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 successful in your new math class. If you 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 27 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 12:00- 2:00
  - August 8, 10,15 3:00-5:00
  - August 17,18 10:00-12:00
  - Other times by appointment

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:

_____

_____

ALGEBRA I

SUMMER MATH REVIEW

Welcome to Algebra I at PCHS! 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. Get help if you need it!

I. Prime Numbers

A. A prime number has only itself and 1 as factors. *One (1) is not a prime number.*

Examples of prime numbers: 2, 5, 29

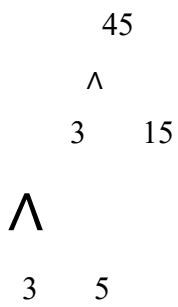
B. Factors (from the Latin for "to make") make numbers by multiplying.

Example: $2 \times 3 = 6$ 2 and 3 are factors of six; they are also prime.

$3 \times 15 = 45$ 3 and 15 are factors of 45; but 15 is not prime.

C. A factor tree can break a composite number into prime factors.

Example: 45



The prime factors of 45 are 3 and 5. If all are listed: 3, 3, and 5.

D. **Practice**

Make a factor tree for each of the following numbers, then list all prime factors:

1. 25
2. 36
3. 108
4. 95

II. Greatest Common Factor and Least Common Multiple

A. The greatest common factor (GCF) of two or more number is the largest number that is a factor of both numbers.

Example: The GCF of 24 and 18 is 6.

24: 1, 2, 3, 4, **6**, 8, 12, 24 **(**All the factors of 24)

18: 1, 2, 3, **6**, 9, 18 (All the factors of 18)

B. The least common multiple (LCM) is the smallest number of which both numbers are factors. These are often used as common denominators when combining fractions.

Example: The LCM of 24 and 18 is 72.

18: 18, 36, 54, **72 (**Some multiples of 18)

24: 24, 48, **72** (Some multiples of 24)

C. **Practice**: Find the GCF and LCM of the following numbers:

1. 36 and 72
2. 30 and 100
3. 3 and 49
4. 5 and 40

III. Fractions are Your Friends

A. Parts of fractions:

1. The top part is the numerator (from the Latin), or the counter. It counts.
2. The bottom part is the denominator (Latin, of course), the namer.

B. Adding and Subtracting

1. To add or subtract, make sure the fractions have a common denominator, LCM, then add or subtract the numerators, leaving the denominators unchanged. Then simplify (reduce) the answer if you can.

2. Example:

a. $\frac{1}{5}+\frac{2}{5}=\frac{3}{5}$ b. $\frac{1}{2}+\frac{1}{4} \rightarrow \frac{2}{4}+\frac{1}{4}=\frac{3}{4}$

3. Practice:

1. $\frac{1}{2} + \frac{2}{3}$
2. $\frac{3}{8} + \frac{3}{4}$
3. $\frac{3}{4} - \frac{3}{8}$
4. $\frac{3}{7} + (\frac{1}{2} - \frac{1}{4})$

C. Multiplying and Dividing

1. To multiply, just multiply the numerators, multiply the denominators, and then simplify your answer.

Example: $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$

2. To divide by a fraction, invert it (to make a reciprocal) and multiply. Simplify if possible.

Example: $\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3} = \frac{8}{9}$

3. **Practice:**

1. $\frac{4}{5} \times \frac{5}{4}$
2. $\frac{4}{5} \div \frac{5}{4}$
3. $\frac{8}{13} \times \frac{2}{3}$
4. $\frac{8}{13} \div \frac{2}{3}$

IV. Fractions, Decimals, and Percents - All of these are ways to denote parts of a whole.

A.To change a fraction to a decimal:

1. Divide numerator by denominator. (The fraction bar looks like a division sign for a good reason!)

2. Look for repeating patterns or a remainder of 0.

B. To change from a decimal to a percent and back

1. To change a decimal number to a percent, move decimal point two places to the right (in other words, multiply by 100), then add % sign.

Ex: 1.245 = 124.5% .5 = 50%

2. To go the other way, move decimal point two spaces to the left and delete the % sign.

Ex. 98% = .98 (read "98 hundredths")

3. **Practice:** Change to percent or decimal.

1. 9.6%
2. 0.0068
3. 1.5
4. 350%

4. **Practice:** Change to a fraction.

1. 25%
2. 20%
3. 40%
4. 70 %

V. The Coordinate Plane - (x,y)

A. Axes: x-axis is horizontal, y axis is vertical.

B. Always list x coordinate first in an ordered pair.

C. On the x-axis, positive is to the right, negative to the left; on the y-axis, positive is up, negative is down.

D. **Plot and label the following points *on graph paper***:

1. A(5,3)
2. B(-2,7)
3. C(3, -5)
4. D(0,0)
5. E(-5, -5)
6. F(7, -2)

VI. Integers and Absolute Value

A. Remember, on a number line, negative is left of 0, positive is right.

B. Remember, on a number line, the number to the right of another is larger.

C. Absolute value is always positive (unless it is zero), because it is defined as the distance from 0 on a number line. Another way of saying that is "the absolute value is always non-negative."

Ex: |2| = 2 |-2| = 2 (Same distance from 0)

D. **Practice:**

List from smallest to greatest: -2, 5, 0, |-6|, -8

VII. Working with Integers

A. Adding and subtracting

1. To add a positive integer, go to the right on the number line.
2. To add a negative integer, go to the left.
3. To subtract an integer, add its opposite.

Ex: 2 + 4 = 6; 2 + (-4) = -2; 2 - 4 = -2; 2 - (-4) = 2 + 4 = 6

4. **Practice**

1. 14 - 8
2. 6 + 25
3. 6 - 25
4. 6 - (-25)

B. Multiplying and dividing integers

1. A positive multiplied or divided by a positive is a positive.
2. A negative multiplied or divided by a negative is a positive.
3. A positive multiplied or divided by a negative is a negative.

Ex: 2 x 5 = 10, 2 x -5 = -10, -2 x -5 = 10

10 ÷ 5 = 5, -10 ÷ -5 = 2, 10 ÷ -2 = -5

4. **Practice** - multiply or divide

1. 108 ÷ 12
2. 98 ÷ -2

3. -72 ÷ -18

4. 9 x 8

5. -7 x -12

6. -5 x 7

VIII. 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. When you are using a calculator, writing an equation can help you avoid entering the wrong information.

Ex: One half of what number is 6? $\frac{1}{2} \times = 6$

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?

IX. Simplifying expressions

A. To simplify expressions, follow order of operations (PEMDAS)

1. Parentheses (grouping symbols are done first, then exponents.
2. Multiplication and division are done LEFT to RIGHT, as written.
3. Addition and subtraction are done LEFT to RIGHT, as written.

B. Use the distributive property when appropriate.

C. Add or subtract LIKE EXPRESSIONS ONLY.

Example:

$2z + 3(z - 5) - (-12)$ First distribute the 3 and the - sign.

$2z + 3z - 15 + 12$ Now combine variables and constants.

$5z - 3$ Final answer.

D. Practice

1. $14d - 17 + 12d + 6$
2. $2(f + 6) - 3(f - 2)$

X. 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. Add, subtract, multiply, or divide terms (inverse operations) as needed.

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

Ex 1: $25 = 7 + x$ Subtract 7 from both sides

$-7 \quad -7$

$18 = x$ Final answer

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

$10(x + 3) = 1$ Distribute

$10x + 30 = 1$ Subtract 30

$10x = -29$ Divide by 10

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

D. Practice

1. $M - 16 = 5$

2. $-g + 21 = 13$
3. $-5 + 3k = 10$