

Pre-Calculus Summer Assignment

This assignment is designed to make the transition to Algebra II Pre-AP a smooth one. You will be practicing skills you have acquired in earlier math classes. **The entire assignment is due on the first day of class.** There will be a test on this material at the end of the first week of school in the Fall.

Directions: In order to receive credit all work must be completed **in pencil**. Remember that we care about process, so show your work carefully on lined paper. **This should include: problem numbers, calculations done neatly, sketches drawn carefully, and labeled answers (circled, underlined, or boxed).** Graphs should be done on graph paper. Organize your work into columns and work down, not across the paper. **No Calculators! DO NOT USE CALCULATORS, unless the directions instruct you to do so.**

Solving Equations

Solve each equation below:

1. $5 - 3(x - 2) = -2$	2. $4x + 5(x - 2) = -2(3x + 1) - 7$	3. $x(x + 3) = 2x^2 + 2x - 6$
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Solve each quadratic. (If not in factored form, try factoring first, otherwise use the quadratic formula)
When applicable, answers should be in simplified radical form. (Hint: Can't solve a quadratic unless one side is equal to 0)

4. $(5 - 3x)(x - 2) = 0$	5. $x^2 - 9 = 0$	6. $x^2 + 5x = 0$
7. $2x^2 = 4x$	8. $x^2 - 9x - 10 = 0$	9. $x^2 + 7x = -12$
10. $2x^2 - x - 3 = 0$	11. $x^2 - 4x - 3 = 0$	12. $x^2 + 6x = -12$

Slope and Linear Equations

13. Describe the slope of the following: i. Parallel lines ii. Perpendicular lines iii. Horizontal lines iv. Vertical lines	14. For linear equations, what is the i. Slope-intercept form? ii. Standard form? iii. Point-slope form?
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Write the equation of each line in slope-intercept form and standard form, based on the given.

15. Passes through $(0, -4)$, has slope of $\frac{2}{3}$.	16. Passes through $(-2, 1)$, has slope of $\frac{5}{2}$.
17. Passes through points $(3, -4)$ and $(5, 1)$.	18. Passes through points $(2, \frac{1}{2})$ and $(\frac{1}{2}, \frac{5}{4})$.
19. Passes through $(4, 7)$, has slope of 0.	20. Passes through $(4, 7)$, has undefined slope.

21. Parallel to $y = \frac{1}{2}x + 7$ crossing $(4, -3)$.	22. Perpendicular to $5 = 2x - 3y$ crossing $(4, -3)$.
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Functions and Their Properties

23. How does one find the x-intercept of any given function?
24. How does one find the y-intercept of any given function?
25. Can a function have more than one x-intercept? (Explain/Justify your answer)
26. Can a function have more than one y-intercept? (Explain/Justify your answer)

For each, find the x and y-intercepts algebraically. Confirm your answers by graphing using a TI-84 or Desmos (www.desmos.com).

27. $y = -3x + 9$. x-int(s): _____ y-int: _____	28. $y = (x + 1)(x - 3)$. x-int(s): _____ y-int: _____	29. $y = -x^2 - 3x$. x-int(s): _____ y-int: _____
30. $y = x - 2 - 1$. x-int(s): _____ y-int: _____	31. $y = x + 1 + 3$. x-int(s): _____ y-int: _____	32. $y = \frac{x - 3}{x + 1}$ x-int(s): _____ y-int: _____

Functions and Their Notation

For each given function find $f(-3)$

33. $f(x) = (x + 1)(x + 3)$.	34. $f(x) = -x^2 + 5x$.	35. $f(x) = \sqrt{x + 19}$.												
36. $f(x) = 3x^3 + 2x^2 - 5x - 1$.	37.	38. <table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>-6</td> <td>-3</td> </tr> <tr> <td>-3</td> <td>-1</td> </tr> <tr> <td>0</td> <td>1</td> </tr> <tr> <td>3</td> <td>3</td> </tr> <tr> <td>6</td> <td>5</td> </tr> </tbody> </table>	x	y	-6	-3	-3	-1	0	1	3	3	6	5
x	y													
-6	-3													
-3	-1													
0	1													
3	3													
6	5													
39. If $f(2) = 0$ for a given function, list at least 3 things that are either implied in the notation of $f(2) = 0$ or can be seen on the graph of the function.														
1. _____	2. _____													
3. _____	4. _____													

If $f(x) = 3x - 4$ and $g(x) = 2x^2 - 4x + 1$, Find

40. $2f(x) + 3g(x)$	41. $g(x) - 2f(x)$	42. $f(x) \bullet g(x)$
43. $f(g(x))$	44. $4f(2) + 3g(-1) - f(5)$	45. $g(f(g(1)))$

Graphing Functions

Graph each given function on graph paper. Label your axis, and be sure to include a scale.

46. $y = -\frac{3}{2}x + 2.$	47. $4x - 3y = 12.$	48. $y = x^2 + 2.$
49. $f(x) = (x - 1)(x + 3).$	49. $y = \sqrt{x + 2} - 1.$	50. $y = \frac{x + 2}{x - 1}.$

System of Equations

51. What does the solution to a system mean looking at their graphs on the same coordinate plane?
52. What does it mean for a system to have no solution?

Solve each system of equation algebraically either by substitution or elimination.

53. $y = 3x - 2$ $x - y = 8$	54. $3x - 2y = -5$ $x - 2y = -11$	55. $3x - 2y = -2$ $4x - 5y = 1$
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Algebraic Manipulation

For given situation, solve for b.

56. $z = ax + by$	57. $bx = b + y$	58. $x = \frac{3b + y}{a + b}$
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Exponents

Apply exponential rules and simplify each. Write final answer with no negative exponents. If given a radical, write the equivalent exponential form and then simplify.

59. 3^{-1}	60. 4^{-2}	61. x^{-5}	62. $8^{\frac{2}{3}}$
63. $(\sqrt[5]{x^2})^5$	64. $\sqrt{(2x)^8}$	65. $\frac{9^4}{9^2}$	66. $\sqrt[3]{(125)^4}$

Inverse of a function

67. What are the steps to finding the inverse function?
68. What is the notation for the inverse function?
69. List at least 3 properties of inverse functions

Find the inverse function for each.

70. $y = -\frac{3}{2}x + 2.$	71. $y = \sqrt[3]{2x-1} + 4$	72. $y = \frac{7x^2 + 2}{3} - 5; x \geq 0$
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Distance Between two points

73. Find the distance between the points $(3, -5)$ and $(5, 1)$.
74. If a circle has center $(1, -3)$ and goes through the point $(-2, 3)$, what is the length of the radius of the circle?

Imaginary number (i)

Simplify each problem involving the imaginary number, i.

75. i^{95}	76. $\frac{1}{i^5}$	77. $(2+i)^2$
79. $\frac{2+3i}{4i}$	80. $\frac{2}{3-i}$	81. $\sqrt{-2} \cdot \sqrt{-8}$

Trigonometric Functions and the Unit Circle

82. $\sin 240^\circ =$	83. $\cos \frac{5\pi}{6} =$	84. $\tan \frac{11\pi}{6} =$
85. $\cot 120^\circ =$	86. $\sec \frac{3\pi}{4} =$	87. $\csc \frac{5\pi}{3} =$

Random

88. Simplify: $\frac{\frac{x}{2} - \frac{3}{2}}{\frac{x}{9} - \frac{2}{3}} =$	89. Factor $x^3 - 27$	90. Simplify: $\frac{\frac{u}{4} - \frac{3u-1}{16}}{\frac{3u-1}{u-4} + \frac{3u-1}{4}} =$
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Must Know Formulas: Quadratic, Slope, Distance, and Midpoint!!!!!!!