

Dear Algebra II student,

Welcome to Upper School and Algebra II. I am looking forward to teaching you in the fall. I have a lot of fun projects planned for next year. We will design our own word problems and decode secret messages using matrices.

Algebra II provides a review and thorough extension of the topics introduced in Algebra I, followed by a study of advanced algebraic topics including quadratics and polynomials, exponents and logarithms, systems of equations, coordinate geometry, matrices and determinants and conic sections and statistics (time permitting).


In preparation for next year, I wanted to let you know what you will be required to bring to class. Early in the year students are encouraged to strengthen their computations skills by working without a calculator, while many of the topics in the second semester will be enhanced by the use of a graphing calculator. Therefore you will need to purchase a **TI 84 Plus Silver Edition graphing calculator**. In addition, you will need a **2 inch ring binder with loose leaf paper and a pack of 5 index tab dividers** for notes, seatwork, vocabulary, quizzes, and homework. A portion of your grade will be based on your notebook.

In addition, to help you retain the math concepts and skills learned this school year, I have created the attached summer packet. Working through these problem sets is mandatory. Students should bring completed problem sets as outlined on the attached cover sheet. Late packets will **not** be accepted. I have also included a study guide to assist you.

Please check your email mid-July for an invitation to a math blog. This will provide you with a forum to ask questions regarding the summer packet. If you experience difficulty or do not receive an invitation, please feel free to contact me at pastor.s@harrisburgacademy.org.

I hope you have a safe and enjoyable summer. I look forward to seeing you in August!

Sincerely,



Mrs. Pastor

Algebra II – Summer Packet for 2009

- This packet is intended for students entering Algebra II in August 2009.
- It reviews concepts and skills you have learned in previous math courses.
- It is a mistake to begin this now. Enjoy a well earned break before you get started. Let it go until mid-summer. I want these concepts and skills to be fresh in you mind in August. Also, do not wait until the last minute to complete the packet. Completing it all at once will be overwhelming. If you complete two concepts a day, it will take you about a week to complete it.
- Complete the problems on a separate piece of paper. Do your work in vertical algebra columns. Do not string equal signs across the page horizontally. Show all of your work – do not skip steps. Please circle your final answer.
- It is strongly recommended that calculators **not** be used to complete this packet.
- The work is due according to the schedule below. It will be collected at the beginning of class. Late work will not be accepted. Each section will be worth 10 homework points.
- Please note that regular homework will be assigned during the first week of class, so it is important to complete this packet over the summer.

Due Date	Section Names
Tuesday, September 1, 2009	Order of Operations Fractions Exponents Vocabulary
Wednesday, September 2, 2009	Radicals Simplifying Expressions Solving Equations
Thursday, September 3, 2009	Solving Inequalities Linear Graphs (graph on attached sheet) Polynomial Expressions and Equations

Vocabulary

Copy and define each vocabulary word on a separate sheet of paper. Please attach it to the first section of the summer packet which is due on September 1, 2009.

You may be wondering why I am requiring you to define mathematical words. I just want you to know that I am not asking you to do this to keep you busy during the summer break. I want each of you to be successful in my math class. I strongly believe that math has a language of its own. To be successful in math, it is important to be able to communicate mathematically. For example when I say add the coefficient of the monomial to the coefficient of the second term of the polynomial. You should know exactly what I am telling you. Otherwise you will be lost before you even get started.

Addend	Exponent
Additive identity	Function
Algebraic expression	Integers
Associative property	Irrational numbers
Binomial	LCD
Coefficient	Monomial
Commutative Property	Natural numbers
conjugate	Numerator
Constant	Principle of Zero Products
Coordinates	Polynomial
Degree of a term	Quotient
Denominator	Radical expression
Difference	Range
Difference of two squares	Rational expression
Degree of a polynomial	Real number
Distance formula	Term of a polynomial
Distributive property	Whole number
Domain	Rational expression

Name: _____

1. Order of Operations

Evaluate each expression. Write your answer in simplest form.

1. $4^2 \cdot 2 + [7 - (3^2 - 5)]$ 2. $[15(10) - 12(10)] \div 10$ 3. $(8 - 4) \cdot (12 - 3) \cdot \frac{1}{2}(2 + 1 \times 2)$
4. $4[(3 + 2 \times 3) - 5] + 7$ 5. $80 \div 4 \times 2 - 2 \times 2$ 6. $3^2 + 7 \times 2 - 8 \times 2$

2. Fractions

Evaluate each expression. Write your answer in simplest form. Where applicable, leave answers as improper fractions. (Reduce, reduce, reduce!)

7. $\frac{1}{3} \left(\frac{5}{6} - \frac{3}{4} + \frac{2}{3} \right)$ 8. $\frac{\frac{3}{9} - \frac{8}{12}}{\frac{3}{8} \cdot 2}$ 9. $-\frac{4}{9} \cdot \frac{3}{2} - \frac{5}{6} + 3$
10. $\left(4 - \frac{5}{6} + 3 \times 2 \right) \div \frac{5}{6}$ 11. $\frac{\frac{2}{3} + 4}{\frac{5}{6}}$ 12. $\frac{\frac{3}{2} + \frac{3}{4} + \frac{3}{8}}{21}$

3. Exponents

Simplify each expression. Write your answer in simplest form. Where applicable, leave answers as improper fractions. The simplified expression should have no negative exponents.

13. $\frac{4x^8}{6x^{-5}}$ 14. $(6xy^2)(-8x + 9y)$ 15. $(3x \cdot x^3)^{-2}$
16. $\frac{x^2y}{3y^3x^3} \cdot \frac{18x^4y^2}{xy^6}$ 17. $(12xy)^0(x^2y^4)^5$ 18. $\frac{2x^{-2}y}{3y^{-3}x^2} \cdot \frac{3x^4}{8y^{-2}}$

4. Radicals

Evaluate each expression. Rationalize the denominator where necessary.

19. $36^{\frac{1}{2}}$

20. $\sqrt{45}$

21. $\sqrt{a^5b^{10}}$

22. $\sqrt{24} \cdot \sqrt{54}$

23. $(x^{\frac{1}{2}})^5(x^{\frac{3}{2}})$

24. $\sqrt{\frac{ab^2}{c}}$

5. Simplifying Expressions

Simplify each expression. Write your answer in simplest form.

25. $(2y^3 - 9y + 16) - (5y^3 + 3y - 3)$

26. $-7x + 8(-2x + 5)$

27. $4y(2 - y) + 3y^2$

28. $5(x + y) - 4(3x - 2y + 1)$

29. $\frac{30x^2 + 20x - 10}{-5}$

30. $\left(\frac{x^4 + 7x^5 + 3x^4 - 3x^5}{x^3}\right)^{\frac{1}{2}}$

6. Solving Equations

Solve each of the following equations for x .

31. $3 - 2(x - 1) = 2 + 4x$

32. $8x - 4 + 3(x + 7) = 6x - 3(x - 3)$

33. $16x - 3(4x + 7) = 6x - (2x + 21)$

34. $(x - 3) - 5(x + 7) = 10(x + 3) - (7x + 5)$

35. $-6x^2 = -216$

36. $\frac{2}{3} = \frac{x + 7}{3x}$

37. $\frac{x + 6}{4} = \frac{-4x}{16}$

38. $16x + 24 = 7(x + 6)$

Solve each equation for the indicated variable.

39. $ax + r = 7$, for x

40. $y = 3x + 3b$, for b

41. $y = mx + 6$, for m

42. You can estimate the time, t , in hours that it takes to fly a distance, d , in miles by using the formula $t = \frac{d}{500} + \frac{1}{2}$.
- Use the formula to estimate the time that it takes to fly 1300 miles.
 - Solve the formula for d .
 - Use the rewritten formula from **b** to find how many miles you can fly in 4 hours.

7. Solving Inequalities

Solve each of the following inequalities for x .

43. $4x + 7 - x \leq 31$ 44. $4x + 5 \geq x + 26$ 45. $2(x - 3) + 8x \leq 11$

Solve each of the following compound inequalities for x .

46. $-7 \leq 3x + 2 \leq 8$ 47. $-2 \leq 4x + 6 \leq 22$ 48. $8 < 3x - 1 \leq 11$

8. Linear Graphs

Given two points M & N on the coordinate plane, find the slope of \overline{MN} and state the slope of the line perpendicular to \overline{MN} .

49. $M(9, 6)$, $N(1, 4)$ 50. $M(-2, 2)$, $N(4, -4)$ 51. $M(-9, 16)$, $N(-11, 16)$

Find the x -intercept and y -intercept of the given line. Using the intercepts, graph the line.

52. $y = x - 5$ 53. $6x + 2y = -12$ 54. $3y = 9x + 15$

55. $y = -2x + 1$ 56. $y - 10 \leq 2(x - 4)$ 57. $6x - 5 \geq 2y + 3$

Find the slope and y -intercept of the graph of the equation. Using slope-intercept form, graph the line.

58. $y - 2x = 7$ 59. $y = \frac{2x + 7}{14}$ 60. $3x + 6y \leq 12$

9. Multiplying, Factoring and Solving Polynomial Expressions and Equations

Use the FOIL method to find each product.

61. $(3x - 2)(x - 1)$ 62. $(2x - 9)(3x - 8)$ 63. $(3x - 5)^2$

Find the greatest common factor and factor it out of the expression.

64. $-4x^3 - 20x^2 + 16x$ 65. $3x^5y^2 - 21x^2y^7$ 66. $15x^5 - 10x^4 + 5x^2$

Factor each expression completely.

67. $x^2 - 25$

68. $x^2 + 2x - 8$

69. $x^2 - 2x - 24$

70. $9x^2 - 81$

71. $9x^2 + 24x + 16$

72. $2x^2 + x - 6$

73. $-12x^3 - 2x^2 + 24x$

74. $8x^3 - 3x^2 + 16x - 6$

75. $6x^4 - 4x^3 + 12x - 8$

Using the Principle of Zero Products, solve the following quadratic equations for x.

76. $x^2 = 25$

77. $3x^2 = 48$

78. $x^2 - 9x - 36 = 0$

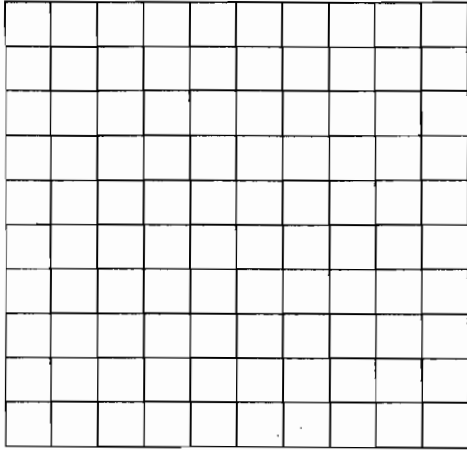
79. $2x^2 - 3x + 1 = 0$

80. $x^2 + 7x + 12 = 0$

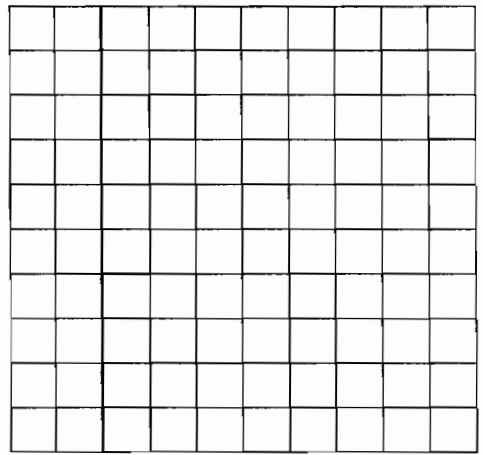
81. $x^2 - 10x + 9 = 0$

Name: _____

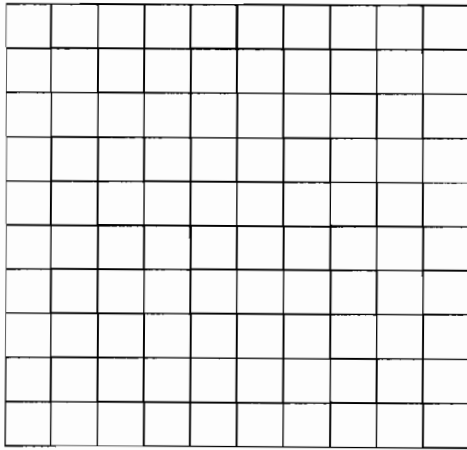
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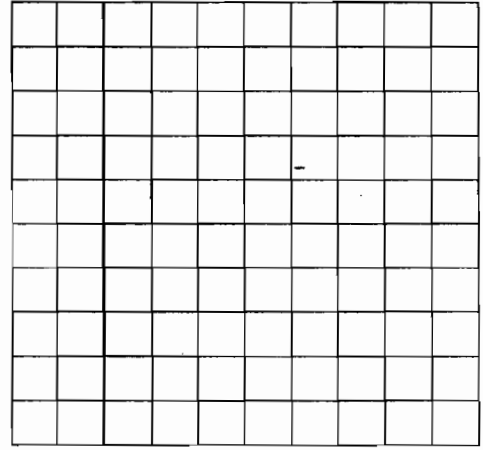
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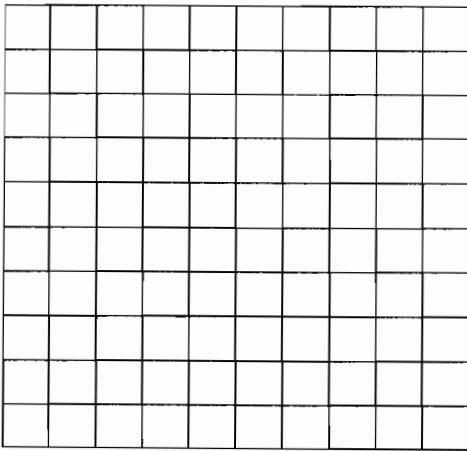
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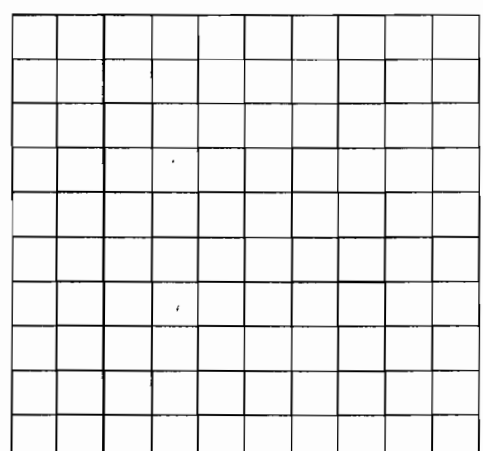
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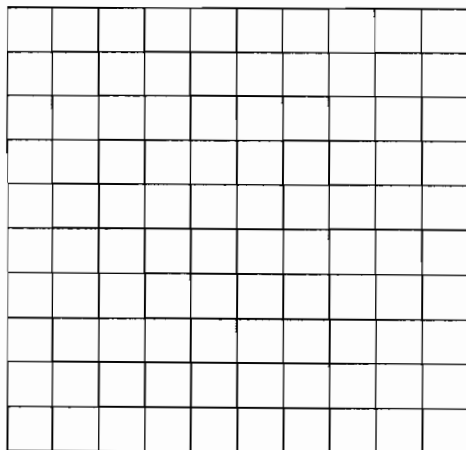


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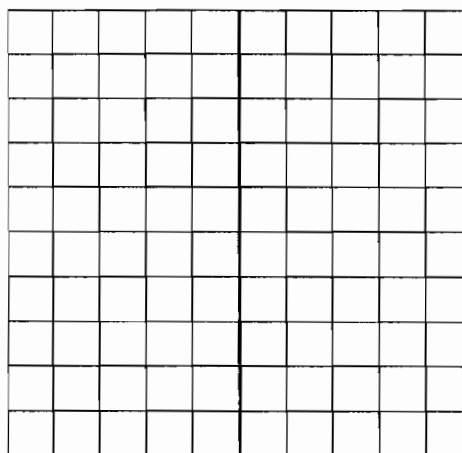


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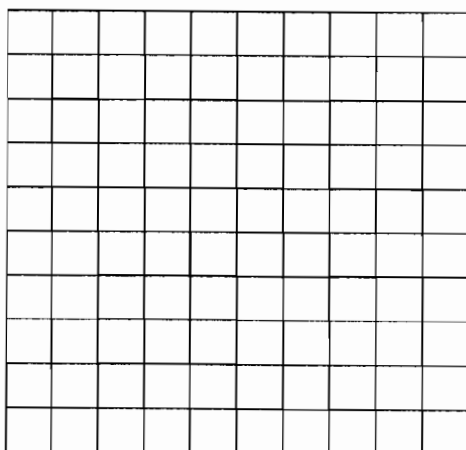
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59.



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Order of Operation

Order	Operation	
1	Compute with-in parenthesis	please
2	Compute number raised to powers	remember
3	Multiply from left to right	my
4	Divide from left to right	dear
5	Add from left to right	aunt
6	Subtract from left to right	sally

Simplifying Algebraic Expressions Using Properties of Exponents

Properties of Exponents	
The Multiplication Property	$a^n \times a^m = a^{n+m}$
The Division Property	$\frac{a^n}{a^m} = a^{n-m}$
The Power Property	$(a^n)^m = a^{nm}$
The Distributive Property	$(ab)^n = a^n b^n$
The Zero Power Property	$a^0 = 1$ for any quantity $a \neq 0$

Solving Linear Inequalities in One Variable

A linear inequality looks like a linear equation, but instead of an equals sign it has a symbol of inequality: greater than or equal (\geq), greater than ($>$), less than or equal (\leq), or less than ($<$).

Solving an inequality is similar to solving an equation. You can:

- add the same quantity from each side of the inequality
- subtract the same quantity from each side of the inequality
- multiply both sides of an inequality by the same positive number
- divide both sides of an inequality by the same positive number

If you multiply or divide an inequality by a negative number the inequality symbol reverses: greater than becomes less than and vice-versa.

Example: Solve $2x - 5 > 13$

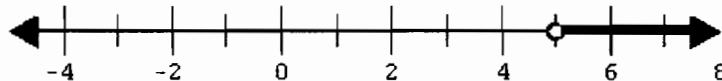
Solution: Add 5 to each side to get $2x > 18$

Divide both sides by 2 to get $x > 9$,

You can **graph** the an inequality on a number line by shading in all values of x that make the inequality true.

Example: Graph the inequality $x > 5$

Solution: The solution appears below. Notice that we place an open circle at $x = 5$ to show that this value is not part of the solution.



Graphing Linear Equations

Quick Review	
Slope of a Line	$\frac{\text{Rise}}{\text{Run}} = \frac{\text{Change in } y}{\text{Change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$
y-intercept	The point where the line crosses the y-axis, $(0, b)$
x-intercept	The point where the line crosses the x-axis, $(a, 0)$
Equation of a Line	$y = mx + b$
Equation of a Vertical Line	$x = c$ (where c is a constant)
Equation of a Horizontal Line	$y = c$ (where c is a constant)

To Graph a line:

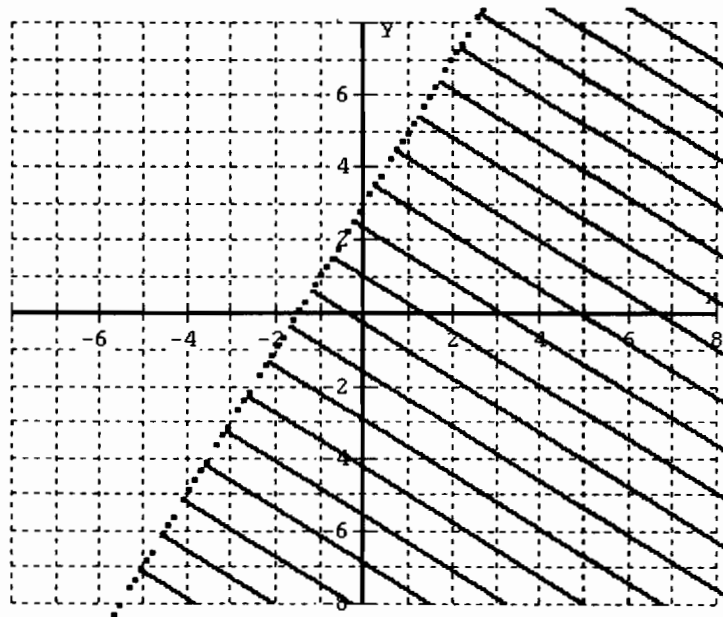
Method 1: Make a table of values and plotting points

Method 2: Plot the x-intercept and y-intercept and join them

Method 3: Plot a point on the line and use slope to find **other points**

Graphing Linear Inequalities With Two Variables

Quick Review	
To graph a linear inequality	for example, $y < 2x + 3$
first graph the equation	$y = 2x + 3$
Draw the equation as a dotted line since the inequality is $<$. If it have been \leq then draw it as a solid line.	
The line divides the plane into two regions. Pick a point in each region	for example, $(0, 0)$ and $(1, 7)$
Substitute <u>into the inequality</u> . If the result is true then shade that point and the entire region. If the result is false then shade nothing.	In this case, $(0, 0)$ gives $0 < 3$ which is true, so we would shade the origin and everything below the line. The solution is shown below.



Definition of a Function

Quick Review: A *function* is a rule that connects two quantities. We say that " y is a function of x " if each value of x gives only one value of y .

Example: If N stands for the number of tickets sold to the Spring Play at Williston, and M stands for the amount of money collected, then M is a function of N because each value of N produces just one value of M .

Example: If M stands for the final grades in Math of all Williston Juniors, and E stands for the final grades in English, then M is not a function of E because each value of E might be matched with several values of M .