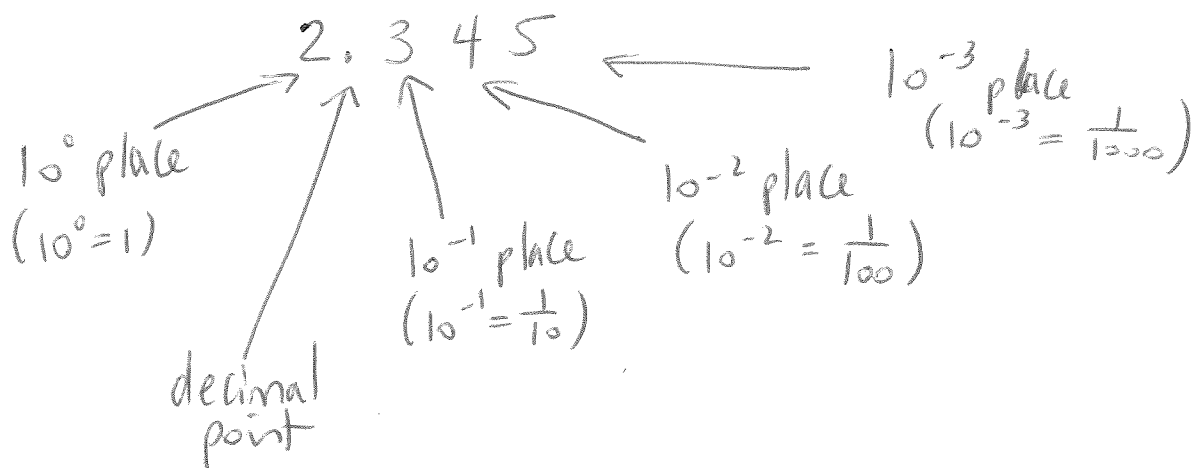


1.3 Converting Non-Integer Numbers to Decimal



$$\begin{aligned} 2.345 &= 2 \times 10^0 + 3 \times 10^{-1} + 4 \times 10^{-2} + 5 \times 10^{-3} \\ &= 2 + \frac{3}{10} + \frac{4}{100} + \frac{5}{1000} \end{aligned}$$

In other bases:

$$\begin{aligned} 57.14_8 &= 5 \times 8^1 + 7 \times 8^0 + 1 \times 8^{-1} + 4 \times 8^{-2} \\ &= 40 + 7 + \frac{1}{8} + \frac{4}{64} \\ &= 47.1875 \end{aligned}$$

The dot is called the radix point rather than the decimal point.

Notice: The number to the left of the radix point is associated with the exponent 0.

Ex: Convert to decimal :

a) 11.011_2

$$= 1 \times 2^1 + 1 \times 2^0 + 0 \times 2^{-1} + 1 \times 2^{-2} + 1 \times 2^{-3}$$

$$= 2 + 1 + \frac{1}{4} + \frac{1}{8}$$

$$= 3.375$$

b) $A0.3F6_{16}$ (round to 3 decimal places)

$$= 10 \times 16^1 + 0 \times 16^0 + 3 \times 16^{-1} + 15 \times 16^{-2} + 6 \times 16^{-3}$$

$$= 160 + \frac{3}{16} + \frac{15}{16^2} + \frac{6}{16^3}$$

$$\approx 160.248$$

A	= 10
B	= 11
C	= 12
D	= 13
E	= 14
F	= 15

c) 765.4_8

$$= 7 \times 8^2 + 6 \times 8^1 + 5 \times 8^0 + 4 \times 8^{-1}$$

$$= 7 \times 64 + 48 + 5 + \frac{4}{8}$$

$$= 501.5$$