

**ALGEBRA 2  
SUMMER WORK**

**Mathematician:** \_\_\_\_\_

**Directions:** The concepts covered in this packet are skills that students should have mastered in Algebra 1. If you are drawing a blank, please refer to the problems that have already been completed for you.

**Rationale:** The math course you are starting on August 14<sup>th</sup> has some high expectations. Therefore, we are asking for you to work on the skills in this packet to be better prepared for this course. The skills include:

- (1) follow order of operations appropriately in all situations
- (2) add, subtract, & multiply polynomials
- (3) solve a variety of linear equations

To refresh on these topics, you'll need to practice these skills in the weeks leading up to the beginning of the 2019 - 2020 school year.

**Resources:** For each even numbered problem you need to complete, there is an odd-numbered example problem worked out in detail. If that's not enough to guide your work, then we suggest you google the topic you are struggling with or go to one of the following websites & search the topic...

<https://www.youtube.com/channel/UCcfzvi8xPFOToNua6HRDflA/playlists> (English & Spanish Videos)

<https://www.khanacademy.org/>

<http://www.purplemath.com/>

<http://www.mathgoodies.com/students.html>

*This packet will count as a grade, so please take the time to complete these problems.*

(OVER)

A requirement of this course is that you purchase a graphing calculator. Although these can be expensive, we will use it in every unit to supplement the content that is being learned. Below are *suggested* calculators that are appropriate to use in Algebra 2 and can be used in subsequent years through college level math courses.

TI - 83+



If you purchase a TI - 83, it needs to be a plus (+) model. You will need the blue/purple "APPS" key.

This is the button we are looking for.

TI - 84/TI - 84+



These calculators come in various models, as they have been updated over the years. ANY TI - 84 is appropriate. It can be a plus (+) model, a C or CE model or a silver edition model. It can also have a black and white screen or a color screen. The most efficient calculators are the newest thinner calculators with a color screen.

It is highly recommended to purchase one of these calculators as soon as possible, as they do sell out quickly at the beginning of the school year.

Thank you,

Mr. Dorado  
Mrs. Lu  
Mr. Pennella  
Ms. Skala

(WB Algebra 2 Teachers for 2018-2019)

ORDER OF OPERATIONS	GROUPING SYMBOLS (P)	EXPONENTS & ROOTS (E)	MULTIPLICATION & DIVISION (M) (D)	ADDITION & SUBTRACTION (A) (S)
Parenthesis Exponents Multiplication Division Addition Subtraction	Parentheses ( ) OR Brackets [ ] Absolute values 	Exponents Ex: $3^2 \Rightarrow 3 \cdot 3 = 9$ OR Roots Ex: $\sqrt{25} = 5$	MUST be done from LEFT to RIGHT!! Ex: $18 \div 6 \cdot 3$ $\begin{array}{r} 3 \cdot 3 \\ \hline 9 \end{array}$	MUST be done from LEFT to RIGHT!! Ex: $4 - 2 + 7$ $\begin{array}{r} 2 + 7 \\ \hline 9 \end{array}$

#1 - 5: Evaluate.

1a.  $4 + 3 \cdot 4 \div 2 - 9$

$$4 + 12 \div 2 - 9$$

$$4 + 6 - 9$$

$$10 - 9$$

$$\boxed{1}$$

2a.  $4 + 3(5 - 6)^2$

$$4 + 3(-1)^2$$

$$4 + 3(1)$$

$$4 + 3$$

$$\boxed{7}$$

3a.  $(2x)^2 - y$  when  $x = 3, y = 17$

$$(2(3))^2 - 17$$

$$(6)^2 - 17$$

$$36 - 17$$

$$\boxed{19}$$

4a.  $\frac{1}{2}(x - 7) - 3x$  when  $x = -11$

$$\frac{1}{2}(-11 - 7) - 3(-11)$$

$$\frac{1}{2}(-18) - 3(-11)$$

$$-9 + 33$$

$$\boxed{24}$$

1b.  $18 - 12 \div 6 \cdot 2 - 10$

2b.  $20 - (7 + (-9))^2 \cdot 3$

3b.  $3x - 4y^3$  when  $x = 7, y = -1$

4b.  $b^2 - 4ac$  when  $a = 2, b = -3, c = -1$

5a.  $\frac{3b-a}{b+a}$  when  $a=3$ ,  $b=-4$

$$\frac{3(-4)-3}{-4+3}$$

$$\frac{-12-3}{-4+3}$$

$$\frac{-15}{-1}$$

$$\boxed{15}$$

5b.  $\frac{4b+2a}{2b}$  when  $a=3$ ,  $b=-4$

## ADDING & SUBTRACTING POLYNOMIALS

### RULES:

- **Distribute** to eliminate parenthesis (if necessary)
- **Combine like terms** by adding the coefficients of terms with the same variable & same exponent

EX 1:  $(x^3 + 6x^2 - 1) + (-x^3 + 7x^2 - 7)$   
 $\cancel{x^3} + 6x^2 - 1 - \cancel{x^3} + 7x^2 - 7$   
 $13x^2 - 8$

EX 2:  $4m^2 - (-8m + 3m^2 - 2)$   
 $4m^2 + 8m - 3m^2 + 2$   
 $m^2 + 8m + 2$

## MULTIPLYING POLYNOMIALS

### RULES:

- **Distribute/Multiply** each term from the 1<sup>st</sup> polynomial with each term of the 2<sup>nd</sup> polynomial.  
*(add the exponents of same bases)*
- **Combine like terms** if possible

EX 3:  $-4x(x^3 + 6x^2 - 1)$   
 $-4x^4 - 24x^3 + 4x$

EX 4:  $(m+4)(2m-1)$   
 $2m^2 - m + 8m - 4$   
 $2m^2 + 7m - 4$

#6 - 9: Simplify.

6a.  $x^2 - x^2 + 3x^2 + 5x$   
 $2x^2 + 6x$

7a.  $6y - 2(3y - 8) + 2y$   
 $6y - 6y + 16 + 2y$   
 $2y + 16$

8a.  $(4+x)(x-3)$   
 $4x - 12 + x^2 - 3x$   
 $x^2 + x - 12$

9a.  $(2+3x)^2$   
 $(2+3x)(2+3x)$   
 $4 + 6x + 6x + 9x^2$   
 $9x^2 + 12x + 4$

6b.  $4x^2 - 3x + 5x - 6x^2$

7b.  $5m - 3m(m+2) + 5m^2$

8b.  $(3x-4)(2x+1)$

9b.  $(2x-5)^2$

### Solving Multi-Step Equations (Checklist)

- Distribute
- Combine like terms on either side of the "="
- Move variable to one side of "=" (Smaller Variable Term)
- Solve using SADMEP

### Example:

$$\begin{aligned}
 3(x+1) &= 6x+9+3x \\
 3x+3 &= \underline{6x+9} + \underline{3x} \\
 3x+3 &= 9x+9 \\
 -3x &\quad -3x \\
 3 &= 6x+9 \\
 -9 &\quad -9 \\
 \underline{-6} &= \underline{6x} \\
 -1 &= x
 \end{aligned}$$

$$x = -1$$

#10 - 16: Solve.

10a.  $4x - 3 = 9$

$$\begin{aligned}
 &+3 \quad +3 \\
 \hline
 4x &= 12 \\
 4 & \quad 4 \\
 \hline
 x &= 3
 \end{aligned}$$

10b.  $3 - 5x = 16$

11a.  $3x - 6 = 5x + 12$

$$\begin{aligned}
 &-3x \quad -3x \\
 \hline
 -6 &= 2x + 12 \\
 -12 &\quad -12 \\
 \hline
 -18 &= 2x \\
 -9 &= x
 \end{aligned}$$

11b.  $16 - 8x = 4x + 6$

12a.  $-3(2x + 5) = 20$

$$\begin{aligned}
 -6x - 15 &= 20 \\
 +15 &+15 \\
 \hline
 -6x &= 35 \\
 -6 &\quad -6 \\
 \hline
 x &= -\frac{35}{6}
 \end{aligned}$$

12b.  $4(3x - 7) = -40$

$$13a. 2(4-x) = 16 + 2x$$

$$8 - 2x = 16 + 2x$$

$$\begin{array}{r} +2x \quad +2x \\ \hline 8 = 16 + 4x \\ -16 \quad -16 \end{array}$$

$$\frac{-8}{4} = \frac{4x}{4}$$

$$\boxed{-2 = x}$$

$$13b. 5x - 20 = 6(2x + 1)$$

$$14a. 4 - 3(4x + 6) = 1$$

$$4 - 12x - 18 = 1$$

$$\begin{array}{r} -12x - 14 = 1 \\ +14 \quad +14 \end{array}$$

$$\frac{-12x}{-12} = \frac{15}{-12}$$

$$\boxed{x = -\frac{5}{4}}$$

$$14b. 18 = 10 - 2(2x + 3)$$

$$15a. 5(3x - 2) + 10 = 2(5 - 6x)$$

$$15x - 10 + 10 = 10 - 12x$$

$$\begin{array}{r} 15x = 10 - 12x \\ +12x \quad +12x \end{array}$$

$$\frac{27x}{27} = \frac{10}{27}$$

$$\boxed{x = \frac{10}{27}}$$

$$15b. 20 + 8(3 + 4x) = -3(6x - 5)$$

$$16a. \left(\frac{2}{3}m + 5 = 4m - 9\right) \cdot 3$$

$$2m + 15 = 12m - 27$$

$$\begin{array}{r} -2m \quad -2m \\ \hline 15 = 10m - 27 \\ +27 \quad +27 \end{array}$$

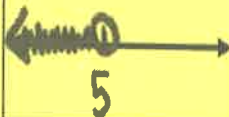
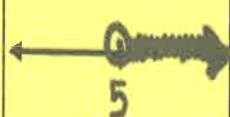


$$\frac{42}{10} = \frac{10m}{10}$$


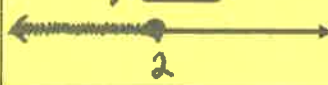
$$\frac{42}{10} = \frac{10m}{10}$$

$$\boxed{\frac{21}{5} = m}$$

$$16b. 4 - \frac{5}{6}x = \frac{1}{2}x + 2$$

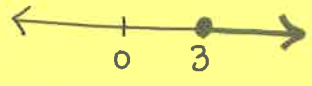


	SHADE LEFT	SHADE RIGHT
OPEN CIRCLE	<	>
CLOSED CIRCLE	≤	≥
EXAMPLES	$x < 5$ 	$x > 5$ 
	$x \leq 5$ 	$x \geq 5$ 

SPECIAL RULES FOR INEQUALITIES	
<b>FLIP!</b> (When multiplying or dividing by a negative)	<b>REWRITE!</b> (When variable is on the right side of the inequality)
$\begin{array}{r} 13 - 2a < 7 \\ -13 \quad -13 \\ \hline -2a < -6 \\ \hline \frac{-2a}{-2} < \frac{-6}{-2} \\ \text{FLIP} \rightarrow a > 3 \end{array}$ 	$\begin{array}{r} 23 \geq 7 + 8a \\ -7 \quad -7 \\ \hline 16 \geq 8a \\ \hline \frac{16}{8} \geq \frac{8a}{8} \\ \text{REWRITE} \rightarrow 2 \geq a \\ \hline a \leq 2 \end{array}$ 

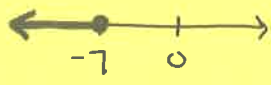
#17 - 22: Solve and graph on a number line.

17a.  $x + 4 \geq 7$   

$$\begin{array}{r} x + 4 \geq 7 \\ -4 \quad -4 \\ \hline x \geq 3 \end{array}$$


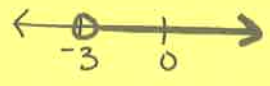
17b.  $x - 3 < 5$

18a.  $2x + 5 \leq -9$   

$$\begin{array}{r} 2x + 5 \leq -9 \\ -5 \quad -5 \\ \hline 2x \leq -14 \\ \hline \frac{2x}{2} \leq \frac{-14}{2} \\ x \leq -7 \end{array}$$


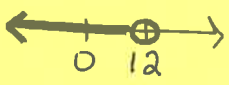
18b.  $4 + 3x \geq 19$

19a.  $3 - x < 6$   

$$\begin{array}{r} 3 - x < 6 \\ -3 \quad -3 \\ \hline -x < 3 \\ \hline \frac{-x}{-1} < \frac{3}{-1} \\ x > -3 \end{array}$$






19b.  $2 - 3x \geq 14$

20a.  $5x - 6 < 3x + 18$   

$$\begin{array}{r} 5x - 6 < 3x + 18 \\ -3x \quad -3x \\ \hline 2x - 6 < 18 \\ +6 \quad +6 \\ \hline 2x < 24 \\ \hline \frac{2x}{2} < \frac{24}{2} \\ x < 12 \end{array}$$


20b.  $3x + 5 > 6x - 12$

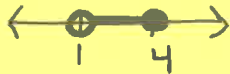


COMPOUND INEQUALITIES	
"AND"	"OR"
$\begin{array}{ccc} -4 \leq 3x - 7 < 8 \\ +7 & +7 & +7 \end{array}$	$\begin{array}{ccc} 8x - 7 \leq 1 & \text{or} & 3x + 4 > 19 \\ +7 & +7 & -4 & -4 \end{array}$
$\frac{3 \leq 3x < 15}{3 \quad 3 \quad 3}$	$\frac{8x \leq 8}{8} \text{ or } \frac{3x > 15}{3 \quad 3}$
$\boxed{1 \leq x < 5}$	$\boxed{x \leq 1 \text{ or } x > 5}$
	
EASY WAY TO REMEMBER "AND" and "OR"	
	

$$21a. \begin{array}{ccc} 5 < 3 + 2x \leq 11 \\ -3 & -3 & -3 \end{array}$$

$$\frac{2 < 2x \leq 8}{2 \quad 2 \quad 2}$$

$$\boxed{1 < x \leq 4}$$

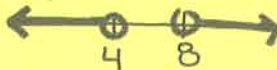


$$21b. 19 > 5 - 2x > -7$$

$$22a. \begin{array}{ccc} 4 + 2x < 12 & \text{or} & 5 - 2x < -11 \\ -4 & -4 & -5 & -5 \end{array}$$

$$\frac{2x < 8}{2 \quad 2} \quad \frac{-2x < -16}{-2 \quad -2}$$

$$\boxed{x < 4 \text{ or } x > 8}$$



$$22b. 3 - 6x > 15 \text{ or } 5x - 3 \geq 12$$

#23 - 28: Name the following polynomials using the vocabulary below.

Example	Degree	Name by Degree	Name by Terms
4	0	Constant	Monomial
$2x + 3$	1	Linear	Binomial
$3x - 4x^2 + 1$	2	Quadratic	Trinomial
$-6x^3 + 1$	3	Cubic	Binomial
$x^6$	4+	4 <sup>th</sup> degree ... etc.	Monomial

23.  $3x^2 + 4x - 9$

24.  $-2x$

25.  $x^3 - 5x^2 + 4x - 7$

26.  $-5x^3 + 7$

27.  $3x + 12$

28. 6