Converting Non-integer Numbers

converting from non-integer binary to decimal:

$$11.011_2 \rightarrow \text{base } 10$$

↑

binary point
(radix point)

$$11.011_2 = 1 \times 2^1 + 1 \times 2^0 + 0 \times 2^{-1} + 1 \times 2^{-2} + 1 \times 2^{-3}$$

converting from non-integer decimal to binary:

$$9_{10} \rightarrow \text{base } 2$$

	Q	R
$9 \div 2$		

method of repeated division

$$0.375_{10} \rightarrow \text{base } 2$$

method of repeated multiplication

$$0.375 \times 2 = 0 \quad + \quad 0.75$$
$$0.75 \times 2 = 1 \quad + \quad 0.5$$
$$0.5 \times 2 = 1$$

$$0.375_{10} = 0.011_2$$

note: $0.1_{10} \rightarrow$ binary

$$0.1 \times 2 = 0 + 0.2$$
$$0.2 \times 2 = 0 + 0.4$$
$$0.4 \times 2 = 0 + 0.8$$
$$0.8 \times 2 = 1 + 0.6$$
$$0.6 \times 2 = 1 + 0.2$$

$$0.1_{10} = 0.0\overline{0011}_2$$