

## Ecuaciones de primer grado con denominadores

### 3. Ecuaciones con denominadores

$$\frac{4x-12}{4} = 2x-15$$

$$\frac{4x-12}{4} = \frac{4(2x-15)}{4}$$

$$4x-12 = 4(2x-15)$$

$$20) \quad 4x-12 = 8x-60$$

$$4x-8x = -60+12$$

$$-4x = -48$$

$$x = \frac{-48}{-4}$$

$$x = 12$$

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

$$\frac{3(x+5)}{3} = \frac{x+3}{3}$$

$$3(x+5) = x+3$$

$$21) \quad 3x+15 = x+3$$

$$3x-x = 3-15$$

$$2x = -12$$

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

$$x = -6$$

$$\frac{3x}{2} + \frac{5x}{3} = \frac{3x}{2} - 1$$

$$\frac{9x}{6} + \frac{10x}{6} = \frac{9x}{6} - \frac{6}{6}$$

$$9x+10x = 9x-6$$

$$22) \quad 9x+10x-9x = -6$$

$$10x = -6$$

$$x = \frac{-6}{10}$$

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

$$\frac{2x+3}{4} - \frac{143}{6} = \frac{9x-5}{8} - 2x$$

$$\frac{6(2x+3)}{24} - \frac{572}{24} = \frac{3(9x-5)}{24} - \frac{48x}{24}$$

$$6(2x+3) - 572 = 3(9x-5) - 48x$$

$$34) \quad 12x+18-572 = 27x-15-48x$$

$$12x-27x+48x = -15-18+572$$

$$33x = 542$$

$$x = \frac{542}{33}$$

$$10x - \frac{95-10x}{2} = \frac{10x-55}{2}$$

$$\frac{20x}{2} - \frac{95-10x}{2} = \frac{10x-55}{2}$$

$$20x - (95-10x) = 10x-55$$

$$20x-95+10x = 10x-55$$

$$35) \quad 20x+10x-10x = -55+95$$

$$20x = -55+95$$

$$20x = 40$$

$$x = \frac{40}{20}$$

$$x = 2$$

$$\frac{x+3}{2} - \frac{143}{3} = \frac{2x-5}{9} - x$$

$$\frac{9(x+3)}{18} - \frac{858}{18} = \frac{2(2x-5)}{18} - \frac{18x}{18}$$

$$9(x+3) - 858 = 2(2x-5) - 18x$$

$$36) \quad 9x+27-858 = 4x-10-18x$$

$$9x-4x+18x = -10-27+858$$

$$23x = 821$$

$$x = \frac{821}{23}$$

$$\frac{4}{5} = \frac{2}{3} - x$$

$$\frac{12}{15} = \frac{10}{15} - \frac{15x}{15}$$

23)  $12 = 10 - 15x$

$$15x = 10 - 12$$

$$15x = -2$$

$$x = -\frac{2}{15}$$

$$\frac{-3+x}{2} = 4$$

$$\frac{-3+x}{2} = \frac{8}{2}$$

24)  $-3+x=8$

$$x=8+3$$

$$x=11$$

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

$$\frac{x+3}{3} = \frac{3x}{3} + \frac{15}{3}$$

25)  $x+3=3x+15$

$$x-3x=15-3$$

$$-2x=12$$

$$x = \frac{12}{-2} = -6$$

$$\frac{-3x+1}{2} = 2x+5$$

$$\frac{-3x+1}{2} = \frac{4x}{2} + \frac{10}{2}$$

26)  $-3x+1=4x+10$

$$-3x-4x=10-1$$

$$-7x=9$$

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

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

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

$$\frac{12x}{2} - \frac{3}{2} + \frac{4x}{2} + \frac{12}{2} = \frac{14}{2}$$

37)  $12x-3+4x+12=14$

$$12x+4x=14+3-12$$

$$16x=5$$

$$x = \frac{5}{16}$$

$$\frac{3}{2}x+1 = \frac{1}{2}x+6$$

$$\frac{3}{2}x + \frac{2}{2} = \frac{1}{2}x + \frac{12}{2}$$

38)  $3x+2=x+12$

$$3x-x=12-2$$

$$2x=10$$

$$x = \frac{10}{2} = 5$$

$$\frac{x+12}{6} = \frac{x+13}{12}$$

$$\frac{2(x+12)}{6} = \frac{x+13}{12}$$

39)  $2(x+12)=x+13$

$$2x+24=x+13$$

$$2x-x=13-24$$

$$x=-11$$

$$\frac{2x-5}{3} = \frac{3}{4}$$

$$\frac{4(2x-5)}{12} = \frac{9}{12}$$

$$4(2x-5)=9$$

40)  $8x-40=9$

$$8x=9+40$$

$$8x=49$$

$$x = \frac{49}{8}$$

$$\frac{x-1}{5} = 3 + \frac{x}{2}$$

$$\frac{2(x-1)}{10} = \frac{30}{10} + \frac{5x}{10}$$

$$2(x-1) = 30 + 5x$$

27)  $2x - 2 = 30 + 5x$

$$2x - 5x = 30 + 2$$

$$-3x = 32$$

$$x = -\frac{32}{3}$$

$$\frac{2x-6}{2} = 2x-5$$

$$\frac{2x-6}{2} = \frac{4x}{2} - \frac{10}{2}$$

28)  $2x-6 = 4x-10$

$$2x-4x = -10+6$$

$$-2x = -4$$

$$x = \frac{-4}{-2} = 2$$

$$\frac{x}{2} + 7 = \frac{4x}{3} + 8$$

$$\frac{3x}{6} + \frac{42}{6} = \frac{8x}{6} + \frac{48}{6}$$

29)  $3x+42 = 8x+48$

$$3x-8x = 48-42$$

$$-5x = 6$$

$$x = -\frac{6}{5}$$

$$\frac{x+1}{2} + \frac{x+4}{5} - \frac{x+3}{4} = 1$$

$$\frac{10(x+1)}{20} + \frac{4(x+4)}{20} - \frac{5(x+3)}{20} = \frac{20}{20}$$

30)  $10(x+1) + 4(x+4) - 5(x+3) = 20$

$$10x+10+4x+16-5x-15 = 20$$

$$10x+4x-5x = 20-10-16+15$$

$$x = 9$$

$$\frac{3x}{2} + 20 = \frac{x}{3} + 25$$

$$\frac{9x}{6} + \frac{120}{6} = \frac{2x}{6} + \frac{150}{6}$$

41)  $9x+120 = 2x+150$

$$9x-2x = 150-120$$

$$7x = 30$$

$$x = \frac{30}{7}$$

$$\frac{3-x}{6} - \frac{x}{2} = \frac{1-x}{5} + \frac{2-x}{3}$$

$$\frac{5(3-x)}{30} - \frac{15x}{30} = \frac{6(1-x)}{30} + \frac{10(2-x)}{30}$$

$$5(3-x) - 15x = 6(1-x) + 10(2-x)$$

42)  $15-5x-15x = 6-6x+20-10x$

$$-5x-15x+6x+10x = 6+20-15$$

$$-4x = 11$$

$$x = -\frac{11}{4}$$

$$x - \frac{3}{2} = 2x - \frac{7}{3}$$

$$\frac{6x}{6} - \frac{9}{6} = \frac{12x}{6} - \frac{42}{6}$$

43)  $6x-9 = 12x-42$

$$6x-12x = -42+9$$

$$6x = -33$$

$$x = \frac{-33}{6} = -\frac{11}{2}$$

$$\frac{x+4}{5} - \frac{x+3}{4} = 1 - \frac{x+1}{2}$$

$$\frac{4(x+4)}{20} - \frac{5(x+3)}{20} = \frac{20}{20} - \frac{10(x+1)}{20}$$

$$4(x+4) - 5(x+3) = 20 - 10(x+1)$$

44)  $4x+16-5x-15 = 20-10x-10$

$$4x-5x+10x = 20-10-16+15$$

$$9x = 9$$

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

$$\frac{x+1}{6} - \frac{x-4}{3} = 2 + \frac{1}{2}$$

$$\frac{x+1}{6} - \frac{2(x-4)}{6} = \frac{12}{6} + \frac{3}{6}$$

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

31)  $x+1-2x+8=12+3$

$$x-2x=12+3-1-8$$

$$-x=6$$

$$x=\frac{6}{-1}$$

$$x=-6$$

$$\frac{2x}{3} + \frac{5}{4} + \frac{x}{6} - 7 = 0$$

$$\frac{8x}{12} + \frac{15}{12} + \frac{2x}{12} - \frac{84}{12} = \frac{0}{12}$$

32)  $8x+15+2x-84=0$

$$8x+2x=84-15$$

$$10x=69$$

$$x=\frac{69}{10}$$

$$\frac{x+1}{8} - \frac{x+1}{3} + \frac{x+3}{5} = 0$$

$$\frac{15(x+1)}{120} - \frac{40(x+1)}{3} + \frac{24(x+3)}{5} = 0$$

33)  $15(x+1)-40(x+1)+24(x+3)=0$

$$15x+15-40x-40+24x+72=0$$

$$15x-50x+24x=-15+40-72$$

$$-11x=-47$$

$$x=\frac{-47}{-11}$$

$$x=\frac{47}{11}$$

$$\frac{2x-3}{2} - \frac{4x-1}{2} = \frac{6x-2}{6}$$

$$\frac{3(2x-3)}{6} - \frac{3(4x-1)}{6} = \frac{6x-2}{6}$$

45)  $3(2x-3)-3(4x-1)=6x-2$

$$6x-9-12x+3=6x-2$$

$$6x-12x-6x=-2+9-3$$

$$-12x=4$$

$$x=\frac{4}{-12}=-\frac{1}{3}$$

$$\frac{2(x-1)}{9} - \frac{6-2x}{3} = 1$$

$$\frac{2x-2}{9} - \frac{6-2x}{3} = 1$$

$$\frac{2x-2}{9} - \frac{3(6-2x)}{9} = \frac{9}{9}$$

46)  $2x-2-3(6-2x)=9$

$$2x-2-18+6x=9$$

$$2x+6x=9+2+18$$

$$8x=29$$

$$x=\frac{29}{8}$$