Name: _____

Algebra II - Summer Work
Part I

Dear Algebra II students,

Summer math work is designed to keep your math skills sharp over the lazy summer months. It is divided into four parts, each requiring about 2 hours to complete.

In addition to providing you with practice while away from school, this review will help us assess your strengths and weaknesses coming into the class. While you are free to use any notes or texts from previous classes, please do not ask anyone else for assistance unless the directions explicitly state that you may discuss your work with classmates. Further expectations for the work's completion are outlined below.

Take note of those problems with which you have trouble and ask about them during the first week of class. Some of the problems are drawn from Chapter 0 of our textbook, so feel free to look them up after you have given them an honest effort. When school begins, we will do a very brief review of chapter 0 and have a test on it within the first couple weeks of classes.

Best of luck, and enjoy your summer!

Directions:

1. All parts of the summer work must be submitted on the first day of class.
2. Each part is divided into four separate sections, described in **bold** at the top of each page.
3. **Pay attention to the rules regarding calculators for each section!** Unless expressly forbidden, you may use a calculator.
4. Please do your work neatly in **pencil** on separate graph paper.
5. Please **box** or **circle your answers**.
6. **Show your work!** We are interested in both accuracy and process.
7. You may use any written resources available to you, but please do not ask anyone else for assistance.
8. Grades are based on effort, not correctness.
9. The grade you earn will play a significant role in your first marking period grade and effort grade.
10. Some of the questions will be easy, and some may cover topics about which you are unsure. That is normal and expected. Just make your **best written attempt on each problem,** and you'll get a high grade!

Practicing Arithmetic – DO NOT USE A CALCULATOR!

Please do not use your calculator on this page. This is just to see how well you can handle arithmetic without the wonderful black box (or gray or whatever) that lets us forget how to actually manipulate numbers.

For the expression at the top of each column, substitute the values given and then evaluate and simplify or reduce.

	A + B	B – C	A ÷ C	BC
A = 2 B = 3 C = 6	2 + 3 5	3 – 6 -3	2 ÷ 6 $\frac{2}{6}$ $\frac{1}{3}$	3·6 18
A = 50 B = 10 C = 25				
A = 1 B = 3 C = -2				
A = -5 B = -10 C = -1				

Sample Row

Function Section – CALCULATOR OK

Use the following function definitions to answer the questions in this section.

$f(x) = 3x + 1$ $\quad$ $g(x) = x^2 + 2x + 1$ $\quad$ $h(x) = 7 - x$

To get you started, here's an example: $f(2) = 3(2) + 1 = 6 + 1 = 7$

1) Evaluate $f(3)$

2) Evaluate $f(-1)$

3) Evaluate $f(0)$

4) Evaluate $f\left(\frac{2}{3}\right)$

5) Evaluate $g(7)$

6) Evaluate $g(0)$

7) Evaluate $h(2)$

8) Evaluate $g\left(\frac{1}{2}\right)$

Fun with Problem Solving

Solve the problems below however you best see fit. You may find that pictures, graphs, or diagrams will help you visualize and apply the information you are given. You are welcome to collaborate when attempting these problems, but **only with other members of this class**. Remember, effort counts for a lot in the eyes of the grader!

Problem 1: Alexa needs to mix some lawn fertilizer with 7 liters of water. She has only two buckets: one that hold exactly 3 liters; and another that holds 8 liters. Describe or illustrate a procedure that will give exactly 7 liters of water in the 8-liter bucket.

Problem 2: A polar bear rests by a stack of 3,000 pounds of fish he has caught. He plans to travel 1,000 miles across the Arctic to bring as many fish as possible to his family. He can pull a sled that holds up to 1,000 pounds of fish, but he must eat 1 pound of fish for every mile he walks in order to keep up his strength. What is the maximum amount of fish (in pounds) the polar bear can transport across the Arctic? Describe how he does it using words, pictures, equations—whatever you find most useful.

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Algebra II - Summer Work
Part II

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Practicing Arithmetic – DO NOT USE A CALCULATOR!

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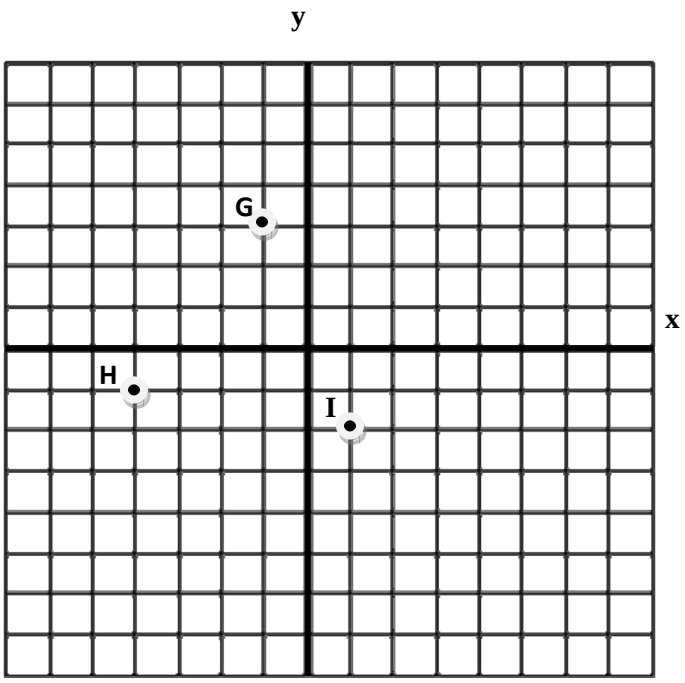
For the expression at the top of each column, substitute the values given and then evaluate and simplify or reduce.

	A + B	B – C	A ÷ C	BC
A = $\frac{1}{3}$ B = $\frac{2}{3}$ C = $\frac{1}{2}$				
A = $-\frac{2}{5}$ B = $\frac{3}{4}$ C = -2				

Graph Section

1) On the coordinate plane shown below, label the following with the specified letter:

A) The Origin
B) Quadrant II
C) Quadrant III
D) The point (7, 3)
E) The point (-3, 5)
F) The point (-2, -6)



What are the coordinates of the following points?

2) G?

3) H?

4) I?

5) What is the minimum number of quadrants that a line can pass through? Explain your answer.

6) What is the maximum number of quadrants that a line can pass through? Explain your answer.

A New Language: Translating Words into Equations

For the following problems, begin by assigning variables to represent the quantities involved, then translate the problems into one or more equations that relate the unknown quantities to conditions of the problem. Finally, solve the equations and interpret your solutions according to the context of the problem. You are welcome to collaborate when attempting these problems, but **only with other members of this class** Remember, effort is everything! You can get a good grade so long as you display genuine and thorough effort on each problem.

Problem 1: Chen, Juanita, and Lou went to the gym together to work out. Find how much each of the kids can leg-press given the following clues.

- Chen said that Juanita and Lou averaged 87 pounds.
- Juanita said that Chen leg-pressed 6 pounds more than Lou.
- Lou said that eight times Juanita's amount equals seven times Chen's amount.

Problem 2: Sven uses a pickup truck to transport ingredients for mortar. The pickup truck can carry a load of up to 1,000 pounds. Mortar is made from five bags of sand for every bag of cement. Sand comes in 50-pound bags and cement comes in 40-pound bags. How many bags of each should Sven load into the truck to make the most mortar possible?

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Algebra II - Summer Work
Part III

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Graph Section

Using the graph shown below, answer the following questions.

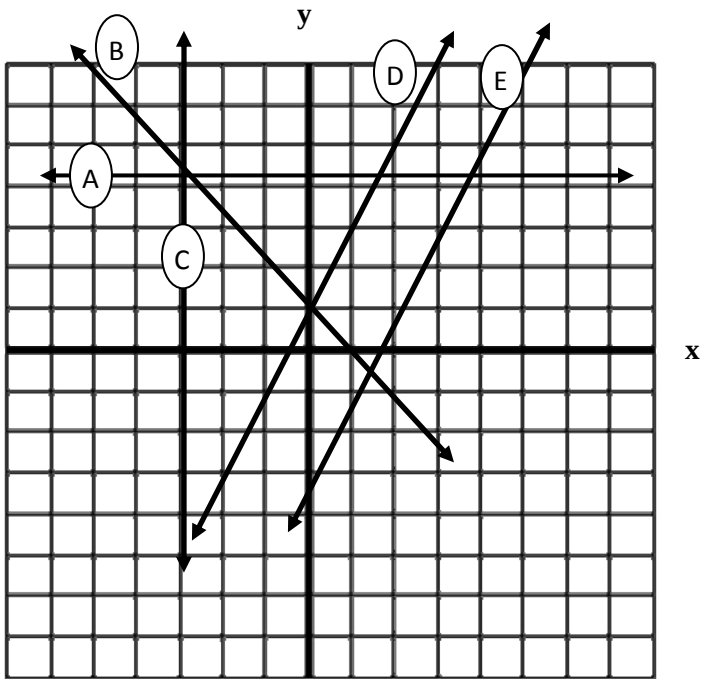
1) Which line(s) has a slope = 0?

2) Which line(s) has an undefined slope?

3) Which lines have the same slope as each other?

4) Which line has a y-intercept that is equal to its x-intercept?

5) Which lines have a positive slope?



"Interesting Question" Section

1) Is there a positive real number that is closest to zero? Explain your answer.

2) Can every line be written in slope-intercept form (y=mx+b)? Explain your answer.

Practicing with Properties of Exponents

This section asks you to simplify exponential expressions using the properties of exponents. If for some reason you have forgotten those properties, you can look them up!

Rewrite and simplify each expression so that all exponents are positive.

1) raising a fraction to a power: $\left(\frac{4}{x}\right)^3$

2) the meaning of a negative exponent: $(2x)^{-6}$

3) negative exponents in a fraction: $\frac{7y^{-2}}{x^2 z^{-2}}$

4) exponential expression raised to an exponent: $(f^2)^9$

5) quotient of exponential expressions: t^{50}/t^{38}

Organizing Information – Getting Things Straight

Solve the problems below by first organizing the information you are given. Start by making lists of similar items or separating quantities into those you know already and those you need to find. You are welcome to collaborate when attempting these problems, but **only with other members of this class**. Remember, effort counts! You will get a high score if you show that you made a thorough attempt at each problem.

Problem 1: To qualify for the Indianapolis 500 auto race, each driver must complete two laps of the 5-mile track at an average speed of 200 mph. Due to some problems at the start, Naomi averages only 160 mph on her first lap. How fast must she go on the second lap to qualify for the race?

Problem 2: Lab assistant Jerry Anderson has just finished cleaning a messy lab table and is putting the equipment back on the table when he reads a note telling him not to disturb the positions of three water samples. Not knowing the correct order of the three samples, he finds these facts in the lab notes.

- The water that is highest in sulfur was on one end.
- The water that is highest in iron is in the Erlenmeyer flask.
- The water taken from the spring is not next to the water in the bottle.
- The water that is highest in calcium is left of the water taken from the lake.
- The water in the Erlenmeyer flask, the water taken from the well, and the water that is highest in sulfur are three distinct samples.
- The water in the round flask is not highest in calcium.

First, organize these facts into categories. Then, determine the order in which Jerry should replace the flasks on the table.

Name: _____

Algebra II - Summer Work
Part IV

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Function Section – CALCULATOR OK

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$f(x) = 3x + 1$ $\quad$ $g(x) = x^2 + 2x + 1$ $\quad$ $h(x) = 7 - x$

To get you started, here's an example: $f(2) = 3(2) + 1 = 6 + 1 = 7$

1) Evaluate $h\left(-\frac{1}{3}\right)$

2) Evaluate $h(f(3))$

3) Evaluate $f(h(1))$

4) Solve for x: $f(x) = 7$

5) Solve for x: $f(x) + 5 = 18$

6) Solve for x: $h(x) = 13$

7) Solve for x: $f(x) = h(x)$

Practicing with Properties of Exponents

This section asks you to simplify exponential expressions using the properties of exponents. If for some reason you have forgotten them, you can look them up!

Rewrite and simplify each expression so that all exponents are positive.

1) multiplying monomials with exponents: $(2p^2q^4r)(6p^7q^3r)$

2) monomial to a power: $(3rs)^4$

3) meaning of zero as an exponent: $\dfrac{x^2x^0}{-x}$

4) what you should say to a burnt meal: $\dfrac{un^{-1}e^{-1}}{dox^0r^{-1}}$

Scavenger Hunt!

Use any written resources you like to answer the following math-oriented questions. Cite the source you used to answer each question; if it's a web page, include the URL. If you choose to use the Internet, be selective in your choice of references: web pages associated with schools, universities, or science/math organizations are great tools, whereas personal web pages can have unverified or incorrect information. You may use Wikipedia as a starting point, but you should find another reference to back up the information you find; do not list Wikipedia as a reference. Your answers to the following items should be brief, but be sure to include short descriptions where necessary.

Find the following:

1. The name, birth date, and birth place of the man widely considered the "Father of Algebra."

2. Two real life examples or applications of parabolas or paraboloids.

3. The famous physicist who is credited with the invention of calculus.

4. Two examples of the use of scientific notation and the context in which you found them.

5. The meanings of the words *abscissa* and *ordinate* and their mathematical relevance.

6. The algebraic topic that John Napier is famous for introducing.

7. The name of any mathematician you choose (cannot be any of those mentioned above) and a brief description of his or her contributions to the world of mathematics.