Piedmont Classical High School

Summer Math Packet

Summer math packets are designed to brush up your math skills and prepare you to start the year with a firm foundation of appropriate knowledge and understanding. Summer math packets are optional and designed to contain material that should be review. If you don't understand or have forgotten something in the math packet it is important that you get help and learn the concept so that you will be able to be successful in your new math class. If you choose to complete the packet, you will benefit from stronger skills, better understanding, and a 100% quiz grade.

Guidelines:

- You should complete the math packet for the class that you will be going into
- Math packets should reflect your own work
- You may get help with the material and concepts, but you must list people and resources who helped you on the accompanying form
- Completed Packets are due on August 19 at 4:00 pm and are to be turned into your math teacher
- If you need help, you may use the following recommended resources or find some on your own
    - Last year's textbook (you may check one out if you don't have one)
    - Khan academy
    - Tutoring hours at the school (confirm times and dates on website)
        - August 1, 3 from 10:00 -12:00
        - August 8, 10,15 3:00-5:00
        - August 17,18 during after school study hall

I will honor, through my words and actions, my school, my family, my country, and myself.

This packet reflects my own work and upholds the honor code.

Signed: _____

I received help from the following people: _____

_____

_____

AFM

SUMMER REVIEW PACKET

Welcome to AFM! Here is your optional summer review packet. Be sure to show all work on a separate sheet of paper, read directions carefully, and do NOT use a calculator. You will need some graph paper. Get help if you need it!

I. Order of Operations: PEMDAS

A. P (parentheses) - Simplify within parentheses or other grouping symbols first.

B. E (exponents) - Simplify all exponential expressions, following rules for exponents.

C. MD (multiply and divide) - Perform these operations as they occur, left to right.

D. AS (add and subtract) - Perform these operations as they occur, left to right.

Examples: $10 + 4 \div 2 - 3(2 \times 6 - 3)^2$

P $10 + 4 \div 2 - 3\,(12 - 3)^2$

P $10 + 4 \div 2 - 3(9)^2 = 10 + 4 \div 2 - 3 \times 81$

MD $10 + 2 - 243$

AS $12 - 243 = -231$

E. Practice

1. $2 + (2^2 + 6) \div 2 - 1$
2. $[16 - 4(3 + 2)] \div (-2)$
3. $(2 + 2^2 + 6) \div 2 - 1$
4. $3 \times 4^2 - (5 \times 1 - 4)$

II. Solving Equations

A. The goal is to get the variable (or the chosen variable) ALONE on one side of the equal marks.

B. Use mathematical operations to rearrange the terms - do NOT even think "move it over!" Add, subtract, multiply, or divide terms and coefficients as needed.

C. Whatever you do to one side of the equation (sides are separated by the =), you must do to the other.

Ex: $25 = 7 + x$ Subtract 7 from both sides

$-7 \quad -7$

$18 = x$

Ex: $5(x + 3) = 1/2$ Multiply both sides by 2 to eliminate the fraction

$10(x + 3) = 1$ Distribute

$10x + 30 = 1$ Subtract 30

$10x = -29$ Divide by 10

$x = -2.9$ Also correct would be $\frac{-29}{10}$

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D. Practice

1. $m - 16 = 5$
2. $-g + 21 = 13$
3. $-5 + 3k = 10$
4. $(x + 5)/6 = 3$

III. Tackling word problems

A. Turn word problems into number problems as soon as possible.

B. Follow the question word by word, following instructions.

C. If the problem is a "story", write down what you know, *then* decide what to do.

D. Always write an equation. Simple problems that you can work in your head can give you safe practice writing the equations.

Ex: One half of what number is 6? $1/2\ X = 6$

What is 3 times the sum of 6 and 3? $X = 3\ (6 + 3)$

Hamburgers cost $4.50 each. You have $25. How many hamburgers can you buy?

25 = 4.50 X In this case, your calculated answer, 5.555... seems to make no sense; nobody sells 5/9 of a hamburger. You can only buy 5 hamburgers and get 2.50 in change. Your correct final answer is 5; math always makes sense.

E. Practice

1. Twelve divided by what number is 4?
2. What number added to 16 makes 25?
3. What is 5 less than 38?
4. Joe had 14 M&M's. He gave 6 to Sally. How many does he have left?

IV. Linear Equations (equations whose solutions form a straight line)

A. Forms of linear equations

1. Standard form: $Ax + By = C$
   a. A, B, and C are integers (no fractions!)
   b. A (or B if there is no A, i.e., if A is zero) must be positive
2. Slope - intercept form: $y = mx + b$
   a. Any linear equation can be put in this form by solving for y.
   b. m is the slope of the line; b is the y-intercept (line crosses y axis)
   c. If m is 0, then y = b and the line is horizontal (⟷)
   d. If m is undefined (i.e., y = 0), the x = a constant and the line is ↕ .
   e. Fractions are allowed.
3. Point-slope form: $(y - y_1) = m (x - x_1)$
   a. y_1 and x_1 are points on the line, m is the slope.
   b. This can be turned into slope-intercept form easily.

c. Fractions are allowed

4. Slope formula: $\frac{y_2 - y_1}{x_2 - x_1}$, which gives you "rise over run"

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B. Graphing

1. Plotting points

a. Choose a small number for x and plug it into equation, repeat.

b. Graph points, then connect dots.

2. Using point-slope form:

a. Find y-intercept, then

b. Move to other points according to slope.

c. Connect dots.

C. Practice (on graph paper, see last page)

1. Graph: $y = 3x + 2$

2. Graph: $3x + 3y = 12$

3. Graph: $y = 4$ and $x = 3$ on the same set of axes

4. Write an equation (in any form) for the line with slop -2 that passes through the point (1, 3).

V. Factoring Polynomials

- Factoring polynomials "breaks downs" the polynomial into its simplest set of factors. It's essentially the opposite of FOILing or multiplying polynomials.
- Always look for a GCF (greatest common factor) first. If there is one, factor it out (but don't "drop it" and continue, if possible.

Examples:

Ex. 1. Factor completely. $x^2 + 7x + 6$. Ask yourself what two numbers multiply to get 6 and add to get 7? 6 and 1.

$\boxed{(x + 6)(x + 1)}$

Ex. 2. $100x^2 - 9$. This is a special case. It's the difference of two squares.

$\boxed{(10x - 3)(10x + 3)}$

Factor completely.

1. 13x+26y
2. $x^2 + 7y + 12$
3. $x^2 + 5x - 6$
4. $2h^2 + 13h - 24$
5. $49f^2 - 36$

VI. Probability

A. Probability is the chance of something happening

1. If you flip a fair coin, the probability of heads is .5. So is the probability of tails. The total of all probabilities is 1. (No, don't start with "what if it stands on edge?"; it won't.)

B. If a die (singular of dice) is rolled, the probability of a 4 showing is 1/6. There are six sides, each with spots from one to six.

C. Practice and think (or play with dice or make charts):

What is the probability that rolling two dice will give a total of 8?

VII. Properties of Exponents

$x^m * x^n = x^{m+n}$ When multiplying the same base ADD their exponents.

$\frac{x^m}{x^n} = x^{m-n}$ When dividing the same base SUBTRACT their exponents.

$(x^m)^n$ When distributing one exponent to another MULTIPLY them.

$x^{-m} = \frac{1}{x^m}$ A simplified answer cannot contain negative exponents. "Flip" the term with the negative exponent either over or under the fraction bar to make it positive.

$x^0 = 1$ Anything raised to the zero power is one.

***Simplified monomial expressions will contain only one of each variable, will not have any negative exponents, will not have any parentheses, and all constant fractions will be reduced.

Examples:

Simplify.

Ex. 1. $t^4 * t^3 * t = \boxed{t^8}$

Ex. 2. $(2ab^2)(3a^2b^3) = \boxed{6a^3b^5}$

Ex. 3. $\frac{(3y)^0}{6a} = \frac{1}{6a}$

Practice:

1. $c^5 * c^4$
2. $\left(\frac{a^2}{a}\right)^2$
3. $\frac{-6n^5x^3}{18nx^7}$