STUDY GUIDE = NUMBER BASES

STANDARD BASE → Base 10 also known as Decimal or Denary

↳ Does not require the subscript so $129 = 129_{10}$ → subscript representing the base

FACTS ABOUT ALL BASES

1. All bases have the same number of digits as the base number
   BASE 2 (BINARY) has 2 digits → 0 & 1
   BASE 10 has 10 digits → 0, 1, 2, 3, 4, 5, 6, 7, 8 & 9.
2. The largest digit of any base is one less than the base number.
3. Place values always start with the base number to the power of zero
   which always equals to ONE. Hence, why the 1st place value is called the ONES place.

CHANGE **TO** BASE 10

● Use place values & write out in expanded form

534_6 → Base 10

$$534 = 5 \times 6^2 + 3 \times 6^1 + 4 \times 6^0$$

powers (2 1 0)

$5 \times 36 + 3 \times 6 + 4 \times 1$

$180 + 18 + 4$

$= 202$

CHANGE **FROM** BASE 10

● Divide by the Base you want keeping track of remainders. Write them in the reverse order.

202 → Base 6

$= 534_6$

6	$20^2 2$
6	033 R4
6	005 R3
6	000 R5

↑

↳ stop when the quotient is zero.

ADD When larger than the base subtract the base and carry.

$$\begin{array}{r} {}^{1+}35_7 \\ +\ 16_7 \\ \hline 54_7 \end{array}$$

$5 + 6 = 11$ → bigger than 7

$11 - 7 = 4$ → the answer

↳ have to add one to the next place value (hence the +1 by the 3)

SUBTRACT

When borrowing, add on the base.

carried one group of 7

$$\begin{array}{r} {}^2\cancel{3}1_7 \quad +7 = 8\ (7+1=8) \\ \text{so, } 8 - 6 = 2 \\ -\ 16_7 \\ \hline 12_7 \end{array}$$

→ the answer

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