

FRACCIONES

Problema 6:

Resolver:

$$\frac{0,5 \times \left[\frac{1}{2} + \left(\frac{2}{3} - 0,0[6] \right) : 2 \right] : \frac{1}{2,5}}{\left(\frac{3, [5] - 1,8[3]}{9, [7] - 6, [4]} \times \frac{1}{71} \right) : \frac{3,1 \times 0,1[01]}{2, [15]}}$$

Solución Problema 6:

Hallamos las fracciones generatrices de los números decimales exactos: 0,5; 2,5 y 3,1

$$0,5 = \frac{5}{10} = \frac{5}{2 \times 5} = \frac{1}{2}$$

$$2,5 = \frac{25}{10} = \frac{5 \times 5}{2 \times 5} = \frac{5}{2}$$

$$3,1 = \frac{31}{10}$$

Hallamos la fracción generatriz de las expresiones decimales periódicas mixtas que tiene la parte entera nula: $0,0[6]$; $0,1[01]$;

$0,0[6]$

$$f = 0,0666666 \dots$$

$$10f = 0,666666 \dots$$

$$100f = 6,666666 \dots$$

$$100f - 10f = 6,666666 \dots - 0,666666 \dots = 6$$

$$90f = 6$$

$$f = \frac{6}{90} = \frac{6}{6 \times 15} = \frac{1}{15} = 0,0666666 \dots$$

$0,1[01]$

$$f = 0,1010101 \dots$$

$$10f = 1,010101 \dots$$

$$1000f = 101,010101 \dots$$

$$1000f - 10f = 101,010101 \dots - 1,010101 \dots = 100$$

$$990f = 100$$

$$f = \frac{100}{990} = \frac{10}{99} = 0,1010101 \dots$$

Hallamos la fracción generatriz de las expresiones decimales periódicas puras que tiene la parte entera > 1 : $3,[5]$; $1,8[3]$; $9,[7]$; $6,[4]$; y $2,[15]$:

En este caso la fracción generatriz se compondrá de la parte entera, más el quebrado equivalente a la parte decimal

$3, [5]$

$$f = 3 + 0,555555 \dots$$

Calculamos el quebrado correspondiente a la parte decimal

$$q = 0,555555 \dots$$

$$10q = 5,555555 \dots$$

$$10q - q = 5,555555 \dots - 0,555555 \dots = 5$$

$$9q = 5$$

$$q = \frac{5}{9} = 0,555555 \dots$$

$$f = 3 + \frac{5}{9} = \frac{27 + 5}{9} = \frac{32}{9} = 3,555555$$

$1,8[3]$

$$f = 1 + 0,8333333 \dots$$

Calculamos el quebrado correspondiente a la parte decimal

$$q = 0,8333333 \dots$$

$$10q = 8,333333 \dots$$

$$100q = 83,333333 \dots$$

$$100q - 10q = 83,333333 \dots - 8,333333 \dots = 75$$

$$90q = 75$$

$$q = \frac{75}{90} = \frac{15}{18} = 0,8333333 \dots$$

$$f = 1 + \frac{15}{18} = \frac{18 + 15}{18} = \frac{\mathbf{33}}{\mathbf{18}} = 1,8333333 \dots$$

9, [7]

$$f = 9 + 0,777777 \dots$$

Calculamos el quebrado correspondiente a la parte decimal

$$q = 0,777777 \dots$$

$$10q = 7,777777 \dots$$

$$10q - q = 7,777777 \dots - 0,777777 \dots = 7$$

$$9q = 7$$

$$q = \frac{7}{9} = 0,777777 \dots$$

$$f = 9 + \frac{7}{9} = \frac{81 + 7}{9} = \frac{\mathbf{88}}{\mathbf{9}} = 9,777777$$

6, [4]

$$f = 6 + 0,444444 \dots$$

Calculamos el quebrado correspondiente a la parte decimal

$$q = 0,444444 \dots$$

$$10q = 4,444444 \dots$$

$$10q - q = 4,444444 \dots - 0,444444 \dots = 4$$

$$9q = 4$$

$$q = \frac{4}{9} = 0,444444 \dots$$

$$f = 6 + \frac{4}{9} = \frac{54 + 4}{9} = \frac{58}{9} = 6,444444 \dots$$

2, [15]

$$f = 2 + 151515 \dots$$

Calculamos el quebrado correspondiente a la parte decimal

$$q = 0,151515 \dots$$

$$100q = 15,151515 \dots$$

$$100q - q = 15,151515 \dots - 0,151515 \dots$$

$$= 15$$

$$99q = 15$$

$$q = \frac{15}{99} = 0,151515 \dots$$

$$f = 2 + \frac{15}{99} = \frac{198 + 15}{99} = \frac{213}{99} = 2,151515$$

Una vez terminados los cálculos previos los sustituimos en el problema:

$$\frac{\frac{1}{2} \times \left[\frac{1}{2} + \left(\frac{2}{3} - \frac{1}{5} \right) : 2 \right] : \frac{1}{\frac{2}{5}}}{\left(\frac{\frac{32}{9} - \frac{33}{18} \times \frac{1}{71}}{\frac{88}{9} - \frac{58}{9}} \right) : \frac{\frac{31}{10} \times \frac{10}{99}}{\frac{213}{99}}}$$

$$\frac{\frac{1}{2} \times \left[\frac{1}{2} + \left(\frac{10 - 1}{15} \right) : 2 \right] : \frac{2}{5}}{\left(\frac{\frac{32}{9} - \frac{33}{18} \times \frac{1}{71}}{\frac{88}{9} - \frac{58}{9}} \right) : \frac{\frac{31}{10} \times \frac{10}{99}}{\frac{213}{99}}}$$

$$\frac{\frac{1}{2} \times \left[\frac{1}{2} + \left(\frac{9}{15} \right) : 2 \right] : \frac{2}{5}}{\left(\frac{\frac{64 - 33}{18}}{\frac{30}{9}} \times \frac{1}{71} \right) : \frac{31}{213}}$$

$$\frac{\frac{1}{2} \times \left[\frac{1}{2} + \left(\frac{3}{5} \right) : 2 \right] : \frac{2}{5}}{\left(\frac{\frac{31}{18}}{\frac{10}{3}} \times \frac{1}{71} \right) : \frac{31}{213}}$$

$$\frac{\frac{1}{2} \times \left[\frac{1}{2} + \frac{3}{10} \right] : \frac{2}{5}}{\left(\frac{31 \times 3}{10 \times 18} \times \frac{1}{71} \right) : \frac{31}{213}}$$

$$\frac{\frac{1}{2} \times \left[\frac{5 + 3}{10} \right] : \frac{2}{5}}{\left(\frac{31}{10 \times 6 \times 71} \right) : \frac{31}{213}}$$

$$\frac{\frac{1 \times 8 \times 5}{2 \times 10 \times 2}}{\frac{\cancel{31} \times 213}{10 \times 6 \times 71 \times \cancel{31}}}$$

$$\frac{\frac{40}{40}}{213} \\ \frac{1}{10 \times 6 \times 71}$$

$$\frac{1}{213} \\ \frac{1}{10 \times 6 \times 71}$$

$$\frac{10 \times 6 \times 71}{213} = \frac{4260}{213} = \mathbf{20}$$