NAME ______________________

Date __________ Period__________

SYLLABUS
ALGEBRA 2

Unit 1: Equations & Inequalities in One Variable

Day	Topic
1	Properties of Real Numbers Algebraic Expressions
2	Solving Equations
3	Solving Inequalities
4	QUIZ
5	Absolute Value Equations
6	Double Absolute Value Equations
7	Absolute Value Inequalities
8	Double Absolute Value Inequalities
9	REVIEW

NAME ____________________

Date __________ Period__________

NOTES ALGEBRA 2

U1 D1: Properties of Real #'s & Algebraic Expressions

1. All numbers that you have dealt with up until this point are known as ___________ numbers.
    a. ____________________ numbers are based on the idea that __________________. More on this to come in a later chapter!
2. Real numbers can be broken down into groups known as _____________________.

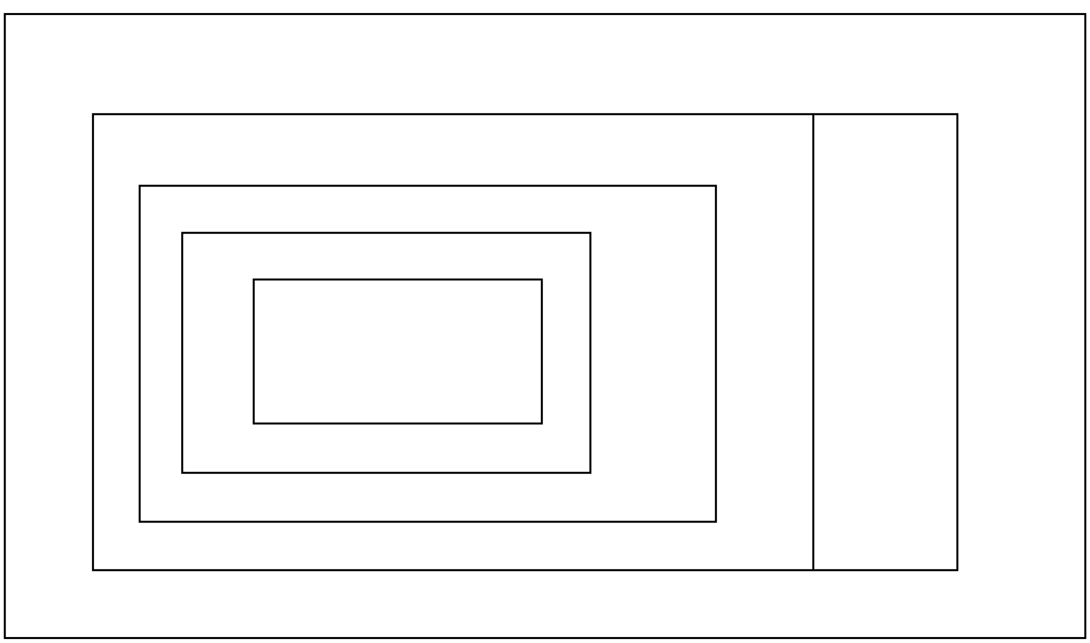
Subsets of Real Numbers		
Name	**Explanation**	**Example**
Natural Numbers		
Whole Numbers		
Integers		
Rational Numbers		
Irrational Numbers		

Decimals: Rational #'s ___________________ or ____________________ & irrational #'s DO NOT!

Fill in the Diagram.

Word Bank:

- Whole Numbers
- Rational Numbers
- Real Numbers
- Whole Numbers
- Irrational Numbers
- Integers



Properties of Real Numbers

If *a*, *b*, and *c* are all real numbers, then…		
Property	**Addition**	**Subtraction**
Closure	$a+b$ is a real number	
Commutative		$ab=ba$
Associative		
Identity	$a+0=a$, $0+a=a$	
Inverse	*opposite or additive inverse	*reciprocal or multiplicative inverse
Distributive	$a\left(b+c\right)=$	

Properties for Simplifying Algebraic Expressions

If *a*, *b*, and *c* are all real numbers, then…

1. ______________________________ $a-b=a+(-b)$
2. ______________________________ $-\left(-a\right)$
3. ______________________________ $a(b-c)=ab-ac$
4. ______________________________ $-1\cdot a=-a$
5. ______________________________ $-\left(ab\right)=-a\cdot b=a\cdot\left(-b\right)$
6. ______________________________ $a\div b=\dfrac{a}{b}=a\cdot\dfrac{1}{b},b\neq 0$
7. ______________________________ $0\cdot a=0$
8. ______________________________ $-\left(a+b\right)=-a+\left(-b\right)$
9. ______________________________ $-\left(a-b\right)=b-a$

WORD BANK

definition of division

multiplication by 0

opposite of a sum

opposite of an opposite

Definition of subtraction

opposite of a product

opposite of a difference

multiplication by -1

distributive property for subtraction

Additional Algebraic Information

3. The **absolute value** of a number is always ____________________. The formal definition is…

4. Algebraic Expressions → Example:
   a. Term:

   b. Coefficient:

   c. Like Terms:

Examples of combining "like" terms:

1. $3k - k$

2. $5x^2 - 10x - 8x^2 + x$

3. $-(m-n) + 2(m-3n)$

4. $2x^2 + 5x - 4x^2 + x - x^2$

5. $y(1+y) - 3y^2 - (y+1)$

6. $3x + 2x - y + y + y + 3x - y + 2x$

Closure

Can you write 2 expressions that simplify to $x^2 + x$? One of the expressions must have more than 2 terms.

NAME ______________________

Date __________ Period__________

NOTES
ALGEBRA 2

U1 D2: Solving Equations

1. A large part of algebra will be ________________ **expressions** and **solving** __________________.
2. What's the difference?

3. Examples:

   a. Solve $0.2(x+3)-4(2x-3)=3.4$

   b. Evaluate $\dfrac{5(x-1)-2(x+1)}{2x+3}; \quad when\, x=2$

4. Solving literal equations for an indicated variable

   a. $I=prt$, for r

   b) $bx-cx=-c$, for x

   * What if $b=c$?!

Solve for *x*. State any restrictions on the variables.

5. $c(x+2)-5=b(x-3)$

6. $\frac{x}{2}+\frac{x}{5}+\frac{x}{3}=31$

7. The lengths of the sides of a triangle are in the ratio 3:4:5. The perimeter of the triangle is 18 in. Find the lengths of the sides.

8. A tortoise crawling at a rate of 0.1 mi/h passes a resting hare. The hare wants to rest another 30 min before chasing the tortoise at the rate of 5 mi/h. How many feet must the hare run to catch the tortoise?

9. A dog kennel owner has 100 ft. of fencing to enclose a rectangular dog run. She wants it to be 5 times as long as it is wide. For the dimensions of the dog run.

NAME ____________________

Date __________ Period__________

NOTES ALGEBRA 2

U1 D3: Solving Inequalities

1. Solving inequalities is (*almost*) like solving equations….

2. Examples:

   a. $17 - 2y \le 5(7 - 3y) - 15$

   b. $-4x + 3 > 2x - 9$

3. Sometimes your solution will be _______ **real** ____________________ or ______ **solution!**

   c. $2x - 3 > 2(x - 5)$

   d. $7x + 6 < 7(x - 4)$

4. Try this one on your own: $4(x - 3) + 7 \ge 4x + 1$

Important Information about Inequalities

Compound Inequality: a pair of inequalities joined by "______________" or "__________"

Name	**Symbol**	**Info and "Usually"**	**Alternate Form**
And	$\cap$	Shade parts only where both are true – "Between"	$-3 < x < 5$
Or	$\cup$	Shade parts that make either true – "Outside"	None

< or >	Open Circle	≤ or ≥	Closed Circle
< or ≤	Less Than (or…)	> or ≥	Greater Than (or…)

Set Notation		Interval Notation	

Examples involving compound inequalities:

1) $3x - 1 > -28$ *and* $2x + 7 < 19$

2) $4y - 2 \geq 14$ *or* $3y - 4 \leq -13$

3) $2x > x + 6$ *and* $x - 7 < 2$

4) $x - 1 < 3$ *or* $x + 3 > 8$

Mixed Review….

5) What properties of real numbers are used in each step of the following simplification?

$$\frac{1}{5}(2\cdot 5)=\frac{1}{5}(5\cdot 2)$$ a. ____________________________

$$=\left(\frac{1}{5}\cdot 5\right)\cdot 2$$ b. ____________________________

$$=1\cdot 2$$ c. ____________________________

$$=2$$ d. ____________________________

6) Solve for *x* and state any restrictions: $yx-ux=5y$

7) Solve for *x*: $3(x-2)-5=8-2(x-4)$

<u>Closure</u>: What's the major difference between solving an equation and inequality?

U1 D5: (Single) Absolute Value Equations

1. Up until now, you probably solved absolute value equations like so…

$|2x-4|=12$

2. Because we are soon going to deal with absolute value inequalities, and even ____________________ absolute values, we need to *practice* a new approach.
   a. This approach will be based on finding ___________________ ______________________ - which are points when the graph changes directions.

$|2x-4|=12$ CP:

(Set Abs Val. = 0) (Define Regions)

Test Regions: If the absolute value is __________________ inside the region, keep $(2x-4)$.

If the absolute value is negative, then use ________________.

Solve: Solve the equation for x using all ______________________ !!

The answer only counts if….

Solutions that are found that are not actual solutions to the original equation are known as ______________________________ solutions.

3. Summarize the Steps for Solving Absolute Value Equations
    a. Find critical points by…
    b. Define and Test Regions
    c. Solve the equation for ___________ region!
    d. Test to see if the answer…

Example: $|3x+2|=7$

4. Solving Multi-Step Absolute Value Equations

$3|4w-1|-5=10$ ⇨ Treat this like $3(x)-5=10$ to ___________________ the absolute value!

Now solve using our new steps!

5. Classwork Problems (to be posted on the board by groups).

a) $|15-3x|=6$

b) $2|4w-1|+5=33$

c) $4-3|x+9|=-5$

d) $5|6-5x|=15-35$

e) $|z-1|=72-13$

Closure: Describe the Step!

NAME ____________________

Date __________ Period__________

NOTES ALGEBRA 2 H - AB

U1 D6: Double Absolute Value Equations

1. Warmup: Solve the following absolute value equation using the steps outlined in class.

   $|6-2x| = x-7$

2. Whenever there are **two** absolute values in the same equation, we call this a __________________ absolute value problem.
   a. In these problems there will be _____ critical points, and thus ______ regions!

a. $|x-3| = |3x+2| - 1$

b. $|x+4| + |x-2| = 8$

C $|3-x|+|x+1|=4$

3. The above example represents a ________________ case. When the variable drops out, the information is either _____________ true, or _______________ false!

4. Closure Questions (work with a partner)

a. What are the steps for solving a double absolute value equation?

b. What causes a “special case?”

c. When a special case occurs, how do you handle it.

d. Begin your homework: U1 D6 Worksheet B

NAME ____________________

Date __________ Period__________

NOTES

ALGEBRA 2 H - AB

U1 D7: Absolute Value Inequalities

1. Write each answer in both set and interval notation, then describe the difference between the two.

   a. $x = 5$ and $x = -3$

   b. $x > 4$ or $x < -1$

2. What is the biggest difference about the process of solving an inequality compared to an equation. (Hint: This was **stressed heavily** in day 3!)

3. Describe when to use an open circle and when to use a closed circle when graphing inequalities (in one variable).

4. What symbols are used for "union" and "intersection" and what do they mean?!

Example #1: $|3x+6| \geq 12$

2. $3|2x+6|-9<15$

3. $|2x-5|>3$

4. $-2|x+1|+5\geq -3$

5. $|\frac{x-3}{2}|+2<6$

NAME ____________________

Date __________ Period__________

NOTES

ALGEBRA 2 H - AB

U1 D8: Double Absolute Value Inequalities

1. $|x+2|+|x-3|>5$

2. $|x+5|+|x-3|\ge 4$

3. $|2x+1|-|x-4|>3$

NAME ____________________

Date __________ Period__________

REVIEW!

ALGEBRA 2 H - AB

U1 D9: Unit 1 Test Review

1. Give an example of the following:

   a. Natural number ____________

   b. Whole number ______________

   c. Real number ______________

   d. Integer _______________

   e. Irrational number ____________

   f. Rational number __________

2. Solve the following:

   a. $-(m-n)+2(m-3n)$

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

3. Solve when c=-3 and d=-2

   a. c^2-d^2

   b. $c(3-d)-c^2$

4. Solve for x: $\frac{2x}{a}+b=d$. State any restrictions.

5. Name a number that is rational, but not an integer: _______

6.

7. Solve and graph: $2x-3>2x-10$

8. $2x<2(x+1)$

9. $3x-1>-28$ *and* $2x+7<19$

10. Solve using partitioning.

a. $|x-1|=5x+10$

b. $|2x+3|-6\geq 7$

c. $|x-5|-|x+2|=0$

d. $|x+5|+|x-3| \geq 4$

11. What property of real numbers is illustrated by each of the following:

a. $(x + 3)(1) = x + 3$ ______________________________

b. $(2x + 7) + 3y = 2x + (7 + 3y)$ ______________________________

c. $3(2x - 4) = 6x - 12$ ______________________________

d. $(5x)(3y) = (3y)(5x)$ ______________________________

e. $10z + 0 = 10z$ ______________________________

12. Two buses leave Houston at the same time and travel in opposite directions. One bus averages 55 mph and the other averages 45 mph. When will they be 400 miles apart? Don't forget units!

13. The lengths of the sides of a triangle are in the ratio 3:4:5. The perimeter of the triangle is 24in. Find the lengths. Don't forget units!