

Taller Sistemas numéricos

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- Completa la siguiente tabla con valores equivalentes en los sistemas binario, octal, decimal y hexadecimal

Decimal	Binario	Octal	Hexadecimal
10	1010	12	A
17	10001	21	11
34	100010	42	22
56	111000	70	38
90	1011010	132	5A

- Convierte los siguientes números:

Binario a Decimal

$$\begin{array}{r} 1 \ 0 \ 1 \ 0 \ 1 \ 0 \\ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \end{array} = 42$$

$$\begin{array}{r} 1 \ 1 \ 0 \ 0 \ 1 \ 1 \\ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \end{array} = 51$$

$$\begin{array}{r} 1 \ 1 \ 1 \ 1 \ 0 \ 0 \\ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \end{array} = 60$$

$$\begin{array}{r} 1 \ 0 \ 0 \ 0 \ 0 \ 1 \\ 64 \ 32 \ 16 \ 8 \ 4 \ 2 \ 1 \end{array} = 65$$

Decimal a Binario

$$\begin{array}{r} 19 \\ 19 \ 2 \\ 19 \ 14 \\ 14 \ 2 \\ 14 \ 10 \\ 10 \ 2 \\ 10 \ 0 \\ 0 \ 1 \\ 1 \ 0 \end{array} = 10011$$

$$\begin{array}{r} 42 \\ 42 \ 2 \\ 42 \ 21 \\ 21 \ 10 \\ 21 \ 10 \\ 10 \ 5 \\ 10 \ 0 \\ 0 \ 1 \\ 1 \ 0 \end{array} = 101010$$

$$\begin{array}{r} 101 \\ 101 \ 2 \\ 101 \ 50 \\ 50 \ 25 \\ 25 \ 12 \\ 25 \ 12 \\ 12 \ 6 \\ 12 \ 0 \\ 0 \ 3 \\ 3 \ 1 \\ 1 \ 0 \end{array} = 1100101$$

• $\begin{array}{r} 256 \quad 256 \quad 128 \quad 128 \quad 64 \quad 32 \quad 16 \quad 8 \quad 4 \quad 2 \quad 1 \\ \underline{\times} \quad \underline{\times} \\ 05 \quad 128 \quad 0864 \quad 0432 \quad 1216 \quad 08 \quad 04 \quad 02 \quad 01 \quad 10 \\ 16 \quad 0 \quad 0 \quad 0 \quad 0 \\ 0 \\ = 1000000000 \end{array}$

Octal a decimal

• 45 $\rightarrow (4 \times 8^1) + (5 \times 8^0) = (4 \cdot 8) + (5 \cdot 1) = 37$

• 67 $\rightarrow (6 \cdot 8^1) + (7 \cdot 8^0) = (6 \cdot 8) + (7 \cdot 1) = 55$

• 157 $\rightarrow (1 \cdot 8^2) + (5 \cdot 8^1) + (7 \cdot 8^0) = (64) + (40) + (7) = 111$

• 341 $\rightarrow (3 \cdot 8^2) + (4 \cdot 8^1) + (1 \cdot 8^0) = (192) + (32) + (1) = 225$

Decimal a Octal

• $\begin{array}{r} 23 \quad 23 \quad 18 \\ \underline{\times} \quad \underline{\times} \quad \underline{\times} \\ 72 \quad 20 \end{array} = 27$

$$\bullet 341 \rightarrow (3 \cdot 8^2) + (4 \cdot 8^1) + (1 \cdot 8^0) = (192) + (32) + (1) = 225$$

Decimal a Octal

$$\bullet 23 \quad \begin{array}{r} 23 \\ \overline{7 \quad 2} \\ 2 \quad 18 \end{array} \quad = 27$$

$$\bullet 89 \quad \begin{array}{r} 89 \\ \overline{09 \quad 11} \\ 11 \quad 18 \end{array} \quad = 131$$

$$\bullet 512 \quad \begin{array}{r} 512 \\ \overline{32 \quad 64} \\ 0 \end{array} \quad \begin{array}{r} 64 \quad 18 \\ \overline{0 \quad 8} \\ 8 \quad 18 \end{array} \quad -1 \quad 18 \quad = 1000$$

$$\bullet 999 \quad \begin{array}{r} 999 \\ \overline{19 \quad 124} \\ 39 \end{array} \quad \begin{array}{r} 124 \quad 18 \\ \overline{44 \quad 15} \\ 4 \end{array} \quad \begin{array}{r} 15 \\ \overline{7 \quad 1} \\ 1 \quad 18 \end{array} \quad = 1747$$

Hexadecimal a Decimal

$$\bullet 1B \rightarrow (1 \cdot 16^1) + (11 \cdot 16^0) = (16) + (11) = 27$$

$$\bullet 3E \rightarrow (3 \cdot 16^1) + (14 \cdot 16^0) = (48) + (14) = 62$$

$$\begin{array}{r} 0 \\ \cdot 999 \quad 999 \cdot 18 \\ 19 \quad 124 \\ 39 \quad 7 \\ \hline & 4 \end{array} \quad \begin{array}{r} 124 \cdot 18 \\ 44 \cdot 15 \\ \hline 4 \end{array} \quad \begin{array}{r} 15 \cdot 18 \\ 7 \cdot 1 \\ \hline 0 \end{array} \quad 1 \cdot 13 = 13$$

$$= 1747$$

Hauskunst a. Decimal

- 1B $\rightarrow (1 \cdot 16^1) + (1 \cdot 16^0) = (16) + (1) = 27$
- 3E $\rightarrow (3 \cdot 16^1) + (14 \cdot 16^0) = (48) + (14) = 62$
- 7D $\rightarrow (7 \cdot 16^1) + (13 \cdot 16^0) = (112) + (13) = 125$
- F1 $\rightarrow (15 \cdot 16^1) + (1 \cdot 16^0) = (240) + (1) = 241$

Decimal a. Hauskunst

$$\begin{array}{r} 99 \rightarrow 99 \cdot 16 \\ \underline{-3} \quad \underline{6} \\ 6 \end{array} \quad \begin{array}{r} 6 \cdot 16 \\ \underline{-6} \quad \underline{0} \\ 0 \end{array} = 63$$

Scifile

$$\begin{array}{r} \overset{+}{2} 5 0 \\ 2 5 0 \quad | 1 6 \\ 4 0 \quad 1 5 \quad | 1 6 \\ 1 0 \quad \quad \quad 1 5 \quad 0 \\ \hline & & & = 7 4 \end{array}$$

$$\bullet \begin{array}{r} 543 \\ \times 3 \\ \hline 16 \\ 15 \\ \hline 16 \end{array} \quad \begin{array}{r} 33 \\ \times 2 \\ \hline 16 \\ 16 \\ \hline 20 \end{array} \quad = \quad \begin{array}{r} 21 \\ + \\ 20 \\ \hline 41 \end{array}$$

$$\begin{array}{r} \overline{1024} \\ \times 1024 \\ \hline 1024 \\ 64\ 64 \\ \hline 0 \end{array}$$

• Convexità

• 1001101 a actual

$$\begin{array}{r} \overbrace{1}^w \\ \overbrace{1}^w \\ + \end{array} \begin{array}{r} \overbrace{001}^m \\ \overbrace{1}^m \\ - \end{array} \begin{array}{r} 101 \\ \overbrace{5}^n \\ = \end{array} \begin{array}{r} 115 \\ - 4 \\ \hline \end{array}$$

• 111111 a hexadecimal

$$\begin{array}{r} \overbrace{11}^3 \\ + \quad \overbrace{1111}^4 \\ \hline \end{array} = 37$$

• 111111 a hexadecimal

$$\begin{array}{r} \cancel{1} \cancel{1} \cancel{1} \\ 3 \end{array} \quad \begin{array}{r} \cancel{1} \cancel{1} \cancel{1} \\ F \end{array} = 3^F$$

• 5A a binario

$$\begin{array}{r} 5 \quad 1 \quad 2 \quad 2 \quad 1 \quad 2 \quad 1 \quad 2 \\ \cancel{1} \quad \cancel{2} \quad 0 \quad 1 \quad \cancel{1} \quad 0 \end{array} = 101$$

1011010

$$A=10 \quad \begin{array}{r} 1 \quad 0 \quad 1 \quad 2 \\ 0 \quad 5 \end{array} \quad \begin{array}{r} 5 \quad 1 \quad 2 \\ 1 \quad 2 \end{array} \quad \begin{array}{r} 2 \quad 1 \quad 2 \\ 0 \quad 1 \end{array} \quad \begin{array}{r} 1 \quad 1 \quad 2 \\ 1 \quad 0 \end{array} = 1010$$

• 7D a octal

$$7D \rightarrow \begin{array}{r} 7 \quad 1 \quad 2 \\ 1 \quad 3 \end{array} \quad \begin{array}{r} 3 \quad 1 \quad 2 \\ 1 \quad 1 \end{array} \quad \begin{array}{r} 1 \quad 1 \quad 2 \\ 1 \quad 0 \end{array} = 1411 \quad \begin{array}{r} 0 \\ 13 \quad 1 \quad 2 \\ 16 \quad 0 \quad 3 \end{array} \quad \begin{array}{r} 6 \quad 1 \quad 2 \\ 0 \quad 3 \end{array} \quad \begin{array}{r} 3 \quad 1 \quad 2 \\ 1 \quad 1 \end{array} \quad \begin{array}{r} 1 \quad 1 \quad 2 \\ 1 \quad 0 \end{array} = 1101$$

$$\begin{array}{r} 1 \quad 1 \quad 1 \quad 1 \quad 0 \quad 1 \quad 1 \quad 5 \\ \cancel{1} \quad \cancel{1} \quad \cancel{1} \quad \cancel{1} \quad 1 \quad 1 \quad 5 \\ 1 \quad 7 \quad 5 \end{array}$$

175

• 64(octal) a binario

$$64 \rightarrow \begin{array}{r} 6 \quad 1 \quad 2 \\ 0 \quad 3 \end{array} \quad \begin{array}{r} 3 \quad 1 \quad 2 \\ 1 \quad 1 \end{array} \quad \begin{array}{r} 1 \quad 1 \quad 2 \\ 1 \quad 0 \end{array} = 110 \quad \begin{array}{r} 1 \quad 1 \quad 0 \quad 1 \quad 0 \quad 0 \\ 1 \quad 1 \quad 0 \quad 1 \quad 0 \quad 0 \end{array}$$

- 173 (actual) a hexadecimal

$$\rightarrow (8^2 \cdot 1) + (8^1 \cdot 7) + (8^0 \cdot 3) = 64 + 56 + 3 = 123$$

$$\begin{array}{r} 123 \\ \underline{- 96} \\ 27 \\ \underline{- 16} \\ 11 \\ \underline{- 16} \\ 11 \\ \end{array} \quad \begin{array}{r} 1101 \\ \underline{- 1011} \\ 1101 \\ \underline{- 8421} \\ 13 \\ \end{array} \quad \begin{array}{r} 1011 \\ \underline{- 8421} \\ 11 \\ \end{array} = 7B$$

Suma y resta

- $1101 + 1011$

$$13 + 11 = 24 \rightarrow \begin{array}{r} 24 \\ \underline{- 09} \\ 12 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 06} \\ 6 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 03} \\ 3 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 11} \\ 1 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 10} \\ 2 \\ \end{array} = 11000$$

- $101010 + 110011$

$$42 + 51 = \begin{array}{r} 93 \\ \underline{- 46} \\ 47 \\ \end{array} \quad \begin{array}{r} 46 \\ \underline{- 06} \\ 23 \\ \end{array} \quad \begin{array}{r} 23 \\ \underline{- 03} \\ 11 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 15} \\ 1 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 12} \\ 0 \\ \end{array} \quad \begin{array}{r} 21 \\ \underline{- 61} \\ 10 \\ \end{array} = 1011101$$

- $111001 - 1010$

$$57 - 10 = 47 \quad \begin{array}{r} 47 \\ \underline{- 07} \\ 23 \\ \end{array} \quad \begin{array}{r} 23 \\ \underline{- 03} \\ 11 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 15} \\ 1 \\ \end{array} \quad \begin{array}{r} 12 \\ \underline{- 12} \\ 0 \\ \end{array} \quad \begin{array}{r} 21 \\ \underline{- 01} \\ 10 \\ \end{array} = 101111$$

$$\bullet 111001 - 1010 \quad \begin{array}{r} 111001 \\ - 1010 \\ \hline 100101 \end{array}$$

$$57 - 10 = 47 \quad \begin{array}{r} 47 \\ 07 \\ \hline 23 \\ 03 \\ \hline 1 \end{array} \quad \begin{array}{r} 2312 \\ 0311 \\ \hline 15 \end{array} \quad \begin{array}{r} 1112 \\ 15 \\ \hline 12 \end{array} \quad \begin{array}{r} 512 \\ 12 \\ \hline 01 \end{array} \quad \begin{array}{r} 2112 \\ 01 \\ \hline 10 \end{array} = 101111$$

$$\begin{array}{r} \overline{58} \\ \underline{-18} \\ 29 \end{array} \quad \begin{array}{r} \overline{29} \\ \underline{-14} \\ 09 \end{array} \quad \begin{array}{r} \overline{14} \\ \underline{-7} \\ 7 \end{array} \quad \begin{array}{r} \overline{7} \\ \underline{-3} \\ 4 \end{array} \quad \begin{array}{r} \overline{3} \\ \underline{-1} \\ 2 \end{array} \quad \begin{array}{r} \overline{1} \\ \underline{-1} \\ 0 \end{array} = 111010 //$$

Otul

$$(8 \cdot 4) + (9 \cdot 3) = 35 \quad 88$$

$$43 + 65 = (8 \cdot 6) + (1 \cdot 5) = 53$$

$$\begin{array}{r} 88 \\ \times 11 \\ \hline 08 \\ 88 \\ \hline 96 \end{array} \quad \begin{array}{r} 11 \\ \times 31 \\ \hline 31 \\ 33 \\ \hline 341 \end{array} \quad \begin{array}{r} 118 \\ \times 10 \\ \hline 118 \end{array} = 130$$

$$(64 \cdot 1) + (2 \cdot 8) + (7 \cdot 1) = 87 \quad \{ \quad 144$$

$$127 + 71 = 198$$

$$\begin{array}{r} 144 \\ \times 15 \\ \hline 720 \end{array}$$

Scribe

Multiplicación y División

- Binario

$$\begin{array}{r} 1011 \\ \times 11 \\ \hline \end{array}$$

$$\begin{array}{r} 110 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 6612 \\ 033 \\ \hline 1315 \\ 1 \end{array} \quad \begin{array}{r} 3312 \\ 1315 \\ \hline 08 \\ 1 \end{array} \quad \begin{array}{r} 1612 \\ 08 \\ \hline 04 \\ 1 \end{array} \quad \begin{array}{r} 812 \\ 04 \\ \hline 02 \\ 1 \end{array} \quad \begin{array}{r} 312 \\ 02 \\ \hline 01 \\ 1 \end{array} \quad \begin{array}{r} 212 \\ 01 \\ \hline 10 \\ 1 \end{array} \quad 112 = 1000010 \quad \cancel{\text{1}}$$

$$\begin{array}{r} 1111 \\ \times 15 \\ \hline \end{array}$$

$$\begin{array}{r} 101 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 7512 \\ 1537 \\ \hline 1 \end{array} \quad \begin{array}{r} 3712 \\ 1718 \\ \hline 1 \end{array} \quad \begin{array}{r} 1812 \\ 09 \\ \hline 09 \\ 1 \end{array} \quad \begin{array}{r} 912 \\ 14 \\ \hline 14 \\ 1 \end{array} \quad \begin{array}{r} 412112 \\ 02 \\ \hline 01 \\ 1 \end{array} \quad \begin{array}{r} 112 \\ 10 \\ \hline \end{array} \quad 112 = 1001011 \quad \cancel{\text{1}}$$

$$\begin{array}{r} 110100 \\ \times 52 \\ \hline \end{array}$$

$$\begin{array}{r} \div 10 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 12 \\ 0 \\ \hline 2612 \\ 0613 \\ \hline 0 \\ 1312 \\ 16 \\ \hline 03 \\ 612 \\ 03 \\ \hline 11 \\ 312 \\ 11 \\ \hline 10 \\ 112 \\ 10 \\ \hline \end{array} \quad 112 \rightarrow 11010 \quad \cancel{\text{1}}$$

Octal

$$\begin{array}{r} \div 10 \rightarrow \\ 29 \end{array} \quad \begin{array}{r} 12 \\ 0 \end{array} \quad \begin{array}{r} 3612 \\ 0813 \end{array} \quad \begin{array}{r} 1312 \\ 10 \end{array} \quad \begin{array}{r} 612 \\ 03 \end{array} \quad \begin{array}{r} 312 \\ 11 \end{array} \quad \begin{array}{r} 112 \\ 10 \end{array} + 11010$$

Actul

$$\begin{array}{r} \text{• } 23 \rightarrow (2 \cdot 2) + (3 \cdot 1) = 19 \quad 19 \times 10 = 190 \\ \times 12 \rightarrow (1 \cdot 8) + (2 \cdot 1) = 10 \quad 10 \end{array}$$

$$\begin{array}{r} \cancel{190} \\ \underline{-30} \\ 6 \end{array} \quad \begin{array}{r} 23 \\ \underline{\times 7} \\ 18 \end{array} \quad \begin{array}{r} 2 \\ \underline{\times 2} \\ 0 \end{array} = 276$$

$$74 \rightarrow (8 \cdot 7) + (1 \cdot 4) \rightarrow 60 \quad 60 \times 5 = 300$$

$\times \quad 5 \rightarrow \quad (1 \cdot 5) \rightarrow \quad 5$

$$\begin{array}{r} 300 \\ \underline{+} 18 \\ \hline 318 \end{array} \quad \begin{array}{r} 37 \\ \underline{-} 18 \\ \hline 19 \end{array} \quad \begin{array}{r} 418 \\ \underline{-} 40 \\ \hline 40 \end{array} = 454$$

$$156 \rightarrow (64 \cdot 7) + (3 \cdot 5)(1 \cdot 6) \rightarrow 110$$

$\frac{1}{4}$ $(4 \cdot 1) \rightarrow 4$

$$\begin{array}{r} 110 \\ \times 30 \\ \hline 30 \\ 27,5 \\ \hline \end{array}$$

$$27,5 \quad | \quad 18 \\ 3,5 \quad | \quad 3,4 \\ \hline 3 \quad | \quad 10 = 33,4$$

• 2773 (hexadeimal)

$$\begin{array}{r} \cdot 27 \rightarrow (2 \cdot 16) + (7 \cdot 1) = 47 \\ \times 33 \rightarrow (3 \cdot 16) + (3 \cdot 1) = 59 \end{array} \quad \left. \begin{array}{r} 2773 \\ 59 \end{array} \right\} \quad 2773$$

$$\begin{array}{r} 2773 \longdiv{16} & 173 \longdiv{16} & 10 \longdiv{16} \\ \begin{array}{r} 117 \\ 53 \\ 5 \end{array} & \begin{array}{r} 13 \\ 43 \end{array} & \begin{array}{r} 10 \\ 0 \end{array} \end{array} \rightarrow \text{ADS} \quad \cancel{\text{--}}$$

$$\begin{array}{r} \cdot A9 \rightarrow (10 \cdot 16) + (9 \cdot 1) = 169 \\ \times 17 \rightarrow (1 \cdot 16) + (7 \cdot 1) = 23 \end{array} \quad \left. \begin{array}{r} 169 \\ 23 \end{array} \right\} \quad 3887$$

$$\begin{array}{r} 3887 \longdiv{16} & 242 \longdiv{16} & 15 \longdiv{16} \\ \begin{array}{r} 68 \\ 47 \\ 15 \end{array} & \begin{array}{r} 82 \\ 2 \end{array} & \begin{array}{r} 15 \\ 0 \end{array} \end{array} \rightarrow \text{F2F}$$

$$\begin{array}{r} \cdot 84 \rightarrow (11 \cdot 16) + (4 \cdot 1) \rightarrow 180 \\ \div 5 \rightarrow (5 \cdot 1) \rightarrow 5 \end{array} \quad \left. \begin{array}{r} 180 \\ 30 \\ 0 \end{array} \right\} \quad \frac{5}{36}$$

$$\begin{array}{r} 36 \longdiv{16} & 2 \longdiv{16} \\ \begin{array}{r} 4 \\ 2 \end{array} & \begin{array}{r} 2 \\ 0 \end{array} \end{array} \rightarrow 24 \quad \cancel{\text{--}}$$