

Number Systems pre-Columbian Context

2) Introduction to Digits and Bases

1. D all of the above

2. B: 10

3. A: 8

4. $255 = \underline{2 \times 10^2 + 5 \times 10^1 + 5 \times 10^0}$

3) Base-2 or Binary

1)

1000

$$1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 0 \times 2^0 \\ 8 + 0 + 0 + 0 = \boxed{8}$$

1001

$$1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 \\ 8 + 0 + 0 + 1 = \boxed{9}$$

1101

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

1111

$$1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 \\ 8 + 4 + 2 + 1 = \boxed{14}$$

$$\begin{aligned}
 2) \quad 32 &= 32/2 = 16r0 \\
 &16/2 = 8r0 \\
 &8/2 = 4r0 \\
 &4/2 = 2r0 \\
 &2/2 = 1r0 \\
 &1/2 = 0r1
 \end{aligned}$$

$$32 = 000001$$

$$\begin{aligned}
 42 &= 42/2 = 21r0 \\
 &21/2 = 10r1 \\
 &10/2 = 5r0 \\
 &5/2 = 2r1 \\
 &2/2 = 1r0 \\
 &1/2 = 0r1
 \end{aligned}$$

$$42 = 010101$$

$$\begin{aligned}
 11 &= 11/2 = 5r1 \\
 &5/2 = 2r1 \\
 &2/2 = 1r0 \\
 &1/2 = 0r1
 \end{aligned}$$

$$11 = 1101$$

$$\begin{aligned}
 17 &= 17/2 = 8r1 \\
 &8/2 = 4r0 \\
 &4/2 = 2r0 \\
 &2/2 = 1r0 \\
 &1/2 = 0r1
 \end{aligned}$$

$$17 = 10001$$

4. Base -16 or Hexadecimals

1. B: C

2. $255 / 16 = 15 \text{ r } 15$

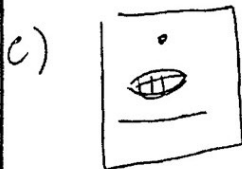
$15 / 16 = 0 \text{ r } 15$

$= 15 \times 16 + 15 = 255$

5. Base 20 Systems

1.

a) $20^0 = 1, 20^1 = 20, 20^2 = 400$



2.

$25 = 0 \times 20^2 + 1 \times 20^1 + 5 \times 20^0$

$45 = 0 \times 20^2 + 2 \times 20^1 + 5 \times 20^0$

$425 = 1 \times 20^2 + 1 \times 20^1 + 5 \times 20^0$

$625 = 1 \times 20^2 + 11 \times 20^1 + 5 \times 20^0$

3.

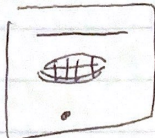
$$25 - 20 = 5$$



$$45 - 20 = 25$$



$$425 - 20 = 405$$



$$625 - 20 = 605$$

