Number Bases:

To understand the notion of base numbers, we look at our own number system. We use the decimal, or base-10, number system. To help explain what this means, consider the number 2746. This number can be rewritten as $2746_{10} = 2 \cdot 10^3 + 7 \cdot 10^2 + 4 \cdot 10^1 + 6 \cdot 10^0$. Note that each number in 2746 is actually just a placeholder which shows how many of a certain power of 10 there are.

Converting from base b to base 10

Example 1: what does 4201_5 mean? Just like base 10, the first digit to the left of the decimal place tells us how many 5^0's we have, the second tells us how many 5^1's we have, and so forth.

Converting from base 10 to base b.

Example 2: Write the base 10 number 216 in base 4.

*In base 4, each digit in a number represents the number of copies of that power of 4.

Converting from base b to non-base 10 base

Example 3: Convert 10100111_2 to base 4.

Ex. 4: Convert 10100111_2 to base 8

Ex. 5: What is the largest base 10 number that can be expressed as a 3-digit base 5 number?

Ex. 6: Given $9^6 = 531,441$ how would you represent 531,440 in base 9?

7) Convert 12321_4 to base 16

8) Convert 112010032_4 to base 8

9) Convert 12345678_9 to base 3