Lake Zurich High School

Mathematics Department

GETTING STARTED PACKET for Honors Algebra II

Welcome to Honors Algebra II.

Honors Algebra II is a fun and exciting course. It is a fast paced course that covers a variety of topics. The topics in the course have much practical application and serve as a foundation for further study in mathematics. We look forward to beginning this adventure in mathematical study with you this Fall.

This Getting Started Packet was prepared for students to be able to review material from Algebra I before beginning H-Algebra II. The packet is to be completed by August 28, 2009 (the first Friday of the new school year). We thought you might want to get a head start on it over the summer☺.

You will hand in the completed packet on August 28, 2009. It will be graded based upon completion and correctness. You will find the answers to the problems on the back of this page, however you MUST show all work in order to receive credit! This material will be assessed in conjunction with the first chapter test.

Calendar of first week of the 2008-2009 school year.

Tuesday, August 25	Half Day → get books & begin Chapter 1
Wednesday, August 26	First Full Day → continue work in Chapter 1
Friday, August 28	**Getting Started Packet DUE**

The packet is available on the Math Department's web page. Additionally, if you need help with some concepts, you can find explanations in the Resource Companion. Both can be found using the link:

http://www.lz95.org/lzhs/Math/mathhome.htm

Answers … Remember to show work!!!

1. $\frac{19}{15}$
2. $\frac{11}{60}$
3. $\frac{5x-4}{12x}$
4. $\frac{4}{21}$
5. $\frac{1}{6}$
6. $\frac{11}{30}$
7. $\frac{3}{2}$
8. $\frac{5}{14}$
9. $-\frac{50}{99}$
10. x = 6
11. x = $\frac{63}{2}$
12. x = -7
13. x = $-\frac{1}{2}$
14. x < 3
15. $x \le -3$
16. (3, -2)
17. (-1, -1)
18. $\left(\frac{7}{5}, -\frac{12}{5}\right)$
19. $\left(\frac{20}{3}, \frac{40}{3}\right)$
20. (-1, 3)
21. (-2, 3)
22. zero
23. many solutions
24. x^6
25. $x^{14}y^{21}$
26. a^6
27. $8x^3y^6$
28. -64
29. -1
30. -6
31. $6x^3 - 4x^2 - 11x - 3$
32. $21x^4 + x^3 - 13x + 14$
33. $-\frac{1}{6}t^2 + \frac{1}{2}$
34. $-\frac{3}{2}x^4 + 2x^3 - 7x^2 + 8x - 4$
35. $x^2 - 4y^2$
36. $12x^2 + 4x - 56$
37. $5x^3 + 5x^2 - 30x$
38. $6x^3 + 11x^2 + 14x + 5$
39. $16x^2 + 24xy + 9y^2$
40. $9x^2 - 12x + 4$
41. $4x^4\left(2 - 3x^3 + 5x^5\right)$
42. $4x^2y^4(3y + 4x)$
43. (x + 5)(x - 5)
44. (4x – 9y)(4x + 9y)
45. (x - 3)(x - 4)
46. (x - 9)(x + 4)
47. (x + 3)(x + 8)
48. (x - 9)(x + 6)
49. (2x + 1)(x + 1)
50. (3x + 1)(x + 2)
51. (5x - 2)(x - 1)
52. (3x - 2)(x + 3)
53. x = $-\frac{1}{3}$, 4
54. x = 2, 8
55. x = 0, $\frac{9}{2}$
56. x = 5, $-\frac{2}{3}, \frac{1}{2}$
57. x = -5, $\frac{3}{2}$
58. x = $\frac{-4 \pm \sqrt{10}}{3}$
59. x = $\frac{3 \pm \sqrt{149}}{10}$
60. $\sqrt{29}$
61. $\left(2, \frac{3}{2}\right)$
62. x = 3
63. y = 4
64. y = $\frac{1}{2}$x - 4
65. y = $-\frac{2}{3}$x + 5
66. y = -3x - 1
67. x = 3, -2
68. $-6 \le x \le 2$
69. x = $\pm\frac{3}{2}$
70. $x \ge 10$ or $x \le 6$
71. $2\sqrt{6}$
72. $2\sqrt{2}$
73. $\frac{\sqrt{2}}{2}$
74. $6x^3y^2z^4\sqrt{3x}$
75. $48\sqrt{7}$
76. $3\sqrt{2}$
77. $-11 - 32\sqrt{2}$
78. 18n
79. a.) -12
    b.) -3
    c.) 12
    d.) $-6 - 6\sqrt{2}$

For #1-9, perform the operation and simplify.

1. $\frac{2}{3}+\frac{3}{5}$

2. $\frac{1}{3}-\frac{2}{5}+\frac{1}{4}$

3. $\frac{5}{12}-\frac{1}{3x}$

4. $\frac{1}{3}\bullet\frac{4}{7}$

5. $\frac{7}{9}\times\frac{3}{14}$

6. $\frac{11}{4}\bullet\frac{6}{5}\bullet\frac{1}{9}$

7. $\frac{2}{3}\div\frac{4}{9}$

8. $\frac{3}{7}\div\frac{6}{5}$

9. $\frac{5}{9}\bullet\frac{-10}{11}$

For #10-15, solve for x.

10. $\frac{2}{3}x+1=5$

11. $\frac{x}{7}=\frac{9}{2}$

12. $3(x-5)=6(x+1)$

13. $3(2x-5)-x=-7(x+3)$

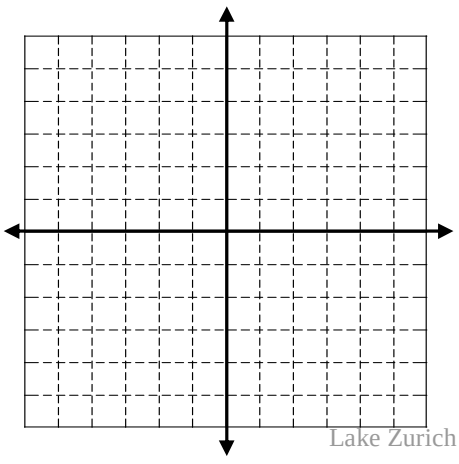
14. $2x+1<7$

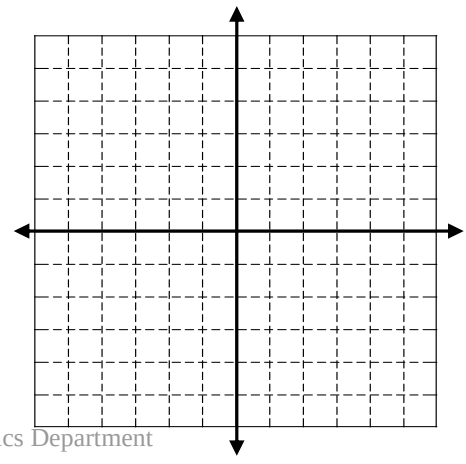
15. $5-2x>11$

For #16-17, solve the system by graphing.

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

17. $\begin{cases} x-y=0 \\ 3x-2y=-1 \end{cases}$





Solving a system by substitution:

$\begin{cases} 2x + 3y = 7 \\ x + 2y = 5 \end{cases}$

Solve for x in the second equation … x = -2y + 5

Now, substitute this value of x into the first equation.

$2(-2y + 5) + 3y = 7$
$-4y + 10 + 3y = 7$
$-y = -3$ so $y = 3$

Now substitute this into x = -2y + 5

$x = -2(3) + 5$
$x = -6 + 5$ so $x = -1$

The solution is (-1, 3)

For #18-19, solve the system by substitution.

18. $\begin{cases} y = 4x - 8 \\ 2x - 3y = 10 \end{cases}$

19. $\begin{cases} \frac{1}{5}x + \frac{1}{2}y = 8 \\ x + y = 20 \end{cases}$

Solving a system by elimination method (linear combinations):

$\begin{cases} 3x + 4y = -8 \\ 5x - 3y = 35 \end{cases}$

First, decide on a variable to eliminate (we chose y)

Multiply the 1st equation by 3 → $9x + 12y = -24$
Multiply the 2nd equation by 4 → $20x - 12y = 140$

Add the two equations $9x = 116$
Solve for x $x = 4$

Now substitute x = 4 into one of the original equations to solve for y. $3(4) + 4y = -8$
$12 + 4y = -8$
$4y = -20$ so $y = -5$

The solution is (4, -5)

For #20-21, solve the system by elimination (linear combinations).

20. $\begin{cases} 3x + 2y = 3 \\ 4x - 2y = -10 \end{cases}$

21. $\begin{cases} 4x + 5y = 7 \\ 6x - 2y = -18 \end{cases}$

For #22-23, determine the number of solutions of the system (zero, one, many) and justify your answer.

22. $\begin{cases} 6x-5y=3 \\ -12x+10y=5 \end{cases}$

23. $\begin{cases} \frac{2}{3}x+\frac{1}{6}y=\frac{2}{3} \\ 4x+y=4 \end{cases}$

Using the Laws of Exponents:

multiplication	division	powers
$x^m \cdot x^n = x^{n+m}$	$\frac{x^n}{x^m} = x^{n-m}$	$(x^n)^m = x^{n \cdot m}$
$x^5 \cdot x^7 = x^{12}$	$\frac{x^8}{x^3} = x^5$	$\left(x^7\right)^3 = x^{21}$

For #24-27, simplify each of these expressions.

24. $\left(x^2\right)^3$

25. $(x^2y^3)^7$

26. $\frac{a^{11}}{a^5}$

27. $(2xy^2)^3$

28. Evaluate $\left(a^3b^2\right)^3$ when a = -1 and b = -2

29. $3-2\bullet 5+6$

30. $(2-3)^3 \bullet 3-3\bullet 4\div 2^2$

For #31-34, perform the operations and simplify.

31. $\left(3x^3-6x^2+x-12\right)+\left(2x^2+3x^3-12x+9\right)$

32. $\left(8x^4-3x^2-11x-3\right)-\left(-13x^4-x^3-3x^2+2x-17\right)$

33. $\frac{1}{2}\left(t^2+9\right)-\frac{2}{3}\left(t^2+6\right)$

34. $\left(-3x^2+4x-2\right)\left(\frac{1}{2}x^2+2\right)$

Multiplying Polynomials:

A. $(2x+3)(6x-5)$

$2x(6x-5)+3(6x-5)$

$12x^2-10x+18x-15$

$12x^2+8x-15$

B. $(3x+4)\left(5x^2-7x+6\right)$

$3x\left(5x^2-7x+6\right)+4\left(5x^2-7x+6\right)$

$15x^3-21x^2+18x+20x^2-28x+24$

$15x^3-x^2-10x+24$

C. $(x+y)^2$

$(x+y)(x+y)$

$x^2+xy+xy+y^2$

$x^2+2xy+y^2$

D. $(5x+7)(5x-7)$

$5x(5x-7)-7(5x-7)$

$25x^2+35x-35x-49$

$25x^2-49$

For #35-40, multiply and simplify completely.

35. $(x+2y)(x-2y)$

36. $(3x+7)(4x-8)$

37. $5x(x+3)(x-2)$

38. $(2x+1)\left(3x^2+4x+5\right)$

39. $(4x+3y)^2$

.40. $(3x-2)^2$

For #41-42, factor using the GCF.

41. $8x^4-12x^7+20x^9$

42 . $12x^2y^5+16x^3y^4$

For #43-44, using the difference of squares.

43. x^2-25

44. $16x^2-81y^2$

For #45-52, factor completely.

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

46. $x^2 + 5x - 36$

47. $x^2 + 11x + 24$

48. $x^2 - 3x - 54$

49. $2x^2 + 3x + 1$

50. $3x^2 + 7x + 2$

51. $5x^2 - 7x + 2$

52. $3x^2 + 7x - 6$

Solving quadratic equations by factoring:

A. $12x^2 - 7x - 10 = 0$

$(3x + 2)(4x - 5) = 0$

$3x + 2 = 0$ or $4x - 5 = 0$

$3x = -2$ $\quad$ $4x = 5$

$x = -\frac{2}{3}$ $\quad$ $x = \frac{5}{4}$

B. $5x^2 + 28x - 32 = 0$

$(5x - 4)(3x + 8) = 0$

$5x - 4 = 0$ or $3x + 8 = 0$

$5x = 4$ $\quad$ $3x = -8$

$x = \frac{4}{5}$ $\quad$ $x = -\frac{8}{3}$

For #53-56, solve for x by factoring.

53. $(3x + 1)(x - 4) = 0$

54. $5(x - 2)(x - 8) = 0$

55. $x(2x - 9) = 0$

56. $(x - 5)(3x + 2)(2x - 1) = 0$

Solving quadratic equations using the quadratic formula:

A. $3x^2 - 14x - 5 = 0$

a = 3, b = -14, c = -5

$$x = \frac{14 \pm \sqrt{(-14)^2 - 4 \bullet 3 \bullet (-5)}}{2 \bullet 3}$$

$$x = \frac{14 \pm \sqrt{196 + 60}}{6} = \frac{14 \pm \sqrt{256}}{6}$$

$$x = \frac{14 \pm 16}{6} \text{ so } x = \frac{30}{6}, \; x = \frac{-2}{6}$$

$$x = 5, \; x = \frac{-1}{3}$$

B. $5x^2 - 12x + 3 = 0$

a = 5, b = -12, c = 3

$$x = \frac{12 \pm \sqrt{(-12)^2 - 4 \bullet 5 \bullet 3}}{2 \bullet 5}$$

$$x = \frac{12 \pm \sqrt{144 - 60}}{10} = \frac{12 \pm \sqrt{84}}{10}$$

$$x = \frac{12 \pm 2\sqrt{21}}{10} = \frac{2\left(6 \pm \sqrt{21}\right)}{2(5)}$$

$$x = \frac{6 \pm \sqrt{21}}{5}$$

*For #57-59, solve the following equations by using the **quadratic formula**.*

57. $2x^2 + 7x - 15 = 0$

58. $3x^2 + 8x = -2$

59. $5x^2 = 3x + 7$

Distance Formula: $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

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

60. Find the distance between (-3, -1) and (2, 1).

61. Find the midpoint of (-2, 4) and (6, -1)

62. Write the equation of a vertical line through (3, -2).

63. Write the equation of a horizontal line through (1, 4).

Writing the equation of the line passing through two points:

(4, 5) and (7, 9)

$$m = \frac{(9-5)}{(7-4)} = \frac{4}{3}$$

$$y - 5 = \frac{4}{3}(x - 4)$$

$$y - 5 = \frac{4}{3}x - \frac{16}{3}$$

$$y = \frac{4}{3}x - \frac{16}{3} + \frac{15}{3}$$

$$y = \frac{4}{3}x - \frac{1}{3}$$

64. Write the equation of a line, using slope-intercept form, through the points (2, -3) and (-6, -7).

Writing the equations of lines parallel and perpendicular to other lines:

First, determine the slope of the "other" line.

Standard form: $Ax + By = C$

$By = -Ax + C$

Solve for y: $y = \left(-\frac{A}{B}\right)x + \frac{C}{B}$

This is the slope

Two lines that are **parallel** have the **same slope**.

Two lines that are **perpendicular** have slopes that are **opposite reciprocals.**

65. Write the equation of a line through the point (6, 1) and parallel to the line $2x + 3y = 1$

66. Write the equation of a line through the point (-1, 2) and perpendicular to the line $y = \frac{1}{3}x + 4$.

Solving absolute value equations:

A. $|3x + 5| = 9$

$3x + 5 = 9$ or $3x + 5 = -9$

$3x = 4$ $\quad$ $3x = -14$

$x = \frac{4}{3}$ $\quad$ $x = -\frac{14}{3}$

B. $2|x + 5| - 3 = 1$

$|x + 5| = 2$

$x + 5 = 2$ or $x + 5 = -2$

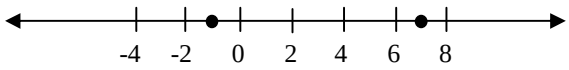
$x = -3$ $\quad$ $x = -7$

Solving absolute value inequalities:

$|2x-6| \geq 8$ Forget about the inequality for now and just consider $|2x-6| = 8$

$$\begin{array}{rcl} 2x-6=8 & \text{or} & 2x-6=-8 \\ 2x=14 & & 2x=-2 \\ x=7 & & x=-1 \end{array}$$

Plot the zeros on the number line



Test a point in each interval (space between points) to find the solution set

testing -4 in the left interval → $|2(-4)-6| = |-8-6| = |-14| = 14$ which is ≥ 8 TRUE

testing 0 in the middle interval → $|2(0)-6| = |0-6| = |-6| = 6$ which is not ≥ 8 FALSE

testing 8 in the right interval → $|2(8)-6| = |16-6| = |10| = 10$ which is ≥ 8 TRUE

Therefore, the solution is the left and right intervals. $\{x : x \leq -1 \text{ or } x \geq 7\}$

An ALTERNATIVE notation $(-\infty, -1] \cup [7, +\infty)$

*NOTE: This approach on this inequality may be different from the technique that you learned in Algebra I. It is the approach that will be used in H-Algebra II. Don't worry. It is much easier than it looks on this page. It **will** be reviewed in H-Algebra II.*

For #67-70, solve for x in each. This will be covered in detail in Chapter 1

67. $|2x-1| = 5$

68. $|x+2| \leq 4$

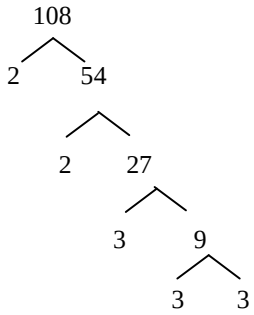
69. $2\left|\frac{2}{3}x\right| + 1 = 3$

70. $\left|\frac{1}{2}x - 4\right| \geq 1$

Simplifying Radicals:

A. $\sqrt{108}$

Factor tree for prime factorization



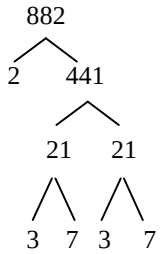
$\sqrt{2^2 \times 3^3}$

$2 \bullet 3\sqrt{3^1}$

$6\sqrt{3}$

B. $\sqrt{882}$

Factor tree for prime factorization



$\sqrt{2 \times 3^2 \times 7^2}$

$3 \bullet 7\sqrt{2^1}$

$21\sqrt{2}$

C. $3\sqrt{5} \bullet 4\sqrt{7}$

$3 \cdot 4\sqrt{5 \cdot 7}$

$12\sqrt{35}$

D. $3x\sqrt{2x} \bullet 4x^2\sqrt{5x}$

$3x \cdot 4x^2\sqrt{2x \cdot 5x}$

$12x^3\sqrt{2 \cdot 5x^2}$

$12x^3 \cdot x\sqrt{2 \cdot 5}$

$12x^4\sqrt{10}$

E. $5\sqrt{3} + 4\sqrt{2} + 7\sqrt{3}$

$12\sqrt{3} + 4\sqrt{2}$

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

$\frac{\sqrt{2}}{\sqrt{3}} \bullet \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{6}}{\sqrt{3}} = \sqrt{2}$

For #71-74, simplify each.

71. $\sqrt{24}$

72. $\sqrt{\frac{48}{6}}$

73. $\sqrt{\frac{1}{2}}$

74. $3x\sqrt{12x^5y^4z^8}$

For #75-78, perform the indicated operations and simplify your results.

75. $\sqrt{7} \bullet 4\sqrt{8} \bullet 3\sqrt{2}$

76. $\sqrt{32} + 3\sqrt{18} - 2\sqrt{50}$

77. $\left(5\sqrt{2}+3\right)\left(\sqrt{2}-7\right)$

78. $3\sqrt{n} \bullet 6\sqrt{n}$

Using function notation:

Given: $f(x) = 3x^2 + 2x - 5$

Find: f(2) $f(2) = 3(2)^2 + 2(2) - 5$

$f(2) = 3 \bullet 4 + 4 - 5$
$f(2) = 12 + 4 - 5$
$f(2) = 11$

Find: f(-3) $f(-3) = 3(-3)^2 + 2(-3) - 5$

$f(-3) = 3(9) - 6 - 5$
$f(-3) = 27 - 6 - 5$
$f(-3) = 16$

79. Given: $f(x) = 3x^2 - 6x - 12$, find each of the following:

a. f(0)

b. f(3)

c. f(-2)

d. $f\left(\sqrt{2}\right)$