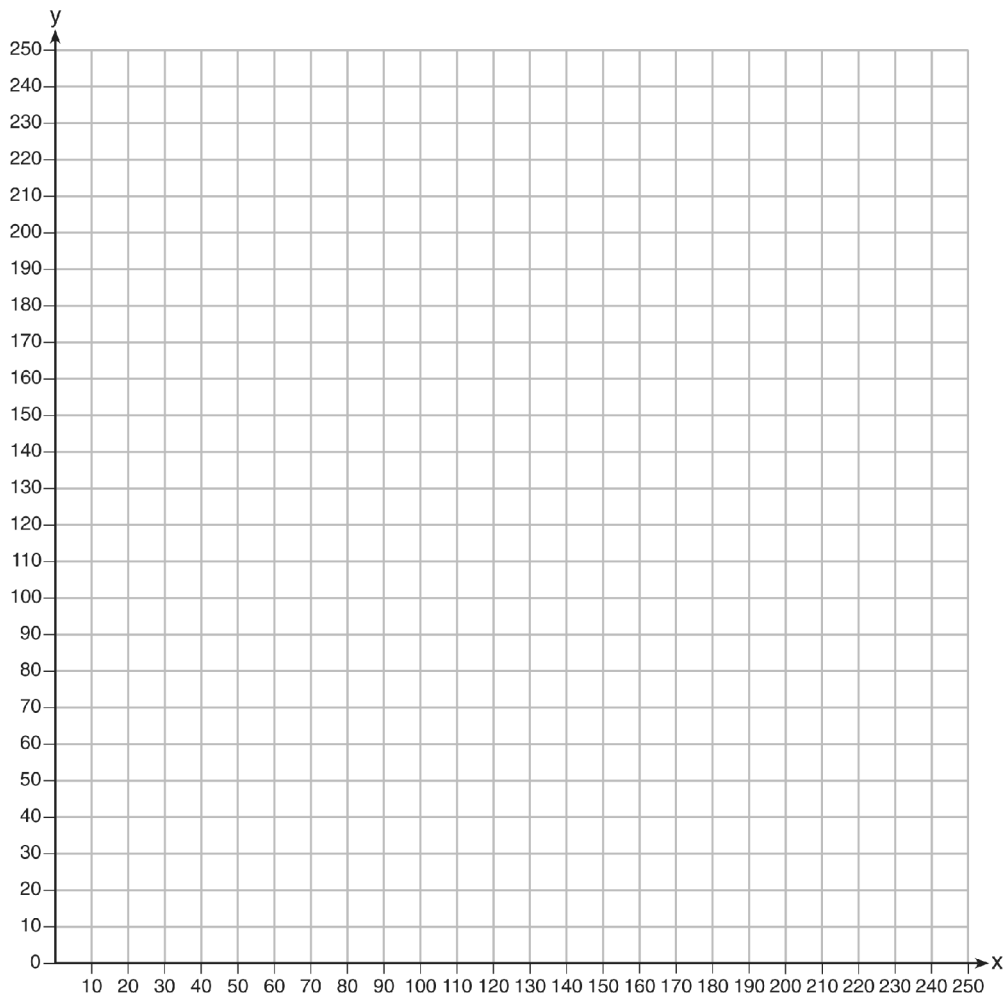
Determine, algebraically, the dimensions of the garden in meters.

89. The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost \$12.50 and child tickets cost \$6.25. The cinema's goal is to sell at least \$1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets,  $x$ , and child tickets,  $y$ , that would satisfy the cinema's goal.

Graph the solution to this system of inequalities on the set of axes below. Label the solution with an  $S$ .

Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.



90. The expression  $x^4 - 16$  is equivalent to
- (1)  $(x^2 + 8)(x^2 - 8)$     (2)  $(x^2 - 8)(x^2 - 8)$   
 (3)  $(x^2 + 4)(x^2 - 4)$     (4)  $(x^2 - 4)(x^2 - 4)$

91. An expression of the fifth degree is written with a leading coefficient of seven and a constant of six. Which expression is correctly written for these conditions?
- (1)  $6x^5 + x^4 + 7$     (2)  $7x^6 - 6x^4 + 5$   
 (3)  $6x^7 - x^5 + 5$     (4)  $7x^5 + 2x^2 + 6$

92. The Celluloid Cinema sold 150 tickets to a movie. Some of these were child tickets and the rest were adult tickets. A child ticket cost \$7.75 and an adult ticket cost \$10.25. If the cinema sold \$1470 worth of tickets, which system of equations could be used to determine how many adult tickets,  $a$ , and how many child tickets,  $c$ , were sold?
- (1)  $a + c = 150$   
 $10.25a + 7.75c = 1470$   
 (2)  $a + c = 1470$   
 $10.25a + 7.75c = 150$   
 (3)  $a + c = 150$   
 $7.75a + 10.25c = 1470$   
 (4)  $a + c = 1470$   
 $7.75a + 10.25c = 150$

93. When  $3x + 2 \leq 5(x - 4)$  is solved for  $x$ , the solution is
- (1)  $x \leq 3$     (2)  $x \geq 3$   
 (3)  $x \leq -11$     (4)  $x \geq 11$

94. The expression  $3(x^2 - 1) - (x^2 - 7x + 10)$  is equivalent to
- (1)  $2x^2 - 7x + 7$     (2)  $2x^2 + 7x - 13$   
 (3)  $2x^2 - 7x + 9$     (4)  $2x^2 + 7x - 11$

95. The zeros of the function  $f(x) = x^2 - 5x - 6$  are
- (1)  $-1$  and  $6$     (2)  $1$  and  $-6$   
 (3)  $2$  and  $-3$     (4)  $-2$  and  $3$

96. The line represented by the equation  $4y + 2x = 33.6$  shares a solution point with the line represented by the table below.

$x$	$y$
$-5$	$3.2$
$-2$	$3.8$
$2$	$4.6$
$4$	$5$
$11$	$6.4$

The solution for this system is

- (1)  $(-14.0, -1.4)$     (2)  $(-6.8, 5.0)$   
 (3)  $(1.9, 4.6)$     (4)  $(6.0, 5.4)$
97. What is the solution of the equation  $2(x + 2)^2 - 4 = 28$ ?
- (1)  $6$ , only    (2)  $2$ , only  
 (3)  $2$  and  $-6$     (4)  $6$  and  $-2$
98. Amy solved the equation  $2x^2 + 5x - 42 = 0$ . She stated that the solutions to the equation were  $\frac{7}{2}$  and  $-6$ . Do you agree with Amy's solutions? Explain why or why not.
99. The formula for the sum of the degree measures of the interior angles of a polygon is  $S = 180(n - 2)$ . Solve for  $n$ , the number of sides of the polygon, in terms of  $S$ .

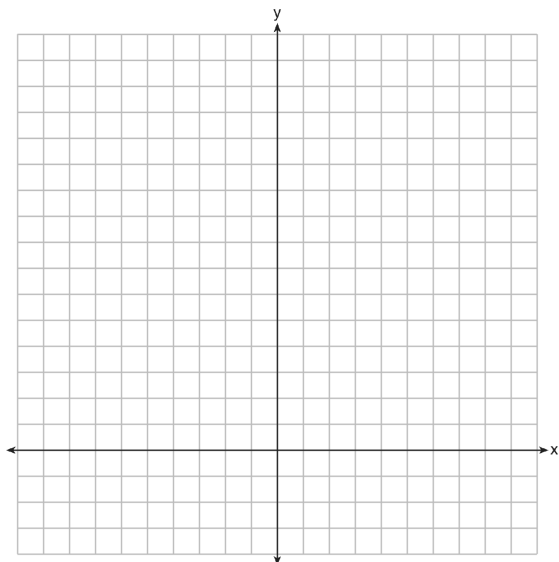
100. The height,  $H$ , in feet, of an object dropped from the top of a building after  $t$  seconds is given by  $H(t) = -16t^2 + 144$ .

How many feet did the object fall between one and two seconds after it was dropped?

Determine, algebraically, how many seconds it will take for the object to reach the ground.

101. The sum of two numbers,  $x$  and  $y$ , is more than 8. When you double  $x$  and add it to  $y$ , the sum is less than 14.

Graph the inequalities that represent this scenario on the set of axes below.

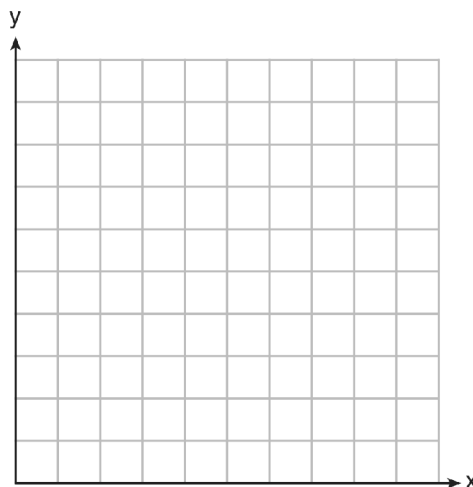


Kai says that the point  $(6, 2)$  is a solution to this system. Determine if he is correct and explain your reasoning.

102. Franco and Caryl went to a bakery to buy desserts. Franco bought 3 packages of cupcakes and 2 packages of brownies for \$19. Caryl bought 2 packages of cupcakes and 4 packages of brownies for \$24. Let  $x$  equal the price of one package of cupcakes and  $y$  equal the price of one package of brownies.

Write a system of equations that describes the given situation.

On the set of axes below, graph the system of equations.



Determine the exact cost of one package of cupcakes and the exact cost of one package of brownies in dollars and cents. Justify your solution.

103. What is the solution to  $2h + 8 > 3h - 6$ ?

- (1)  $h < 14$                       (2)  $h < \frac{14}{5}$   
 (3)  $h > 14$                         (4)  $h > \frac{14}{5}$

104. Which expression is equivalent to  $36x^2 - 100$ ?

- (1)  $4(3x - 5)(3x - 5)$   
 (2)  $4(3x + 5)(3x - 5)$   
 (3)  $2(9x - 25)(9x - 25)$   
 (4)  $2(9x + 25)(9x - 25)$

105. What is the product of  $2x + 3$  and  $4x^2 - 5x + 6$ ?

(1)  $8x^3 - 2x^2 + 3x + 18$

(2)  $8x^3 - 2x^2 - 3x + 18$

(3)  $8x^3 + 2x^2 - 3x + 18$

(4)  $8x^3 + 2x^2 + 3x + 18$

106. Kendal bought  $x$  boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes,  $x$ , Kendal bought?

(1)  $2x - 12 = 60$       (2)  $12x - 2 = 60$

(3)  $12x - 24 = 60$       (4)  $24 - 12x = 60$

107. What are the solutions to the equation  $3x^2 + 10x = 8$ ?

(1)  $\frac{2}{3}$  and  $-4$       (2)  $-\frac{2}{3}$  and  $4$

(3)  $\frac{4}{3}$  and  $-2$       (4)  $-\frac{4}{3}$  and  $2$

108. A system of equations is given below.

$$x + 2y = 5$$

$$2x + y = 4$$

Which system of equations does *not* have the same solution?

(1)  $3x + 6y = 15$       (2)  $4x + 8y = 20$   
 $2x + y = 4$                        $2x + y = 4$

(3)  $x + 2y = 5$       (4)  $x + 2y = 5$   
 $6x + 3y = 12$                        $4x + 2y = 12$

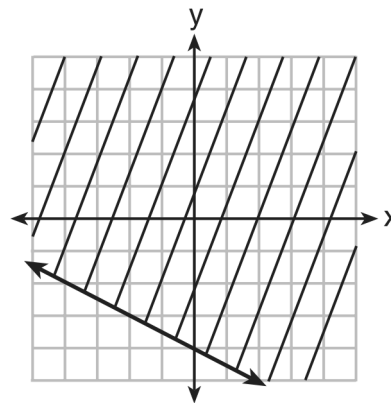
109. When multiplying polynomials for a math assignment, Pat found the product to be  $-4x + 8x^2 - 2x^3 + 5$ . He then had to state the leading coefficient of this polynomial. Pat wrote down  $-4$ . Do you agree with Pat's answer? Explain your reasoning.

110. Find the zeros of  $f(x) = (x - 3)^2 - 49$ , algebraically.

111. Solve the equation below for  $x$  in terms of  $a$ .

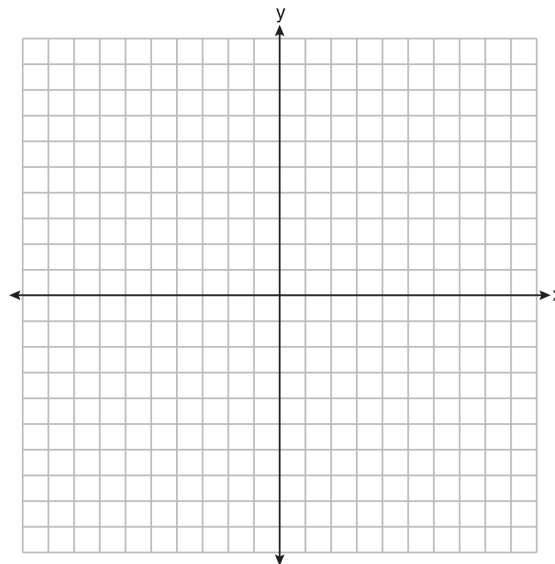
$$4(ax + 3) - 3ax = 25 + 3a$$

112. Shawn incorrectly graphed the inequality  $-x - 2y \geq 8$  as shown below.



Explain Shawn's mistake.

Graph the inequality correctly on the set of axes below.





113. A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost \$12 at the door and \$8.50 if purchased in advance. The drama club has a goal of selling at least \$1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

114. For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent \$19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent \$15.76.

Write a system of equations to represent the costs of a juice box,  $j$ , and a bottle of water,  $w$ .

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

115. Which expression is equivalent to  $16x^2 - 36$ ?

- (1)  $4(2x - 3)(2x - 3)$
- (2)  $4(2x + 3)(2x - 3)$
- (3)  $(4x - 6)(4x - 6)$
- (4)  $(4x + 6)(4x + 6)$

116. What is the solution set of the equation  $(x - 2)(x - a) = 0$ ?

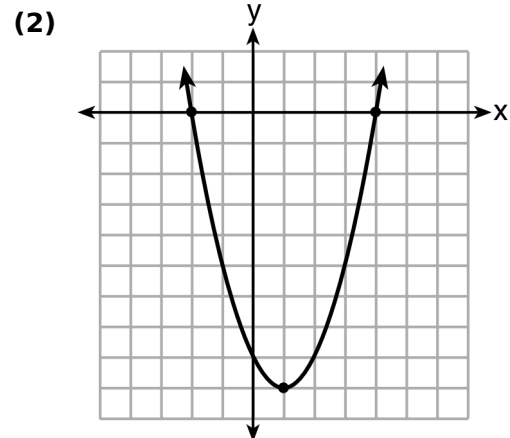
- (1)  $-2$  and  $a$
- (2)  $-2$  and  $-a$
- (3)  $2$  and  $a$
- (4)  $2$  and  $-a$

117. Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula  $P_1V_1 = P_2V_2$ . When the formula is solved for  $P_2$ , the result is

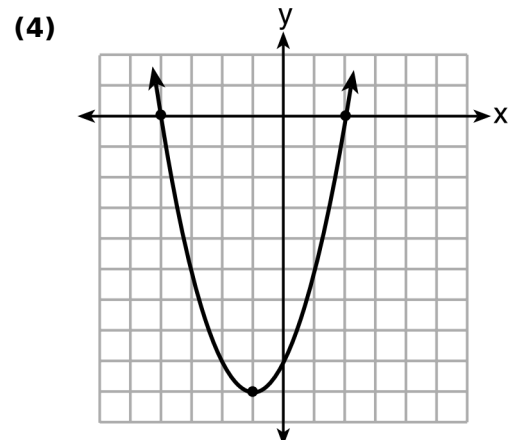
- (1)  $P_1V_1V_2$
- (2)  $\frac{V_2}{P_1V_1}$
- (3)  $\frac{P_1V_1}{V_2}$
- (4)  $\frac{P_1V_2}{V_1}$

118. Which function has zeros of  $-4$  and  $2$ ?

(1)  $f(x) = x^2 + 7x - 8$



(3)  $g(x) = x^2 - 7x - 8$



119. Which expression is equivalent to  $2(3g - 4) - (8g + 3)$ ?

- (1)  $-2g - 1$                       (2)  $-2g - 5$   
(3)  $-2g - 7$                       (4)  $-2g - 11$

120. Which value of  $x$  is a solution to the equation  $13 - 36x^2 = -12$ ?

- (1)  $\frac{36}{25}$     (2)  $\frac{25}{36}$     (3)  $-\frac{6}{5}$     (4)  $-\frac{5}{6}$

121. Which point is a solution to the system below?

$$\begin{aligned} 2y &< -12x + 4 \\ y &< -6x + 4 \end{aligned}$$

- (1)  $(1, \frac{1}{2})$                       (2)  $(0, 6)$   
(3)  $(-\frac{1}{2}, 5)$                       (4)  $(-3, 2)$

122. Andy has \$310 in his account. Each week,  $w$ , he withdraws \$30 for his expenses. Which expression could be used if he wanted to find out how much money he had left after 8 weeks?

- (1)  $310 - 8w$   
(2)  $280 + 30(w - 1)$   
(3)  $310w - 30$   
(4)  $280 - 30(w - 1)$

123. In attempting to solve the system of equations  $y = 3x - 2$  and  $6x - 2y = 4$ , John graphed the two equations on his graphing calculator. Because he saw only one line, John wrote that the answer to the system is the empty set. Is he correct? Explain your answer.

124. Solve the inequality below:

$$1.8 - 0.4y \geq 2.2 - 2y$$

125. Two friends went to a restaurant and ordered one plain pizza and two sodas. Their bill totaled \$15.95. Later that day, five friends went to the same restaurant. They ordered three plain pizzas and each person had one soda. Their bill totaled \$45.90.

Write and solve a system of equations to determine the price of one plain pizza. [Only an algebraic solution can receive full credit.]

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## Regents Review Session 1    XXXX-XX-XX

- |                |                                     |                |   |
|----------------|-------------------------------------|----------------|---|
| 1.<br>Answer:  | $\frac{12}{5}$ or 2.4               | 19.<br>Answer: | $x + y \leq 15$ and $4x + 8y \geq 80$ are stated. Both inequalities are graphed and shaded correctly with at least one labeled correctly. A correct combination of babysitting hours and library hours is stated. |
| 2.<br>Answer:  | $-\frac{3}{8}$ ; [explanation]      | 20.<br>Answer: | 2   |
| 3.<br>Answer:  | 1                                   | 21.<br>Answer: | 1   |
| 4.<br>Answer:  | $x \leq \frac{10b}{b-a}$            | 22.<br>Answer: | 2   |
| 5.<br>Answer:  | 3                                   | 23.<br>Answer: | 1   |
| 6.<br>Answer:  | 7 and 3                             | 24.<br>Answer: | 2   |
| 7.<br>Answer:  | 4                                   | 25.<br>Answer: | 3   |
| 8.<br>Answer:  | 2                                   | 26.<br>Answer: | 2   |
| 9.<br>Answer:  | 4                                   | 27.<br>Answer: | 2   |
| 10.<br>Answer: | $(x-3)(2x) = 1.25x^2$ ; area = 80   | 28.<br>Answer: | 4   |
| 11.<br>Answer: | 2                                   | 29.<br>Answer: | 2   |
| 12.<br>Answer: | 1                                   | 30.<br>Answer: | $(12 + 2x)(16 + 2x) = 396$ ;<br>3 meters  |
| 13.<br>Answer: | 1                                   | 31.<br>Answer: | 3   |
| 14.<br>Answer: | [answers vary] Agree, justification | 32.<br>Answer: | 4   |
| 15.<br>Answer: | $m(x) = x^2 + 10x + 16$ ; -8 and -2 | 33.<br>Answer: | 1   |
| 16.<br>Answer: | $(x^2 + 7)(x + 1)(x - 1)$           | 34.<br>Answer: | 3   |
| 17.<br>Answer: | 4                                   | 35.<br>Answer: | 1   |
| 18.<br>Answer: | 4                                   | 36.<br>Answer: | 4   |

37.  
Answer: 4
38.  
Answer: 1
39.  
Answer: 4 and 6
40.  
Answer: 18,000
41.  
Answer:  $2x^3 + 17x^2 + 25x - 50$
42.  
Answer: 6
43.  
Answer: 9
44.  
Answer:  $\frac{2A - hb_2}{h}$  or an equivalent expression and 8, and correct work is shown.
45.  
Answer: 60 and 100
46.  
Answer: 2
47.  
Answer: 1
48.  
Answer: 3
49.  
Answer: 4
50.  
Answer: 2
51.  
Answer: 1
52.  
Answer: 1
53.  
Answer:  $f(x) = 6.50x + 4(12)$
54.  
Answer: [answers vary] 7, explanation
55.  
Answer:  $x^4 - \frac{5}{2}x^3 + \frac{7}{2}x^2$
56.  
Answer: 0
57.  
Answer: [answers vary] correct equation, 4.1 feet
58.  
Answer: 4
59.  
Answer: 2
60.  
Answer: 3
61.  
Answer: 1
62.  
Answer: 4
63.  
Answer: 3
64.  
Answer:  $-2x^2 + 6x + 4$
65.  
Answer:  $\frac{7}{2}$  and  $-\frac{1}{2}$
66.  
Answer: popcorn = \$5.75; drink = \$2.25
67.  
Answer:  $y \geq 2x - 3$ , [graph], disagree
68.  
Answer: 3
69.  
Answer: 4
70.  
Answer: 3
71.  
Answer: 3
72.  
Answer: 2
73.  
Answer: 4
74.  
Answer: [graph]
75.  
Answer: None
76.  
Answer:  $x \geq 6$ ; 6, 7, 8
77.  
Answer: [equation]; [explanation]; 1.5
78.  
Answer: 2

79.  
Answer: 3
80.  
Answer: 4
81.  
Answer: 1
82.  
Answer: 3
83.  
Answer: 2
84.  
Answer: 3
85.  
Answer: 2
86.  
Answer: 4
87.  
Answer: Complete the square, quadratic formula;  $x = -0.7$   $x = -3.3$
88.  
Answer: 6 and 18
89.  
Answer:  $x + y \leq 200$ ,  $12.5x + 6.25y \geq 1500$ ;  
No, she incorrect because both of the coordinates aren't from the solutions area; [task].
90.  
Answer: 3
91.  
Answer: 4
92.  
Answer: 1
93.  
Answer: 4
94.  
Answer: 2
95.  
Answer: 1
96.  
Answer: 4
97.  
Answer: 3
98.  
Answer: Yes, [explanation]
99.  
Answer:  $n = \frac{S + 360}{180}$  or  $n = \frac{S}{180} + 2$
100.  
Answer: 48, 3.
101.  
Answer: He is incorrect.
102.  
Answer:  $3x + 2y = 19$  and  $2x + 4y = 24$ ;  
 $x = 3.50$  and  $y = 4.25$  or the coordinates (3.50, 4.25)
103.  
Answer: 1
104.  
Answer: 2
105.  
Answer: 3
106.  
Answer: 3
107.  
Answer: 1
108.  
Answer: 4
109.  
Answer: No, [explanation]
110.  
Answer: -4 and 10
111.  
Answer:  $\frac{13 + 3a}{a}$
112.  
Answer: [explanation]; [graph]
113.  
Answer: [system of inequalities]; 48
114.  
Answer:  $18j + 32w = 19.92$ ,  
 $14j + 26w = 15.76$ ; [explanation];  
 $j = 0.68$ ,  $w = 0.24$
115.  
Answer: 2
116.  
Answer: 3
117.  
Answer: 3
118.  
Answer: 4

119.  
Answer: 4
120.  
Answer: 4
121.  
Answer: 4
122.  
Answer: 4
123.  
Answer: No
124.  
Answer:  $y \geq .25$
125.  
Answer: 12.05