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29 **Reduce:**

a) $\frac{2}{3} \cdot \left(\frac{3}{4} - \frac{1}{2}\right) - \frac{1}{6} \cdot \left(\frac{5}{6} - \frac{1}{3}\right)$ b) $5 : \left(\frac{2}{4} + 1\right) - 3 : \left(\frac{1}{2} - \frac{1}{4}\right)$

a) $\frac{2}{3} \cdot \left(\frac{3}{4} - \frac{1}{2}\right) - \frac{1}{6} \cdot \left(\frac{5}{6} - \frac{1}{3}\right) = \frac{2}{3} \cdot \frac{1}{4} - \frac{1}{6} \cdot \frac{3}{6} = \frac{2}{3} \cdot \frac{1}{4} - \frac{1}{6} \cdot \frac{1}{2} =$

$= \frac{2}{12} - \frac{1}{12} = \frac{1}{12}$

b) $5 : \left(\frac{2}{4} + 1\right) - 3 : \left(\frac{1}{2} - \frac{1}{4}\right) = 5 : \frac{3}{2} - 3 : \frac{1}{4} = \frac{10}{3} - \frac{12}{1} = \frac{10}{3} - \frac{36}{3} = \frac{-26}{3}$

30 **Reduce a una fracción:**

a) $\dfrac{1 + \frac{1}{2}}{1 - \frac{1}{2}}$ b) $\dfrac{3 - \frac{5}{3}}{3 + \frac{5}{3}}$ c) $\dfrac{\frac{1}{4} - \frac{3}{5}}{\frac{7}{10} - \frac{3}{4}}$

a) $\dfrac{1 + \frac{1}{2}}{1 - \frac{1}{2}} = \dfrac{\frac{3}{2}}{\frac{1}{2}} = 3$ b) $\dfrac{3 - \frac{5}{3}}{3 + \frac{5}{3}} = \dfrac{\frac{4}{3}}{\frac{14}{3}} = \frac{4}{14} = \frac{2}{7}$

c) $\dfrac{\frac{1}{4} - \frac{3}{5}}{\frac{7}{10} - \frac{3}{4}} = \dfrac{\frac{5}{20} - \frac{12}{20}}{\frac{14}{20} - \frac{15}{20}} = \dfrac{\frac{-7}{20}}{\frac{-1}{20}} = 7$

31 **Comprueba que el resultado de estas operaciones es un número entero:**

a) $\left(\frac{1}{6} - 1\right) \cdot \left(3 - \frac{2}{5}\right) - \left(\frac{1}{3} - \frac{1}{2}\right)$ b) $2 : \left(\frac{1}{6} + \frac{1}{2}\right) - 3 : \left(1 + \frac{1}{2}\right)$

c) $-\frac{3}{8} \cdot \left[1 - \frac{3}{5} - \left(\frac{17}{20} - 1\right) \cdot \left(\frac{1}{3} - 3\right)\right]$

d) $\left[\left(\frac{2}{3} - \frac{1}{9}\right) + 13\left(\frac{2}{3} - 1\right)^2\right] : \left(\frac{1}{3} - 1\right)$

a) $\left(\frac{1}{6} - 1\right) \cdot \left(3 - \frac{2}{5}\right) - \left(\frac{1}{3} - \frac{1}{2}\right) = \frac{-5}{6} \cdot \frac{13}{5} - \left(\frac{-1}{6}\right) = \frac{-13}{6} + \frac{1}{6} = \frac{-12}{6} = -2$

b) $2 : \left(\frac{1}{6} + \frac{1}{2}\right) - 3 : \left(1 + \frac{1}{2}\right) = 2 : \frac{4}{6} - 3 : \frac{3}{2} = 3 - 2 = 1$

c) $\frac{-3}{8} \cdot \left[1 - \frac{3}{5} - \left(\frac{17}{20} - 1\right) \cdot \left(\frac{1}{3} - 3\right)\right] = \frac{-3}{8} \cdot \left[\frac{2}{5} - \left(\frac{-3}{20}\right) \cdot \left(\frac{-8}{3}\right)\right] =$

$= \frac{-3}{8} \cdot \left[\frac{2}{5} - \frac{8}{20}\right] = \frac{-3}{8} \cdot \left[\frac{2}{5} - \frac{2}{5}\right] = 0$

d) $\left[\left(\frac{2}{3} - \frac{1}{9}\right) + 13\left(\frac{2}{3} - 1\right)^2\right] : \left(\frac{1}{3} - 1\right) = \left[\frac{5}{9} + 13 \cdot \frac{1}{9}\right] : \left(\frac{-2}{3}\right) = \frac{18}{9} : \frac{-2}{3} =$

$= 2 : \frac{-2}{3} = \frac{6}{-2} = -3$

32 **Calcula las siguientes potencias:**

a) $(-2)^4$ **b)** $(-2)^3$ **c)** -2^2

d) -2^{-3} **e)** $(-2)^{-2}$ **f)** $(-2)^{-3}$

a) $(-2)^4 = 16$ b) $(-2)^3 = -8$ c) $-2^2 = -4$

d) $-2^{-3} = -1/8$ e) $(-2)^{-2} = \frac{1}{(-2)^2} = \frac{1}{4}$ f) $(-2)^{-3} = \frac{1}{(-2)^3} = \frac{-1}{8}$

33 **¿A qué número entero es igual cada una de estas potencias?**

a) 1^{-37} **b)** $(-1)^{-7}$ **c)** $\left(\frac{1}{2}\right)^{-2}$

d) $\left(-\frac{1}{2}\right)^{-4}$ **e)** $\left(-\frac{1}{3}\right)^{-4}$ **f)** $\left(\frac{4}{5}\right)^{0}$

a) $1^{-37} = 1$ b) $(-1)^{-7} = -1$ c) $\left(\frac{1}{2}\right)^{-2} = 2^2 = 4$

d) $\left(-\frac{1}{2}\right)^{-4} = (-2)^4 = 16$ e) $\left(-\frac{1}{3}\right)^{-4} = (-3)^4 = 81$ f) $\left(\frac{4}{5}\right)^{0} = 1$

34 **Escribe en forma de potencia de base 2 ó 3:**

a) 128 **b)** 729 **c)** $\frac{1}{64}$ **d)** $-\frac{1}{27}$ **e)** $\frac{1}{3}$

a) $128 = 2^7$ b) $729 = 3^6$ c) $\frac{1}{64} = \frac{1}{2^6} = 2^{-6}$

d) $-\frac{1}{27} = -\frac{1}{3^3} = -3^{-3}$ e) $\frac{1}{3} = 3^{-1}$

35 **Expresa con potencias de base 10:**

a) 1 000 000 **b)** mil millones **c)** 0,00001

d) una milésima **e)** 0,000000001 **f)** una millonésima

a) 10^6 b) 10^9 c) 10^{-5} d) 10^{-3} e) 10^{-9} f) 10^{-6}

36 **Expresa como potencia única:**

a) $\left(\frac{2}{5}\right)^2 : \left(\frac{2}{5}\right)^{-1}$ b) $\left(\frac{1}{2}\right)^3 : \left(\frac{1}{2}\right)^5$ c) $\frac{3^5 \cdot 3^{-7}}{3^2}$

d) $(2^2 \cdot 2^{-3})^{-4}$ e) $\frac{2^4 \cdot 4^{-2}}{8^2}$ f) $\frac{2^{-5} \cdot 4^2 \cdot 3^2}{2^3 \cdot 9^{-1}}$

a) $\left(\frac{2}{5}\right)^2 : \left(\frac{2}{5}\right)^{-1} = \left(\frac{2}{5}\right)^1 = \frac{2}{5}$ b) $\left(\frac{1}{2}\right)^3 : \left(\frac{1}{2}\right)^5 = \left(\frac{1}{2}\right)^{-2} = 2^2 = 4$

c) $\frac{3^5 \cdot 3^{-7}}{3^2} = 3^{-4} = \frac{1}{3^4} = \frac{1}{81}$ d) $(2^2 \cdot 2^{-3})^{-4} = (2^{-1})^{-4} = 2^4 = 16$

e) $\frac{2^4 \cdot 4^{-2}}{8^2} = \frac{2^4 \cdot 2^{-4}}{2^6} = \frac{1}{2^6} = 2^{-6} = \frac{1}{64}$

f) $\frac{2^{-5} \cdot 4^2 \cdot 3^2}{2^3 \cdot 9^{-1}} = \frac{2^{-5} \cdot 2^4 \cdot 3^2}{2^3 \cdot 3^{-2}} = 2^{-4} \cdot 3^4 = \frac{3^4}{2^4} = \left(\frac{3}{2}\right)^4 = \frac{81}{16}$

37 **Reduce:**

a) $\frac{-3^2}{(-3)^2}$ b) $\left(\frac{2}{5}\right)^2 : \left(\frac{2}{5}\right)^3$ c) $\left(\frac{2}{3}\right)^2 \cdot \left(\frac{-3}{2}\right)^4$

d) $\frac{3 \cdot (-3)^2 \cdot 4^2}{6^3 \cdot 9^2}$ e) $\left(\frac{1}{3}\right)^3 : \left(\frac{1}{4}\right)^2$ f) $\left[\left(\frac{1}{2}\right)^3\right]^2$

a) $\frac{-3^2}{(-3)^2} = \frac{-3^2}{3^2} = -1$

b) $\left(\frac{2}{5}\right)^2 : \left(\frac{2}{5}\right)^3 = \left(\frac{2}{5}\right)^{-1} = \frac{5}{2}$

c) $\left(\frac{2}{3}\right)^2 \cdot \left(\frac{-3}{2}\right)^4 = \frac{2^2}{3^2} \cdot \frac{3^4}{2^4} = \frac{3^2}{2^2} = \frac{9}{4}$

d) $\frac{3 \cdot (-3)^2 \cdot 4^2}{6^3 \cdot 9^2} = \frac{3 \cdot 3^2 \cdot 2^4}{2^3 \cdot 3^3 \cdot 3^4} = \frac{2}{3^4} = \frac{2}{81}$

e) $\left(\frac{1}{3}\right)^3 : \left(\frac{1}{4}\right)^2 = \frac{1}{27} : \frac{1}{16} = \frac{16}{27}$

f) $\left[\left(\frac{1}{2}\right)^3\right]^2 = \left(\frac{1}{2}\right)^6 = \frac{1}{2^6} = \frac{1}{64}$

38 **Simplifica:**

a) $\frac{2^3 \cdot (-3)^2 \cdot 4^2}{6^3 \cdot 9^2}$ b) $\frac{2^{-4} \cdot 4^2 \cdot 3 \cdot 9^{-1}}{2^{-5} \cdot 8 \cdot 9 \cdot 3^2}$

a) $\dfrac{2^3 \cdot (-3)^2 \cdot 4^2}{6^3 \cdot 9^2} = \dfrac{2^3 \cdot 3^2 \cdot 2^4}{2^3 \cdot 3^3 \cdot 3^4} = \dfrac{2^4}{3^5} = \dfrac{16}{243}$

b) $\dfrac{2^{-4} \cdot 4^2 \cdot 3 \cdot 9^{-1}}{2^{-5} \cdot 8 \cdot 9 \cdot 3^2} = \dfrac{2^{-4} \cdot 2^4 \cdot 3 \cdot 3^{-2}}{2^{-5} \cdot 2^3 \cdot 3^2 \cdot 3^2} = \dfrac{2^2}{3^5} = \dfrac{4}{243}$

39 **Calcula:**

a) $\left[\left(\dfrac{1}{2} - 1\right)^3\right]^2$ **b)** $\left[\left(\dfrac{1}{6} - \dfrac{2}{3}\right)^{-1}\right]^{-5}$ **c)** $\left(\dfrac{3}{2} - \dfrac{3}{4}\right)^{-2} \cdot \left(\dfrac{1}{3} - \dfrac{7}{9}\right)^{-1}$

a) $\left[\left(\dfrac{1}{2} - 1\right)^3\right]^2 = \left(-\dfrac{1}{2}\right)^6 = \dfrac{1}{2^6} = \dfrac{1}{64}$

b) $\left[\left(\dfrac{1}{6} - \dfrac{2}{3}\right)^{-1}\right]^{-5} = \left(-\dfrac{3}{6}\right)^5 = \left(-\dfrac{1}{2}\right)^5 = \dfrac{-1}{32}$

c) $\left(\dfrac{3}{2} - \dfrac{3}{4}\right)^{-2} \cdot \left(\dfrac{1}{3} - \dfrac{7}{9}\right)^{-1} = \left(\dfrac{3}{4}\right)^{-2} \cdot \left(\dfrac{-4}{9}\right)^{-1} = \left(\dfrac{4}{3}\right)^2 \cdot \left(\dfrac{-9}{4}\right) = \dfrac{16}{9} \cdot \dfrac{-9}{4} = -4$

40 **Calcula pasando a fracción:**

a) $0,\widehat{4} + 0,\widehat{3} + 0,\widehat{2}$ **b)** $3,0\widehat{7} - 1,6\widehat{7}$ **c)** $0,\widehat{7} + 1,\widehat{23}$ **d)** $0,3\widehat{6} - 1,\widehat{2}$

a) $0,\widehat{4} + 0,\widehat{3} + 0,\widehat{2} = \dfrac{4}{9} + \dfrac{3}{9} + \dfrac{2}{9} = \dfrac{9}{9} = 1$

b) $3,0\widehat{7} - 1,6\widehat{7} = \dfrac{277}{90} - \dfrac{151}{90} = \dfrac{126}{90} = \dfrac{7}{5} = 1,4$

c) $0,\widehat{7} - 1,\widehat{23} = \dfrac{7}{9} + \dfrac{122}{99} = \dfrac{77}{99} + \dfrac{122}{99} = \dfrac{199}{99} = 2,\widehat{01}$

d) $0,3\widehat{6} - 1,\widehat{2} = \dfrac{33}{90} - \dfrac{11}{9} = \dfrac{33}{90} - \dfrac{110}{90} = \dfrac{-77}{90} = -0,8\widehat{5}$

41 **Calcula:**

a) $\dfrac{4}{3} - (0,75 + 0,\widehat{6}) + \dfrac{13}{12}$ **b)** $\left(\dfrac{5}{6} + 0,1\widehat{6}\right)\left(-\dfrac{4}{3}\right) - \dfrac{65}{8}\left(0,\widehat{6} + 0,2 - \dfrac{1}{3}\right)$

a) $\dfrac{4}{3} - (0,75 + 0,\widehat{6}) + \dfrac{13}{12} = \dfrac{4}{3} - \left(\dfrac{3}{4} + \dfrac{2}{3}\right) + \dfrac{13}{12} = \dfrac{16}{12} - \left(\dfrac{9}{12} + \dfrac{8}{12}\right) + \dfrac{13}{12} =$

$= \dfrac{16}{12} - \dfrac{17}{12} + \dfrac{13}{12} = \dfrac{12}{12} = 1$

b) $\left(\dfrac{5}{6} + 0,1\widehat{6}\right)\left(-\dfrac{4}{3}\right) - \dfrac{65}{8}\left(0,\widehat{6} + 0,2 - \dfrac{1}{3}\right) =$

$= \left(\dfrac{5}{6} + \dfrac{1}{6}\right) \cdot \left(-\dfrac{4}{3}\right) - \dfrac{65}{8}\left(\dfrac{2}{3} + \dfrac{1}{5} - \dfrac{1}{3}\right) = -\dfrac{4}{3} - \dfrac{65}{8}\left(\dfrac{1}{3} + \dfrac{1}{5}\right) =$

$= -\dfrac{4}{3} - \dfrac{65}{8}\left(\dfrac{5}{15} + \dfrac{3}{15}\right) = -\dfrac{4}{3} - \dfrac{65}{8} \cdot \dfrac{8}{15} = -\dfrac{4}{3} - \dfrac{65}{15} = -\dfrac{4}{3} - \dfrac{13}{3} = \dfrac{-17}{3}$