

# Binary to Decimal Worked Example

1) convert 10110 to decimal.

⇒ 1<sup>st</sup>, count the # of digits: 5

$$\begin{aligned} &\Rightarrow \begin{array}{ccccc} 1 & 0 & 1 & 1 & 0 \\ \swarrow \text{1st digit} & \swarrow \text{2nd digit} & \swarrow \text{3rd digit} & & \\ 5-1 & 5-2 & 5-3 & 5-4 & 5-5 \end{array} \\ &(1)(2)^{5-1} + (0)(2)^{5-2} + (1)(2)^{5-3} + (1)(2)^{5-4} + (0)(2)^{5-5} \\ &= (1)2^4 + (0)2^3 + (1)2^2 + (1)2^1 + (0)2^0 \\ &= 16 + 0 + 4 + 2 + 0 \\ &= \boxed{22} \end{aligned}$$

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convert 111001

⇒ There are 6 digits.

$$\begin{aligned} &(1)(2)^5 + (1)(2)^4 + (1)(2)^3 + (0)(2)^2 + (0)(2)^1 + (1)(2)^0 \\ &= 32 + 16 + 8 + 0 + 0 + 1 \\ &= \boxed{57} \end{aligned}$$