

Changing from base 10 to base b:

A. This method will instruct you to write the answer from left to right.

1. To change a number from base 10 to base b you must find the largest power of b that will go into the number, and write down the number of times it will go into it. (*Remember that there can be no digit in the number greater than the base.)

Ex [1] $475 = \underline{\hspace{2cm}}_6$.

- a. In this example 6^3 is the largest power and it evaluates to 216, which goes into 475, 2 times. Write down 2.

2. To find the next numbers, multiply the power found in the previous step and the number of times it goes into the number. Then, subtract this value from the original number. Then find out how many times the next power goes into this number and write it down.

Ex [1] $475 = \underline{\hspace{2cm}}_6$.

- b. Multiply $6^3 \times 2$ which equals 432. Subtract this value from 475 which equals 43. The next power in line is 6^2 which is 36. Since 36 goes into 43, 1 time, write down 1.

3. Repeat step 2 until all powers are gone.

Ex [1] $475 = \underline{\hspace{2cm}}_6$.

- c. Multiply $6^2 \times 1$ which equals 36. Subtract this value from 43 which equals 7. The next power in line is 6^1 which is 6. Since 6 goes into 7, 1 time, write down 1.
- d. Multiply $6^1 \times 1$ which equals 6. Subtract this value from 7 which equals 1. Since 6^0 is the last power we just write down whatever number is left, which in this case is 1.
- e. The answer is 2111.

B. Additional Examples:

Ex [2] $134 = \underline{\hspace{2cm}}_5$.

- a. The largest power of 5 that goes into 134 is 5^3 which equals 125. Since 125 only goes into 134, 1 time, we write down 1.
- b. Multiply $5^3 \times 1$ which equals 125 and subtract this value from 134 which equals 9. The next power in line is 5^2 which is 25. Since 25 goes into 9, 0 times, we write down 0.
- c. Multiply $5^2 \times 0$ which is 0 and subtract this value from 9 which is still 9. The next power in line is 5^1 which is 5. Since 5 goes into 9, 1 time, we write down 1.
- d. Multiply $5^1 \times 1$ which is 5 and subtract this value from 9 which is 4. Since 5^0 is the last power we just write down 4.
- e. The answer is 1014.

Ex [3] $76 = \underline{\hspace{2cm}}_2$.

- a. The largest power of 2 is 2^6 which is 64. 64 goes into 76, 1 time, so write down 1.
- b. $76 - 64 = 12$. The next power in line is 2^5 which equals 32. Since 32 does not go into 12, write down 0.
- c. The next power in line is 2^4 which is 16. Since 16 does not go into 12, write down 0.
- d. The next power in line is 2^3 which is 8. Since 8 goes into 12, 1 time, write down 1.
- e. $12 - 8 = 4$. The next power in line is 2^2 which is 4. Since 4 goes into 4, 1 time, write down 1.
- f. $4 - 4 = 0$. The next power in line is 2^1 which is 2. Since 2 goes into 0, 0 times, write down 0.
- g. $0 - 0 = 0$. Since the last power is 0, we just write down what is left, which is 0.
- h. The answer is 1001100.