

Date: 1/8/2021



Introduction to Digits and Bases

1. D. all of the above
2. B. 10
3. A. 8
4. $255 \rightarrow (2 \times 10^2) + (5 \times 10^1) + (5 \times 10^0)$

Base-2 or Binary

1. Convert binary to decimal

$$1000 \rightarrow 1 \times 2^3 = \boxed{8}$$

$$1001 \rightarrow (1 \times 2^3) + (1 \times 2^0) = 8 + 1 = \boxed{9}$$

$$1101 \rightarrow (1 \times 2^3) + (1 \times 2^2) + (1 \times 2^0) = 8 + 4 + 1 = \boxed{13}$$

$$1111 \rightarrow (1 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) = 8 + 4 + 2 + 1 = \boxed{15}$$

2. Convert decimal to binary

$$32 : \frac{32}{2} = 16r0, \frac{16}{2} = 8r0, \frac{8}{2} = 4r0, \frac{4}{2} = 2r0, \frac{2}{2} = 1r0, \frac{1}{2} = 0r1$$

LSB ← MSB

$$32 \rightarrow \boxed{100000}$$

$$42 : \frac{42}{2} = 21r0, \frac{21}{2} = 10r1, \frac{10}{2} = 5r0, \frac{5}{2} = 2r1, \frac{2}{2} = 1r0, \frac{1}{2} = 0r1$$

$$42 \rightarrow \boxed{101010}$$

$$11 : \frac{11}{2} = 5r1, \frac{5}{2} = 2r1, \frac{2}{2} = 1r0, \frac{1}{2} = 0r1$$

$$11 \rightarrow \boxed{1011}$$

$$17 : \frac{17}{2} = 8r1, \frac{8}{2} = 4r0, \frac{4}{2} = 2r0, \frac{2}{2} = 1r0, \frac{1}{2} = 0r1$$

$$17 \rightarrow \boxed{10001}$$

0, 1, 2, 3, 4, 5, 6, 7, 8, 9,
A, B, C, D, E, F

A → F = 10 → 15

Base-16, or Hexadecimals

1. (B) C

2. $255 : \frac{255}{16} = 15 \text{ r } 15, \frac{15}{16} = 0 \text{ r } 15$

$255 \rightarrow \boxed{\text{FF}}$

$\hookrightarrow F \times 16^1 + F \times 16^0$

$(15 \times 16) + (15 \times 1) = 255 \checkmark$

Base-20 Systems

0 1 2 3 4 5 6 7 8 9
A B C D E F G H I J

A → J = 10 → 19

1a. $20^0 = 1 \rightarrow 1 \times 20^0 = 1$

$20^1 = 20 \rightarrow (1 \times 20^1) + (0 \times 20^0) = 10$

1b. $20^2 = 400 \rightarrow (1 \times 20^2) + (0 \times 20^1) + (0 \times 20^0) = 100$

1c. $401 \rightarrow \overset{400}{(1 \times 20^2)} + \overset{0}{(0 \times 20^1)} + \overset{1}{(1 \times 20^0)} = 101$

2. Convert following numbers to YOUR base-20 system

$25 \rightarrow (1 \times 20^1) + (5 \times 20^0) = 15 = \text{F}$

$45 \rightarrow (2 \times 20^1) + (5 \times 20^0) = 25$

$425 \rightarrow (1 \times 20^2) + (1 \times 20^1) + (5 \times 20^0) = 115$

$625 \rightarrow (1 \times 20^2) + (11 \times 20^1) + (5 \times 20^0) = 1B5$

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3. Convert the following numbers as Mayans wrote them

$$25 \rightarrow \underbrace{(1 \times 20^1)}_{20} + \underbrace{(5 \times 20^0)}_5 \Rightarrow 25 = \underline{\dot{\quad}}$$

$$45 \rightarrow \underbrace{(2 \times 20^1)}_{40} + \underbrace{(5 \times 20^0)}_5 \Rightarrow 45 = \underline{\ddot{\quad}}$$

$$425 \rightarrow \underbrace{(1 \times 20^2)}_{400} + \underbrace{(1 \times 20^1)}_{20} + \underbrace{(5 \times 20^0)}_5 \Rightarrow 425 = \underline{\dot{\quad}}$$

$$625 \rightarrow \underbrace{(1 \times 20^2)}_{400} + \underbrace{(11 \times 20^1)}_{220} + \underbrace{(5 \times 20^0)}_5 \Rightarrow 625 = \underline{\underline{\dot{\quad}}}$$