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

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 $P_2(x_2, y_2)$

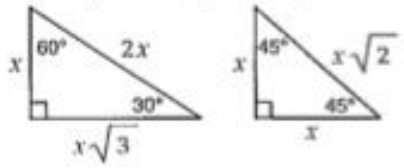
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Quadratic formula

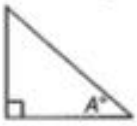
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

Special Right Triangles



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

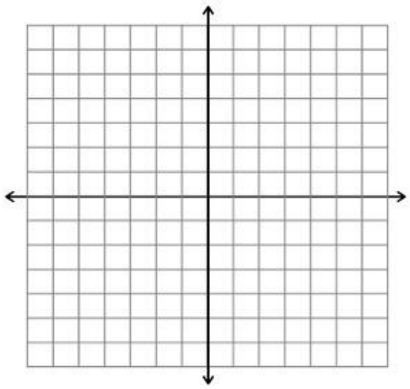
46. _____

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

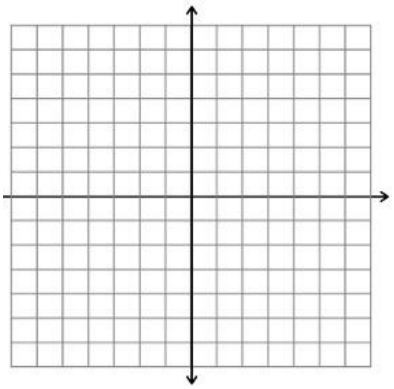
47. _____

Graph the linear equations.

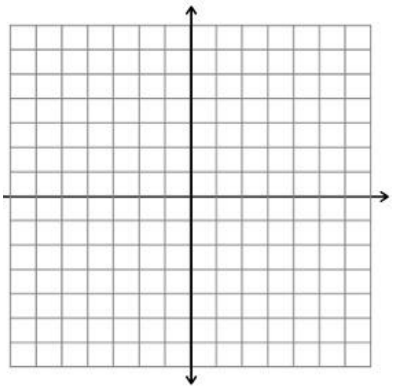
48. y = -3x + 2



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 and 4y = 3 – 2x 60. _____

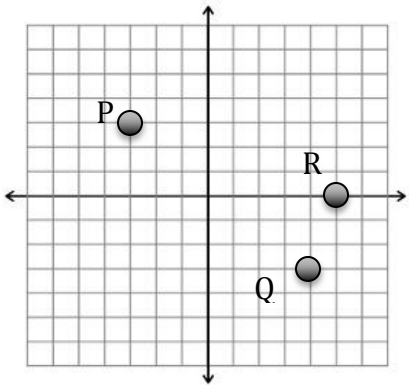
61. Glen Cove has a population of 7,200, which is decreasing at a rate of 80 people per year. Locust Valley has a population of 5,000 and is gaining 120 people per year. In how many years will the populations of Glen Cove and Locust Valley be the same?

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 ½ inches, what is the actual width of the room?

67. _____

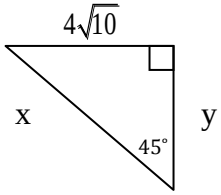
68. Find three consecutive integers whose sum is 141. 68._____

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.

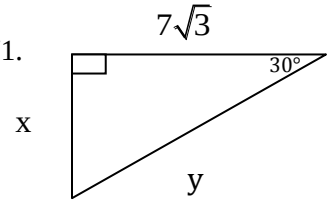
69._____

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

70.



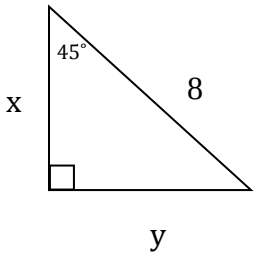
71.



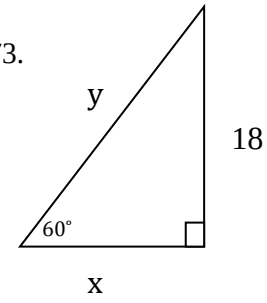
70._____

71._____

72.



73.



72._____

73._____

Simplify the radical expressions.

74. $\dfrac{1}{3-\sqrt{2}}$ 74._____

75. $\dfrac{\sqrt{5}}{4+\sqrt{5}}$ 75._____

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

76. Write the equation of a line parallel to y = ½ 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

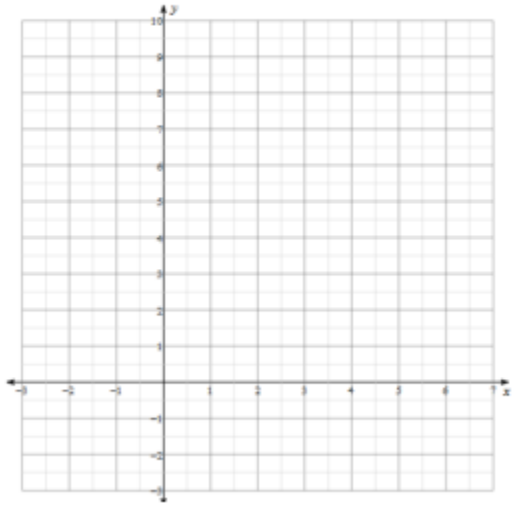
82. Mean: _____ Median: _____ Mode: _____ Range: _____

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.

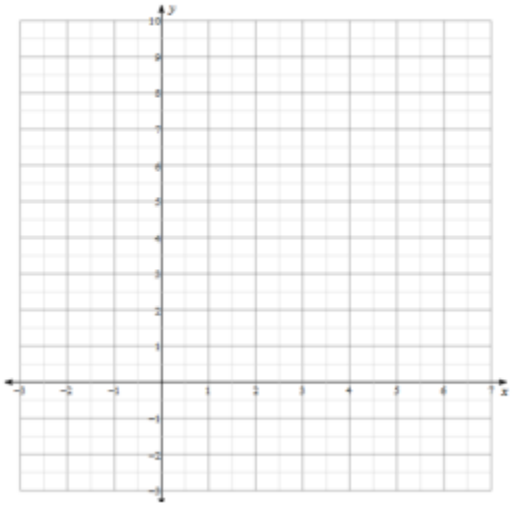
84. In how many ways can you arrange the letters of the word APPLE?

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

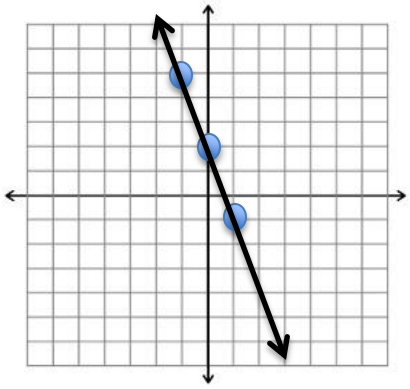
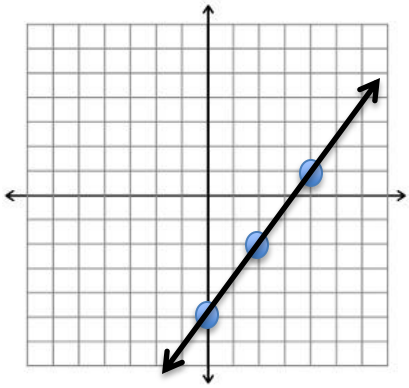
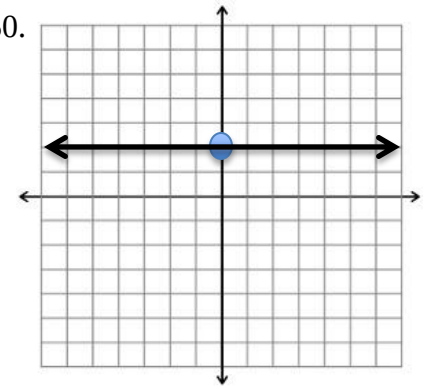


86. $y = -x^2 + 4x - 2$



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 62/63
12. 4a+7
13. a = 1/3
14. x = -3 1/3 or x = -10/3
15. r = -16/5 or r = -3 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. $x = \{ \frac{2\pm\sqrt{5}}{3}\}$
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. (1/2, ½)
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 1/3, or 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 = 1/2x + 3/2
77. y = 1/2x - 3
78. 4/9
79. 5/18
80. 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