

## Rising Algebra II Student Summer Work

Mastery of the algebra skills listed below is essential for success in Algebra II/Trigonometry. The course moves quickly and the skills attached are necessary tools used in complicated problem solving throughout both semesters.

1. PEMDAS
2. Solving multi-step equations
3. Graphing linear equations and inequalities
4. Operations with polynomial expressions (addition, subtraction, multiplication, and division)
5. Factoring and solving polynomial equations (quadratic equations)
6. Graphing quadratic functions
7. Solving quadratic equations using the Quadratic Formula
8. Simplifying radical expressions
9. Operations with radical expressions (addition, subtraction, multiplication, and division)

I have attached rules and a few practice problems for each of the skills listed. Please bring the completed packet to the first day of class in August.

Your Algebra I and Algebra II textbooks and Khan Academy on Youtube.com are excellent resources for a quick review of all of these skills.

Please contact me if you have any questions.

Have a great summer!

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## 1. Order of Operations (PEMDAS)

The Rules for Order of Operations

Step 1: Evaluate expressions inside grouping symbols

Step 2: Evaluate all powers

Step 3: Do all multiplication and/or division from left to right

Step 4: Do all addition and/or subtraction from left to right

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Simplify each expression.

1.  $(8 - 4) \cdot 2$

2.  $12(20 - 17) - 3 \cdot 6$

3.  $3^2 \div 3 + 2^2 \cdot 7 - 20 \div 5$

4.  $250 \div [5(3 \cdot 7 + 4)]$

5.  $\frac{4(5^2) - 4 \cdot 3}{4(4 \cdot 5 + 2)}$

## 2. Solving Multi-Step Equations

Rules for solving multi-step equations.

Step 1: Use the Distributive Property to eliminate grouping symbols.

Step 2: Use the Addition or Subtraction Property of Equality to get the variable on one side of the equation.

Step 3: Undo the operations by working backward to get the variable alone.  
Reverse order of operations.

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Solve each equation.

1.  $14n - 8 = 34$

2.  $\frac{2}{3}g + 6 = -12$

3.  $12 + 2y = 10y - 12$

4.  $\frac{2}{5}y - 8 = 9 - \frac{3}{5}y$

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5.  $2(4 + 2k) + 10 = k$

6.  $-4(r + 2) = 4(2 - 4r)$

### 3. Graphing Linear Equations and Inequalities

Rules for graphing linear equations

Step 1: Write each equation in slope-intercept form  $y = mx + b$

Step 2: Graph the  $y$  -intercept  $(0, b)$

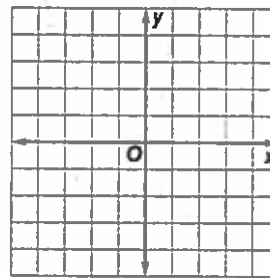
Step 3: Use the slope  $m$  to graph the next point from  $(0, b)$  and the rise over run of  $m$

Step 4: If graphing an inequality use a solid or dotted line and shade above or below the line

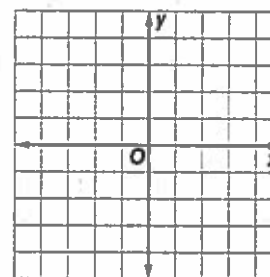
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Graph each linear equation or inequality.

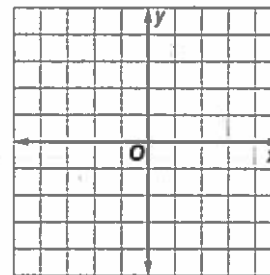
1.  $y = -\frac{1}{2}x + 2$



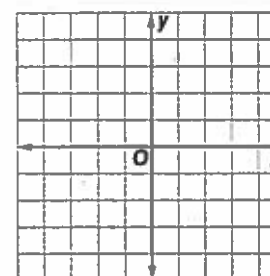
2.  $3y = 2x - 6$



3.  $y - 4 = 3(x - 2)$



4.  $2y - x < -4$



#### 4. Operations with Polynomial Expressions

Product of Powers- For any number  $a$  and all integers  $m$  and  $n$ ,  $a^m \cdot a^n = a^{m+n}$

Power of a Power- For any numbers  $a$  and any integers  $m$  and  $p$ ,  $(a^m)^p = a^{mp}$

Power of a Product- For any numbers  $a$  and  $b$  and any integer  $m$ ,  $(ab)^m = a^m b^m$

Quotient of Powers- For all integers  $m$  and  $n$  and any nonzero number  $a$ ,

$$\frac{a^m}{a^n} = a^{m-n}$$

Power of a Quotient- For any integer  $m$  and any real numbers  $a$  and  $b$ ,  $b \neq 0$ ,

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

Zero Exponent- For any nonzero number  $a$ ,  $a^0 = 1$

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Simplify each expression.

1.  $(-2xy^2)^4(2x^3y^4)^2$

2.  $\frac{6n^{-3}y}{2n^{-1}y^{-3}}$

3.  $(3c^2 - 8c + 5) + (c^2 - 8c - 6)$

4.  $3b^2(4b + 7) - 2b(b^2 - 5b - 3) - 6(b - 2)$

5.  $(x + 2)(x + 4)$

6.  $(3x + 2)(4x^2 - 2x - 7)$

## 5. Factoring and Solving Polynomial Equations

Step 1: Always look for a GCF first

Step 2: If the polynomial has four terms try grouping the first two terms and the second two terms and then remove the GCF

Step 3: Factoring  $x^2 + bx + c = (x + m)(x + p)$  where  $m + p = b$  and  $mp = c$

Step 4: Factoring  $ax^2 + bx + c$ , find two integers  $m$  and  $p$  whose product is  $ac$  and whose sum is  $b$ . Then split the middle term and regroup as in Step 2

Step 5: Set each factored piece equal to zero and solve

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Factor each equation completely, then solve.

1.  $16x^2 - 8x = 0$

2.  $x^2 - x - 110 = 0$

3.  $8x^2 - 12x + 4 = 0$

4.  $4x^2 + 16x + 7 = 0$

5.  $49x^2 - 25 = 0$  Factor as a difference of squares

6.  $5x^3 - 80x = 0$

## 6. Solving Quadratic Equations using the Quadratic Formula

Quadratic Formula- the formula  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$  that gives the solutions of  $ax^2 + bx + c = 0$  where  $a \neq 0$

Set the equation equal to zero, if needed

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Find the values of  $x$  by using the Quadratic Formula.

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

2.  $6x^2 - 10x + 10 = 0$

3.  $9x^2 - 18x + 9 = 0$

4.  $12x^2 + 9 = -6x$

5.  $8x^2 + 9x = 2$

6.  $4x^2 - 4x + 4 = 3$

7.  $3x^2 - 18x = -14$

## 7. Simplifying Radical Expressions

Prime factorization can be used to simplify expressions involving irrational square roots.

Product Property of Square Roots- For any numbers  $a$  and  $b$ , where  $a \geq 0$ , and  $b \geq 0$ ,  $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$

Quotient Property of Square Roots- For any numbers  $a$  and  $b$ , where  $a \geq 0$  and  $b \geq 0$ ,  $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

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Simplify each expression.

1.  $\sqrt{28}$

2.  $\sqrt{72}$

4.  $2\sqrt{3} \cdot 3\sqrt{15}$

5.  $\sqrt{81a^2d^4}$

6.  $\sqrt{\frac{q}{12}}$



## 8. Operations with Radical Expressions

Simplify all radicals. Combine “like” radicals when adding and subtracting.

Multiply two radicals expressions with different radicands (similar to multiplying binomials and using FOIL)

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Simplify each expression.

1.  $8\sqrt{30} - 4\sqrt{30}$

2.  $\sqrt{40} - \sqrt{10} + \sqrt{90}$

3.  $\sqrt{6}(\sqrt{10} + \sqrt{15})$

4.  $2\sqrt{7}(3\sqrt{12} + 5\sqrt{8})$

5.  $(\sqrt{10} + \sqrt{6})(\sqrt{30} - \sqrt{18})$

6.  $(\sqrt{2} + 2\sqrt{8})(3\sqrt{6} - \sqrt{5})$

7.  $(4\sqrt{3} - 2\sqrt{5})(3\sqrt{10} + 5\sqrt{6})$