

Bases

$$31 \text{ Oct} = 25 \text{ Dec}$$

$$\underline{\underline{531}}_{10} = 5 \cdot 100 + 3 \cdot 10 + 1$$

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

$$531_6 = 5 \cdot 6^2 + 3 \cdot 6^1 + 1 \cdot 6^0$$

$$5 \cdot 36 + 3 \cdot 6 + 1$$

$$180 + 18 + 1 = 199$$

$$31_8 = 3 \cdot 8^1 + 1 \cdot 8^0$$

$$3 \cdot 8 + 1 = 25_{10}$$

Base 4

| | | | | |
|----------|----------|---------|---------|--|
| 0, | 1, | 2, | 3, | $4 = 1 \cdot 4^1 + 0 \cdot 4^0$ |
| $10_4,$ | $11_4,$ | $12_4,$ | $13_4,$ | $8 = 2 \cdot 4^1 + 0 \cdot 4^0$ |
| $20_4,$ | $21_4,$ | $22_4,$ | $23_4,$ | |
| $30_4,$ | $31_4,$ | $32_4,$ | $33_4,$ | $16 = 1 \cdot 4^2 + 0 \cdot 4^1 + 0 \cdot 4^0$ |
| $100_4,$ | $101_4,$ | - | - | |

Base 16: 16 digits

0, 1, 2, ..., 9, A, B, C, D, E, F
=10 =11 =12 =13 =14 =15

$24 \cdot 10^1 \quad 60^1 \quad 600$
 $20 : 46 = 18$
 $0-23 \quad 0-59 \quad 0-524$
 mixed radix base

$123_4 \rightarrow \text{base } 10$

$$123_4 = 1 \cdot 4^2 + 2 \cdot 4^1 + 3 \cdot 4^0$$

$$16 + 8 + 3 = 27_{10}$$

$$123_{10} = \overset{13}{A} \overset{23}{B} \overset{3}{C} \overset{3}{D} \quad 4 = A \cdot 4^3 + B \cdot 4^2 + C \cdot 4^1 + D$$

$$30 \text{ R } 3 = ABC \text{ R } 10$$

$$30 \text{ R } (3)$$

$$123 = 4(A \cdot 4^2 + B \cdot 4^1 + C \cdot 4^0) + D$$

$$4 \overline{) 123}$$

$$7 \text{ R } (2)$$

$$4 \overline{) 30}$$

$$(1) \text{ R } (3)$$

$$4 \overline{) 7}$$

$$4 \overline{) 123} \Leftrightarrow 123 = 4 \cdot 30 + 3$$

$$30 = A \cdot 4^2 + B \cdot 4^1 + C$$

$$30 = 4(A \cdot 4^1 + B \cdot 4^0) + C$$

$$4 \overline{) 30} \quad \begin{matrix} 1 & 3 \\ 7 = A \cdot 4 + B \end{matrix}$$

$$123_{10}$$

$$\hline 10$$

$$= 12 \text{ R } 3$$