Algebra 2 Honor Summer Assignment Name _____Period_____

Algebra 2 Honors Summer Assignment
2025-2026 School year

It has been a year since you have taken Algebra 1, and you might have forgotten some of the benchmarks you learned. The purpose of this packet is to make sure that you have the mathematical skills you will need to succeed in Algebra II Honors.

Algebra 2 Honors is a college preparatory class. This class will prepare you to take college level courses. **You should complete this packet prior to the first day of class, during which you will have the opportunity to ask questions over the material covered in this packet. You will turn in your completed packet during the first week of class.**

Discussing and working on the problems with your peers is encouraged, but copying someone's answers is not! This also includes using Chat GBT, Photo Math and any other website. There is a difference and at this point in your academic career you will be expected to know that.

You will be expected to do most of these problems ***without using a calculator***, and all non-integer answers should be written as a reduced, improper fraction. You may print this packet or complete the work on your own paper.

The first two pages are a summary of topics from Algebra 1. ***This assignment is due the first week of school with all work shown.***
To receive credit all work must be shown, and any work done on additional paper must be turned in with the assignment.

VERY IMPORTANT: YOU ARE ONLY REQUIRED TO COMPLETE THE ODD PROBLEMS. YOU MAY COMPLETE THE EVEN PROBLEMS IF YOU FEEL YOU NEED MORE PRACTICE.

PLEASE HIGHLIGHT OR BOX ALL OF YOUR ANSWERS!

ALGEBRA 1 REVIEW

DOMAIN & RANGE

DISCRETE: List out the x's & y's

CONTINUOUS: Use inequality symbols

INDEPENDENT VARIABLE: x-axis and domain of the function

DEPENDENT VARIABLE: y-axis and range of the function

LINEAR EQUATION FORMS

SLOPE-INTERCEPT FORM: $y = mx + b$
*m = slope/rate of change
*b = y-intercept/beginning amount

POINT-SLOPE FORM: $y - y_1 = m(x - x_1)$
*m = slope/rate of change
*(x_1, y_1) = point on the line

STANDARD FORM: $Ax + By = C$

SPECIAL CASES OF LINEAR EQUATIONS

DIRECT VARIATION: $y = kx$
*k = constant of variation/slope

KEY THINGS TO REMEMBER:
*always proportional
*always has a y-intercept of zero

LINEAR INEQUALITIES

***GRAPH** y-intercept and use slope to graph other ordered pairs.
> or <: DASHED LINE
≥ or ≤: SOLID LINE
*LOOK at the y-intercept of the graph:
IF > or ≥: SHADE UP on y-axis
IF < or ≤: SHADE DOWN on y-axis

SYSTEM OF EQUATIONS

SOLUTION:
*intersection point on graph
*shared ordered pair on table

ELIMINATION METHOD

$2x - 5y = 11$ *Multiply by* -3
$3x + 2y = 7$ *Multiply by* 2
$-6x + 15y = -33$
$6x + 4y = 14$
Add equations

SUBSTITUTION METHOD

$y = 3x + 1$ $4y = 12x + 4$
$4y = 12x + 4$
$4(3x + 1) = 12x + 4$
$12x + 4 = 12x + 4$
Infinite solutions

PARTS OF LINEAR FUNCTION & TRANSFORMATIONS

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

SLOPE: (rate of change)

When m >1: line becomes steeper (vertically stretched)
When 0<m<1:line becomes flatter (horizontally stretched)

Y-INT: beginning amount and where x = 0.
SHIFTING LINE UP: adding constant to y-intercept
SHIFTING LINE DOWN: subtracting constant from y-int

SEQUENCES

ARITHMETIC: (linear) $a_n = a_1 + d(n-1)$
*n = number of term
*d = common difference

GEOMETRIC: (exponential)

$a_n = a_1(r)^n$
*n = number of term
*r= common ratio

SLOPES OF LINEAR FUNCTION

SPECIAL LINES

WHEN SLOPE IS ZERO:
*IS STILL A FUNCTION
*y = 8, y = 0, y = -5

WHEN SLOPE IS UNDEFINED:
*IS NOT A FUNCTION
*x = 4, x = 1/2 , x = -4

FUNCTION OR NON-FUNCTION

*You can't repeat x-values

*Vertical Line Test

FUNCTION NOTATION

F(x) is the same thing as the y or output of equation.

$y = 3x - 8 \longrightarrow f(x) = 3x - 8$

Example: Solve for f(-2) for $f(x) = x^2 - 3x + 1$

$f(-2) = (-2)^2 - 3(-2) + 1$ USE PEMDAS!!

$f(-2) = 4 - 3(-2) + 1$

$f(-2) = 4 + 6 + 1$

$f(-2) = 11$

(-2, 11)

Writing Linear Equation from Two Points

(-2, 4) and (-4, 0)

Find the slope: $\frac{0-(4)}{-4-(-2)} = \frac{-4}{-2} = +2$

Use Point-Slope Formula with One Point

$y - (4) = 2(x + 2)$ Distribute the 2

$y - 4 = 2x + 4$ Move -4

$+4 \quad +4$

$y = 2x + 8$

Laws of Exponent

$x^2 + 2x^2 = 3x^2$ Combining Like Terms

$x^2 \bullet 2x^3 = 2x^5$ Same Base→ADD

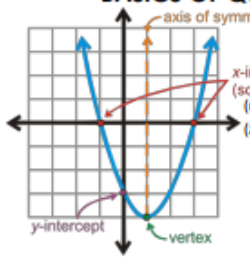
$\frac{2x^3}{x^2} = 2x$ Dividing with Same Base SUBTRACT Exponents

$(2x^4)^3 = 2^3x^{12} = 8x^{12}$ Power of a Power Raise each base to the power

$3x^{-3} = \frac{3}{x^3}$ Negative exponent moves to opposite

$x^{2/3} = \sqrt[3]{x^2}$ Fractional exponent

BASICS OF QUADRATICS



Standard Form

$y = ax^2 + bx + c$

c: y-intercept

Axis of Symmetry

$x = -b/2a$

Vertex

If a is + (Minimum)

If a is – (Maximum)

*Ordered pair

*Same x as Axis of Symmetry

Finding X-Intercepts (Solving Quadratics)

1 Factor using X-Method

$3x^2 + 20x - 7 = 0$

$\frac{3x}{3} \div 3 \quad \frac{x}{+7} \quad \frac{3x}{-1}$

$+21 \div 3$

$(x + 7)(3x - 1) = 0$

$x + 7 = 0 \qquad 3x - 1 = 0$

$-7 \quad -7 \qquad +1 \quad +1$

$x = -7 \qquad \frac{3x}{3} = \frac{1}{3}$

$x = 1/3$

(-7, 0) & (1/3, 0)

2 Use Quadratic Formula

$3x^2 + 10 - 25 = 0$

-21, +21, -1, +20

$x = \frac{-10 \pm \sqrt{(10)^2 - 4(3)(-25)}}{2(3)}$

$= \frac{-10 \pm \sqrt{100 + 300}}{6}$

$= \frac{-10 \pm \sqrt{400}}{6}$

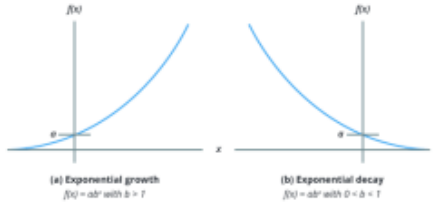
$= \frac{-10 \pm 20}{6}$

$x = \frac{5}{3}$ or $x = -5$

3 Graph on Calculator

Use the Zero function under Analyze Graph

EXPONENTIAL FUNCTIONS



$y = ab^x$

a = beginning amount (y-int)

b = growth or decay factor

Asymptote

Horizontal asymptote at y = 0 since it never crosses

Interest Rate Problems

Increasing by a %: b = 1 +% (Ex: 3%; b = 1.03)

Word Problem Ex: Savings Acct earns 5% a year

Depreciating by a %: b = 1 - % (Ex: 8%; b = 0.92)

Word Problem Ex: Car depreciates by 8% a year. Keeps 92% of it's value.

Solving Equations

Solve each equation for the given variable. Check your solutions. **#1-21 No Calculator**

1. $8 = 8p + 13 - 3p$
2. $4y - 16 + 8y = -4$
3. $-14 = -4(9x - 1)$
4. $-(5z + 12) = 18$
5. $\frac{m}{3} + \frac{1}{3} = \frac{2}{3}$
6. $5r - \frac{1}{5} = \frac{4}{5}$
7. $\frac{w}{9} - 6 = \frac{7}{9}$
8. $11 + \frac{4x}{-5} = \frac{2}{3}$
9. $\frac{5}{7}(k + 5) = -7$
10. $25h + 40 = -15h - 80$
11. $-0.2m + 13 = 0.2m - 6$
12. $5x + 7 + 3x = -8 + 3x$
13. $18 - 6a = 4a - 4(a + 3)$
14. $6(4z + 2) = 3(8z + 4)$
15. $-8t - 3t + 2 = -5t - 6t$
16. $-6(-p + 8) = -6p + 12$
17. $-8x - (3x + 6) = 4 - x$
18. $-2(2f - 4) = -4(-f + 2)$

19. $3w - 6 + 2w = -2 + w$

20. $\frac{3}{8}f + \frac{1}{2} = 6(\frac{1}{16}f - 3)$

21. $14 + 3n = 8n - 3(n - 4)$

Literal Equations - Solve each equation for *m*.

22. $4n - 6m = -2$

23. $-5n = 13 - 3m$

24. $10m + 6n = 12$

Solve each equation for *x*.

25. $fx - gx = h$

26. $qx + x = r$

27. $m = \frac{x+n}{p}$

28. $d = f + fx$

29. $-3(x + n) = x$

30. $\frac{x-4}{y+2} = 5$

Solve each equation for the given variable.

31. $4k + mn = n - 3$; solve for ***n***

32. $\frac{c}{d} + 2 = \frac{f}{g}$; solve for ***c***

33. $3ab - 2bc = 12$; solve for ***c***

34. $z = \left(\frac{x+y}{3}\right)w$; solve for ***y***

35. $-3(m - 2n) = 5m$; solve for ***m***

36. $A = \frac{1}{2}bcd + bc$; solve for ***d***

37. A room with width w, length l, and height h with four walls needs to be painted.
    a. Write a formula for the area that needs to be painted not accounting for doors or windows.

    b. Rewrite the formula to find h in terms of A, l, and w.

    c. If l is 18 ft, w is 14 ft and A is 512 ft^2, what is the height of the room?

    d. Reasoning: Suppose l is equal to w. Write a formula for A in terms of w and h.

Solve the formula for the indicated variable.

Perimeter of a Parallelogram

38. Solve for b: $P = 2b + 2s$

Area of a Rhombus

39. Solve for d_1: $A = \frac{1}{2}d_1d_2$

Volume of a Right Circular Cone

40. Solve for h: $V = \frac{\pi r^2 h}{3}$

Area of a Trapezoid

41. Solve for b_1: $A = \frac{1}{2}(b_1 + b_2)h$

Solve the formula for the indicated variable. The use the given information to find the value of the variable. Include units of measure in the answer.

Area of a Parallelogram

42. Solve for h: $A = bh$

Find h when $A = 81\ cm^2$ and $b = 9\ cm$.

Celsius to Fahrenheit

43. Solve for C: $F = \frac{9}{5}C + 32$

Find C when $F = 77°F$.

Linear Inequalities

Solve each inequality and graph the solution on a number line. #44-64 No Calculator

44. $33y - 3 \leq 8$

45. $12 > 60 - 6r$

46. $-5 \leq 11 + 4j$

47. $2(k + 4) - 3k \leq 14$

48. $3(4c - 5) - 2c > 0$

49. $15(j - 3) + 3j < 45$

50. $20(d - 4) + 4d \leq 8$

51. $-x + 2 < 3x - 6$

52. $3v - 12 > 5v + 10$

53. $6w + 5 > 2(3w + 3)$

54. $-5r + 15 \geq -5(r - 2)$

55. $-2(6 + s) < -16 + 2s$

Compound Inequalities - Solve each inequality and graph the solution on a number line.

56. $5 < k - 2 < 11$

57. $3d + 3 \leq -1$ or $5d + 2 \geq 12$

58. $3 < 2p - 3 \leq 12$

59. $3a - 25 \leq -25$ or $2a + 3 > 13$

60. $-3 \leq \frac{11 + x}{4} < 3$

61. $6b - 1 \leq 41$ or $2b + 1 \geq 11$

62. $5 - m < 4$ or $7m > 35$

63. $-3 \leq \frac{2}{3}x - 1 \leq 1$

64. $5z + 3 < -7$ or $-2z - 6 > -8$

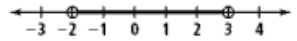
What compound inequality represents each phrase? Graph the solutions.

65. All real numbers greater than –2 and less than or equal to 3

66. All real numbers less than or equal to –1 or greater than 1.

Write a compound inequality that each graph could represent.

67.



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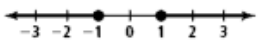
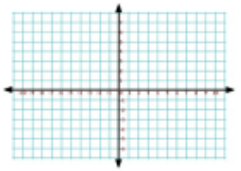


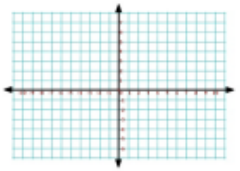
Graph the inequality on the coordinate plane.

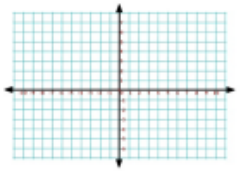
69. $2x \leq 8$

70. $y < 2x - 1$

71. $-\frac{1}{4}y \leq -1$



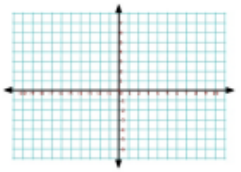


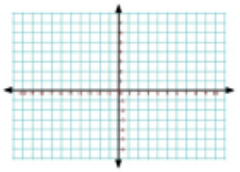


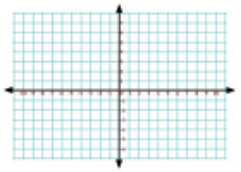
72. $x + 3y < 6$

73. $-6x - 2y \leq 4$

74. $x - 3y > -3$







Linear Equations - Write an equation in slope-intercept form of each line.

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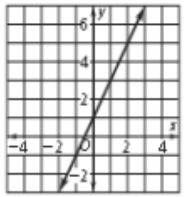

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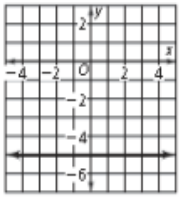

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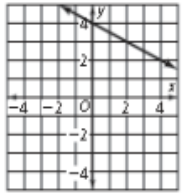


Write an equation in slope-intercept form of the line that passes through the given points.

78. (3, 5) and (0, 4)

79. (2, 6) and (–4, –2)

80. (–1, 3) and (–3, 1)

Write an equation, in slope-intercept form, of the line that passes through the given point and satisfies the given condition.

81. $(-2, 3)$; parallel to $y = 4x - 3$

82. $(3, 7)$; parallel to $y = -3x + 6$

83. $(-1, -4)$; perpendicular to $y = 2x + 5$

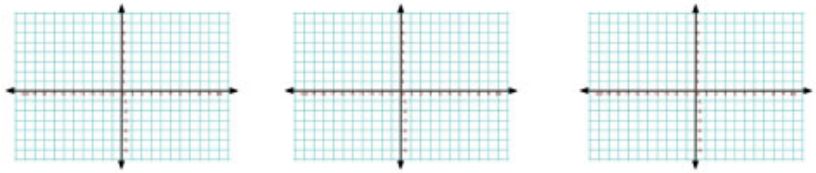
84. $(6, -2)$; perpendicular to $y = -5x - 7$

Graph each equation.

85. $y = 3x - 2$

86. $y = \frac{1}{4}x - 1$

87. $y = -x + 6$



Find the slope and the *y*-intercept of the graph of each equation.

88. $y + 4 = -6x$

89. $y + \frac{1}{2}x = -4$

90. $3y - 12x + 6 = 0$

Write an equation in point-slope form of the line through the given points. Then write the equation in slope-intercept form.

91. (4, 0), (–2, 1)

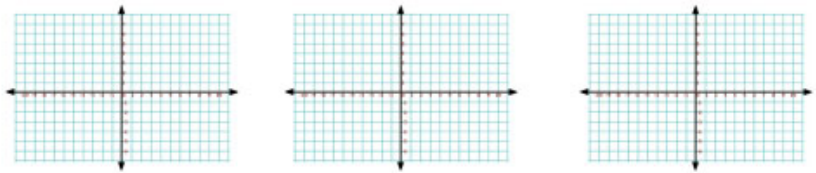
92. (–3, –2), (5, 3)

Graph each equation.

93. $y - 2 = 2(x + 3)$

94. $y + 3 = -2(x + 1)$

95. $y + 1 = -\frac{3}{5}(x + 5)$

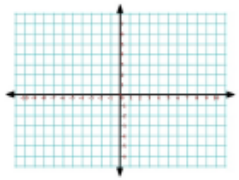
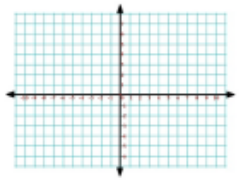
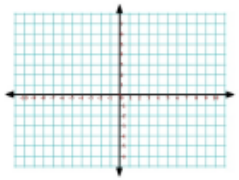


Find the *x*- and *y*-intercepts and the slope of the graph of each equation.

96. $2x + 3y = -6$ 97. $x - 3y = 9$ 98. $5x - 4y = -12$

Graph each equation using a zero and the *y*-intercept.

99. $-5x + 2y = -10$ 100. $-3x - 6y = 12$ 101. $4x - 12y = -24$

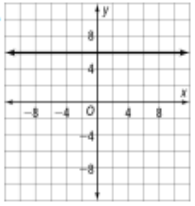




For each equation, tell whether its graph is a *horizontal* or a *vertical* line.

102. $y = -2$ **103.** $x = 0$ **104.** $y = -0.25$ **105.** $x = -\frac{3}{5}$

Write an equation for each horizontal or vertical line.

106.



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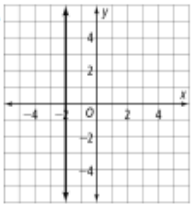


Applications: Define all variables, write an equation, and solve.

108. The membership to your local video store is \$10 per year and the DVD rental rate is \$3.95 per DVD. Write an equation that models the total amount of money you will spend on DVD rentals this year.

109. The price for U.S. Postage stamps has increased over the years. Since, 1975, the price has increased from \$0.13 to \$0.37 in 2005 at a rate that is approximately linear.

A. Write a linear model for the price of stamps during this time period. Let ***p*** represent the price and ***t*** represent the number of years since 1975.

B. What would you expect the price of a stamp to be in 2015?

110. You have a piece of wood that is 72 inches long. You cut the wood into three pieces. The second piece is 6 inches longer than the first piece. The third piece is 6 inches longer than the second piece. Draw a diagram and then write and solve an equation to find the lengths of the three pieces.

111. You want to tape five posters on a wall so that the spaces between posters are the same. You also want the spaces at the left and right of the group of posters to be three times the space between any two adjacent posters. The wall is 15 feet wide and the posters are 1.5 feet wide. Draw a diagram and then write and solve an equation to find how to position the posters.

112. A Moving company weighs 20 boxes you have packed that contain either books or clothes and says the total weight is 404 pounds. You know that a box of books weighs 40 pounds and a box of clothes weighs 7 pounds. Write and solve an equation to find how many boxes of books and how many boxes of clothes you packed.

Factoring

Factor out the Greatest Common Factor (GCF) in each expression.

113. $10x^2y - 15xy^2$

114. $-3n^3 + 12n^2 - 30n$

115. $6r^2s - 3rs + 21rs^2$

Factor each trinomial.

116. $t^2 - 2t - 35$

117. $x^2 - 7x + 12$

118. $51 - 20x + x^2$

Factor each difference of squares or perfect square trinomial.

119. $x^2 - 49$

120. $16n^2 - 9$

121. $w^2 + 16w + 64$

122. $y^2 - 10y + 25$

123. $16b^2 - 40b + 25$

124. $4m^2 - 25$

Factor completely.

125. $12x^2 - 27$

126. $4x^2 - 25x - 56$

127. $2x^2 - 19x + 24$

128. $-6y^2 - 9y + 60$

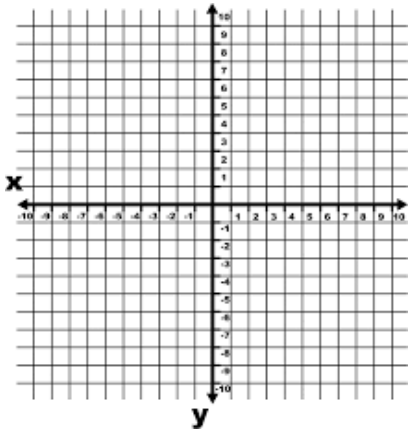
129. $24b^2 - 24b - 18$

130. $48x^2y - 3y$

Graph the quadratics and answer the following questions.

131.

$$2x^2 + 7x + 6 = y$$



a= _____; b= _____; c= _____

Which way does the quadratic open?

What is the axis of symmetry?

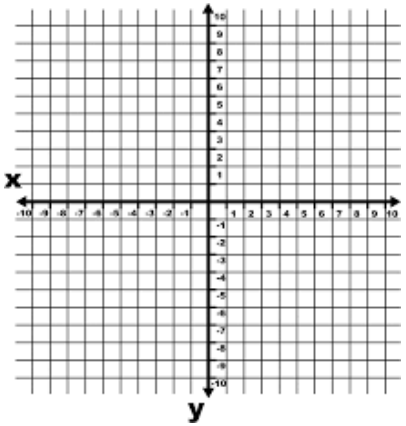
What is the x-intercepts?

What is the y-intercept?

What are the coordinates of the vertex?

132.

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



a= _____; b= _____; c= _____

Which way does the quadratic open?

What is the axis of symmetry?

What is the x-intercepts?

What is the y-intercept?

What are the coordinates of the vertex?