$1205 = 1 \cdot 10^3 + 2 \cdot 10^2 + 0 \cdot 10^1 + 5 \cdot 10^0$

i digits in base 10 $\quad 10^i$

0 1 2

2

10

11

12

20

21

22

100

101

002

$231_4 = 2\cdot4^2 + 3\cdot4^1 + 1\cdot4^0 = 32 + 12 + 1$

$= 45_{10}$

$2\cdot4^2$ — —

$1\cdot4^2$

$2\cdot4^2$

base b

$d_{n-1}d_{n-2}\ldots d_0 = d_{n-1}\cdot b^{n-1} + d_{n-2}b^{n-2} + \ldots + d_0b^0$

0-9	A	B	C	D	E	F
	10	11	12	13	14	15

$B87 = B\cdot16^2 + 8\cdot16^1 + 7\cdot16^0 = 11\cdot256$

$+128 + 7 =$

$2816 + 128 + 7 = 2816 + 135 = 2951_{10}$

$11011_2 = 1\cdot2^4 + 1\cdot2^3 + 0\cdot2^2 + 1\cdot2^1 + 1\cdot2^0$

$= 16 + 8 + 0 + 2 + 1 = 27_{10}$

$EA2_{16}$

E A 2

1110 1010 0010

$1110\ 10100010_2$

284_9

2 8 4

02 22 11

02221_3

$7.6 + 2.8$

56.8

$136_{10} \rightarrow X_b$

136_{10}

$136 \% 2 = 0$

$68 \% 2 = 0$

$34 \% 2 = 0$

$17 \% 2 = 1$

$8 \% 2 = 0$

$4 \% 2 = 0$

$2 \% 2 = 0$

$1 \% 2 = 1$

$\frac{136}{2} = 68$

$\frac{68}{2} = 34$

$\frac{34}{2} = 17$

$\frac{17}{2} = 8$

$\frac{8}{2} = 4$

$\frac{4}{2} = 2$

$\frac{2}{2} = 1$

$\frac{1}{2} = 0$

10001000_2

$$117_{10} = d_6 \cdot 2^6 + d_5 2^5 + d_4 2^4 + \cdots d_1 2^1 + d_0 2^0$$

d_0

$117 \% 2 = d_0$

$$\left\lfloor \frac{117}{2} \right\rfloor = \left\lfloor \frac{d_6 2^6}{2} + \frac{d_5 2^5}{2} + \cdots + \frac{d_1 2^1}{2} + \frac{d_0 2^0}{2} \right\rfloor$$

$$58 = \underbrace{d_6 \cdot 2^5 + d_5 \cdot 2^4 + \cdots + d_1 2^0}_{} + \cancel{\frac{d_0}{2}}$$

$58 \% 2 = d_1$

152_{10}

$152 \% 5 = 2$

$30 \% 5 = 0$

$6 \% 5 = 1$

$1 \% 5 = 1$

$\lfloor \frac{152}{5} \rfloor = 30$

$\lfloor \frac{30}{5} \rfloor = 6$

$\lfloor \frac{6}{5} \rfloor = 1$

$\lfloor \frac{1}{5} \rfloor = 0$

$152_{10} = 1102_5$

$b_1 \rightarrow b_2$

alg: $b_1 \rightarrow 10$ ← base of exponentiation

$10 \rightarrow b_2$