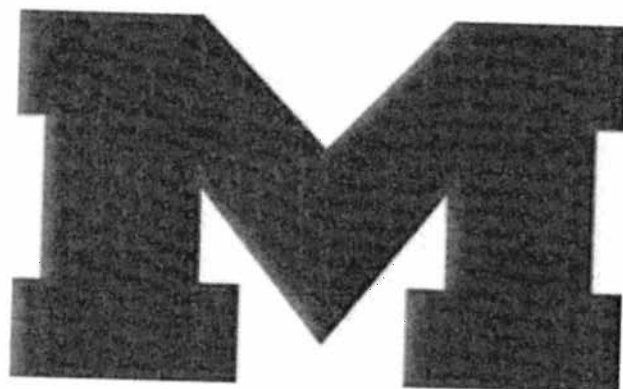


Brien McMahon High School

SUMMER REVIEW ALGEBRA 2



The purpose of the Algebra 2 summer packet is for you to review your Algebra 1 skills and make sure you are well prepared for the start of Algebra 2. It is expected that students in Algebra 2 have already mastered the concepts in this packet. Many of these topics will NOT be reviewed during the school year.

The notes in this packet are designed to help you complete the Algebra 2 Problem sets. At the start of the school year, the problem set will be collected, graded for completion and assessed.

****It is strongly recommended to have a TI-83 or TI-84 graphing calculator for Algebra 2****

I. Mental Math

Adding from left to right: Add the largest place values first and then work your way right, to the ones column.

Multiplying from left to right: Multiply the left most column and work your way to the ones column. Add the results.

Examples for Topic I:

Simplify the following problems using mental math (NO CALCULATOR).

A. $79 + 67$	
$70 + 60 = 130$	Add the tens column.
$9 + 7 = 16$	Add the ones column.
$130 + 16 = 146$	Add the results.
B. $124 \cdot 3$	
$100 \cdot 3 = 300$	Multiply the hundreds column by 3.
$20 \cdot 3 = 60$	Multiply the tens column by 3
$4 \cdot 3 = 12$	Multiply the ones column by 3.
$300 + 60 + 12 = 372$	Add the results.

Practice Problems for Topic I:

Simplify the following problems using mental math (NO CALCULATOR).

a) $325 + 251$

b) $85 \cdot 6$

c) $3952 \cdot 2$

Answers: a) $500 + 70 + 6 = 576$ b) $480 + 30 = 510$ c) $6000 + 1800 + 100 + 4 = 7904$

II. Prime Factorization

Prime Numbers: Prime numbers are numbers that are only divisible by 1 and themselves. For example, the only numbers that divide evenly into 7 are 1 and 7. The first few prime numbers are 2, 3, 5, 7, 11, 13, 17, 19, 23, and 29.....

Factors: A factor is a term that is part of another term when multiplied, or the numbers that are multiplied together to get another number.

Example: What are the factors of 15?

$$5 \cdot 3 = 15 \text{ (3 and 5 are the factors of 15)}$$

Prime Factorization: The prime numbers that are multiplied together to make the original number.

Example: What is the prime factorization of 20?

$$20 = 2 \cdot 2 \cdot 5 = 2^2 \cdot 5$$

Examples for Topic II:

Find the prime factorization for each number.

A. 18	Start with the smallest prime number, 2 and check to see if 2 can divide 18.
$2(9)$	Working with the 9, check to see if 2 can divide 9. It cannot, so check if 3 (the next prime number) can divide 9.
$2 \cdot 3 \cdot 3$	It is not possible to divide further because 2 and 3 are both prime numbers.
$2 \cdot 3^2$	Write the final answer using exponents.

B. 350	Start with the smallest prime number, 2 and check to see if 2 can divide 350.
$2(175)$	Working with the 175, check to see if 2 can divide 21. It cannot, so check if the next prime number (3 or 5, etc.) can divide 175.
$2 \cdot 5(35)$	Working with the 35, check to see which of the next prime numbers can divide 35.
$2 \cdot 5 \cdot 5(7)$	It is not possible to divide further because 2, 5 and 7 are both prime numbers.
$2 \cdot 5^2 \cdot 7$	Write the final answer using exponents.

Practice Problems for Topic II:

Write the prime factorization for the numbers below.

a) 80

b) 42

c) 75

Answers: a) $2^4 \cdot 5$ b) $2 \cdot 3 \cdot 7$ c) $3 \cdot 5^2$

III: Real Numbers and Their Properties

Number Systems:

- **Natural Number** (Counting Numbers) 1, 2, 3, ...
 - **Whole Numbers** (Introduce Zero) 0, 1, 2, 3,
 - **Integers** (Introduce Negative Numbers) ..., -3, -2, -1, 0, 1, 2, 3,
- Note: The above number systems do not contain fractions or decimals.*
- **Rational Numbers** (Numbers that can be written as the ratio of two integers.) When written as decimals, Rational Numbers terminate or repeat.

Examples: $\frac{2}{3} = 0.666\dots$ $\frac{3}{4} = 0.75$ $\frac{-7}{1} = -7$

- **Irrational Numbers** - Number that when written as decimals neither terminate nor repeat.
Examples: $\pi = 3.1415\dots$ $\sqrt{5} = 2.236067978$
- **Real Numbers** (All numbers on the number line.) This system combines the Natural #s, Whole #s, Integers, Rational #s, and Irrational #s.

Properties of Real Numbers: Let m , n , and p be positive real numbers.

Property	Addition	Multiplication
COMMUTATIVE	$m + n = n + m$	$mn = nm$
ASSOCIATIVE	$(m + n) + p = m + (n + p)$	$(mn)p = m(np)$
IDENTITY	$m + 0 = m, 0 + m = m$	$m \times (1) = m, 1 \times (m) = m$
INVERSE	$m + (-m) = 0$	$m \times \left(\frac{1}{m}\right) = 1, m \neq 0$
DISTRIBUTIVE	$m(n + p) = mn + mp$	

- **Additive inverse:** the opposite of any $m = -m$
Examples: the additive inverse of 4 is -4 the additive inverse of -3 is 3
- **Multiplicative inverse:** the reciprocal; the inverse of m is $\frac{1}{m}$
Examples: the multiplicative inverse of $\frac{1}{3} = 3$ the multiplicative inverse of $\frac{5}{6} = \frac{6}{5}$

Practice Problems for Topic III:

a. Classify the following numbers

a) -12

b) $\sqrt{19}$

c) $\frac{3}{7}$

b. Identify the property being performed.

d) $(3)(8) = (8)(3)$

e) $-6 + 0 = -6$

f) $3(4 + 5) = 3(4) + 3(5)$

Answers: a) Integer, Rational Number, Real Number b) Irrational Number, Real Number c) Rational Number, Real Number d) Associative Property of Multiplication e) Additive Identify f) Distributive Property

IV. Order of Operations

The rules for Order of Operations are as follows:

FIRST: Perform operations inside grouping symbols. Grouping symbols include parentheses (x) , brackets $[x]$, braces $\{x\}$, radical symbols \sqrt{x} , absolute value symbols $|x|$ and fraction bars $\frac{x}{y}$. If an expression contains more than one set of grouping symbols, simplify the expression inside the innermost set first. Follow the order of operations within that set of grouping symbols and then work outward.

SECOND: Simplify exponents.

THIRD: Perform multiplication and division from left to right. (Remember that a fraction indicates division.)

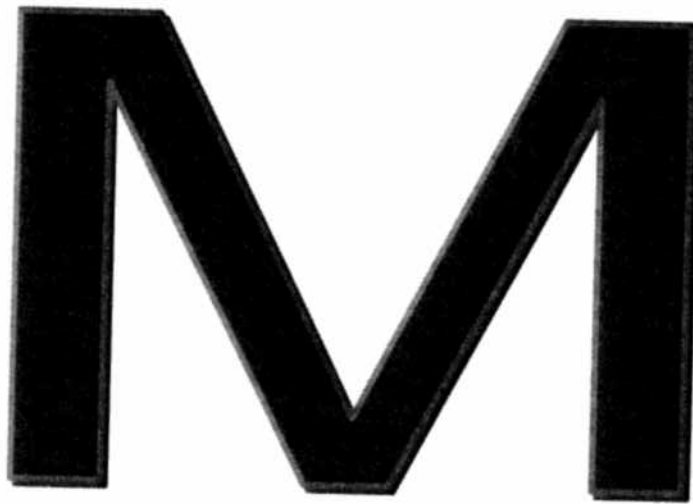
FOURTH: Perform addition and subtraction from left to right.

Tom

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Algebra I

Summer Review



This packet is designed for you to review the skills you will need for success and make sure you are well prepared for the start of your Algebra I course.

This packet is due at the start of school.

**Try to use your calculator only when absolutely necessary while you are completing this packet, since the objective of this packet is to verify your understanding of the concepts. Please show all of your work as this will be required of you throughout the entire school year. Please do all your work in pencil!!!*

****It is highly recommended that you have your own scientific calculator for Algebra I!**

Part 1. Number Sense

Order of Operations – simplify each of the following mathematical expressions. These should be done **without** a calculator.

1). $14 \div 7 + 3^2$ 2). $42 \div 2 (-12 + 9)$ 3). $\sqrt{49}$ 4). $|-14|$

5). $18 - 30 \div 5$ 6). $48 \div (5 + 7) - 9$ 7). $4^3 - 5(2) + 13$

Adding/Subtracting/Multiplying/Dividing Positive and negative Numbers --
This is also done **without** a calculator.

8). $-2 + 11 - 7$ 9). $5 - 3 + 12 - (9)$ 10). $\frac{-4}{\left(\frac{3}{4}\right)}$

11). $(-2)(4)(-5)(-1)$ 12). $-4 + -9 - 3 (-6)$ 13). $\left(\frac{3}{5}\right)\left(-\frac{7}{12}\right)$

Evaluating Expression – you may use a calculator on this, but show substitutions and steps.

14). $3(n-1) + 2n$, when $n = 5$ 15). $7b - 2a$, when $a = -3$ and $b = 4$

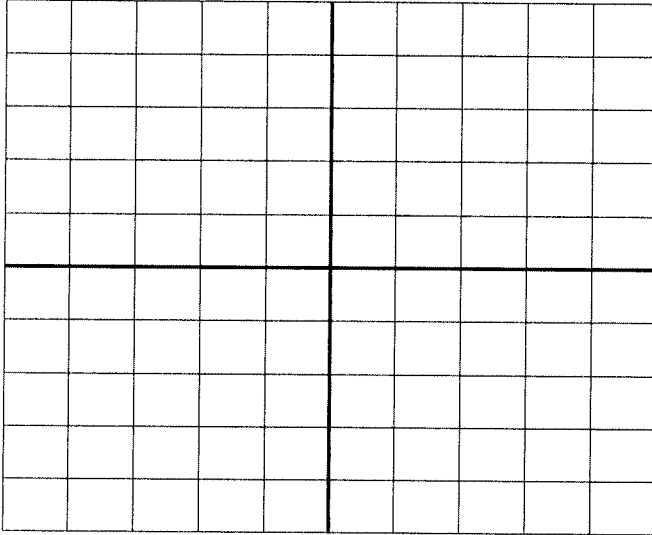
16). $3x^2 + 5x + 1$, when $x = -2$ 17). $\frac{2r}{t} + 7$, when $r = 12$ and $t = 3$

18). $(3x)^2 - 7y^2$, when $x = 3$ and $y = 2$ 19). $4(3d + 6) - 2d$, when $d = -6$

Part 2. Graphing

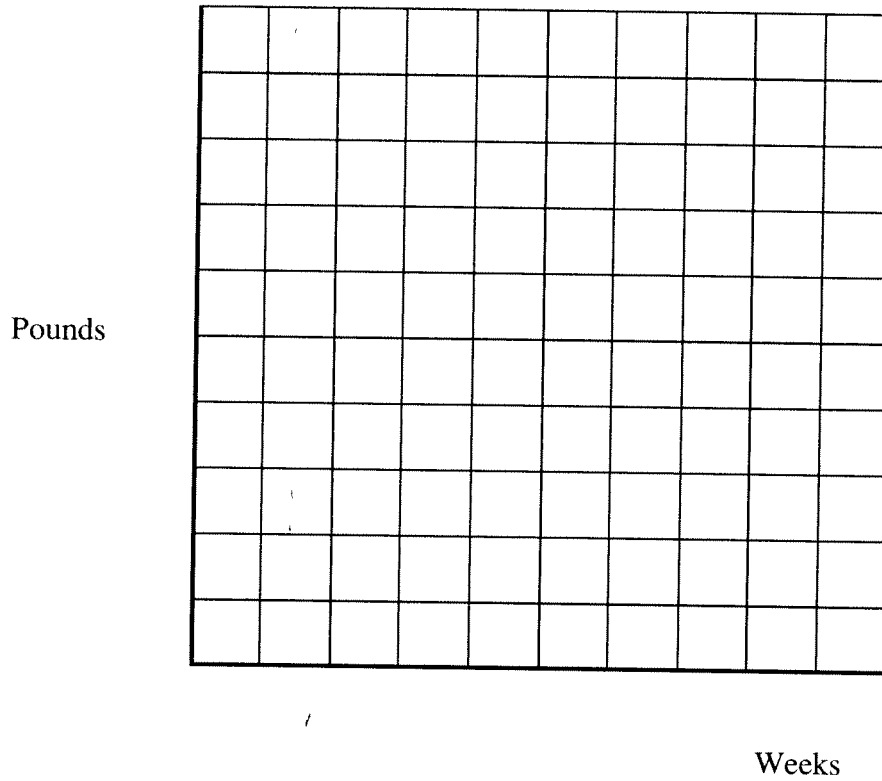
Plot each of the following points on the grid below. Use the letter to label the point on the graph.

- 1). A(3,0) 2). B(3,4) 3). C(-4,3) 4). D(-2,-4) 5). E(0,-2)



Taylor is participating in a new fitness program in which he is required to report his weight at the end of each week. The table below shows some of his results. Graph the data on the graph below.

Number of Weeks in the Fitness Program	Weight (in pounds)
2	181
5	176
9	167
12	160
16	153
19	148



Using information from the graph and table, predict Taylor's starting weight and weight after 25 weeks in the program.

Part 3. Patterns, Functions and Algebra

1). Find the *next three numbers* in the pattern. 2). Find the *next three numbers* in the pattern

3, 7, 11, 15, 19, _____, _____, _____

1, 2, 4, 8, 16, _____, _____, _____

Use the function tables given to find the function rules.

3).

x	? _____
4	-12
5	-15
6	-18
7	-21
8	-24

4)

x	? _____
1	3
2	5
3	7
4	9
5	11

Equations

Solve each equation

5). $x - 5 = 10$

6). $x + 7 = 5$

7). $3x = 18$

8). $\frac{x}{2} = -10$

Distributive Property

Example: $4(x + 5) = 4(x) + 4(5) = 4x + 20$

9). $3(b + 9)$

10). $5(2x - 3)$

11). $-3(4x + 9)$

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

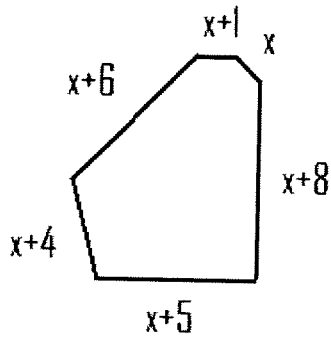
13). $\frac{1}{2}(4r + 12)$

Part 4: Applications

1. What is 50% of the sum of the first 10 odd numbers?
2. Evaluate $\frac{1}{a} + 3a$ if $a = \frac{1}{2}$. Express your answer as a mixed number.
3. Insert the fewest number of grouping symbols to make the following equation true.
$$24 \div 3 + 9 \times 5 - 2 = 6$$
4. A student who is 5' 6" casts a 4' shadow. How many feet tall is a nearby tree which casts a 24' shadow?
5. If eight students scored 100 on a test, twelve scored 90, and eight scored 80, what was the mean of the students' scores?
6. If 24 students in a class of 30 students were present, what percent of the students were absent?
7. If the price of a shirt is reduced by 20% to \$14.40, find the original price.
8. Karen opened a checking account by depositing \$500. She wrote checks for \$13.85, \$28.14 and \$230.18. She made a deposit which was a tenth of the opening balance. What is the balance in her account?

9. The tax on a car costing \$9,200 is \$368. At the same tax rate, what will the tax be on a car costing \$12,500?
- a). \$437.50 b). \$562.50 c). \$250 d). \$500
- 10). Last year, central High School had 800 students. This year's enrollment dropped to 600. What was the percent of decrease?
- a). 75% b). $33\frac{1}{3}\%$ c). 25% d). $133\frac{1}{3}\%$
11. A rubber ball bounces exactly half as high as it did on the previous bounce. It bounces 128 feet high on the first bounce. How high does it bounce on the 12th bounce? Express your answer as a common fraction.
12. Bob lives eight blocks due east of Helen. Helen lives three blocks due west of Ilene. Where does Ilene live in relation to Bob?
- 13). Bob saves \$x per month for three months. His father gives him \$40 and he has enough money to buy the \$115 tennis shoes he wants. Which equation shows this information?
- a). $3x + 25 = 115$ b). $115 - 40 = 3x$ c). $3x + 40 = 115$ d). $40 - 3x = 115$

14). Use the figure below to answer the following questions.



a) If $x = 2.5$, find the perimeter of the figure.

b). If the perimeter of the figure is 84 units, find the value of x .