

Summer Algebra Review

Students entering Geometry should complete this Algebra Review packet.

Directions:

Students entering Geometry at Friends Academy Upper School should complete this packet prior to the start of school as a review of concepts needed for further study of mathematics at FA.

Name: _____

Date: _____

School where Algebra I was taken: _____

Helpful Formulas

Slope formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

where m = slope and (x_1, y_1) and (x_2, y_2) are points on the line

Slope-intercept form of a linear equation

$$y = mx + b$$

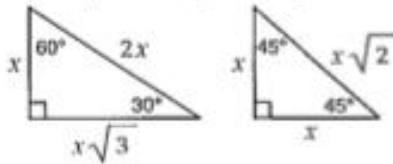
where m = slope and b = y -intercept

Point-slope form of a linear equation

$$y - y_1 = m(x - x_1)$$

where m = slope and (x_1, y_1) is a point on the line

Special Right Triangles



Distance between two points

$P_1(x_1, y_1)$ and $P_2(x_2, y_2)$

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint between two points

$P_1(x_1, y_1)$ and $P_2(x_2, y_2)$

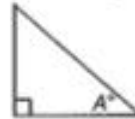
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

where a , b , and c are coefficients in an equation of the form $ax^2 + bx + c = 0$

Trigonometric Ratios



$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$

Conversions

1 yard = 3 feet
1 mile = 1,760 yards = 5,280 feet
1 acre = 43,560 square feet
1 hour = 60 minutes
1 minute = 60 seconds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 pound = 16 ounces
1 ton = 2,000 pounds

1 meter = 100 centimeters = 1000 millimeters
1 kilometer = 1000 meters
1 liter = 1000 milliliters = 1000 cubic centimeters
1 gram = 1000 milligrams
1 kilogram = 1000 grams

Directions: For questions 1 – 41, DO NOT USE A CALCULATOR. Please show all work.

Simplify.

1. $(-16) + (-42) + (-25) + (-19)$

1. _____

2. $-15 - (-4)(6) + (-44) + (-11)$

2. _____

Evaluate if $a = 18$, $b = 3$, $c = 4$, $d = 5$

3. $a - bc + d$

3. _____

4. $a - (bc + d)$

4. _____

5. $a - b(c + d)$

5. _____

6. $(a - b)c + d$

6. _____

Simplify.

7. $6x - 7y + 8x - 2y$

7. _____

8. $3m(n-2m) - 2m(2m-3n)$

8. _____

9. $(2a - 5) - (4a + 6) + (7 - 2a)$

9. _____

10. $\frac{3a^2}{4} + \frac{2ab}{3} + ab - a^2$

10. _____

11. $-\frac{10}{7} + (-\frac{5}{9})$

11. _____

12. $-3\left(-\frac{7}{4}a + \frac{1}{6}\right) + \frac{5}{2}\left(3 - \frac{a}{2}\right)$

12. _____

Solve.

13. $5a + 2a - 6 = 4a - 5$

13. _____

14. $x + 5 - \frac{1}{3}(6x - 5) = 10$

14. _____

15. $\frac{8-5r}{6} - 3 = 1$

15. _____

16. A year-end clearance sale is advertised as 30% off all prices as marked.
What is the sale price of a sofa that is marked as \$925? 16. _____
17. If a calculator costs \$12.90 after a 25% discount, what is the original price of the calculator? 17. _____
18. Evaluate $|4 - x|$, if $x = -2$ 18. _____
19. Evaluate $|a| - |2b|$, if $a = -5$ and $b = 1$ 19. _____
20. Evaluate $-|m + n|$, if $m = 3$ and $n = -12$ 20. _____

Write an expression or equation for each of the following.

21. The product of six less than a number and five more than the same number. 21. _____
22. The number c equals the cube of the sum of 2 and three times m . 22. _____
23. Twelve decreased by the square of a is equal to b . 23. _____

Simplify.

24. $(2x^2 - 5x + 7) - (3x^3 + x^2 + 2)$ 24. _____
25. $(4x^2 - 3x + 7) + (2x^2 + 4x)$ 25. _____
26. $y^3 \cdot y^4 \cdot y$ 26. _____
27. $(-4a^2x)(-5a^3x^4)$ 27. _____
28. $\frac{-16a^3b^2x^4y}{-48a^4bxy^3}$ 28. _____
29. $(-3x^3y)^2(4x)^3$ 29. _____
30. Find p if $p = m^3 - 3mn - n^2$ and $m = -1, n = 2$ 30. _____

Find each product.

31. $(x - 5)(x - 4)$ 31. _____

32. $(4n + 3)(3n - 4)$ 32. _____

33. $(a - 4)(a^2 + 5a - 7)$ 33. _____

34. $(2x + 9y)(3x - y)$ 34. _____

Factor.

35. $5a^2b^2c - 15abc^2$ 35. _____

36. $x^2 - 7x + 6$ 36. _____

37. $b^2 + 5b - 6$ 37. _____

38. $2r^2 - 3r - 20$ 38. _____

39. $6x^2 - 5x - 6$ 39. _____

40. $y^2 - 25$ 40. _____

41. The length of a rectangle is 3 feet less than twice the width. If the area of the rectangle is 54 ft^2 find the dimensions of the rectangle.

41. _____

Solve these quadratics.

42. $(x - 8)(x - 4) = 0$ 42. _____

43. $x^2 - 8x - 20 = 0$ 43. _____

44. $9k^2 - 12k - 1 = 0$ 44. _____

45. Find the slope of a line that passes through the points $(-6, 4)$ and $(3, 5)$

45. _____

46. X and Y are points with coordinates $X(-12,6)$ and $Y(14,-6)$ respectively. Find the coordinates of the midpoint of segment \overline{XY} .

46. _____

47. Point M(5, 2) is the midpoint of segment \overline{XY} . Point X has coordinates (-4, 6). Find the coordinates of point Y.

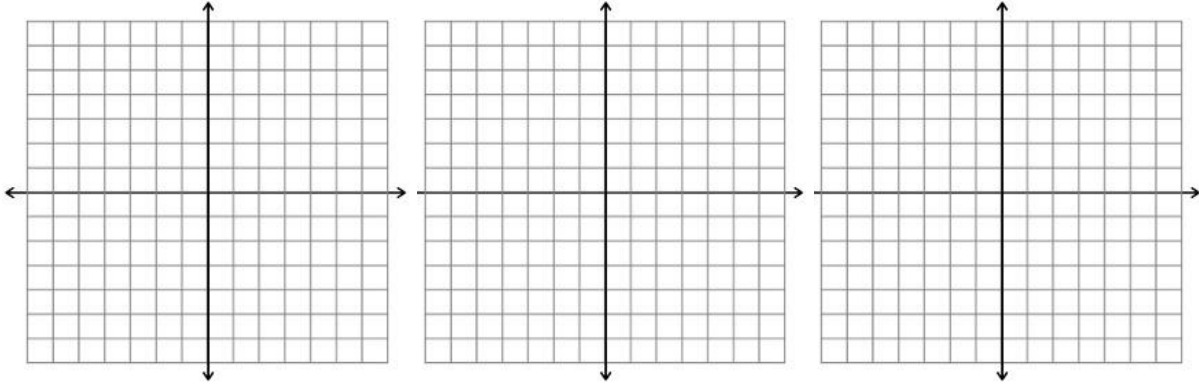
47. _____

Graph the linear equations.

48. $y = -3x + 2$

49. $3x - 2y = 10$

50. $y = 2$



Simplify. Rationalize the denominator when necessary.

51. $\sqrt{144}$

51. _____

52. $\sqrt{24}$

52. _____

53. $\sqrt{108}$

53. _____

54. $\frac{2}{\sqrt{6}}$

54. _____

55. $\frac{3\sqrt{3}}{\sqrt{2}}$

55. _____

56. $4\sqrt{27} + 8\sqrt{48}$

56. _____

57. The points (4,2) and (-1, y) are $\sqrt{74}$ units apart. What is the value of y?

57. _____

Solve these systems of equations.

58. $\begin{cases} 2m + n = 1 \\ m - n = 8 \end{cases}$

58. _____

$$59. \begin{cases} 3x - 2y = -4 \\ 3x + y = 2 \end{cases}$$

59. _____

$$60. 3x - 1 = y \quad \text{and} \quad 4y = 3 - 2x$$

60. _____

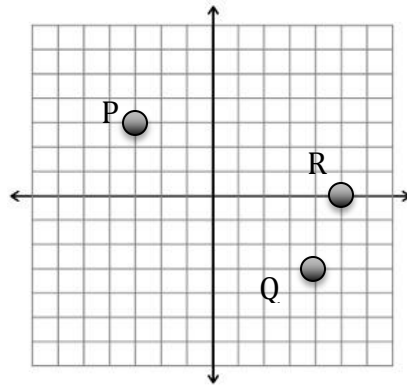
61. Glen Cove has a population of 7,200, which is decreasing at a rate of 80 people per year. Locust Valley has a population of 5,000 and is gaining 120 people per year. In how many years will the populations of Glen Cove and Locust Valley be the same?

61. _____

62. One evening, the candy counter at the Cineplex sold 532 buckets of popcorn for \$1,489.50. A large bucket sells for \$2.25 and a jumbo bucket sells for \$3.75. How many jumbo buckets of popcorn were sold?

62. _____

63. In the graph below, name the coordinates of point P , Q and R .



63. _____

Solve.

$$64. \frac{5}{6} = \frac{a-2}{4}$$

64. _____

$$65. \frac{y+4}{y-1} = \frac{4}{3}$$

65. _____

$$66. \frac{6-z}{z} = \frac{z-6}{2}$$

66. _____

67. On the blue prints for a house, 2 inches represents 3 feet. If the width of a room on the plan is $6\frac{1}{2}$ inches, what is the actual width of the room?

67. _____

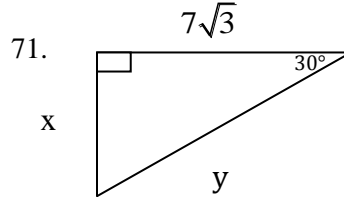
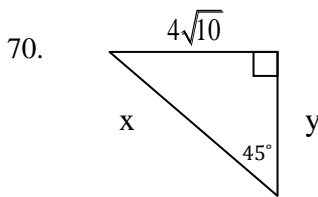
68. Find three consecutive integers whose sum is 141.

68. _____

69. Lynn has scores of 95, 91, and 88 on three tests. Write and solve an equation to find a fourth score that will produce an average of 90 for the four tests.

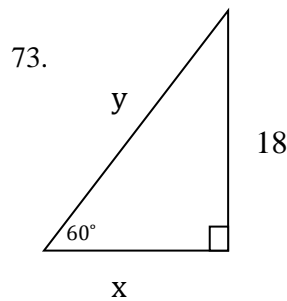
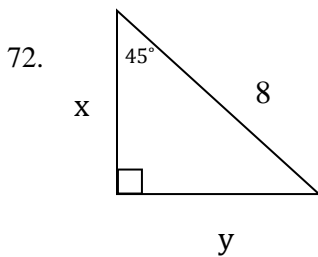
69. _____

Find the missing side lengths. Leave your answers in simplest radical form.



70. _____

71. _____



72. _____

73. _____

Simplify the radical expressions.

74. $\frac{1}{3-\sqrt{2}}$

74. _____

75. $\frac{\sqrt{5}}{4+\sqrt{5}}$

75. _____

Solve the following by writing a line in slope-intercept form

76. Write the equation of a line parallel to $y = \frac{1}{2}x + 5$ and going through the point $(-7, -2)$. 76. _____

77. Write the equation of a line perpendicular to $3y = -6x + 12$ and going through the point $(4, -1)$. (Use slope-intercept method) 77. _____

Answer the following questions regarding probability and statistics.

A box contains 2 red marbles, 3 white marbles, 4 green marbles and 1 blue marble. Two marbles are drawn at random without replacement. Find the probability of:

78. Selecting a green marble on the second draw if the first marble is blue. 78. _____

79. Selecting a red or white on the first draw and green or blue on the second draw. 79. _____

A card is drawn from a deck of 52 cards.

80. Find the probability of drawing a heart. 80. _____

81. Find the probability of drawing either a spade or diamond. 81. _____

Calculate the Mean, Median, Mode and Range.

120, 320, 330, 220, 202, 210, 230, 320, 210, 201, 310, 330, 240, 210, 330, 230

82. Mean: _____ Median: _____ Mode: _____ Range: _____

83. Determine whether the following situations would require calculating a permutation or combination. Then calculate the number of possible arrangements or listings.

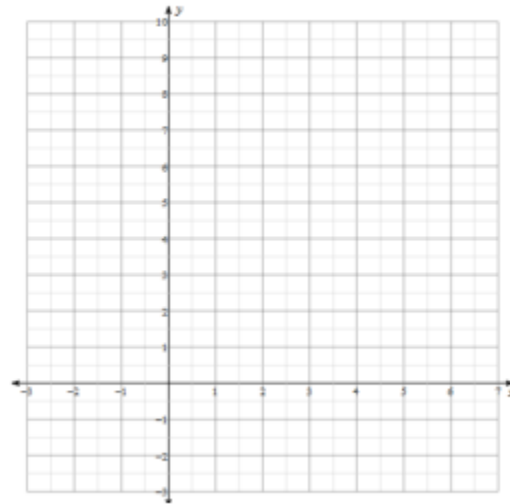
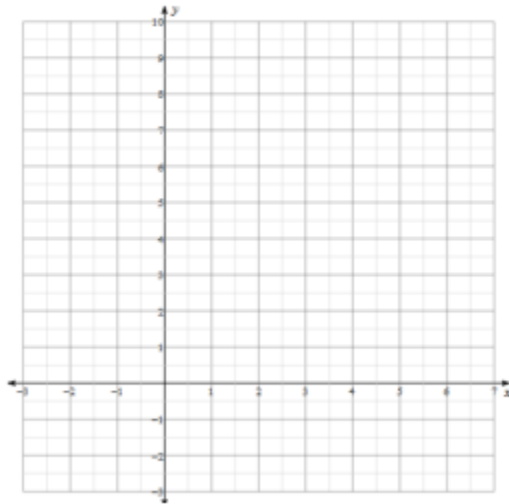
- a.) Selecting three out of ten students to attend a conference in Washington, D.C.
- b.) Selecting a lead and an understudy for a school play from 32 auditions.
- c.) Assigning a class of 12 students to their seats on the first day of school.

84. In how many ways can you arrange the letters of the word APPLE?

85 – 86, Graph the following quadratic functions. Label the Vertex, describe it as a maximum or a minimum point, write the equation for the Axis of Symmetry and label the roots and y – intercept.

85. $y = 2x^2 - 4x + 3$

86. $y = -x^2 + 4x - 2$



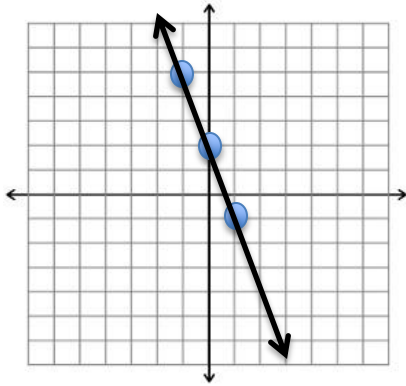
Solutions

1. -102
2. -46
3. 11
4. 1
5. -9
6. 65
7. $14x-9y$
8. $-10m^2 + 9mn$
9. $-4a-4$
10. $(-3a^2 + 20ab) / 12$
11. $-125/63$ OR $-1 \frac{62}{63}$
12. $4a+7$
13. $a = 1/3$
14. $x = -3 \frac{1}{3}$ or $x = -10/3$
15. $r = -16/5$ or $r = -3 \frac{1}{5}$
16. \$647.50
17. \$17.20
18. 6
19. 3
20. -9
21. $(x-6)(x+5)$
22. $c = (2+3m)^2$
23. $12-a^2 = b$
24. $-3x^3 + x^2 - 5x + 5$
25. $6x^2 + x + 7$
26. y^8
27. $20a^5 x^5$
28. $bx^3 / 3ay^2$
29. $576x^9 y^2$
30. $p = 1$
31. $x^2 - 9x + 20$
32. $12n^2 - 7n - 12$
33. $a^3 + a^2 - 27a + 28$
34. $6x^2 + 25xy - 9y^2$
35. $5abc(ab-3c)$
36. $(x-6)(x-1)$
37. $(b+6)(b-1)$
38. $(2r+5)(r-4)$
39. $(3x+2)(2x-3)$
40. $(y-5)(y+5)$
41. width = 6 feet, length = 9 feet
42. $x = \{4, 8\}$
43. $x = \{-2, 10\}$
44. $x = \left\{ \frac{2 \pm \sqrt{5}}{3} \right\}$
45. $m = 1/9$

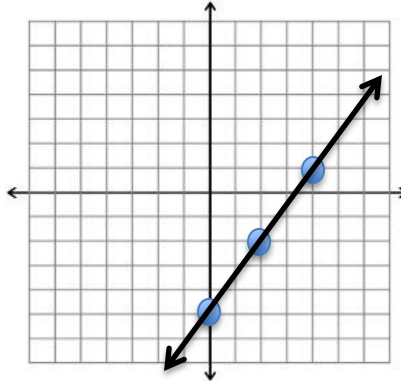
46. Midpoint = (1,0)

47. (14, -2)

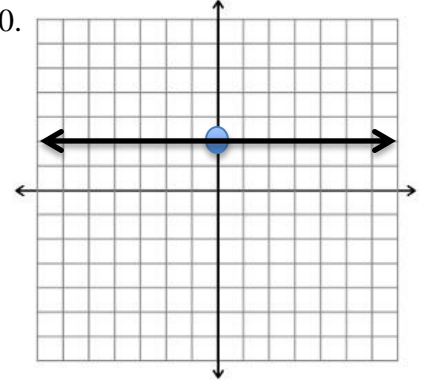
48.



49.



50.



51. ± 12

52. $2\sqrt{6}$

53. $6\sqrt{3}$

54. $\frac{\sqrt{6}}{3}$

55. $\frac{3\sqrt{6}}{2}$

56. $44\sqrt{3}$

57. $y = \{9\}$

58. $m = 3, n = -5$

59. (0, 2)

60. $(\frac{1}{2}, \frac{1}{2})$

61. 11 years

62. $x = 337$ large buckets, $y = 195$ jumbo buckets

63. P (-3,3) Q(4,-3) R(5,0)

64. $a = 5 \frac{1}{3}$, or $\frac{16}{3}$

65. $y = 16$

66. $x = \{-2, 6\}$

67. width = 9.75 feet

68. 46, 47, 48

69. 86%

70. $x = 8\sqrt{5}$ $y = 4\sqrt{10}$

71. $x = 7, y = 14$

72. $x = 4\sqrt{2}, y = 4\sqrt{2}$

73. $x = 6\sqrt{3}, y = 12\sqrt{3}$

74. $\frac{3+\sqrt{2}}{7}$

75. $\frac{4\sqrt{5}-5}{11}$

76. $y = \frac{1}{2}x + \frac{3}{2}$

77. $y = \frac{1}{2}x - 3$

78. $\frac{4}{9}$

79. $\frac{5}{18}$

80. $\frac{1}{4}$

81. $1/2$

82. mean = 250.8; median = 230; mode = 210 & 330; range = 210

83. $C(10, 3) = 120$

$P(32,2) = 992$

$P(12,12) = 479,001,600$

84. 60

85. Vertex (1, 1); Minimum; Axis of Symmetry $x = 1$; no roots; 3

86. Vertex (2, 2); Maximum; Axis of Symmetry $x = 2$; $\{.5, 3.5\}$; -2