

Usamos el sistema base 10 para representar números. Es decir que usamos 10 símbolos diferentes (0 al 9).

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

Si queremos seguir sumando a 9, usamos el 10.

$$10 = 1 \cdot 10^1 + 0 \cdot 10^0$$

Eso quiere decir que la posición del dígito nos indica si contamos unidades, grupos de 10, grupos de 100, etc.

$$\begin{aligned} 572 &= 500 + 70 + 2 \\ &= (5 \cdot 100) + (7 \cdot 10) + (2 \cdot 1) \\ &= (5 \cdot 10^2) + (7 \cdot 10^1) + (2 \cdot 10^0) \end{aligned}$$

Idea: los números son representados con potencias de 10.

Los decimales usan la extensión de esta misma idea a la parte no entera del número:

$$29.17 = \underbrace{29}_{\text{Parte Entera}} + \underbrace{0.17}_{\text{parte Decimal (entre 0 y 1)}}$$

29.17 significa "2 dieces, 9 unos, 1 décimo, 7 centésimos."

$$\begin{aligned} 29.17 &= 20 + 9 + 0.1 + 0.07 \\ &= (2 \cdot 10^1) + (9 \cdot 10^0) + (1 \cdot 10^{-1}) + (7 \cdot 10^{-2}) \end{aligned}$$

Problemas (Personal)

6.1) Calcular las siguientes cantidades:

(a) $2.6 + 3.1$. La idea es la misma que al sumar enteros. Se suman las posiciones correspondientes.

$$\begin{aligned} 2.6 + 3.1 &= 2 \cdot 10^0 + 6 \cdot 10^{-1} + 3 \cdot 10^0 + 1 \cdot 10^{-1} \\ &= (2 \cdot 10^0 + 3 \cdot 10^0) + (6 \cdot 10^{-1} + 1 \cdot 10^{-1}) \\ &= 5 \cdot 10^0 + 7 \cdot 10^{-1} \\ &= \boxed{5.7} \end{aligned}$$

$$\begin{aligned} (b) \quad 13.9 + 2.37 &= 1 \cdot 10^1 + 3 \cdot 10^0 + 9 \cdot 10^{-1} + 2 \cdot 10^0 + 3 \cdot 10^{-1} + 7 \cdot 10^{-2} \\ &= 1 \cdot 10^1 + 5 \cdot 10^0 + \underbrace{12 \cdot 10^{-1}} + 7 \cdot 10^{-2} \end{aligned}$$

Importante: Se desborda, hay una forma más directa de escribirlo: $12 \cdot 10^{-1} = (10 + 2) \cdot 10^{-1} = 10^0 + 2 \cdot 10^{-1} = 1 + 2 \cdot 10^{-1}$

$$= 1 \cdot 10^1 + 5 \cdot 10^0 + 1 \cdot 10^0 + 2 \cdot 10^{-1} + 7 \cdot 10^{-2}$$

$$= 1 \cdot 10^1 + 6 \cdot 10^0 + 2 \cdot 10^{-1} + 7 \cdot 10^{-2}$$

$$= \boxed{16.27}$$

$$(c) \ 0.002 + 0.4 = \boxed{0.402}$$

$$(d) \ 123.8 + 5.2 = \boxed{129}$$

$$(e) \ 3 - 0.27 = \boxed{2.73}$$

$$(f) \ 0.135 - 0.28 = 1 \times 10^{-1} + 3 \times 10^{-2} + 5 \times 10^{-3} - (2 \times 10^{-1} + 8 \times 10^{-2})$$

$$= -1 \times 10^{-1} - 5 \times 10^{-2} + 5 \times 10^{-3}$$

$$= -(1 \times 10^{-1} + 5 \times 10^{-2} - 5 \times 10^{-3})$$

$$= -(1 \times 10^{-1} + 4 \cdot 10^{-2} + 5 \times 10^{-3})$$

$$= \boxed{-0.145}$$

6.2)

$$(a) \ 2.59 \cdot 100 = (2 \times 10^0 + 5 \times 10^{-1} + 9 \times 10^{-2}) \cdot 10^2$$

$$= 2 \times 10^2 + 5 \times 10^1 + 9 \times 10^0$$

$$= \boxed{259.}$$

Idea: al multiplicar por una potencia de 10, se "corre" el punto.

$$(b) \ 36.7 \div 1000 = (3 \times 10^1 + 6 \times 10^0 + 7 \times 10^{-1}) \cdot 10^{-3}$$

$$= 3 \times 10^{-2} + 6 \times 10^{-3} + 7 \times 10^{-4}$$

$$= \boxed{0.0367.}$$

$$(c) \ 0.0028 \cdot 1000 = \boxed{2.8}$$

6.3)

(a) $3.1 \times 5 = 15.5$

$$\begin{array}{r} 3.1 \\ \times 5 \\ \hline 15.5 \end{array}$$

(b) $2.9 \cdot 1.3$

3.77

$$\begin{array}{r} 2.9 \\ \times 1.3 \\ \hline 1.87 \\ 2.9 \\ \hline 3.77 \end{array}$$

(c) $0.002 \cdot 0.003$

$$\begin{aligned} 2 \times 10^{-3} \cdot 3 \times 10^{-3} &= 6 \cdot 10^{-6} \\ &= 0.000006 \\ &0.000006 \end{aligned}$$

(d) $0.11 \cdot 0.15 = (1 \times 10^{-1} + 1 \times 10^{-2}) \cdot (1 \times 10^{-1} + 5 \times 10^{-2})$

$$\begin{array}{r} 0.11 \\ \times 0.15 \\ \hline 0.55 \\ 0.11 \\ \hline 0.0165 \end{array}$$

$$\begin{aligned} &= 1 \times 10^{-2} + 1 \times 10^{-3} + 5 \times 10^{-3} + 5 \times 10^{-4} \\ &= 1 \times 10^{-2} + 6 \times 10^{-3} + 5 \times 10^{-4} \\ &= 0.0165 \quad 0.0165 \end{aligned}$$

Idea: Para revisar si la multiplicación tiene sentido, podemos comprobar que $m \cdot n$ esté entre m^2 y n^2 (si $n > m$).

$$\begin{aligned} (e) \quad 0.48 \div 0.06 &= 48 \times 10^{-2} \div 6 \times 10^{-2} \\ &= 48 \times \frac{1}{10^2} \cdot \frac{1}{6} \cdot 10^2 = 8 \end{aligned}$$

$$\begin{aligned} (f) \quad 0.48 \div 0.6 &= 48 \times 10^{-2} \div 6 \times 10^{-1} \\ &= 48 \cdot \frac{1}{100} \div \left(6 \cdot \frac{1}{10}\right) = \frac{48}{100} \cdot \frac{10}{6} \\ &= \frac{4}{5} = \frac{8}{10} = 8 \times 10^{-1} \\ &= 0.8 \end{aligned}$$

$$\begin{aligned} (g) \quad 0.001 \div 0.0001 &= 1 \times 10^{-3} \div 1 \times 10^{-4} \\ &= \frac{1}{1000} \div \frac{1}{10000} = \frac{1}{1000} \cdot 10000 \\ &= 10 \quad 10 \end{aligned}$$

h) $100 \div 0.25 = 100 \div \frac{1}{4} = 100 \cdot 4 = 400$

$$\begin{array}{r} 17 \\ \times 17 \\ \hline 119 \\ 17 \\ \hline 289 \end{array}$$

6.4) $0.5, 0.505, 0.55, 0.555, 0.06, 0.6, 0.65, 0.66, 0.005$

De mayor a menor: $0.65, 0.6, 0.56, 0.555, 0.55, 0.505, 0.5, 0.06, 0.005$

6.5) (a) $(0.2)^2 = (2 \times 10^{-1})^2 = 4 \times 10^{-2} = 0.04 \quad 0.04$

(b) $(1.7)^2 = (17 \times 10^{-1})^2 = 289 \times 10^{-2} = 2.89 \quad 2.89$

$$(c) \frac{1}{(0.2)} = 1 \div \frac{1}{5} \approx 1.5 = 5 \quad (d) (0.03)^3 = (3 \times 10^{-2})^3$$

$$= 27 \times 10^{-6}$$

$$= 0.00027$$

Ejercicios

6.1.1) 0.99, 0.9099, 0.9, 0.909, 0.9009

5 4 1 3 2

6.1.2) 0.54321. 5

6.1.3) (a) $0.4 + 0.02 + 0.006 = 0.426$

(b) $0.92 + 0.093 = 1.013$

$$\begin{array}{r} 0.920 \\ + 0.093 \\ \hline 1.013 \end{array}$$

(c) $0.0006 - 0.002$

$-(0.002 - 0.0006)$

$$\begin{array}{r} 0.0020 \\ - 0.0006 \\ \hline 0.0014 \end{array} \quad -0.0014$$

6.1.4)

(a) $23.879 \cdot 100 = 2387.9$

(b) $2 \div 10^5 = 2 \cdot 10^{-5} = 0.00002$

(c) $1.6 \div 400 = 16 \times 10^{-1} \cdot \frac{1}{4 \cdot 10^2}$

$$= 4 \times 10^{-1} \cdot 10^{-2}$$

$$= 4 \times 10^{-3} = 0.004$$

0.004

(f) $1.01 \cdot 3.03 = 101 \times 10^{-2} \cdot (303 \times 10^{-2})$

$$= 30603 \times 10^{-4}$$

$$= 3.0603$$

(c) $1.28 - 0.377$

$$\begin{array}{r} 0.71 \\ 1.280 \\ - 0.377 \\ \hline 0.903 \end{array} \quad 0.903$$

(d) $8 - 1.001$

$$\begin{array}{r} 7.999 \\ 8.000 \\ - 1.001 \\ \hline 6.999 \end{array} \quad 6.999$$

(f) $1.1 - 0.11 + 0.011$

$1.1 + 0.011 - 0.11$

$$1.111 - 0.11 = \begin{array}{r} 1.111 \\ - 0.110 \\ \hline 1.001 \end{array}$$

(d) $0.0031 \cdot 10^6 = 3100$

3100

(e) $3.6 \div 0.09 = 36 \times 10^{-1} \div (9 \times 10^{-2})$

$$= 36 \times 10^{-1} \cdot \frac{1}{9} \cdot 10^2$$

$$= 4 \times 10^1 = 40$$

$$\begin{array}{r} 303 \\ \times 101 \\ \hline 303 \\ 060 \\ 303 \\ \hline 30603 \end{array}$$

$$6.1.5) (250 + 25 + 2.5 + 0.25 + 0.025) \div (50 + 5 + 0.5 + 0.05 + 0.005)$$

$$25 \times 10^1 + 25 \times 10^0 + 25 \times 10^{-1} + 25 \times 10^{-2} + 25 \times 10^{-3} \div (5 \times 10^1 + 5 \times 10^0 + 5 \times 10^{-1} + 5 \times 10^{-2} + 5 \times 10^{-3})$$

$$= 25 (10^1 + 10^0 + 10^{-1} + 10^{-2} + 10^{-3}) \div 5 (10^1 + 10^0 + 10^{-1} + 10^{-2} + 10^{-3})$$

$$= 5$$

$$6.1.6) X = 0.\underbrace{00 \dots 00}_\text{5000 zeros} 1$$

$$2+x, 2-x, 2x, \frac{2}{x}, \frac{x}{2}$$

$$X = 10^{-5001} = \frac{1}{10^{5001}}$$

$$⑤ \cdot \frac{2}{x} = 2 \cdot 10^{5001}$$

$$② \cdot 2x = \frac{2}{10^{5001}}$$

$$\frac{x}{2}, 2x, 2-x, 2+x, \frac{2}{x}$$

$$① \cdot \frac{x}{2} = \frac{1}{10^{5001}} \cdot \frac{1}{2} = \frac{1}{2 \times 10^{5001}}$$

$$④ \cdot 2+x = 2 + \frac{1}{10^{5001}}$$

$$③ \cdot 2-x = 2 - \frac{1}{10^{5001}}$$

6.1.7)

$$0.075 \cdot 2.56 = 75 \cdot 256 \cdot 10^{-3} \cdot 10^{-2} = 19200 \cdot 10^{-5}$$

$$75 \cdot 256 = 19200 \quad \quad \quad = 0.192$$

6.1.8)

$$1000 \cdot 1993 \cdot 0.1993 \cdot 10 = 1993 \cdot 0.1993 \times 10^4$$

$$= 1993 \cdot 1993 \times 10^{-4} \times 10^4$$

$$= 1993^2$$

$$\cdot 1.993 \cdot 10^3 = 1993 \text{ No}$$

$$\cdot 1993.1993 \text{ No}$$

$$\cdot (199.3)^2 \text{ No}$$

$$\cdot 10$$

$$(1993)^2$$

6.1.9)

$$0.0481 \cdot 10^{-4} = 4.81 \cdot 10^{-6}$$

$$0.0481 \cdot 10^{-4} = 10^{-4} \cdot 10^{-2} \cdot 4.81$$

$$= 4.81 \cdot 10^{-6} \quad N = 10^{-6}$$

6.1.10)

$$X \cdot 10^1 = (X \cdot 10^{-1}) + 33.66$$

$$10X = \frac{X}{10} + 3366 \times 10^{-2}$$

$$\left(10^{-1} \frac{1}{10}\right) = 3366 \times 10^{-2}$$

$$X \left(\frac{99}{10}\right) = 3366 \cdot 10^{-2}$$

$$X = 3.4$$

$$X = \frac{3366 \cdot 10^{-2} \cdot 10^1}{99}$$

$$X = 34 \cdot 10^{-1}$$