Teaching Notes for Algebra I
Homework #1

Overview: In this lesson, students will be reviewing concepts learned in Basic Math and Pre-Algebra

Preparation: Watch the video "inequality signs," "order of operations," and review the information on number groups.

While the students have learned a few of the number groups in Basic Math and Pre-Algebra and will learn several more in Algebra II, the first lecture of Algebra I reviews what they have learned so far. The "smallest" group of numbers are called the Natural or Counting Numbers and it basically contains the numbers you need to count things in nature. That means that this group begins with the number 1 and progresses through 2, 3, 4, 5, etc…forever as there is no end to how high a person can count. The next group is slightly larger than the Natural or Counting Numbers, they are called the Whole Numbers. The only difference between the Natural Numbers and the Whole Numbers is that the whole numbers start at 0. That's the only difference. The next group is "bigger" as it includes ALL of the Whole Numbers and now includes all of the "whole" negative numbers like –1, –2, –3, –4, etc. This group is called the Integers. There is no smallest Integer and no largest Integer as they go on forever in both directions on a number line. Continuing with this building pattern, the next group is again "bigger" because it includes ALL of the Integers but now also includes EVERY fraction and EVERY decimal that either ends or repeats. This group is known as the Rational Numbers and you can tell the students that this name makes sense because all of the number in this group make sense to most people…they are "normal" numbers…they are rational…just like rational people tend to make sense.

Classroom Examples:

1) What are the natural numbers less than 8?
   7, 6, 5, 4, 3, 2, 1 *Since we asked for less than 8 we do not include 8 and since we are talking about the natural numbers we so not include 0.

2) What are the whole numbers less than or equal to 3?
   3,2,1,0

3) What are the integers that are less than 6 but greater than – 4?
   6, 5, 4, 3, 2, 1, 0, – 1, – 2, – 3

4) Is $-7 > -6$ a true statement?
   No

5) Is $-4 < -2$ a true statement?
   Yes

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6) Write out in words how you would say $x > 10$
"x is greater than ten."

7) Write out in words how you would say $-4 > x$
"x is less than negative four."

8) Simplify: $-4^2 - 72 \div 9(-6-2) - (32 \div 8 \div 4)^3 - (-3-2)^2 - 7^0$

Answer: $-4^2 - 72 \div 9(-6-2) - 1(32 \div 8 \div 4)^3 - 1(-3-2)^2 - 7^0$
$-4^2 - 72 \div 9(-6-2) - 1(32 \div 8 \div 4)^3 - 1(-3-2)^2 - 7^0$
$-4^2 - 72 \div 9(-8) - 1(1)^3 - 1(-5)^2 - 7^0$
$-16 - 72 \div 9(-8) - 1(1) - 1(25) - 1$
$-16 + 64 - 1 - 25 - 1$
$+21$

9) Simplify: $-|-5|^0 - 3^2 - |-1-2|^3 - 4|4+2| - 7|-6+5|^6 - 1$

Answer: $-1|-5|^0 - 3^2 - 1|-1-2|^3 - 4|4+2| - 7|-6+5|^6 - 1$
$-1|-5|^0 - 3^2 - 1|-3|^3 - 4|6| - 7|-1|^6 - 1$
$-1(+5)^0 - 3^2 - 1(+3)^3 - 4(+6) - 7(+1)^6 - 1$
$-1(+1) - 9 - 1(+27) - 4(+6) - 7(+1) - 1$
$-1 - 9 - 27 - 24 - 7 - 1$
-69

10) Simplify:
$-32^3 \div |-1-3| \div (-2) - 2[-(-1-7) - 2^0 + 108 \div 54(-2-1)^3]^2 - 9^0$

Answer: $-32^3 \div |-1-3| \div (-2) - 2[-1(-1-7) - 2^0 + 108 \div 54(-2-1)^3]^2 - 9^0$

Tip: When faced with a large problem that contains sets of parentheses inside other sets of parentheses, it is often helpful to take what's inside of those parentheses and pull that entire expression and work it out separately from the rest of the problem. This is a valid thing to do as all of the work inside of those parentheses fall under the first rule of PEMDAS, doing what's inside of the parentheses first. So, in this problem, after you put in the missing ones, you should do the work inside the super-powered parentheses. And then take EVERYTHING

inside the brackets and work that expression out using the order of operations again. Once you finish the order of operations on that expression, you simply take that answer and put it inside the brackets in the original problem.

$$-32^3 \div |-4| \div (-2) - 2[-1(-8) - 2^0 + 108 \div 54(-3)^3]^2 - 9^0$$

$$-1(-8) - 2^0 + 108 \div 54(-3)^3$$

$$-1(-8) - 1 + 108 \div 54(-27)$$

$$+8 - 1 - 54$$

$$-47$$

$$-32^3 \div |-4| \div (-2) - 2\left[-47\right]^2 - 9^0$$

$$-32^3 \div (+4) \div (-2) - 2[-47]^2 - 9^0$$

$$-32768 \div (+4) \div (-2) - 2[+2209] - 1$$

$$+4096 - 4418 - 1$$

$$-323$$