

Math 0240 Final Exam Review Questions

- Simplify: $24 \div 8 \cdot 3 + 28 \div (-7)$
- Simplify: $\frac{11 - (-9) + 6(10 - 4)}{2 + 3 \cdot 4}$
- Simplify $-(-5x + 7) - 3(2 - x) - 8x - 6$
- Simplify: $(4x^3)^{-2} \cdot x^9$
- Simplify: $\left(\frac{x^4}{x^7}\right)^{-3}$
- Simplify: $3x^{-6}$
- Simplify: $\left(\frac{b^{10}}{b^3}\right)^{-2}$
- Simplify: $(3x^3)^{-2}$
- Evaluate $x^3 - 4x^2y + 2y - 5$ when $x = -2$ and $y = -3$

Write each of the values below in decimal or standard notation.

- 3.113×10^{-5}
- 1.201×10^9

Write each of the values below in scientific notation.

- 87,000,000
- 0.000017

Solve for x .

- $2(x - 3) + 5x = 8(x - 1)$
- $\frac{2x}{3} + \frac{1}{5} = 1 + \frac{3x}{5} - \frac{1}{3}$
- $\frac{x + 2}{3} = \frac{x}{6}$

For each problem define a variable in words, write an equation or inequality, solve algebraically, and write your answer in a complete sentence.

- Seven subtracted from five times a number is 208. Find the number
- An 87-inch board is cut into three pieces. The longest piece is 10 inches longer than twice the shortest piece and the middle-sized piece is 17 inches longer than the shortest piece. How long are the pieces?
- A landscape architect charged a customer \$971, listing \$350 for plants and the remainder for labor. If the architect charged \$23 per hour, how many hours did the architect work?
- A university with 176 people on the faculty wants to maintain a student-to-faculty ratio of 23:2. How many students should they enroll to maintain that ratio?
- To earn a B in a course, a student must have a final average of at least 80%. On the first three examinations, a student has scores of 76%, 74%, and 78%. What must the student earn on the fourth examination to earn a B in the course?

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22. A motorcycle traveling at 50 mph overtakes a car traveling at 30 mph that had a three-hour head start. How far from the starting point are the two vehicles?

23. Solve the inequality, show the solution in set notation, interval notation and graphed on the number line.

$$10 < -2x + 4$$

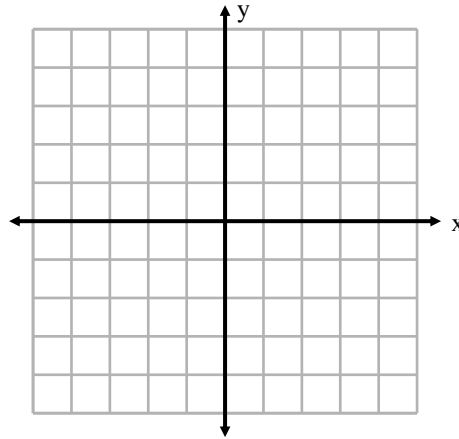


24. Solve the inequality, show your solution in set notation, interval notation and graphed on the number line.

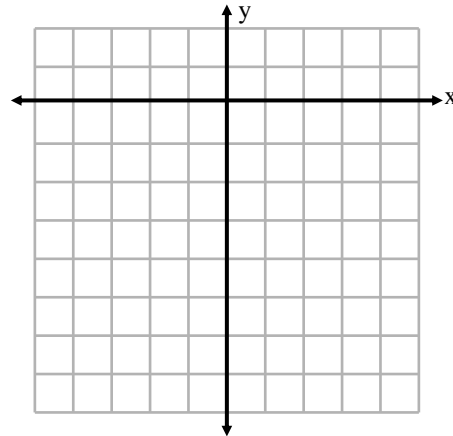
$$33x + 33 \geq 3(4x + 3)$$



25. Sketch the line $5x + 4y = 20$ using x - and y -intercepts and a checkpoint on the axis provided. Write your intercepts as ordered pairs.



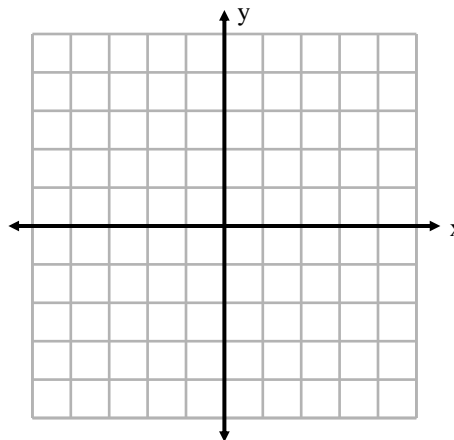
26. Sketch the line $y = 3x - 6$ using x - and y -intercepts and a checkpoint on the axis provided. Write your intercepts as ordered pairs.



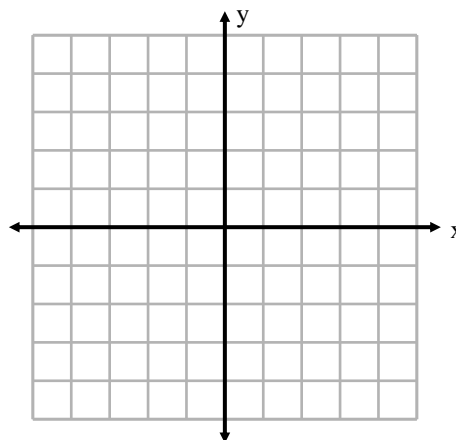
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27. Use the slope and y-intercept to sketch $y = -\frac{1}{2}x + 3$ on the axes provided

State the slope and the y-intercept.



28. Sketch the line with slope $m = \frac{2}{3}$ that contains the point $(-1, -3)$. Label the given point and at least 2 other points on the graph.



29. Find an equation for the line which passes through $(-2, 5)$ and is parallel to the line $y = 3x - 2$. Leave the final answer in slope-intercept form.
30. Find the equation of the line that passes through the points $(3, -4)$ and $(5, 0)$.
31. Find an equation for the line with undefined slope which passes through the point $(-7, 2)$.
32. Find an equation for the line parallel to the line $y = -2$ which passes through the point $(3, -1)$

Given the following equation, determine the slope and the y-intercept.

33. $4x + 3y = 6$

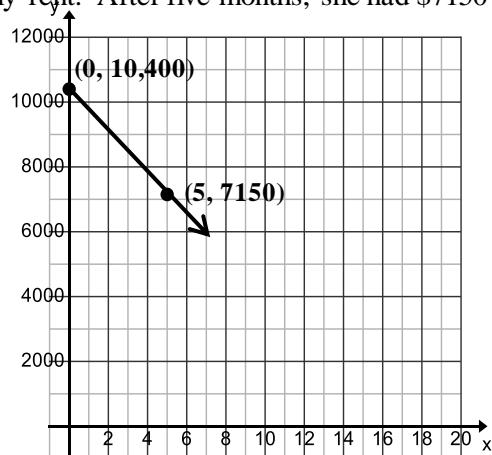
34. $3x - 2y = 5$

35. $5y - 8x = 30$

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36. Sunny had \$10,400 in her bank account that she used just for her monthly rent. After five months, she had \$7150 in her account.

- Find the rate of change in her bank account.
(Use appropriate labels.)
- Write an equation for the line that models the amount in Sunny's account.
- Assuming she never adds any more money into the account, when will she run out of money?



Perform the indicated operations. Leave your answer in simplified form.

- | | |
|--|---|
| 37. $(-2x^2y + 9xy + xy^2 + 21) + (-4xy + 3xy^2 - 11)$ | 38. $(7x^2y - 8xy + 11) - (7x^2y + 9xy + x - 21)$ |
| 39. $(4x + 3)^2$ | 40. $(2y + 4)(-3y + 1)$ |
| 41. $3y^3(2y^2 - 3y + 11)$ | 42. $(x - 9)(x + 9)$ |

Completely factor each of the following expressions. If the expression cannot be factored write "PRIME".

- | | |
|----------------------|------------------------|
| 43. $m^2 + 12m + 36$ | 44. $p^2 - 100$ |
| 45. $r^2 + r + 2$ | 46. $t^2 + 2t - 15$ |
| 47. $2v^2 - v - 3$ | 48. $2x^3 + 8x^2 + 6x$ |

49. Simplify each expression. Leave your answer in the form of a simplified radical, if necessary.

- | | | | |
|---|---------------------|----------------------------|-----------------------------------|
| a. $\frac{\sqrt{49} \cdot \sqrt{54}}{\sqrt{6}}$ | b. $\sqrt{25 - 16}$ | c. $\sqrt{25} - \sqrt{16}$ | d. $\frac{\sqrt{16x}}{\sqrt{2x}}$ |
|---|---------------------|----------------------------|-----------------------------------|

50. Use rules for square roots to simplify completely. DO NOT use a calculator to approximate an answer.

- | | | | |
|----------------|----------------|----------------------|-----------------------|
| a. $\sqrt{72}$ | b. $\sqrt{40}$ | c. $\sqrt{34x^3y^6}$ | d. $\sqrt{700a^5b^4}$ |
|----------------|----------------|----------------------|-----------------------|

51. The length of a rectangular garden is 4 feet longer than the width. If the area of the garden is 140 sq. feet, find the dimensions of the garden.

Solve the quadratics using the method of your choice.

- | | | |
|---------------------------------|---------------------|---------------------|
| 52. $16t^2 - 4 = 0$ | 53. $3x^2 + x = 10$ | 54. $8x^2 + 2x = 1$ |
| 55. Solve $P = 2l + 2w$ for w | | |

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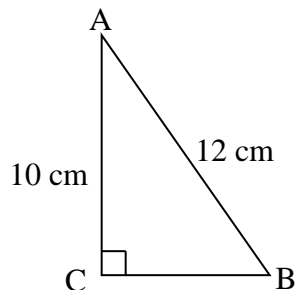
56. Use the quadratic formula to solve the equation.

a. $6x^2 - x - 1 = 0$

b. $t^2 = t + 4$

57. Find the height of a tree that casts an 80 foot shadow at the same time that a telephone pole 18 feet tall casts a 12 foot shadow.

58. Use the Pythagorean Theorem to find the length of side BC on the right triangle below. Leave your answers in simplified radical form. Assume all units are in centimeters.

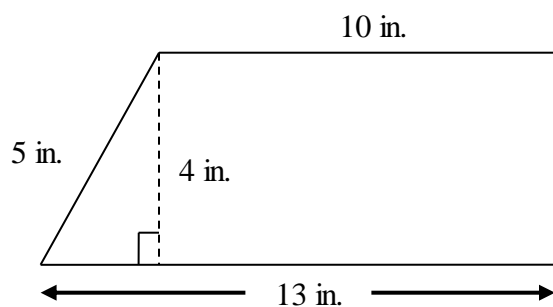


59. Solve the following problem by

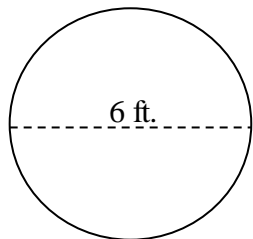
- A) defining a variable,
- B) writing an equation,
- C) solving the equation and
- D) answering the question in context.

A 13 foot ladder is set 5 feet from the base of the wall. How far up the wall will the ladder reach?

60. Find the area and perimeter of the figure.

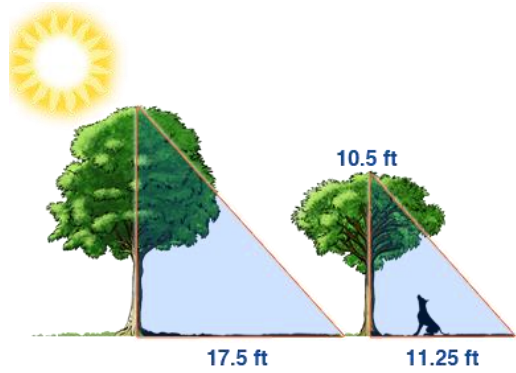


61. Find the circumference and area of the following circle. Leave your answer in terms of π .



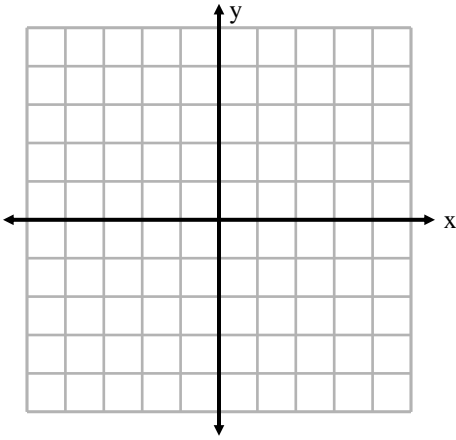
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62. Given the lengths of the shadows of each tree as well as the height of the smaller tree, find the height of the taller tree.

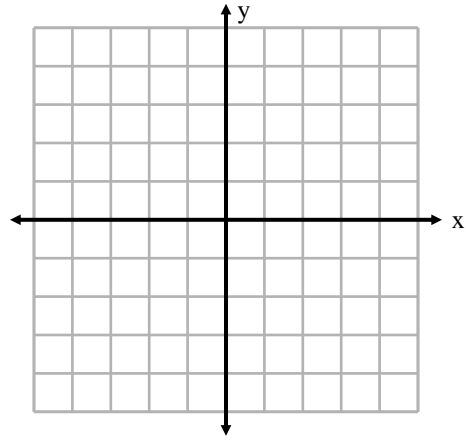


63. Solve each system of equations by graphing.

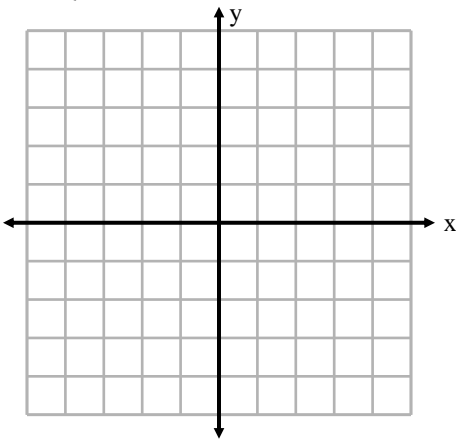
a.
$$\begin{cases} y = x + 3 \\ 2x + y = -3 \end{cases}$$



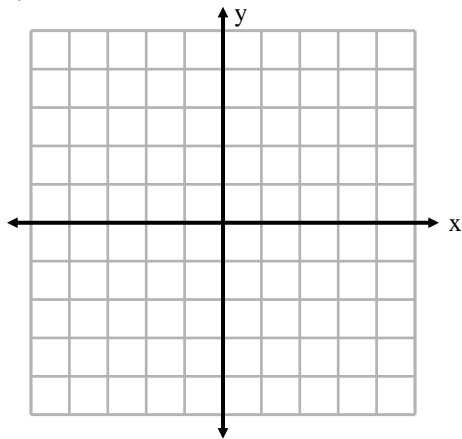
b.
$$\begin{cases} 2y = 3x + 2 \\ 3x - 2y = 6 \end{cases}$$



c.
$$\begin{cases} 3x - y = -3 \\ y - 3x = 3 \end{cases}$$



d.
$$\begin{cases} y = -3 \\ x = 4 \end{cases}$$



Solve each system using either the substitution or elimination method. If there is *No Solution*, or *Infinitely Many Solutions*, so state.

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64.
$$\begin{cases} 3x + 2y = 3 \\ y = 2x - 16 \end{cases}$$

65.
$$\begin{cases} 2x - y = -4 \\ 2y = 4x - 6 \end{cases}$$

66.
$$\begin{cases} 3x + 4y = -24 \\ 5x + 12y = -72 \end{cases}$$

67.
$$\begin{cases} x + 3y = 6 \\ y = -\frac{1}{3}x + 2 \end{cases}$$

68. Solve each compound inequality. Graph the solution set on the number line, and write it in interval notation.

a. $-4(x+2) \geq 12$ OR $3x+8 < 11$



b. $6x+1 < 5x-3$ AND $\frac{x}{2}+9 \leq 6$

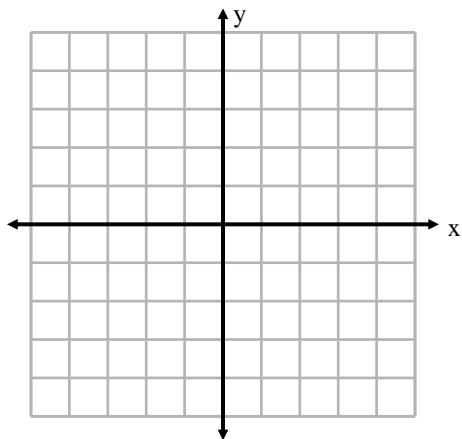


c. $-24 < \frac{3}{2}x - 6 \leq -15$

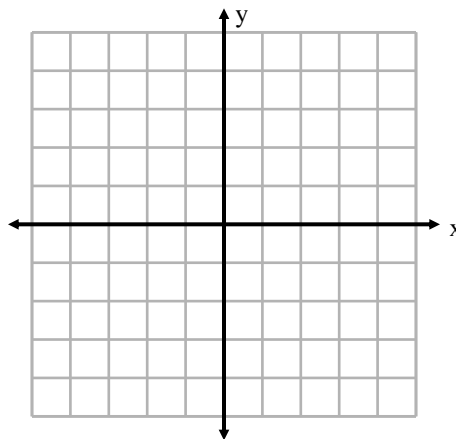


69. Graph the linear inequality in 2 variables.

a. $y + 4x \leq 0$



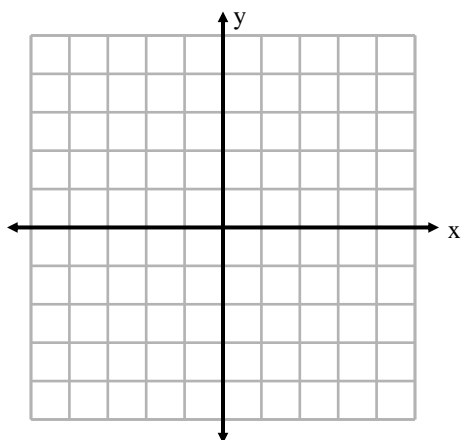
b. $3x - 4y < 12$



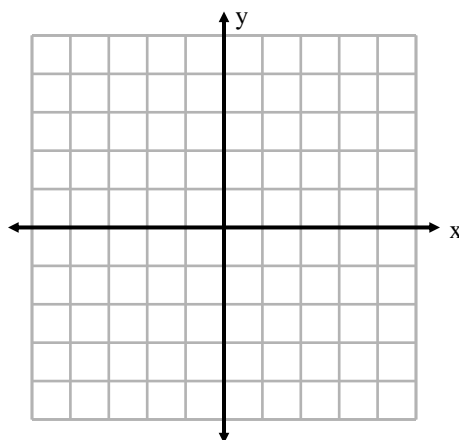
70. Graph the solution of the system of linear inequalities.

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a.
$$\begin{cases} x \geq -1 \\ y > -2 \end{cases}$$



b.
$$\begin{cases} y > 2x \\ x + 2y < 6 \end{cases}$$



71. Write the first 5 terms of each sequence.

a. $a_n = -6n + 2$

b. $a_n = -n^3$

c. $a_n = (-1)^n (2n + 5)$

72. Write out the summation in expanded form, then find the sum.

a. $\sum_{k=2}^7 k^2 + 3$

b. $\sum_{k=4}^6 4k - 1$

73. Billy is stacking blocks. He puts 1 block in the first stack, 3 blocks in the second stack, 5 blocks in the third stack, and so on. Find the number of blocks in the 10th stack. How many blocks does Billy need to build 10 stacks?

74. A rubber ball is dropped from a height of 192 feet and it continues to bounce $\frac{1}{2}$ the height from which it last fell. Write out the first 4 terms of the sequence, and find the general term, a_n . How many bounces does it take for the ball to rebound less than 1 foot?

75. Simplify

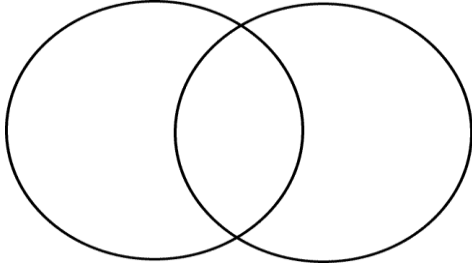
a. 5^{-3}

b. $\left(\frac{4}{7}\right)^{-2}$

76. We have information for the number of students at ARCC taking a college level math class, and the number of students at ARCC taking a science course. Use a Venn diagram to illustrate the number that are

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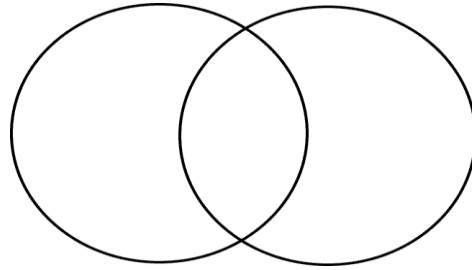
in each region. We know 850 students are taking a college level math class, 1100 students are taking a science course, and 625 students are taking both a college level math class and a science course.



- The number of people taking a college level math class, but not a science course is _____.
- Suppose we want to mail scholarship information to all of the individuals who are taking a college level math course or taking a science course or both but we don't want anyone to receive two mailings. How many mailings do we need to send so that each person receives only one mailing?

77. Given the sets $A = \{m, a, t, h\}$, $B = \{m, y, t, h\}$, $C = \{f, u, n\}$, find the following:

- $A \cup B =$
- $A \cap B =$
- $A \cap C =$
- Fill in the Venn Diagram using A and B

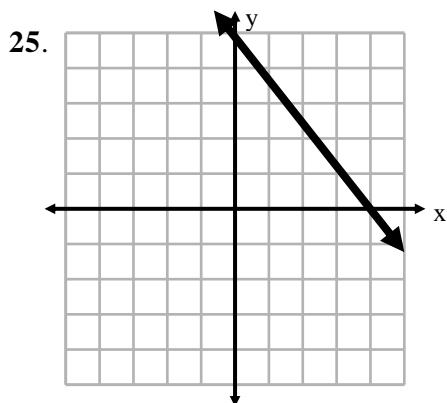


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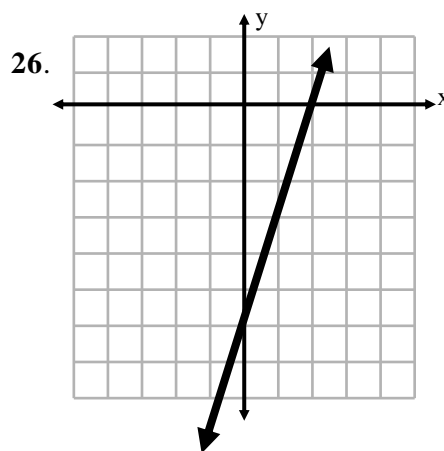
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1. 5
2. 4
3. -19
4. $\frac{x^3}{16}$
5. x^9
6. $\frac{3}{x^6}$
7. $\frac{1}{b^{14}}$
8. $\frac{1}{9x^6}$

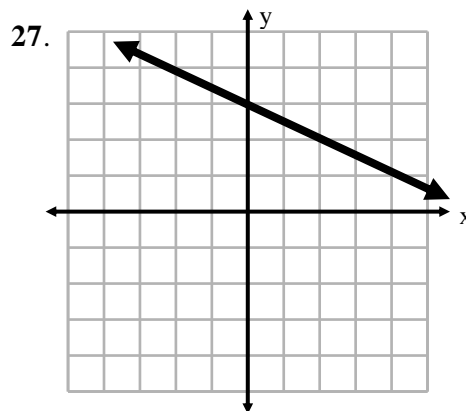
9. 29
10. 0.00003113
11. 1,201,000,000
12. 8.7×10^7
13. 1.7×10^{-5}
14. $x = 2$
15. $x = 7$
16. $x = -4$
17. The number is 43.
18. The lengths of the pieces are 15 inches, 32 inches, and 40 inches.
19. The architect worked 27 hours.
20. They should enroll 2024 students.
21. The student needs 92% or better on test 4 to earn a B in the course.
22. It is 225 miles from the starting point.
23. $\{x \mid x < -3\}, (-\infty, -3)$
24. $\left\{x \mid x \geq -\frac{8}{7}\right\}, \left[-\frac{8}{7}, \infty\right)$



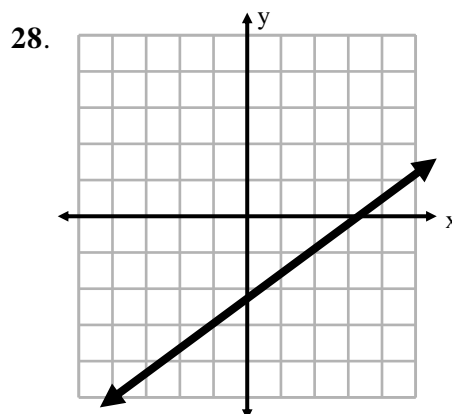
x-int: (4, 0); y-int: (0, 5)



x-int: (2, 0); y-int: (0, -6)



Slope: $-\frac{1}{2}$; y-int: (0, 3)



points on graph: (2, -1), (-4, -5), (5, 1), + others

29. $y = 3x + 11$

30. $y = 2x - 10$

31. $x = -7$

32. $y = -1$

33. slope: $-\frac{4}{3}$; y-int (0, 2)

34. slope: $\frac{3}{2}$; y-int $\left(0, -\frac{5}{2}\right)$

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35. slope: $\frac{8}{5}$; y-int (0, 6)

36a. Her account is decreasing at a rate of \$650 per month. OR -\$650/month

36b. $y = -650x + 10400$

36c. She will run out of money in 16 months

37. $-2x^2y + 5xy + 4xy^2 + 10$

38. $-x - 17xy + 32$

39. $16x^2 + 24x + 9$

40. $-6y^2 - 10y + 4$

41. $6y^5 - 9y^4 + 33y^3$

42. $x^2 - 81$

43. $(m + 6)^2$

44. $(p - 10)(p + 10)$

45. PRIME

46. $(t + 5)(t - 3)$

47. $(2v - 3)(v + 1)$

48. $2x(x + 3)(x + 1)$

49. a. 21; b. 3; c. 1; d. $2\sqrt{2}$

50. a. $6\sqrt{2}$ b. $2\sqrt{10}$ c. $xy^3\sqrt{34x}$ d. $10a^2b^2\sqrt{7a}$

51. The dimensions of the garden are 10 ft x 14 ft

52. $t = \pm \frac{1}{2}$

53. $x = \frac{5}{3}, x = -2$

54. $x = \frac{1}{4}, x = -\frac{1}{2}$

55. $w = \frac{P - 2l}{2}$ or $w = \frac{P}{2} - l$

56a. $\frac{1}{2}, -\frac{1}{3}$

56b. $\frac{1 \pm \sqrt{17}}{2}$

57. The tree is 120 feet tall.

58. $BC = 2\sqrt{11} \text{ cm}$

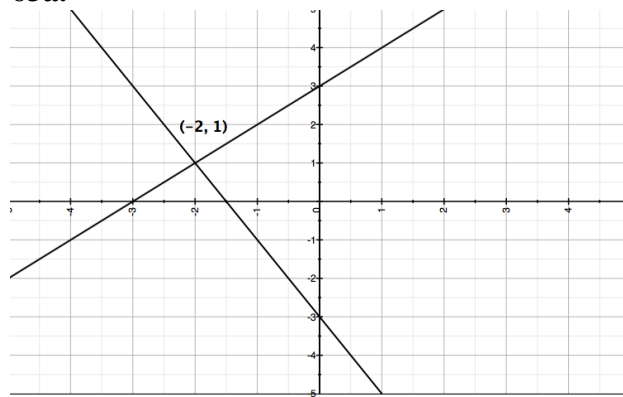
59. The ladder will reach 12 feet up the wall.

60. $A = 46 \text{ sq in}$ $P = 32 \text{ in}$

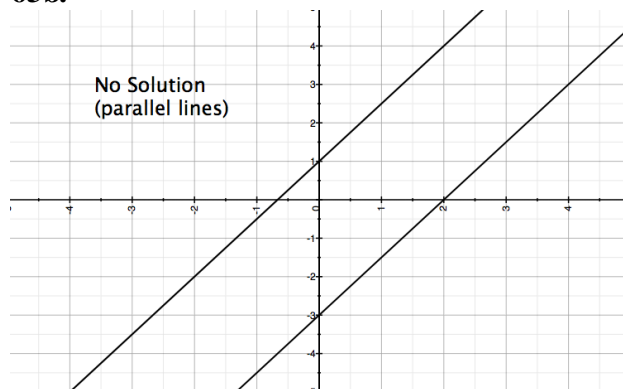
61. $A = 9\pi \text{ sq ft}$ $C = 6\pi \text{ ft}$

62. $16\frac{1}{3}$ feet or 16 feet and 4 inches

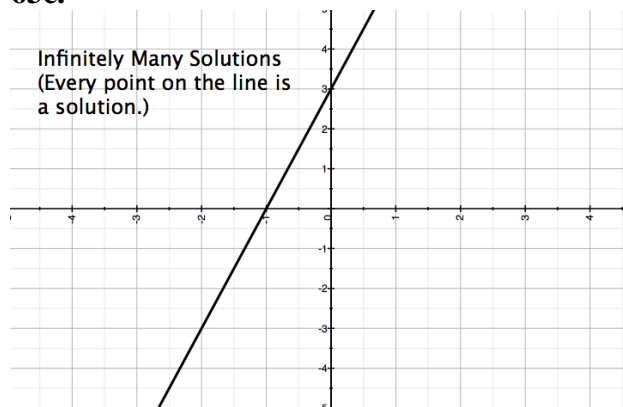
63a.



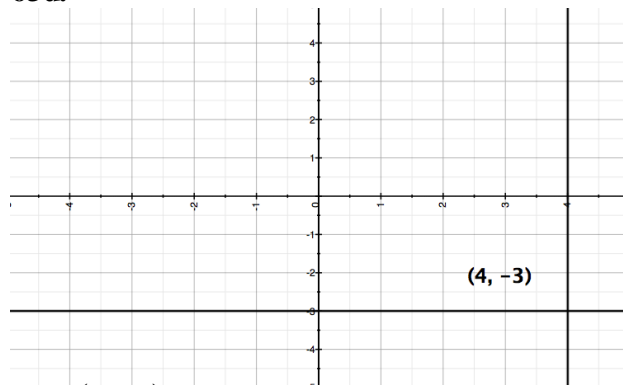
63b.



63c.



63d.



64. (5, -6)

65. No solution

66. (0, -6)

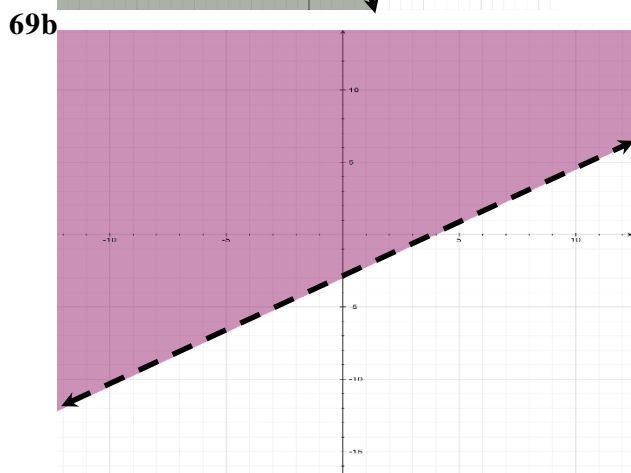
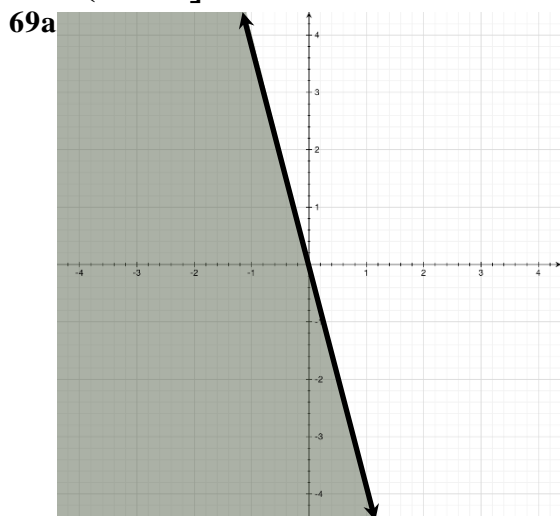
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67. Infinitely Many Solutions (every point on the line $x + 3y = 6$ is a solution)

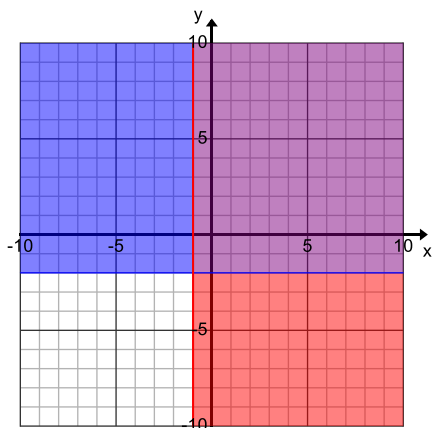
68a. $(-\infty, 1)$

68b. $(-\infty, -6]$

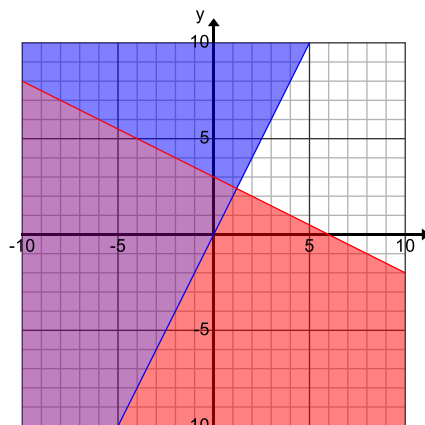
68c. $(-12, -6]$



70a.



70b.



71a. -4, -10, -16, -22, -28

71b. -1, -8, -27, -64, -125

71c. -7, 9, -11, 13, -15

72a. 157

72b. 57

73. 19, 100

74. 192, 96, 48, 24

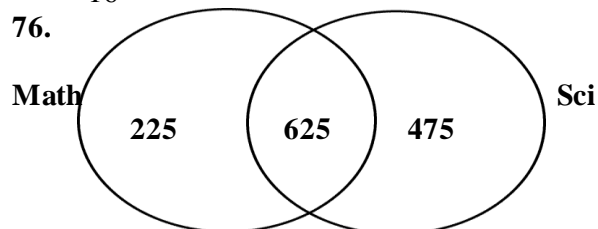
$$a_n = 192 \left(\frac{1}{2} \right)^{n-1}$$

After the 8th bounce, the ball only rebounds $\frac{3}{4}$ ft.

75a. $\frac{1}{125}$

75b. $\frac{49}{16}$

76.



a. 225

b. 1325

77. a. $A \cup B = \{m, a, t, h, y\}$

b. $A \cap B = \{m, t, h\}$

c. $A \cap C = \emptyset$

