Changing base 3 to base 9:

A. This method works because $3^2 = 9$.

    1. Since $3^2 = 9$, we separate the numbers into groups of 2's starting from the right working to the left.

    2. Find the number each pair would be equal to in base 10 and write them down in order. See the table below:

Base 3	Base 10	Base 3	Base 10
00	0	12	5
01	1	20	6
02	2	21	7
10	3	22	8
11	4		

    3. There is no need to memorize these since they can be evaluated easily.   See *base b to 10*.

B. Examples:

    Ex [1] $2012210_3 = $_____$_9$.

        a. Separate the number into pairs: 2 01 22 10. *Notice that the first number has no pair. This is because there is an odd number of digits.

        b. Evaluating each pair we get: 2 1 8 3.

        c. The answer is 2183.

    Ex [2] $121102_3 = $_____$_9$.

        a. Separate the number into pairs: 12 11 02.

        b. Evaluating each pair we get: 5 4 2.

        c. The answer is 542.

C. Notice if you are asked to go from base 9 to base 3, the method would be simple:

    1. Simply take each digit and write its base 3 equivalent. Refer to the table above.

Ex [1] $836_9 =$ _____ $_3$.

   a. Using the table above we know 8 = 22, 3 = 10, and 6 = 20.

   b. The answer is 221020.

Ex [2] $2208_9 =$ _____ $_3$.

   a. Using the table above we know 2 = 02, 2 = 02, 0 = 00, and 8 = 22.

   b. Since the first number is 02, we only write 2 because no number can begin with 0's.

   c. The answer is 2020022.