

Resolución de ecuaciones fraccionarias con denominadores monomios

$$1. \frac{x}{6} + 5 = \frac{1}{3} - x$$

$$\Rightarrow \frac{x+30}{6} = \frac{1-3x}{3}$$

$$x+30 = 2(1-3x)$$

$$x+30 = 2 - 6x$$

$$x+6x = 2 - 30$$

$$7x = -28$$

$$x = \frac{-28}{7}$$

$$x = -4$$

$$2. \frac{3x}{5} - \frac{2x}{3} + \frac{1}{5} = 0 \quad mcm=15$$

$$9x - 10x + 3 = 0$$

$$-x = -3$$

$$x = 3$$

$$3. \frac{1}{2x} + \frac{1}{4} - \frac{1}{10x} = \frac{1}{5} \quad mcm=20x$$

$$10 + 5x - 2 = 4x$$

$$5x - 4x = -10 + 2$$

$$x = -8$$

$$4. \frac{x}{2} + 2 - \frac{x}{12} = \frac{x}{6} - \frac{5}{4} \quad mcm=12$$

$$6x + 24 - x = 2x - 15$$

$$6x - x - 2x = -15 - 24$$

$$3x = -39$$

$$x = \frac{-39}{3}$$

$$x = -13$$

$$5. \frac{3x}{4} - \frac{1}{5} + 2x = \frac{5}{4} - \frac{3x}{20} \quad mcm=20$$

$$15x - 4 + 40x = 25 - 3x$$

$$55x + 3x = 25 + 4$$

$$58x = 29$$

$$x = \frac{29}{58}$$

$$x = \frac{1}{2}$$

$$6. \frac{2}{3x} - \frac{5}{x} = \frac{7}{10} - \frac{3}{2x} + 1 \quad mcm=30x$$

$$20 - 150 = 21x - 45 + 30x$$

$$-130 + 45 = 51x$$

$$\frac{-85}{51} = x$$

$$\frac{-5}{3} = x$$

$$7. \frac{x-4}{3} - 5 = 0 \quad mcm=3$$

$$x-4-15=0$$

$$x-19=0$$

$$x=19$$

$$8. x - \frac{x+2}{12} = \frac{5x}{2} \quad mcm=12$$

$$12x - x - 2 = 30x$$

$$11x - 30x = 2$$

$$-19x = 2$$

$$x = -\frac{2}{19}$$

$$9. x - \frac{5x-1}{3} = 4x - \frac{3}{5} \quad mcm=15$$

$$15x - 25x + 5 = 60x - 9$$

$$-10x - 60x = -9 - 5$$

$$-70x = -14$$

$$x = \frac{-14}{-70}$$

$$x = \frac{1}{5}$$

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$$10. 10x - \frac{8x-3}{4} = 2(x-3) \quad mcm=4$$

$$\begin{aligned} 40x - 8x + 3 &= 8(x-3) \\ 40x - 8x &= 8x - 24 - 3 \\ 40x - 16x &= -27 \\ x &= \frac{-27}{24} \\ x &= -\frac{9}{8} \end{aligned}$$

$$11. \frac{x-2}{3} - \frac{x-3}{4} = \frac{x-4}{5} \quad mcm=60$$

$$\begin{aligned} 20(x-2) - 15(x-3) &= 12(x-4) \\ 20x - 40 - 15x + 45 &= 12x - 48 \\ 5x - 12x &= -48 - 5 \\ -7x &= -53 \\ x &= \frac{53}{7} \end{aligned}$$

$$12. \frac{x-1}{2} - \frac{x-2}{3} - \frac{x-3}{4} = -\frac{x-5}{5} \quad mcm=60$$

$$\begin{aligned} 30(x-1) - 20(x-2) - 15(x-3) &= -12(x-5) \\ 30x - 30 - 20x + 40 - 15x + 45 &= -12x + 60 \\ -5x + 55 &= -12x + 60 \\ -5x + 12x &= 60 - 55 \\ 7x &= 5 \\ x &= \frac{5}{7} \end{aligned}$$

$$13. x - (5x-1) - \frac{7-5x}{10} = 1 \quad mcm=10$$

$$\begin{aligned} 10x - 10(5x-1) - (7-5x) &= 10 \\ 10x - 50x + 10 - 7 + 5x &= 10 \\ -35x + 3 &= 10 \\ -35x &= 7 \\ x &= \frac{-7}{35} \\ x &= -\frac{1}{5} \end{aligned}$$

$$14. 2x - \frac{5x-6}{4} + \frac{1}{3}(x-5) = -5x \quad mcm=12$$

$$\begin{aligned} 24x - 3(5x-6) + 4(x-5) &= -60x \\ 24x - 15x + 18 + 4x - 20 &= -60x \\ 13x - 2 &= -60x \\ 13x + 60x &= 2 \\ x &= \frac{2}{73} \end{aligned}$$

$$15. 4 - \frac{10x+1}{6} = 4x - \frac{16x+3}{4} \quad mcm=12$$

$$\begin{aligned} 48 - 2(10x+1) &= 48x - 3(16x+3) \\ 48 - 20x - 2 &= 48x - 48x - 9 \\ -20x + 46 &= -9 \\ -20x &= -55 \\ x &= \frac{-55}{-20} \\ x &= \frac{11}{4} \end{aligned}$$

$$16. \frac{1}{2}(x-1) - (x-3) = \frac{1}{3}(x+3) + \frac{1}{6} \quad mcm=6$$

$$\begin{aligned} 3(x-1) - 6(x-3) &= 2(x+3) + 1 \\ 3x - 3 - 6x + 18 &= 2x + 6 + 1 \\ -3x + 15 &= 2x + 7 \\ -5x &= -8 \\ x &= \frac{8}{5} \end{aligned}$$

$$17. \frac{6x+1}{3} - \frac{11x-2}{9} - \frac{1}{4}(5x-2) = \frac{5}{6}(6x+1) \quad mcm=36$$

$$\begin{aligned} 12(6x+1) - 4(11x-2) - 9(5x-2) &= 30(6x+1) \\ 72x + 12 - 44x + 8 - 45x + 18 &= 180x + 30 \\ -17x + 38 &= 180x + 30 \\ -197x &= -8 \\ x &= \frac{8}{197} \end{aligned}$$

$$18. \frac{4x+1}{3} = \frac{1}{3}(4x-1) - \frac{13+2x}{6} - \frac{1}{2}(x-3) \quad mcm=6$$

$$\begin{aligned} 2(4x+1) &= 2(4x-1) - (13+2x) - 3(x-3) \\ 8x + 2 &= 8x - 2 - 13 - 2x - 3x + 9 \\ 2 &= -6 - 5x \\ 8 &= -5x \\ -\frac{8}{5} &= x \end{aligned}$$

$$19. \frac{2}{5}(5x-1) + \frac{3}{10}(10x-3) = -\frac{1}{2}(x-2) - \frac{6}{5} \quad mcm=10$$

$$\begin{aligned} 4(5x-1) + 3(10x-3) &= -5(x-2) - 12 \\ 20x - 4 + 30x - 9 &= -5x + 10 - 12 \\ 50x - 13 &= -5x + 10 - 12 \\ 50x - 13 &= -5x - 2 \\ 55x &= 11 \\ x &= \frac{1}{5} \end{aligned}$$

$$20. \frac{3x-1}{2} - \frac{5x+4}{3} - \frac{x+2}{8} = \frac{2x-3}{5} - \frac{1}{10}$$

$$mcm=120$$

$$60(3x-1) - 40(5x+4) - 15(x+2) = 24(2x-3) - 12$$

$$180x - 60 - 200x - 160 - 15x - 30 = 48x - 72 - 12$$

$$-35x - 250 = 48x - 84$$

$$-83x = 166$$

$$x = -2$$

$$21. \frac{7x-1}{3} - \frac{5-2x}{2x} = \frac{4x-3}{4} + \frac{1+4x^2}{3x}$$

$$mcm=12x$$

$$4x(7x-1) - 6(5-2x) = 3x(4x-3) + 4(1+4x^2)$$

$$28x^2 - 4x - 30 + 12x = 12x^2 - 9x + 4 + 16x^2$$

$$8x - 30 = -9x + 4$$

$$17x = 34$$

$$x = 2$$

$$22. \frac{2x+7}{3} - \frac{2(x^2-4)}{5x} - \frac{4x^2-6}{15x} = \frac{7x^2+6}{3x^2}$$

$$mcm=15x^2$$

$$5x^2(2x+7) - 6x(x^2-4) - x(4x^2-6) = 5(7x^2+6)$$

$$10x^3 + 35x^2 - 6x^3 + 24x - 4x^3 + 6x = 35x^2 + 30$$

$$30x = 30$$

$$x = \frac{30}{30}$$

$$x = 1$$

$$23. \frac{2}{3} \left(\frac{x+1}{5} \right) = \frac{3}{4} \left(\frac{x-6}{3} \right) \quad mcm=60$$

$$8(x+1) = 15(x-6)$$

$$8x+8 = 15x-90$$

$$8x-15x = -90-8$$

$$-7x = -98$$

$$x = \frac{-98}{-7}$$

$$x = 14$$

$$27. \frac{3x}{8} - \frac{7}{10} - \frac{12x-5}{16} - \frac{2x-3}{20} + \frac{4x+9}{4} + \frac{7}{80} = 0 \quad mcm=160$$

$$60x - 112 - 10(12x-5) - 8(2x-3) + 40(4x+9) + 14 = 0$$

$$60x - 112 - 120x + 50 - 16x + 24 + 160x + 360 + 14 = 0$$

$$84x + 336 = 0$$

$$84x = -336$$

$$x = \frac{-336}{84}$$

$$x = -4$$

$$24. \frac{3}{5} \left(\frac{2x-1}{6} \right) - \frac{4}{3} \left(\frac{3x+2}{4} \right) - \frac{1}{5} \left(\frac{x-2}{3} \right) + \frac{1}{5} = 0$$

$$mcm=60$$

$$6(2x-1) - 20(3x+2) - 4(x-2) + 12 = 0$$

$$12x - 6 - 60x - 40 - 4x + 8 + 12 = 0$$

$$-52x - 26 = 0$$

$$x = -\frac{26}{52} = -\frac{1}{2}$$

$$28. \frac{5x}{4} - \frac{3}{17}(x-20) - (2x-1) = \frac{x+24}{34} \quad mcm=68$$

$$85x - 12(x-20) - 68(2x-1) = 2(x+24)$$

$$85x - 12x + 240 - 136x + 68 = 2x + 48$$

$$-63x + 308 = 2x + 48$$

$$-65x = -260$$

$$x = \frac{-260}{-65}$$

$$x = 4$$

$$25. 10 - \frac{3x+5}{6} = 3\frac{11}{12} - \frac{x}{4}$$

$$\Rightarrow \frac{60-3x-5}{6} = \frac{47}{12} - \frac{x}{8} \quad mcm=24$$

$$4(55-3x) = 94 - 3x$$

$$220 - 12x = 94 - 3x$$

$$-12x + 3x = 94 - 220$$

$$-9x = -126$$

$$x = \frac{-126}{-9}$$

$$x = 14$$

$$26. 9x - 2 - 7x \left(\frac{1}{x} - \frac{1}{2} \right) = \frac{1+\frac{x}{2}}{2} + 2\frac{3}{4}$$

$$\Rightarrow 9x - 2 - 7x \left(\frac{2-x}{2} \right) = \frac{x+2}{4} + \frac{11}{4}$$

$$\Rightarrow 9x - 2 - 7 \left(\frac{2-x}{2} \right) = \frac{x+13}{4} \quad mcm=4$$

$$36x - 8 - 14(2-x) = x+13$$

$$36x - 8 - 28 + 14x = x+13$$

$$50x - 36 = x+13$$

$$49x = 49$$

$$x = 1$$

$$29. 5 + \frac{x}{4} = \frac{1}{3} \left(2 - \frac{x}{2} \right) - \frac{2}{3} + \frac{1}{4} \left(10 - \frac{5x}{3} \right)$$

$$\Rightarrow \frac{20+x}{4} = \frac{1}{3} \left(\frac{4-x}{2} \right) - \frac{2}{3} + \frac{1}{4} \left(\frac{30-5x}{3} \right)$$

$$\Rightarrow \frac{20+x}{4} = \frac{4-x}{6} - \frac{2}{3} + \frac{30-5x}{12}$$

$$mcm = 12$$

$$3(20+x) = 2(4-x) - 8 + 30 - 5x$$

$$60 + 3x = 8 - 2x - 8 + 30 - 5x$$

$$60 + 3x = -7x + 30$$

$$10x = -30$$

$$x = -3$$

$$30. \frac{5(x+2)}{12} + \frac{4}{9} - \frac{22-x}{36} = 3x - 20 - \frac{8-x}{12} - \frac{20-3x}{18} \quad mcm = 36$$

$$15(x+2) + 16 - 22 + x = 108x - 720 - 3(8-x) - 2(20-3x)$$

$$15x + 30 - 6 + x = 108x - 720 - 24 + 3x - 40 + 6x$$

$$16x + 24 = 117x - 784$$

$$-101x = -808$$

$$x = 8$$

$$31. \left(3 - \frac{x}{2} \right) - \left(1 - \frac{x}{3} \right) = 7 - \left(x - \frac{x}{2} \right)$$

$$\Rightarrow \frac{6-x}{2} - \frac{3-x}{3} = 7 - \frac{x}{2} \quad mcm = 6$$

$$3(6-x) - 2(3-x) = 42 - 3x$$

$$18 - 3x - 6 + 2x = 42 - 3x$$

$$12 - x = 42 - 3x$$

$$2x = 30$$

$$x = 15$$

$$32. (x+3)(x-3) - x^2 - \frac{5}{4} = \left(x - \frac{x}{5} \right) - \left(3x - \frac{3}{4} \right)$$

$$\Rightarrow x^2 - 9 - x^2 - \frac{5}{4} = \frac{4x}{5} - \frac{12x-3}{4}$$

$$\Rightarrow -\frac{41}{4} = \frac{16x-60x+15}{20}$$

$$\Rightarrow -\frac{41}{4} = \frac{-44x+15}{20} \quad mcm = 20$$

$$-205 = -44x + 15$$

$$-220 = -44x$$

$$5 = x$$

$$33. 2x - \left(2x - \frac{3x-1}{8} \right) = \frac{2}{3} \left(\frac{x+2}{6} \right) - \frac{1}{4}$$

$$\Rightarrow 2x - \frac{16x-3x+1}{8} = \frac{2x+4}{18} - \frac{1}{4} \quad mcm = 72$$

$$144x - 9(13x+1) = 4(2x+4) - 18$$

$$144x - 117x - 9 = 8x + 16 - 18$$

$$27x - 9 = 8x - 2$$

$$19x = 7$$

$$x = \frac{7}{19}$$

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Resolución de ecuaciones de primer grado con denominadores compuestos

Ejercicios 2

$$\begin{aligned} 1. \quad \frac{3}{5} + \frac{3}{2x-1} &= 0 \quad mcm = 5(2x-1) \\ 3(2x-1) + 15 &= 0 \\ 6x - 3 + 15 &= 0 \\ 6x &= -12 \\ x &= -2 \end{aligned}$$

$$\begin{aligned} 2. \quad \frac{2}{4x-1} &= \frac{3}{4x+1} \quad mcm = 16x^2 - 1 \\ 2(4x+1) &= 3(4x-1) \\ 8x + 2 &= 12x - 3 \\ -4x &= -5 \\ x &= \frac{5}{4} \end{aligned}$$

$$\begin{aligned} 3. \quad \frac{5}{x^2-1} &= \frac{1}{x-1} \quad mcm = x^2 - 1 \\ 5 &= x + 1 \\ 4 &= x \end{aligned}$$

$$\begin{aligned} 4. \quad \frac{3}{x+1} - \frac{1}{x^2-1} &= 0 \quad mcm = x^2 - 1 \\ 3(x-1) - 1 &= 0 \\ 3x - 3 - 1 &= 0 \\ 3x &= 4 \\ x &= \frac{4}{3} \end{aligned}$$

$$\begin{aligned} 5. \quad \frac{5x+8}{3x+4} &= \frac{5x+2}{3x-4} \quad mcm = (3x+4)(3x-4) \\ (3x-4)(5x+8) &= (5x+2)(3x+4) \\ 15x^2 + 4x - 32 &= 15x^2 + 26x + 8 \\ -26x + 4x &= 8 + 32 \\ -22x &= 40 \\ x &= -\frac{40}{22} \\ x &= -\frac{20}{11} \end{aligned}$$

$$\begin{aligned} 6. \quad \frac{10x^2-5x+8}{5x^2+9x-19} &= 2 \quad mcm = 5x^2 + 9x - 19 \\ 10x^2 - 5x + 8 &= 2(5x^2 + 9x - 19) \\ 10x^2 - 5x + 8 &= 10x^2 + 18x - 38 \\ -5x - 18x &= -38 - 8 \\ -23x &= -46 \\ x &= \frac{-46}{-23} \\ x &= 2 \end{aligned}$$

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$$7. \frac{1}{3x-3} + \frac{1}{4x+4} = \frac{1}{12x-12} \quad mcm=12(x^2-1)$$

$$4(x+1) + 3(x-1) = x+1$$

$$4x+4+3x-3 = x+1$$

$$7x-x=0$$

$$6x=0$$

$$x=0$$

$$8. \frac{x}{4} - \frac{x^2-8x}{4x-5} = \frac{7}{4} \quad mcm=4(4x-5)$$

$$x(4x-5) - 4(x^2-8x) = 7(4x-5)$$

$$4x^2 - 5x - 4x^2 + 32x = 28x - 35$$

$$27x = 28x - 35$$

$$-x = -35$$

$$x = 35$$

$$9. \frac{2x-9}{10} + \frac{2x-3}{2x-1} = \frac{x}{5} \quad mcm=10(2x-1)$$

$$(2x-9)(2x-1) + 10(2x-3) = 2x(2x-1)$$

$$4x^2 - 20x + 9 + 20x - 30 = 4x^2 - 2x$$

$$-21 = -2x$$

$$\frac{-21}{-2} = x$$

$$10\frac{1}{2} = x$$

$$10. \frac{(3x-1)^2}{x-1} = \frac{18x-1}{2} \quad mcm=2(x-1)$$

$$2(9x^2 - 6x + 1) = (x-1)(18x-1)$$

$$18x^2 - 12x + 2 = 18x^2 - 19x + 1$$

$$-12x + 19x = 1 - 2$$

$$7x = -1$$

$$x = -\frac{1}{7}$$

$$11. \frac{2x+7}{5x+2} - \frac{2x-1}{5x-4} = 0 \quad mcm=(5x+2)(5x-4)$$

$$(2x+7)(5x-4) - (2x-1)(5x+2) = 0$$

$$10x^2 + 27x - 28 - 10x^2 + x + 2 = 0$$

$$28x = 26$$

$$x = \frac{13}{14}$$

$$12. \frac{(5x-2)(7x+3)}{7x(5x-1)} - 1 = 0 \quad mcm=7x(5x-1)$$

$$(5x-2)(7x+3) - 7x(5x-1) = 0$$

$$35x^2 + x - 6 - 35x^2 + 7x = 0$$

$$8x = 6$$

$$x = \frac{3}{4}$$

$$13. \frac{3}{x-4} = \frac{2}{x-3} + \frac{8}{x^2-7x+12} \quad mcm=x^2-7x+12$$

$$3(x-3) = 2(x-4) + 8$$

$$3x-9 = 2x-8+8$$

$$3x-2x=9$$

$$x=9$$

$$14. \frac{6x-1}{18} - \frac{3(x+2)}{5x-6} = \frac{1+3x}{9} \quad mcm=18(5x-6)$$

$$(6x-1)(5x-6) - 54(x+2) = 2(1+3x)(5x-6)$$

$$30x^2 - 41x + 6 - 54x - 108 = -26x - 12 + 30x^2$$

$$-95x - 102 = -26x - 12$$

$$-69x = 90$$

$$x = -\frac{90}{69}$$

$$x = -1\frac{7}{23}$$

$$15. \frac{5}{1+x} - \frac{3}{1-x} - \frac{6}{1-x^2} = 0 \quad mcm=1-x^2$$

$$5(1-x) - 3(1+x) - 6 = 0$$

$$5 - 5x - 3 - 3x - 6 = 0$$

$$-8x - 4 = 0$$

$$-8x = 4$$

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

$$16. \frac{1+2x}{1+3x} - \frac{1-2x}{1-3x} = \frac{3x-14}{1-9x^2} \quad mcm=1-9x^2$$

$$(1+2x)(1-3x) - (1-2x)(1+3x) = 3x-14$$

$$1-x-6x^2-1-x+6x^2 = -3x+14$$

$$-2x = -3x+14$$

$$x = 14$$

$$17. \frac{3x-1}{x^2+7x+12} = \frac{1}{2x+6} + \frac{7}{6x+24}$$

$$\Rightarrow x^2+7x+12 = (x+3)(x+4)$$

$$\Rightarrow 2x+6 = 2(x+3)$$

$$\Rightarrow 6x+24 = 6(x+4) \quad mcm=6(x+3)(x+4)$$

$$6(3x-1) = 3(x+4) + 7(x+3)$$

$$18x-6 = 3x+12+7x+21$$

$$18x-6 = 10x+33$$

$$8x = 39$$

$$x = \frac{39}{8}$$

$$x = 4\frac{7}{8}$$

$$18. \frac{1}{(x-1)^2} - \frac{3}{2x-2} = -\frac{3}{2x+2} \quad mcm = 2(x-1)^2(x+1)$$

$$2(x+1) - 3(x-1)(x+1) = -3(x-1)^2$$

$$2x+2 - 3x^2+3 = -3x^2+6x-3$$

$$2x+5 = 6x-3$$

$$-4x = -8$$

$$x = 2$$

$$19. \frac{5x+13}{15} - \frac{4x+5}{5x-15} = \frac{x}{3} \quad mcm = 15(x-3)$$

$$(5x+13)(x-3) - 3(4x+5) = 5x(x-3)$$

$$5x^2 - 2x - 39 - 12x - 15 = 5x^2 - 15x$$

$$-14x - 54 = -15x$$

$$x = 54$$

$$20. \frac{2x-1}{2x+1} - \frac{x-4}{3x-2} = \frac{2}{3} \quad mcm = 3(2x+1)(3x-2)$$

$$3(2x-1)(3x-2) - 3(x-4)(2x+1) = 2(2x+1)(3x-2)$$

$$18x^2 - 21x + 6 - 6x^2 + 21x + 12 = 12x^2 - 2x - 4$$

$$18 = -2x - 4$$

$$22 = -2x$$

$$-11 = x$$

$$21. \frac{4x+3}{2x-5} - \frac{3x+8}{3x-7} = 1 \quad mcm = (2x-5)(3x-7)$$

$$(4x+3)(3x-7) - (3x+8)(2x-5) = (2x-5)(3x-7)$$

$$12x^2 - 19x - 21 - 6x^2 - x + 40 = 6x^2 - 29x + 35$$

$$-20x + 19 = -29x + 35$$

$$9x = 16$$

$$x = \frac{16}{9}$$

$$x = 1\frac{7}{9}$$

$$22. \frac{10x-7}{15x+3} = \frac{3x+8}{12} - \frac{5x^2-4}{20x+4} \quad mcm = 12(5x+1)$$

$$4(10x-7) = (3x+8)(5x+1) - 3(5x^2-4)$$

$$40x - 28 = 15x^2 + 43x + 8 - 15x^2 + 12$$

$$40x - 28 = 43x + 20$$

$$-3x = 48$$

$$x = -16$$

$$23. \frac{4x-1}{5} + \frac{x-2}{2x-7} = \frac{8x-3}{10} - 1\frac{3}{10} \quad mcm = 10(2x-7)$$

$$2(4x-1)(2x-7) + 10(x-2) = (8x-3)(2x-7) - 13(2x-7)$$

$$16x^2 - 60x + 14 + 10x - 20 = 16x^2 - 62x + 21 - 26x + 91$$

$$-50x - 6 = -88x + 112$$

$$38x = 118$$

$$x = \frac{118}{38}$$

$$x = 3\frac{2}{19}$$

$$24. \frac{1}{x-1} - \frac{2}{x-2} = \frac{3}{2x-2} - \frac{2\frac{1}{3}}{2x-4}$$

$$\frac{1}{x-1} - \frac{2}{x-2} = \frac{3}{2x-2} - \frac{7}{3(2x-4)}$$

$$\frac{1}{x-1} - \frac{2}{x-2} = \frac{3}{2x-2} - \frac{7}{6x-12}$$

$$mcm = 6(x-1)(x-2)$$

$$6(x-2) - 12(x-1) = 9(x-2) - 7(x-1)$$

$$6x - 12 - 12x + 12 = 9x - 18 - 7x + 7$$

$$-6x = 2x - 11$$

$$-8x = -11$$

$$x = \frac{-11}{-8} = 1\frac{3}{8}$$

$$25. \frac{1}{x+3} - \frac{2}{5x-20} = \frac{1\frac{1}{2}}{3x-12} - \frac{2}{x+3}$$

$$mcm = 15(x-4)(x+3)$$

$$15(x-4) - 6(x+3) = \frac{15(x+3)}{2} - 30(x-4)$$

$$15x - 60 - 6x - 18 = \frac{15x+45}{2} - 30x - 120$$

$$2(9x - 78) = 15x + 45 - 2(30x - 120)$$

$$18x - 156 = 15x + 45 - 60x + 240$$

$$18x - 156 = -45x + 285$$

$$63x = 441$$

$$x = 7$$

$$26. \frac{1}{6-2x} - \frac{4}{5-5x} = \frac{10}{12-4x} - \frac{3}{10-10x}$$

$$mcm = 20(1-x)(3-x)$$

$$10(1-x) - 16(3-x) = 50(1-x) - 6(3-x)$$

$$10 - 10x - 48 + 16x = 50 - 50x - 18 + 6x$$

$$6x - 38 = -44x + 32$$

$$50x = 70$$

$$x = \frac{7}{5}$$

$$x = 1\frac{2}{5}$$

$$27. \frac{2}{3} - \frac{6x^2}{9x^2-1} = \frac{2}{3x-1} \quad mcm = 3(9x^2-1)$$

$$2(9x^2-1) - 18x^2 = 6(3x-1)$$

$$18x^2 - 2 - 18x^2 = 18x + 6$$

$$-2 = 18x + 6$$

$$-8 = 18x$$

$$-\frac{4}{9} = x$$

$$28. \frac{5x^2 - 27x}{5x+3} - \frac{1}{x} = x-6 \quad mcm = x(5x+3)$$

$$x(5x^2 - 27x) - (5x+3) = x(5x+3)(x-6)$$

$$5x^3 - 27x^2 - 5x - 3 = 5x^3 - 27x^2 - 18x$$

$$-5x - 3 = -18x$$

$$13x = 3$$

$$x = \frac{3}{13}$$

$$29. \frac{4x+1}{4x-1} - \frac{6}{16x^2-1} = \frac{4x-1}{4x+1} \quad mcm = 16x^2 - 1$$

$$(4x+1)^2 - 6 = (4x-1)^2$$

$$16x^2 + 8x + 1 - 6 = 16x^2 - 8x + 1$$

$$16x - 5 = 1$$

$$16x = 6$$

$$x = \frac{3}{8}$$

$$30. 3\left(\frac{x-1}{x+1}\right) + 2\left(\frac{x+1}{x-4}\right) = \frac{5x(x-1)}{x^2-3x-4}$$

$$mcm = x^2 - 3x - 4$$

$$3(x-1)(x-4) + 2(x+1)^2 = 5x(x-1)$$

$$3x^2 - 15x + 12 + 2x^2 + 4x + 2 = 5x^2 - 5x$$

$$-11x + 14 = -5x$$

$$-6x = -14$$

$$x = \frac{-7}{-3}$$

$$x = 2\frac{1}{3}$$

$$31. 2\left(\frac{x+2}{x-2}\right) - 3\left(\frac{x-2}{2x+3}\right) = \frac{x^2+78}{2x^2-x-6}$$

$$mcm = (x-2)(2x+3)$$

$$2(x+2)(2x+3) - 3(x-2)^2 = x^2 + 78$$

$$4x^2 + 14x + 12 - 3x^2 + 12x - 12 = x^2 + 78$$

$$26x = 78$$

$$x = 3$$

$$32. \frac{1}{x^2+3x-28} - \frac{1}{x^2+12x+35} = \frac{3}{x^2+x-20}$$

$$\Rightarrow x^2 + 3x - 28 = (x+7)(x-4)$$

$$\Rightarrow x^2 + 12x + 35 = (x+7)(x+5)$$

$$\Rightarrow x^2 + x - 20 = (x+5)(x-4)$$

$$mcm = (x+7)(x+5)(x-4)$$

$$x+5 - (x-4) = 3(x+7)$$

$$x+5 - x + 4 = 3x + 21$$

$$9 = 3x + 21$$

$$-12 = 3x$$

$$-4 = x$$

$$33. \frac{x-2}{x^2+8x+7} = \frac{2x-5}{x^2-49} - \frac{x-2}{x^2-6x-7}$$

$$\Rightarrow x^2 + 8x + 7 = (x+7)(x+1)$$

$$\Rightarrow x^2 - 49 = (x+7)(x-7)$$

$$\Rightarrow x^2 - 6x - 7 = (x-7)(x+1)$$

$$mcm = (x+7)(x-7)(x+1) = (x^2-49)(x+1)$$

$$(x-2)(x-7) = (2x-5)(x+1) - (x-2)(x+7)$$

$$x^2 - 9x + 14 = 2x^2 - 3x - 5 - x^2 - 5x + 14$$

$$-9x + 14 = -8x + 9$$

$$-x = -5$$

$$x = 5$$

$$34. \frac{4x+5}{15x^2+7x-2} - \frac{2x+3}{12x^2-7x-10} - \frac{2x-5}{20x^2-29x+5} = 0$$

$$\Rightarrow 15x^2 + 7x - 2 = (3x+2)(5x-1)$$

$$\Rightarrow 12x^2 - 7x - 10 = (4x-5)(3x+2)$$

$$\Rightarrow 20x^2 - 29x + 5 = (4x-5)(5x-1)$$

$$mcm = (3x+2)(5x-1)(4x-5)$$

$$(4x+5)(4x-5) - (2x+3)(5x-1) - (2x-5)(3x+2) = 0$$

$$16x^2 - 25 - 10x^2 - 13x + 3 - 6x^2 + 11x + 10 = 0$$

$$-2x - 12 = 0$$

$$-2x = 12$$

$$x = -6$$

$$35. \frac{7}{2x+1} - \frac{3}{x+4} = \frac{2}{x+1} - \frac{3(x+1)}{2x^2+9x+4}$$

$$mcm = (2x+1)(x+4)(x+1)$$

$$7(x+4)(x+1) - 3(2x+1)(x+1) = 2(2x+1)(x+4) - 3(x+1)^2$$

$$7x^2 + 35x + 28 - 6x^2 - 9x - 3 = 4x^2 + 18x + 8 - 3x^2 - 6x - 3$$

$$26x + 25 = 12x + 5$$

$$14x = -20$$

$$x = -\frac{10}{7}$$

$$x = -1\frac{3}{7}$$

$$36. \frac{(x+3)^2}{(x-3)^2} = \frac{x-1}{x+1} + \frac{2(7x+1)}{x^2-2x-3}$$

$$mcm = (x-3)^2(x+1)$$

$$(x+3)^2(x+1) = (x-3)^2(x-1) + 2(7x+1)(x-3)$$

$$x^3 + 7x^2 + 15x + 9 = x^3 - 7x^2 + 15x - 9 + 14x^2 - 40x - 6$$

$$9 = -15 - 40x$$

$$24 = -40x$$

$$-\frac{3}{5} = x$$

$$37. \frac{x-4}{x+5} - \frac{x+1}{x-2} = -\frac{12(x+3)}{(x+5)^2} \quad mcm = (x+5)^2(x-2)$$

$$(x+5)(x-2)(x-4) - (x+5)^2(x+1) = -12(x+3)(x-2)$$

$$x^3 - x^2 - 22x + 40 - x^3 - 11x^2 - 35x - 25 = -12x^2 - 12x + 72$$

$$-57x + 15 = -12x + 72$$

$$-45x = 57$$

$$x = -\frac{57}{45}$$

$$x = -1\frac{4}{15}$$

$$38. \frac{x-3}{x-4} - \frac{x-2}{x-3} = \frac{x+2}{x+1} - \frac{x+3}{x+2} \quad mcm = (x-4)(x-3)(x+1)(x+2)$$

$$(x-3)^2(x+1)(x+2) - (x^2-4)(x-4)(x+1) = (x+2)^2(x-4)(x-3) - (x^2-9)(x-4)(x+1)$$

$$x^4 - 3x^3 - 7x^2 + 15x + 18 - x^4 + 3x^3 + 8x^2 - 12x - 16 = x^4 - 3x^3 - 12x^2 + 20x + 48 - x^4 + 3x^3 + 13x^2 - 27x - 36$$

$$3x + 2 = -7x + 12$$

$$10x = 10$$

$$x = 1$$

$$39. \frac{x+6}{x+2} - \frac{x+1}{x-3} = \frac{x-5}{x-1} - \frac{x}{x+4} \quad mcm = (x+2)(x-3)(x-1)(x+4)$$

$$(x+6)(x-3)(x-1)(x+4) - (x^2-1)(x+2)(x+4) = (x-5)(x+2)(x-3)(x+4) - x(x+2)(x-3)(x-1)$$

$$x^4 + 6x^3 - 13x^2 - 66x + 72 - x^4 - 6x^3 - 7x^2 + 6x + 8 = x^4 - 2x^3 - 25x^2 + 26x + 120 - x^4 + 2x^3 + 5x^2 - 6x$$

$$-60x + 80 = 20x + 120$$

$$-80x = 40$$

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

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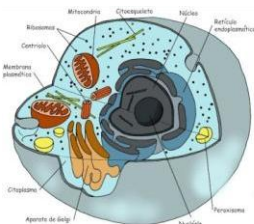
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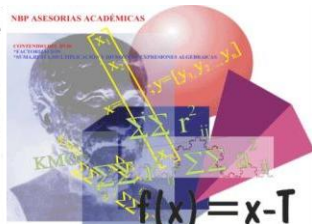


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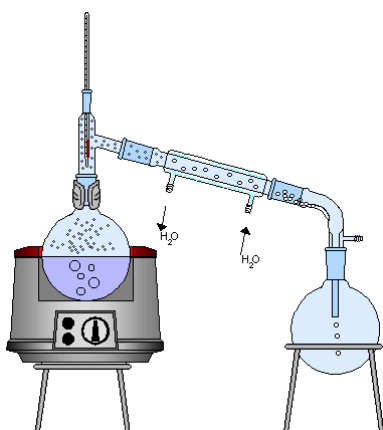
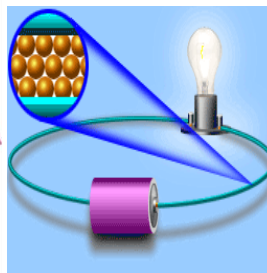
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