

This is a District-Wide Summer Assignment for students taking Math Analysis in September 2016. The Math Analysis teachers in all UCVTS programs will be using this for evaluation in their classes.

Are you ready for Math Analysis? Next year you will be taking **Math Analysis** which is an **honors level** math course. It is a rigorous course that begins with fundamental algebra concepts and continues with the exploration of various functions and their graphs. All topics will be explored *numerically, graphically* and *analytically*. This summer packet is designed to help you review the algebra concepts that will be the foundation for your success in Math Analysis next school year. This summer packet is **due the first day of school**. It will be graded and gone over by your Math Analysis teacher, with an assessment given based on these topics in September.

A successful outcome requires effective planning. This summer assignment provides a minimal number of exercises. It is strongly recommended that you find additional practice resources for the topics that you need extra help with. **Do not wait** until the end of the summer to look at this packet. You should work on this packet **a little at a time**. This will allow you to have time to review the topics that you are having trouble remembering. Schedule time to review and practice these topics. The following is a list of topics you need to review and master:

Algebra Topics to Review

- Polynomials: Add, Subtract, and Multiply
- Factoring: Common monomial factors, quadratics
- Solve equations: Multi-step equations, linear, absolute value & quadratic equations
- Rules of Exponents: Simplify expressions
- Rational Expressions: Simplify, Add, Subtract, Multiply, & Divide (Complex)
- Radicals: Simplify, Add, Subtract, Multiply, Divide (rationalize)
- Equations of lines: Find slope, Graph lines, find equations
- Graph Quadratic equations

There are many resources available online. I suggest that you start with the publisher of the textbooks that you used in Combined Algebra. The following links provide practice quizzes and tests to help you identify the topics that you need to practice.

Algebra I: http://www.classzone.com/books/algebra_1/oltp_welcome.cfm

Algebra II: http://www.classzone.com/books/algebra_2/oltp_welcome.cfm

You can easily find other student resources and practice opportunities if you "google" the topic. Here are a few recommended resources.

www.purplemath.com

www.hippocampus.org

www.brightstorm.com

www.khanacademy.com

Directions:

- Complete Part 1 on loose leaf. **Show all work** to receive full credit.
- Do **NOT** use a calculator. All of the exercises can be completed **WITHOUT** a calculator.
- Complete Part 2 by sketching your graphs and **showing your work** in the space provided in this packet.

1. Find the sum and difference of polynomials. Make sure to combine like terms to simplify.

a.) $10x^3 - 14x^2 + 3x - 4x^3 + 4x - 6$

b.) $[(6x - 8) - 2x] - [(12x - 7) - (4x - 5)]$

c.) $-4y - [3x + (3y - 2x + \{2y - 7\}) - 4x + 5]$

2. Find the product of polynomials. Then combine like terms and simplify.

a.) $-3x(4x^2 - x + 10)$

b.) $(x + 3)(x + 2)$

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

3. Solve basic linear equations

Solve for x: a.) $7x - 3x - 8 = 24$ b.) $9 = 3(5x - 2)$ c.) $8x - 3(2x - 9) = -5$

d.) $4x - 6 = 6x$ e.) $5 + 4x - 7 = 4x - 2 - x$ f.) $7(5x - 2) = 6(6x - 1)$

4. Solve linear equations with fractions and decimals

Solve for x: a.) $\frac{3}{5}x = 10$ b.) $\frac{x}{3} - \frac{6}{2} = \frac{x}{9} + 3$ c.) $0.6a - 0.5a = 4.5$

5. Solve equations involving absolute value

Solve for x: a.) $|x - 2| = 3$ b.) $|2x - 3| - 4 = 3$ c.) $|x^2 - 4x - 5| = 7$

6. Simplify the following expressions completely using the Properties of Exponents.

a.) $x^6 \sqcup x^5$ b.) $(3a^4b^3)(2a^3b)$ c.) $(z^2)^5$ d.) $\frac{x^{14}}{x^8}$ e.) $(2)^{-4}$ f.) $(4x^3)^0$

g.) $\frac{5a^5b^2c^4}{25a^3b^3c^4}$ h.) $\frac{(3^{-1}a^4b^{-3})^{-2}}{(6a^2b^{-1}c^{-2})^2}$ i.) $(5x^2z^6)^3(5x^2z^6)^{-3}$ j.) $(-2x^2)^3(4x^3)^{-1}$

7. Simplify completely using the Properties of Radicals. Assume all variables are positive. No decimals are allowed in your answers. All answers should be in simplified radical form.

a.) $\sqrt{9x^2}$ b.) $\sqrt{24x^2y^4}$ c.) $\sqrt[3]{\frac{125}{64}}$ d.) $\sqrt[3]{40x^6}$ e.) $\sqrt{18} + \sqrt{32}$ f.) $\sqrt{20x^3y^8}$
 g.) $2\sqrt{50} + 2\sqrt{8}$ h.) $11\sqrt{245x^3} - 9\sqrt{45x^3}$

8. Rationalize the denominator and simplify each fraction.

a.) $\frac{3}{\sqrt{5}}$ b.) $\frac{x}{2 - \sqrt{3}}$ c.) $\frac{\sqrt{x} - 1}{\sqrt{x} + 2}$

9. Multiply, remembering to use special product rules when needed. Combine like terms to simplify your final answers.

a.) $(x + 3)(x - 3)$ b.) $(x + 5)^2$ c.) $(4x - 6y)^2$ d.) $(2x - y)(3x + 5y)$

10. Factor each expression by factoring out greatest common monomial factor(GCF).

a.) $5x^2 + 20x$ b.) $-4x^4 - 2x^3 + 24x^2$ c.) $9x^2y^3 - 3x^2y^2 + 24xy^3$

11. Factor completely using any/all techniques studied in Combined Algebra. Hint: Start with GCF technique, if possible, and then use other techniques.

a.) $x^2 - 49$ b.) $x^2 - 1$ c.) $16x^2 - 25$ d.) $x^2 + 12x + 36$ e.) $x^2 - 26 + 169$
 f.) $9x^2 + 12x + 4$ g.) $5x^2 - 45$ h.) $3x^2 - 3x - 36$ i.) $8x^2 + 38x - 10$
 j.) $5x^4 + 6x^3 - 15x - 18$ (factor by grouping)

12. Simplify the following Rational Expressions.

a.) $\frac{2x + 4}{2}$ b.) $\frac{y^3 - 2y^2 - 3y}{y^2 - 1}$ c.) $\frac{y^2 - 16}{y + 4}$ d.) $\frac{3x^4 - 15x^3 + 24x}{3x}$

13. Perform the indicated operation and simplify

a.) $\frac{x^2 - x - 6}{x^2 + 6x + 9} \cdot \frac{x + 3}{x^2 - 4}$ b.) $\frac{x^2 - 14x + 49}{x^2 - 49} \div \frac{3x - 21}{x + 7}$
 c.) $\frac{3}{x - 2} + \frac{5}{2 - x}$ d.) $\frac{1}{x^3 + x} - \frac{1}{x} + \frac{2}{x^2 + 1}$

14. Simplify the following complex fractions.

a.)
$$\frac{\frac{1}{x}}{\frac{1}{x^2 + 1}}$$

b.)
$$\frac{\frac{x^2 - 1}{x}}{\frac{(x - 1)^2}{x}}$$

c.)
$$\frac{\frac{x}{2} - 1}{x - 2}$$

15. Solve the following quadratic equations for the variable by either factoring, square root method, or quadratic formula. Use the appropriate technique for each equation.

a.) $x^2 - 2x - 8 = 0$ b.) $x^2 + 10x + 25 = 0$ c.) $9x^2 = 36$ d.) $x^2 + 3x = 9$

16. Real Numbers. Consider the set $\left\{12, 5, -3, \frac{5}{4}, 3.12, 0, -\frac{7}{3}, \sqrt{2}, 2\pi, 0.333\dots\right\}$

List all the:

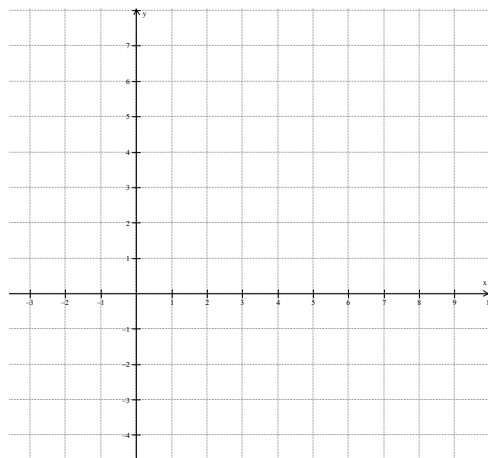
- a.) natural numbers
- b.) integers
- c.) rational numbers
- d.) irrational numbers

17. Equations of lines

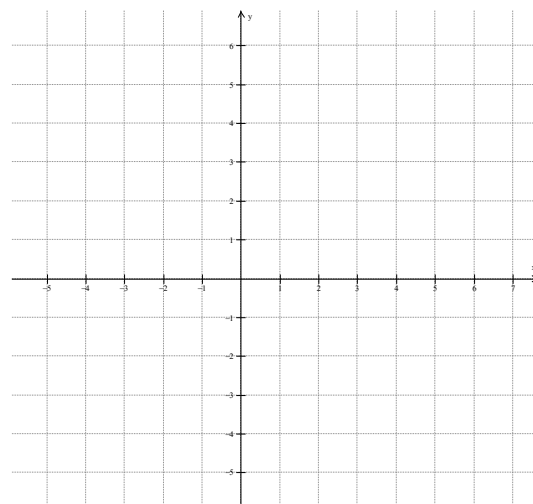
- a.) Write the equation $3x + 4y = 8$ in slope intercept form. Identify the slope and y-intercept.
- b.) Write the equation of a line given the slope is -5 and the y-intercept is 10.
- c.) Write the equation of a line that passes through the point (6, -3) and has a slope of -2.
- d.) Write the equation of a line that passes through the two points (1, 6) and (3, -4).

Part II – Graphing

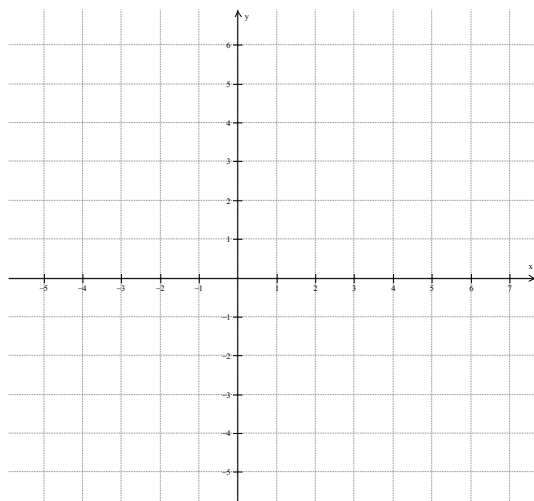
1.) Graph the equation $3y + 2x = 15$



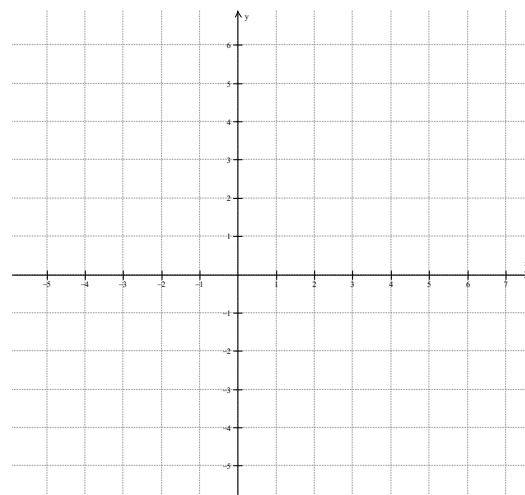
2.) Graph the equation of a line whose slope is 1 and y-intercept is -2



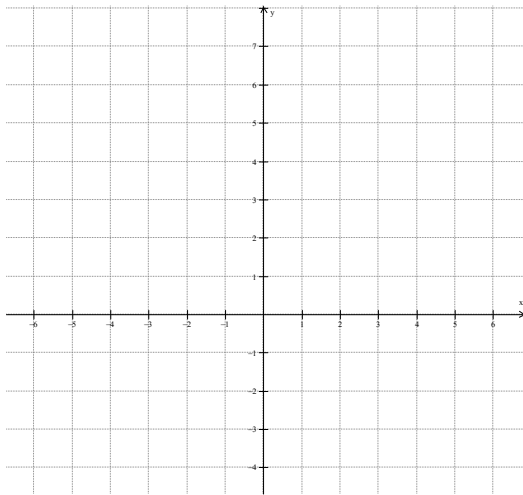
3.) Graph the equation of the line whose slope is 0 and y-intercept is 4.



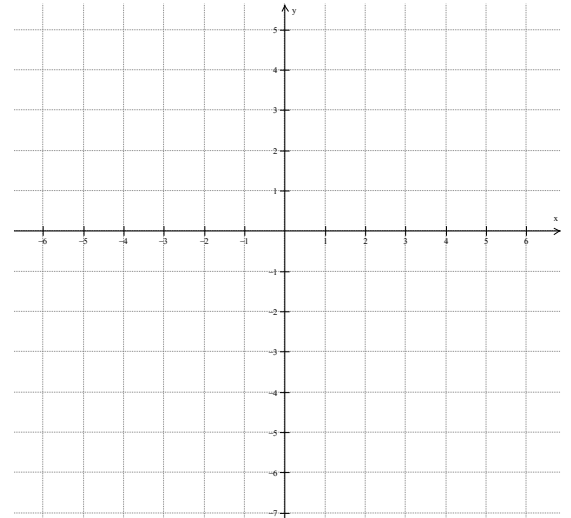
4.) Graph the inequality $2x - y \geq 4$



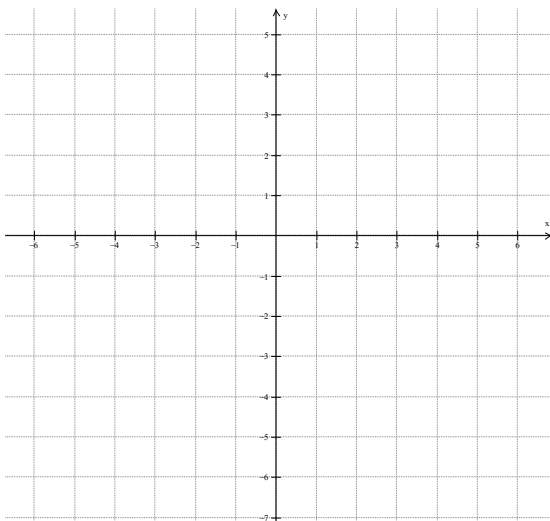
5.) Graph the quadratic $y = x^2 + 1$



6.) Graph the quadratic $y = x^2 - 2x - 5$



7.) Graph the quadratic $y = (x - 2)^2 + 4$



8.) Solve the quadratic by factoring and graph.
 $6 = x^2 - x$

