2017 Pre-Calculus Honors Summer Review Packet

This packet of material consists of topics/skills that we expect students to know upon their arrival to the course this fall. All topics have been previously taught in math courses that precede Pre-Calculus Honors. You should be able to complete this without the use of a calculator. Because this is an honors level course, we will be checking for completion of this packet on the first day of school. We will address any questions that you have about the content of the packet because **an assessment on these topics will be given by the Pre-Calculus Honors teachers to check for student understanding.** It is your responsibility to make sure that you ask questions and understand the review material before this assessment is administered within the first week of classes. The grade on this assessment will be included with your first marking period grades for the course. If you need clarification on a topic during the summer months, consider consulting an Internet resource, textbook, or your notes from previous math courses.

Radicals: Simplify.

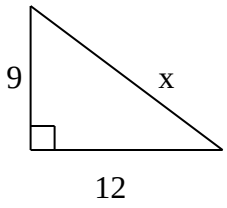
1. $\sqrt{32}$
2. $\sqrt{(2x)^8}$
3. $\sqrt[3]{-64}$
4. $\sqrt{49m^2n^8}$
5. $\sqrt{\frac{11}{9}}$
6. $\sqrt{60} \bullet \sqrt{135}$
7. $\left(\sqrt{5}-\sqrt{6}\right)\left(\sqrt{5}+\sqrt{2}\right)$
8. $\frac{3}{2-\sqrt{5}}$

Complex Numbers: Simplify.

9. $\sqrt{-49}$
10. $6\sqrt{-12}$
11. $-6(2-8i)+3(5+7i)$
12. $(3-4i)^2$
13. $(6-4i)(6+4i)$
14. $\frac{1+6i}{5i}$

Geometry: **Find the value of x.**

15.



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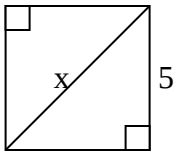

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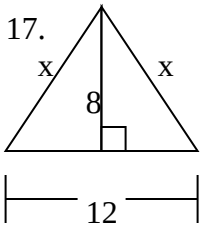
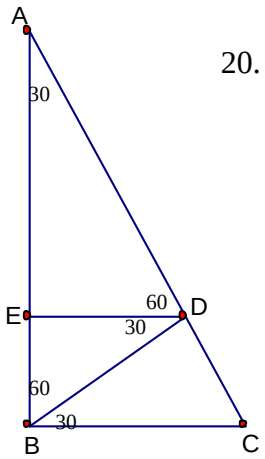


18. A square has perimeter 12 cm. Find the length of the diagonal.

19. If DE = 24, Find:



AE = _____

EB = _____

AB = _____

AD = _____

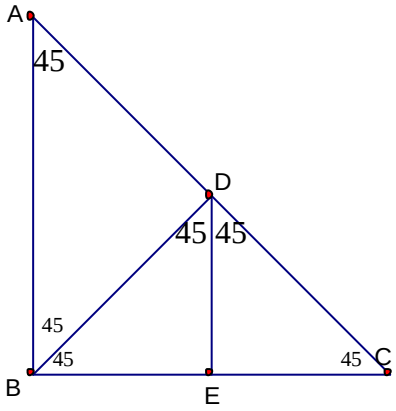
DC = _____

AC = _____

BD = _____

BC = _____

20. If BD = 16, Find:



AB = _____ AD = _____

DC = _____ CE = _____

AC = _____ EB = _____

CB = _____ DE = _____

21. **<u>Graph Transformations</u>: Sketch a graph of each and label at least 2 points on each graph.**

a. $f(x) = |x - 3| + 4$

b. $f(x) = -(x + 1)^3$

c. $f(x) = -3x + 5$

d. $f(x) = x$

e. $f(x) = \sqrt{x - 3}$

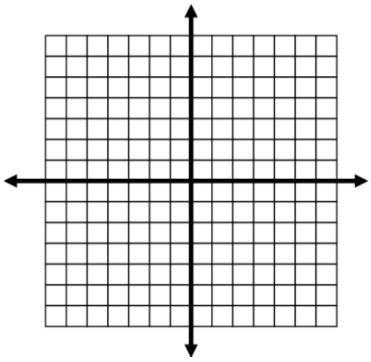
f. $f(x) = -2|x - 1| + 3$

g. $f(x) = 5$

h. $f(x) = -3(x + 2)^2 + 1$

i. $x = -4$

a.



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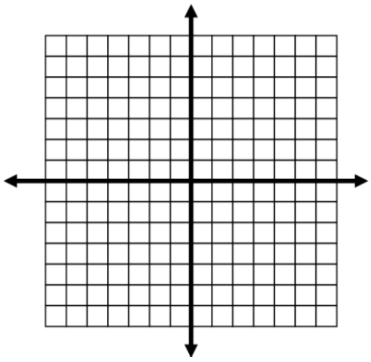

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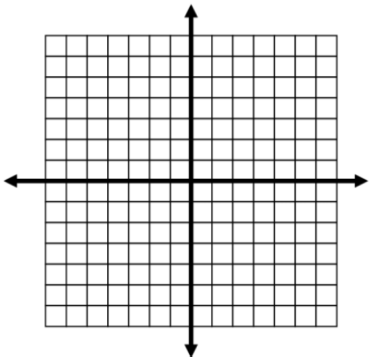

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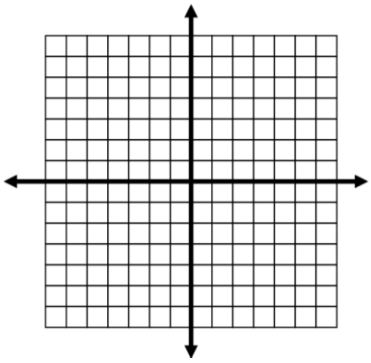

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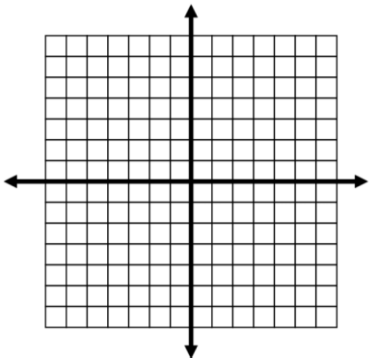

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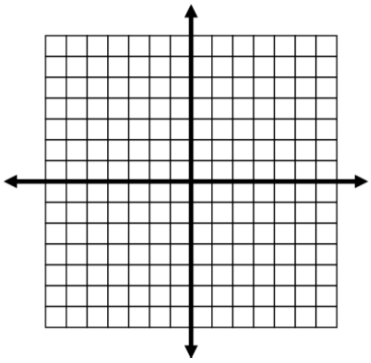

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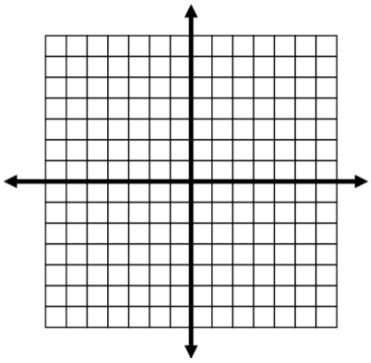

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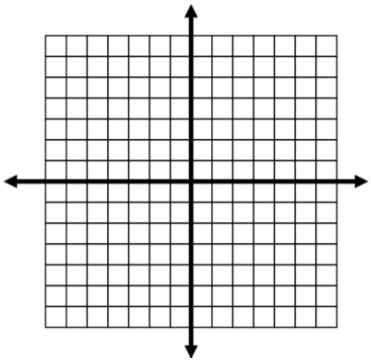
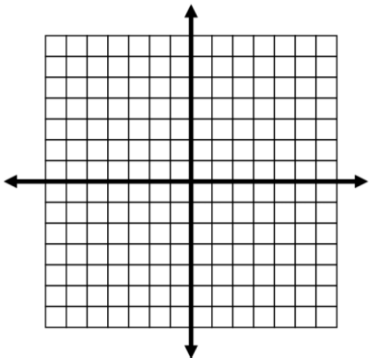


i.



Equations of Lines:

22. Write the equation of a line in slope-intercept form that is:

    a. parallel to $5x - 4y = 8$ and goes through the point (-8, 3)

    b. perpendicular to $5x - 4y = 8$ and goes through the point (5, -2)

23. Find the slope, x-intercept and y-intercept of the equation: $2x - y = 5$

24. Write the equation in standard form ($Ax + By = C$ where A,B,C are integers): $y - 2 = 7(x + 5)$

Write the equation of each line in point-slope form AND slope-intercept form:

25. slope = -5 and passes through the point (-3, -8)

26. passes through the points (4, 3) and (7, -2)

27. x-intercept = 3 and y-intercept = 2

Determine whether each pair of lines below are parallel, perpendicular, or neither:

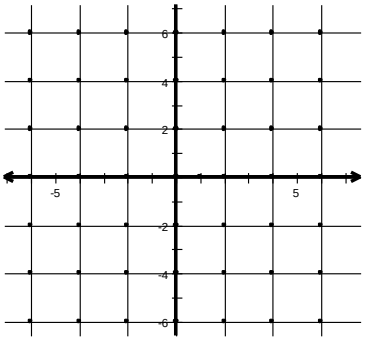
28. $y = -3x$ and $3x + y = 5$

29. $y = \frac{1}{2} x + 3$ and $2x - 4y = 8$

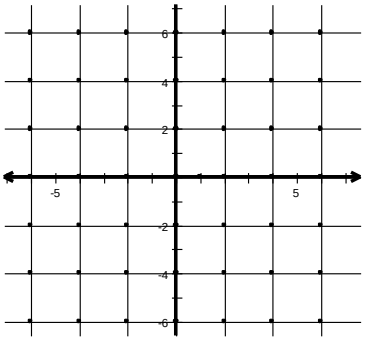
30. $y = -3x + 5$ and $x - 3y = 1$

Graphing: **Graph each function, inequality, and/or system.**

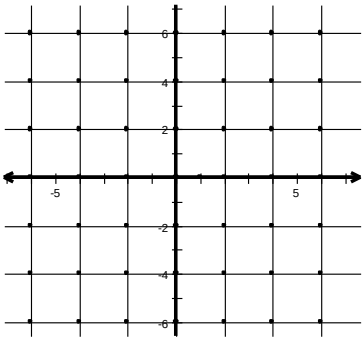
31. $3x-4y=12$



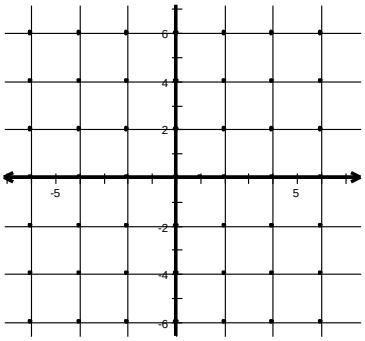
32. $\begin{cases} 2x+y=4 \\ x-y=2 \end{cases}$



33. $y<-4x-2$



34. $\begin{cases} -2x+y\le 4 \\ 4x+y<1 \end{cases}$



Systems of Equations:

Solve each system of equations. Use any method.

35. $\begin{cases} 2x+y=4 \\ 3x+2y=1 \end{cases}$

36. $\begin{cases} 2x+y=4 \\ 3x-y=16 \end{cases}$

37. $\begin{cases} 2w-5z=31 \\ 6w+3z=3 \end{cases}$

<u>Exponents:</u> Express each of the following in simplest form. Answers should not have any negative exponents.

38. $5a^0$

39. $\frac{3c}{c^{-1}}$

40. $\frac{2ef^{-1}}{e^{-1}}$

41. $\frac{(n^3p^{-1})^2}{(np)^{-2}}$

Simplify.

42. $3m^2 \bullet 2m$

43. $(a^3)^2$

44. $(-b^3c^4)^5$

45. $4m(3a^2m)$

<u>Polynomials:</u> Simplify.

46. $3x^3+9+7x^2-x^3$

47. $7m-6-(2m+5)$

Multiply.

48. $(3a + 1)(a - 2)$

49. $(s + 3)(s - 3)$

50. $(5 - c)^2$

51. $(5x + 7y)(5x - 7y)$

Factor completely over the set of real numbers. If the polynomial is not factorable, write "Prime".

52. $x^2 - 5x + 4$

53. $a^2 - a - 6$

54. $z^2 + 4z - 12$

55. $6 - 5e - e^2$

56. $n^2 - 3n + 4$

57. $60 - 5h - 5h^2$

58. $2k^2 + 2k - 60$

59. $-10b^4 - 15b^2$

60. $9c^2 + 30c + 25$

61. $9n^2 - 4$

62. $27z^3 - 8$

63. $2mn - 2mt + 2sn - 2st$

64. $16 - w^4$

65. $m^3 + 512$

66. $x^3 + 7x^2 - x - 7$

<u>Polynomials Continued:</u> Solve each equation over the set of real numbers.

67. $x^2 - 4x - 12 = 0$

68. $x^2 + 25 = 10x$

69. $x^2 - 14x + 19 = 0$

Find the value of the discriminant, describe the nature of the roots, then solve each quadratic. Use EXACT values (no decimals).

70. $x^2 - 9x + 14 = 0$

71. $5x^2 - 2x + 4 = 0$

Determine whether each of the following functions is even, odd, or neither.

72. $f(x) = x^3$

73. $f(x) = -3x + 2$

74. $f(x) = (2x + 1)^2$

Evaluate each function for the given value.

75. $f(x) = x^2 - 6x + 2$

$f(3) =$ _____

76. $g(x) = 6x - 7$

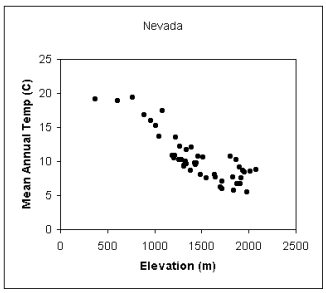
$g(x+h) =$ _____

77. $f(x) = 3x^2 - 4$

$5(f(x+2)) =$ _____

<u>Linear Models and Scatterplots:</u> Sketch a trend line for the given set of graphed data. Then state whether each correlation is positive, negative, or neither.

78a.



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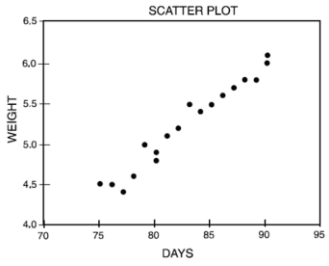


Composition and Inverses of Functions:

Suppose $f(x) = 2x,\ g(x) = 3x - 2,\ and\ h(x) = x^2 - 4$ **. Find each of the following:**

79. $f(g(2)) =$ _____

80. $f(g(x)) =$ _____

81. $f(h(3)) =$ _____

82. $g(f(x)) =$ _____

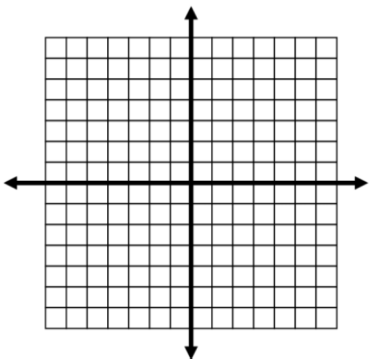
Find the inverse, $f^{-1}(x)$, if possible.

83. $f(x) = 5x + 2$

84. $f(x) = \frac{1}{2}x - \frac{1}{3}$

85. Given f(x) = 4x – 1 and $g(x) = \frac{x+1}{4}$, show that the two functions are inverses by:

a. graphing on the given set of axes and explaining why they are inverses



b. showing algebraically that f(g(x)) = g(f(x)) = x

Solving Polynomial Equations:

86. Find ***ALL*** of the zeros for the function: $f(x) = x^3 + 3x^2 - 6x - 8$

Rational Algebraic Expressions: Simplify.

87. $\dfrac{5z^3 + z^2 - z}{3z}$

88. $\dfrac{m^2 - 25}{m^2 + 5m}$

89. $\dfrac{10r^5}{21s^2} \bullet \dfrac{3s}{5r^3}$

90. $\dfrac{a^2 - 5a + 6}{a + 4} \bullet \dfrac{3a + 12}{a - 2}$

91. $\dfrac{2x}{5} - \dfrac{x}{3}$

92. $\dfrac{b - a}{a^2 b} + \dfrac{a + b}{ab^2}$

93. $\dfrac{1 + \dfrac{1}{z}}{z + 1}$

94. $\dfrac{5 + \dfrac{1}{m} - \dfrac{6}{m^2}}{\dfrac{2}{m} - \dfrac{2}{m^2}}$

95. $\dfrac{1 - \dfrac{1}{2}}{2 + \dfrac{1}{4}}$

Solving Rational Equations: **Solve each equation. Check your solutions.**

96. $\frac{12}{x}+\frac{3}{4}=\frac{3}{2}$

97. $\frac{x+10}{x^2-2}=\frac{4}{x}$

98. $\frac{5}{x-5}=\frac{x}{x-5}-1$

99. $\frac{1}{2x}+\frac{1}{x-1}=\frac{1}{2(x-1)}$

Functions: **Determine whether each of the following equations represents a function. If it is a function, state its domain and range.**

100. $y = 3x$

101. $f(x) = 6$

102. $x = -2$

103. $y = 4x^2 + 5x - 2$

104. $x^2 + y^2 = 16$

105. $f(x) = \frac{5}{x}$

106. Given the table of values,

x	-4	-3	-1	0	2	-3	5	7	9
y	0	4	7	8	-2	-5	-1	3	1

a. Is y a function of x? Why or why not?

b. Is x a function of y? Why or why not?