9th Grade Assignment – Week #16

<u>Group Assignment</u>: Magic Trick!

For Tuesday:

    1) In this week's first lecture, I showed a math magic trick whereby you started with any two numbers, then added those numbers to create third number, and then added the last two numbers to get a fourth number, etc., until you had a list of ten numbers. The surprising thing was that, no matter what your two initial numbers were, the sum of all ten numbers divided by 11 always was equal to the 7th number in the list. Use algebra to verify that this is always the case. (Hint: let your first two numbers be x and y.)

    2) In the lecture, I spoke about systems of equations. I said that the below two equations had infinitely many pairs of solutions, but only one solution works for both of the equations. How can you find the one common solution to these two equations?
$y = 4x-7$ and $2x+3y = -49$

For Thursday:

    From the **Word Problems** unit in the workbook, do the following Group Work exercises:

- Problem Set #1: problems #1, 2, 3.
- Problem Set #2: problems #1-4.

<u>Individual Work</u>

- Take the test found at the end of this document. You should not use notes. Use a calculator only if absolutely necessary.

- There is no additional homework this week.

Factoring Test

Multiply.

1) $(x^3 - 3)(x^3 + 3)$

2) $(x^4 + 5y)^2$

Factor.

3) $x^2 - 10x + 16$

4) $x^8 - 25$

5) $5x^5 - 20x^3$

6) $x^2 + 9x - 20$

7) $x^2 + x - 30$

8) $6x^7y^5 - 4x^2y^3$

9) $x^4 - 16$

10) $8xy^6 + 14x^5z^3$

11) $x^2 + 25x - 84$

12) $x^2 - 25x + 84$

13) $10x^5 + 10x^4 - 200x^3$

14) $x^4 - 10x^2 + 16$

15) $4x^2 + 8x + 140$

16) $x^6 - 25y^4$

Solve.

17) $x^2 + 5x + 6 = 2x^2$

18) $\frac{6}{x+13} = \frac{x}{x+3}$

19) $3x - 5 = 7x - 9$

20) $(x - 3)^2 = (x - 7)(x + 7)$

21) $2x^4 - 48x^2 = 10x^3$

22) $7x - 5 = x(x + 7) - 105$

Problem Set #1

Group Work
Relating numbers.

If we are given two numbers, then we can make statements (in either English or algebra) that relate the numbers.

Example: 6 and 10

Possible statements:

- One number is four greater than the other; $x = y + 4$
- One number is $^3/_5$ of the other; $y = ^3/_5 x$
- The difference of the two numbers is four; $x - y = 4$
- The larger number is eight less than three times the smaller; $x = 3y - 8$

Give at least five statements (in both English and algebra) that relate each pair of numbers.

1) 7 and 3
2) 4½ and 9
3) 8 and 13

Homework
Translate into Algebra.
4) Seven more than twice a number.
5) One number is two more than five times another.

6) Six less than half a number.
7) Half of six less than a number.
8) The sum of two numbers.
9) The sum of two numbers is 18.
10) The product of two numbers is 18.
11) The square of three less than a number.

Translate into English.
(Try to avoid using the words "plus", "minus", "equals", "x", "y", etc.)

12) $6x - 3$
13) $6(x - 3)$
14) $x^2 + 5$
15) $x^2 + y^2$
16) $(x+y)^2$
17) $y = x^2 + 5$
18) $4x - 1 = 5$
19) $x + y = 7$
20) $y - x = 7$

Find the Number.
21) Four more than three times a number is 22.
22) Eight less than three times a number is six.
23) Half a number is twelve less than twice that number.
24) The square of a number is 14 more than five times that number.

Problem Set #2

Group Work
Find the Number.
1) Eight more than three times a number is four.
2) One-half of three less than a number is six.
3) Four less than eight times a number is 37.
4) Consider these statements:
   - The sum of two numbers is 13.
   - The larger number is three greater than the smaller.
   - The larger of two numbers is one more than three times the smaller.

   a) This statement: "The smaller number is three less than the larger" is equivalent to which of the above statements?
   b) How many possible solutions are there to the first statement alone?
   c) How many possible solutions are there to the second statement alone?
   d) How many possible solutions are there that satisfy both the first and second statements?
   e) How many possible solutions are there that satisfy both the first and third statements?
   f) How many possible solutions are there that satisfy both the second and third statements?
   g) How many possible solutions are there that satisfy all three statements?

Two-number Riddles
5) Solve this riddle:
   The smaller of two numbers is four less than the larger. The larger is one less than twice the smaller.
6) Make your own two-number riddle! Start by choosing two numbers (between 1 and 20). Make two statements about your two numbers.