Boletín Polinomios IV – Matemáticas 4º ESO

Ejemplos de Operaciones con Fracciones Algebraicas

a. $\dfrac{x+1}{x^2+3x} \times \dfrac{x+3}{3x} = \dfrac{(x+1)\cdot(x+3)}{(x^2+3x)\cdot 3x} = \dfrac{(x+1)\cdot(x+3)}{x\cdot(x+3)\cdot 3x} = \dfrac{x+1}{3x^2}$

b. $\dfrac{3}{x+3} \div \dfrac{2x}{2x^2-18} = \dfrac{3\cdot(2x^2-18)}{2x\cdot(x+3)} = \dfrac{3\cdot 2(x^2-9)}{2x\cdot(x+3)} = \dfrac{3\cdot 2(x+3)(x-3)}{2x\cdot(x+3)} = \dfrac{3\cdot(x-3)}{x} = \dfrac{3x-9}{x}$

c.
$\dfrac{2x}{x+3} - 5 + \dfrac{x^2}{2x^2-18} = \dfrac{2\cdot(x-3)\cdot 2x}{2\cdot(x+3)\cdot(x-3)} - \dfrac{5\cdot 2\cdot(x+3)\cdot(x-3)}{2\cdot(x+3)\cdot(x-3)} + \dfrac{x^2}{2\cdot(x+3)\cdot(x-3)} =$

$\left.\begin{array}{l} x+3 = x+3 \\ 2x^2-18 = 2\cdot(x+3)\cdot(x-3) \end{array}\right\}$ m.c.m. $= 2\cdot(x+3)\cdot(x-3)$

$= \dfrac{4x^2-12x}{2\cdot(x+3)\cdot(x-3)} - \dfrac{10x^2-90}{2\cdot(x+3)\cdot(x-3)} + \dfrac{x^2}{2\cdot(x+3)\cdot(x-3)} = \dfrac{14x^2-12x-90}{2x^2-18} = \dfrac{7x^2-6x-45}{x^2-9}$

d.
$\dfrac{2x}{2x^2+3x+1} - \dfrac{x+2}{x-2} = \dfrac{2x\cdot(x-2)}{(x+1)\cdot(2x+1)\cdot(x-2)} - \dfrac{(x+1)\cdot(2x+1)\cdot(x+2)}{(x+1)\cdot(2x+1)\cdot(x-2)} =$

$\left.\begin{array}{l} 2x^2+3x+1 = (x+1)\cdot(2x+1) \\ x-2 = x-2 \end{array}\right\}$ m.c.m. $= (x+1)\cdot(2x+1)\cdot(x-2)$

$= \dfrac{2x^2-4x}{(x+1)\cdot(2x+1)\cdot(x-2)} - \dfrac{6x^3+7x^2+7x+2}{(x+1)\cdot(2x+1)\cdot(x-2)} = \dfrac{-6x^3-7x^2-11x-2}{(x+1)\cdot(2x+1)\cdot(x-2)} = \dfrac{-6x^3-7x^2-11x-2}{2x^3-x^2-5x-2}$

e.
$\dfrac{1}{x+2} - \dfrac{2}{x-2} = \dfrac{(x-2)}{(x+2)\cdot(x-2)} - \dfrac{2\cdot(x+2)}{(x+2)\cdot(x-2)} = \dfrac{x-2}{(x+2)\cdot(x-2)} - \dfrac{2x+4}{(x+2)\cdot(x-2)} =$

$\left.\begin{array}{l} x+2 = x+2 \\ x-2 = x-2 \end{array}\right\} \rightarrow$ m.c.m. $= (x+2)\cdot(x-2)$

$= \dfrac{x-2-2x-4}{(x+2)\cdot(x-2)} = \dfrac{-x-6}{x^2-4}$

f. $\dfrac{x}{x^2-4x+4} - \dfrac{x+1}{x-2} = \dfrac{x}{(x-2)^2} - \dfrac{x+1}{x-2} = \dfrac{x-(x+1)(x-2)}{(x-2)^2} = \dfrac{x-x^2+2x-x+2}{(x-2)^2} = \dfrac{-x^2+2x+2}{(x-2)^2}$

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Ejemplo

$$\frac{15y^2z - 10z^3y^3}{5y^2z^2 + 20z^2y} = \left(\frac{5y^2z}{5yz^2}\right) \cdot \left(\frac{3 - 2z^2y}{y + 4z^2}\right) = \left(\frac{y}{z}\right) \cdot \left(\frac{3 - 2z^2y}{y + 4z^2}\right)$$

2. Simplifica las siguientes fracciones algebraicas..

    a. $\dfrac{3x + 3}{5x + 5}$

    b. $\dfrac{3x^2 + 15x}{6x^2 + 30x}$

    c. $\dfrac{3x^3 - 9x^2}{3x^3 - 6x^2}$

    d. $\dfrac{x^3 - x^2}{x^2 - 2x + 1}$

    e. $\dfrac{2a^2b - ab^2}{2a^2b + ab^2}$

    f. $\dfrac{x^2 - 9}{x^2 + 5x + 6}$

3. Opera y simplifica. Calcula el común denominador, si es su caso, utilizando el método de Ruffini.

    a. $\dfrac{5x + 10}{x} \cdot \dfrac{x}{3x + 6}$

    b. $\dfrac{5x}{x + 4} \div \dfrac{10x^2}{x + 4}$

    c. $\dfrac{2}{3x} + \dfrac{x - 2}{x^2} - \dfrac{x + 1}{x^3}$

    d. $\dfrac{x - 1}{x^2} + \dfrac{1}{2x} - \dfrac{5}{x - 4}$

    e. $\dfrac{x}{x - 3} + \dfrac{3}{x + 3} - \dfrac{1}{x^2 - 9}$

    f. $\dfrac{9x - 3}{3x} \div \dfrac{6x - 2}{9x + 3}$

    g. $\left(1 + \dfrac{a}{1 - a}\right) \cdot \left(1 - \dfrac{a}{1 + a}\right)$

    h. $\left(\dfrac{1}{x^2} + \dfrac{2}{x} + 1\right) \div \left(\dfrac{2}{x} + 3 + x\right)$

    i. $\left(\dfrac{1}{x - 1} - \dfrac{2x}{x^2 - 1}\right) \div \dfrac{x}{x + 1}$

    j. $\dfrac{2}{x^2 + x - 6} + \dfrac{3}{x^2 - 4x + 4}$

    k. $\dfrac{2}{7} - \dfrac{3}{7}\left(\dfrac{x + 7}{x - 1}\right) + \dfrac{x}{14} - \dfrac{1}{7} \div \left(\dfrac{x - 1}{x + 5}\right)$

    l. $\left(\dfrac{b}{b - 1} + \dfrac{b}{b + 1}\right) \div \left(1 + \dfrac{1}{b^2 - 1}\right)$

    m. $\dfrac{b + 1}{b} \div \left(\dfrac{1}{b - 1} - \dfrac{2b}{b^2 - 1}\right)$

    n. $\left(x - \dfrac{2x^2 + 3}{5x}\right)\left(\dfrac{x}{1 + x} - \dfrac{x}{1 - x}\right)$

    o. $\dfrac{1}{a} \div \left(\dfrac{a + 3}{a + 1} - 3\right)$

    p. $\left(\dfrac{2}{a - 1} + \dfrac{2}{a + 1}\right) \div \left(\dfrac{2}{a + 1} - \dfrac{2}{a - 1}\right)$

    q. $\left(\dfrac{3x - 6}{3x} \cdot \dfrac{1}{3x^2 - 36}\right) \div \dfrac{1}{9x^2 - 18x}$