Regina

Algebra 1 and A

Summer Math Review

In the following pages, you will find review materials that will prepare you for next year's math course. Please take the exercises seriously as this will allow us to hit the ground running in the fall. These skills have already been taught and are necessary for success. If the examples preceding the practice problems are not enough of a reminder of a concept, please remember that Kahn Academy, YouTube, and math.com are very useful resources!

The review materials are separated into sections. Doing one section a week is only a suggestion. You will have the most benefit from this material if you work on it throughout the summer and do a final review of your work a week or two before school starts. This packet is due the first day of school.

Your completion of the packet will be recorded. It is not okay to skip sections where you are weak. Those are the skills you need to strengthen over the summer. You will be assessed on these skills during the first two weeks of school. Exact assessment dates will be announced by your teacher.

Algebra 1 and A Summer Review Packet

Welcome to Algebra!

Algebra involves complex thinking and working with mathematical patterns.

It is also necessary that you are competent in arithmetic skills: addition, subtraction, multiplication, and division of whole numbers, decimals and fractions without a calculator as well as with one.

The materials are separated into sections so you can work a little at a time if you wish. This will help your math skills stay sharp all summer and you will be ready for the first topic in Algebra A.

SHOW YOUR WORK. These are not calculator problems.

Finish this packet and bring it with you the first day of classes.

Section 1: Numbers

Section 2: Expressions

Section 3: The Distributive Property

Section 4: Simplifying Algebraic Expressions

Section 5: Solving One-Step Equations

Section 6: Graphing in the Coordinate Plane

Section 7: Exponents

Materials needed for Algebra A:

- Scientific Calculator (TI-30xIIS preferred)
- Accordion Folder Pocket/Binder for Math only
- Pencils

Section 1: Numbers

Use the order of operations to evaluate expressions:

Step 1: Simplify the expressions inside grouping symbols

Step 2: Calculate any exponents

Step 3: Do all multiplications and/or divisions as they occur reading from left to right

Step 4: Do all additions and/or subtractions as they occur reading from left to right

Examples:

$6 \cdot 5 - 10 \div 2$

$= 30 - 5$ Multiply and Divide

$= 6$ Subtract

$4(3 + 6) + 2 \cdot 11$

$= 4(9) + 2 \cdot 11$ Simplify inside parentheses

$= 36 + 22$ Multiply

= 58 Add

Practice:

1. $6 + 3 \cdot 9 - 5$
2. $26 - 4 \cdot 9$
3. $2(6 + 2) - 12 \div 4$
4. $3\{(2 + 7) \div 9\} - 3$
5. $22 \div 11 \cdot 6 + 4$
6. $\frac{67+13}{34-29}$
7. $8 \cdot 7 - 100 \div 5 + 5$
8. $22 \div 11 + 1$
9. $2(7 + 3) \div 4 + 1$
10. $6 - 5 + 3 \cdot 4/(2)$

Section 2: Expressions

An algebraic expression is a combination of variables, numbers, and at least one operation. To evaluate an algebraic expression, replace the variable(s) with numbers and follow the order of operations.

Examples. Evaluate each expression if r = 6 and t = 2

8t – 2r =		3(r – t)=	
= 8(2) – 2(6)	substitute in the values	= 3(6 – 2)	substitute in values
= 16 – 12	multiply	= 3(4)	math inside parentheses
= 4	subtract	= 12	multiply

Practice: Evaluate each expression if w = 2, x = 10, y = 5

1. $w - x + y =$
2. $\frac{x}{y} =$
3. $2x + 4w =$
4. $xy + w =$
5. $x(2 + y) =$
6. $\frac{x+y}{w} =$
7. $\frac{(x-y)}{w} =$
8. $3y + 2x =$
9. $\frac{x}{w} + \frac{y}{w} =$
10. $wxy =$

Section 3: The Distributive Property

The Distributive Property lets us seem to avoid the order of operations by multiplying before doing the addition or subtraction inside parentheses. It really lets us consider the multiplication as telling us how many of the values inside the parentheses we have.

Example: 3(x + 4) means we have 3 of the values x + 4. That means we have 3 xs and 3 fours. That gives us 3x and 3(4) = 3x + 12

2(5x – 6) means we have 2 5xs and 2 negative sixes. That means we have 2(5x) and 2(-6) = 10x – 12

-4(2x – 7) means we have (-4)(2x) and (-4)(-7) = -8x + 28

The same process works if our problem looks like (3n – 5)(8). We have 3n(8) and (-5)(8) = 24n – 40

Use the Distributive Property to write each expression as an equivalent sum or difference. Show your steps

1. 7(x + 11) =
2. 20(19 + x) =
3. 6(x – 1) =
4. 22(n + 10) =
5. 9(n – 2) =
6. (x + 11)(-3) =
7. -1(r + 27) =
8. 3(n – 15) =
9. 18(-2x + 3) =
10. (k – 21)(5) =

Section 4: Simplifying Algebraic Expressions

Important vocabulary:

Term: a number, a variable, or a product of numbers and variables (like 3x, -4n, 27, 8xy)
Coefficient: the numerical part of a term that also includes a variable (like 3, -4, and 8 above)
Constant: a term without a variable (like 27 above)
Like terms: terms that contain exactly the same variable (like 3x and 7x, y and -1/2y, 4xy and -8xy)
Expression: a group of terms without an equal sign (like 3x + 4)

To simplify an expression, combine all like terms. It is helpful to change all subtraction to adding the opposite before trying to combine like terms. When an algebraic expression has no like terms and no parentheses, we say it is in simplest form.

Example:

Simplify $6x – 5 – 2x + 7$

First change subtraction to adding the opposite: $6x + (-5) + (-2x) + 7$
Now we can move like terms together: $6x + (-2x) + (-5) + 7$
Now combine like terms: $6x + (-2x) = 4x$, and $(-5) + 7 = 2$
So $6x – 5 – 2x + 7$ simplifies to $4x + 2$

Practice:
Simplify each expression

1. $9m + 3m$
2. $5x – x$
3. $8y + 2y + 5y$
4. $4 + m – 3m$
5. $10 – 4x + 2x – 3$
6. $13n + 7n + 2n$
7. $3y + 1 + 5 + 4y$
8. $8x – 4 – x + 5$
9. $5h – 3g + 2g – h$
10. $m + 4m + 2m + 7$

Section 5: Solving One-Step Equations

In solving any equation we want to "undo" any math that puts numbers with the variable whose value we want. We always look to see what math is used in the equation and use the inverse operation to isolate the variable.

For example: $x + 5 = 13$

We want the x by itself, but there is a 5 with it connected by addition. If we subtract 5 from each side, that will get the x by itself as we want.

$x + 5 = 13$
$-5 \quad -5$
$x = 8$

We can always check to see if we have found the correct answer by substituting the value we found in for the variable and seeing if both sides of the equation have the same value.

Check: $8 + 5 = 13$, $13 = 13$ so we have the correct solution.

To solve $x - 11 = 15$, we would add 11 to both sides of the equation

$x - 11 = 15$
$+ 11 \quad + 11$
$x = 26$ check: $26 - 11 = 15$ Yes!

To solve $3x = 21$, divide both sides of the equation by 3 getting $x = 21$

To solve $x \div 8 = 4$, multiply both sides of the equation by 8 getting $x = 32$

Practice. Show your steps and check:

1. $t + 5 = 14$
2. $n - 24 = 81$
3. $t + 19 = 215$
4. $2n = 25$
5. $3x = 123$
6. $1\ 1y = 132$
7. $n \div 10 = 27$
8. $y - 128 = 208$
9. $x/7 = 8$
10. $x + 14.9 = 37.2$

Section 6: Graphing in the Coordinate Plane

When locating points on a coordinate plane, we use a pair of values called coordinates to tell us where to place the point. The coordinates are written this way: (x , y) where the x-value tells us how many spaces horizontally to travel away from the origin and the y-value tells us how many spaces vertically to travel away from the origin. The coordinates A(-3, 5) mean to go 3 spaces left of the origin and then 5 spaces up. Mark the point and call it A.

1. Graph the following points on the coordinate grid provided. Mark each point with the letter given.

A(-2, 6)

B(4, -7)

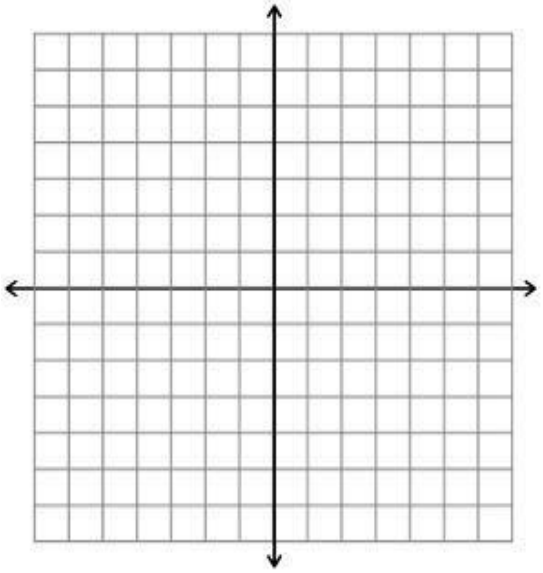
C(0, 2)

D(1, 6)

E(-4, -7)

F(-5, 0)

G(4, -4)



2. Write the coordinates of the points on the graph.

A _____

B _____

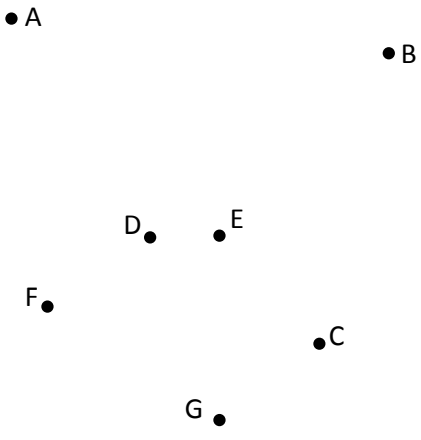
C _____

D _____

E _____

F _____

G _____



Section 7: Exponents

Remember that exponents are notation meaning to repeat a factor in multiplication. 4^3 means 4·4·4.

Rules for exponents:

1. When multiplying exponents with the same base, keep the base and add the exponents.
Example: $3^4 \cdot 3^5 = 3^9$
2. When dividing exponents with the same base, keep the base and subtract the exponents.
Example: $3^6 \cdot 3^4 = 3^2$
3.When taking an exponent to a power, keep the base and multiply the exponents.
Example: $(3^4)^5 = 3^{20}$
4. Any number without a written exponent has an exponent of 1.
Example: $3 = 3^1$
5.If the bases are not the same, there is no quick rule, it cannot be written with a single exponent.

Practice: Write each expression using a single exponent.

1. $x \cdot x \cdot x =$
2. $4^3 \cdot 4^2 =$
3. $5 \cdot 5^2 \cdot 5^7 =$
4. $9^6 \cdot 9^5 =$
5. $7^4 \cdot 4^7 =$
6. $\frac{4^3}{4^2} =$
7. $\frac{10^{18}}{10^5} =$
8. $(4^3)^5 =$
9. $(11^2)^3 =$
10. $(5^3)(5^2)^4 =$