GUIA DE TRABAJO
Materia: Matemáticas Guía #96A.
Tema: Resolución de cuadráticas utilizando la revolvente. (Baldor, ejercicio # 265, 266, 267 y 270)
Fecha: _____
Profesor: Fernando Viso

Nombre del alumno:_____

Sección del alumno:_____

CONDICIONES:
- **Trabajo individual.**
- **Sin libros, ni cuadernos, ni notas.**
- **Sin celulares.**
- **Es obligatorio mostrar explícitamente, el procedimiento empleado para resolver cada problema.**
- **No se contestarán preguntas ni consultas de ningún tipo.**
- **No pueden moverse de su asiento. ni pedir borras, ni lápices, ni calculadoras prestadas.**

Marco Teórico:

Resolvente de la ecuación $ax^2 + bx + c = 0 \Rightarrow x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

PREGUNTAS:

EJERCICIO # 265.

1.- $3x^2 - 5x + 2 = 0$

Solución:

$$x = \frac{5 \pm \sqrt{(5)^2 - (4)(3)(2)}}{6} = \frac{5 \pm \sqrt{25 - 24}}{6} \Rightarrow x = \frac{5 \pm 1}{6} \Rightarrow x_1 = 1, x_2 = \frac{4}{6} = \frac{2}{3}$$

2.- $4x^2 + 3x - 22 = 0$

Solución:

$$x = \frac{-3 \pm \sqrt{(3)^2 + (4)(4)(22)}}{8} = \frac{-3 \pm \sqrt{9 + 352}}{8} = \frac{-3 \pm \sqrt{361}}{8} \Rightarrow$$

$$\Rightarrow x = \frac{-3 \pm 19}{8} \Rightarrow x_1 = \frac{16}{8} = 2; x_2 = \frac{-22}{8} = -\frac{11}{4}$$

3.- $x^2 + 11x = -24$

Solución:

$$x^2 + 11x = -24 \Rightarrow x^2 + 11x + 24 = 0 \Rightarrow x = \frac{-11 \pm \sqrt{(11)^2 - 4(24)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{-11 \pm \sqrt{121 - 96}}{2} = \frac{-11 \pm \sqrt{25}}{2} = \frac{-11 \pm 5}{2} \Rightarrow x_1 = \frac{-11 + 5}{2} = -3; x_2 = -\frac{16}{2} = -8$$

4.- $x^2 = 16x - 63$

Solución:

$$x^2 = 16x - 63 \Rightarrow x^2 - 16x + 63 = 0 \Rightarrow x = \frac{16 \pm \sqrt{(16)^2 - (4)(63)}}{2} =$$

$$x\frac{16 \pm \sqrt{256 - 252}}{2} = \frac{16 \pm \sqrt{4}}{2} = \frac{16 \pm 2}{2} \Rightarrow x_1 = 9; x_2 = 7$$

5.- $12x - 4 - 9x^2 = 0$

Solución:

$$12x - 4 - 9x^2 = 0 \Rightarrow 9x^2 - 12x + 4 = 0 \Rightarrow x = \frac{12 \pm \sqrt{(12)^2 - (4)(9)(4)}}{18} \Rightarrow$$

$$x = \frac{12 \pm \sqrt{144 - 144}}{18} = \frac{12}{18} = \frac{2}{3}$$

6.- $5x^2 - 7x - 90 = 0$

Solución:

$$5x^2 - 7x - 90 = 0 \Rightarrow x = \frac{7 \pm \sqrt{(7)^2 + (4)(5)(90)}}{10} = \frac{7 \pm \sqrt{49 + 1800}}{10} = \frac{7 \pm \sqrt{1849}}{10} = \frac{7 \pm 43}{10} \Rightarrow$$

$$\Rightarrow x_1 = 5; x = \frac{-36}{10} = -\frac{18}{5}$$

7.- $6x^2 = x + 222$

Solución:

$$6x^2 = x + 222 \Rightarrow 6x^2 - x - 222 = 0 \Rightarrow x = \frac{1 \pm \sqrt{1 + 4(6)(222)}}{12} \Rightarrow$$

$$x = \frac{1 \pm \sqrt{1 + 5328}}{12} = \frac{1 \pm \sqrt{5329}}{12} = \frac{1 \pm 73}{12} \Rightarrow x_1 = \frac{74}{12} = \frac{37}{6}; x_2 = -\frac{72}{12} = -6$$

8.- $x + 11 = 10x^2$

Solución:

$$x + 11 = 10x^2 \Rightarrow 10x^2 - x - 11 = 0 \Rightarrow x = \frac{1 \pm \sqrt{1 + 4(10)(11)}}{20} \Rightarrow$$

$$\Rightarrow x = \frac{1 \pm \sqrt{1 + 440}}{20} = \frac{1 \pm \sqrt{441}}{20} = \frac{1 \pm 21}{20} \Rightarrow x_1 = \frac{22}{20} = \frac{11}{10}; x_2 = -\frac{20}{20} = -1$$

9.- $49x^2 - 70x + 25 = 0$

Solución:

$$49x^2 - 70x + 25 = 0 \Rightarrow x = \frac{70 \pm \sqrt{(70)^2 - 4900}}{98} \Rightarrow$$

$$\Rightarrow x = \frac{70 \pm \sqrt{4900 - 4900}}{98} = \frac{70}{98} = \frac{10}{14} = \frac{5}{7}$$

10.- $12x - 7x^2 + 64 = 0$

Solución:

$$12x - 7x^2 + 64 = 0 \Rightarrow 7x^2 - 12x - 64 = 0 \Rightarrow x = \frac{12 \pm \sqrt{(12)^2 + 4(7)(64)}}{14} \Rightarrow$$

$$\Rightarrow x = \frac{12 \pm \sqrt{144 + 1792}}{14} = \frac{12 \pm \sqrt{1936}}{14} = \frac{12 \pm 44}{14} \Rightarrow x_1 = \frac{56}{14} = 4; x_2 = -\frac{32}{14} = -\frac{16}{7}$$

11.- $x^2 = -15x - 56$

Solución:

$$x^2 = -15x - 56 \Rightarrow x^2 + 15x + 56 = 0 \Rightarrow x = \frac{-15 \pm \sqrt{(15)^2 - 4(56)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{-15 \pm \sqrt{225 - 224}}{2} = \frac{-15 \pm 1}{2} \Rightarrow x_1 = -7; x_2 = -8$$

12.- $32x^2 + 18x - 17 = 0$

Solución:

$$32x^2 + 18x - 17 = 0 \Rightarrow x = \frac{-18 \pm \sqrt{(18)^2 + 4(32)(17)}}{64} \Rightarrow$$

$$\Rightarrow x = \frac{-18 \pm \sqrt{324 + 2176}}{64} = \frac{-18 \pm \sqrt{2500}}{64} = \frac{-18 \pm 50}{64} \Rightarrow$$

$$\Rightarrow x_1 = \frac{32}{64} = \frac{1}{2}; x_2 = -\frac{68}{64} = -\frac{34}{32} = -\frac{17}{16}$$

13.- $176x = 121 + 64x^2$

Solución:

$$176x = 121 + 64x^2 \Rightarrow 64x^2 - 176x + 121 = 0 \Rightarrow x = \frac{176 \pm \sqrt{(176)^2 - 4(64)(121)}}{128} \Rightarrow$$

$$\Rightarrow x = \frac{176 \pm \sqrt{30976 - 30976}}{128} = \frac{176}{128} = \frac{22}{16} = \frac{11}{8}$$

14.- $8x + 5 = 36x^2$

Solución:

$$8x + 5 = 36x^2 \Rightarrow 36x^2 - 8x - 5 = 0 \Rightarrow x = \frac{8 \pm \sqrt{(8)^2 + 4(36)(5)}}{72} \Rightarrow$$

$$\Rightarrow x = \frac{8 \pm \sqrt{64 + 720}}{72} = \frac{8 \pm \sqrt{784}}{72} = \frac{8 \pm 28}{72} \Rightarrow x_1 = \frac{36}{72} = \frac{1}{2}; x_2 = -\frac{20}{72} = -\frac{5}{18}$$

15.- $27x^2 + 12x - 7 = 0$

Solución:

$$27x^2 + 12x - 7 = 0 \Rightarrow x = \frac{-12 \pm \sqrt{(12)^2 + 4(27)(7)}}{54} \Rightarrow$$

$$\Rightarrow x = \frac{-12 \pm \sqrt{144 + 756}}{54} = \frac{-12 \pm \sqrt{900}}{54} = \frac{-12 \pm 30}{54} \Rightarrow$$

$$\Rightarrow x_1 = \frac{18}{54} = \frac{1}{3}; x_2 = \frac{-42}{54} = -\frac{7}{9}$$

16.- $15x = 25x^2 + 2$

Solución:

$$15x = 25x^2 + 2 \Rightarrow 25x^2 - 15x + 2 = 0 \Rightarrow x = \frac{15 \pm \sqrt{(15)^2 - 4(25)(2)}}{50} \Rightarrow$$

$$\Rightarrow x = \frac{15 \pm \sqrt{225 - 200}}{50} = \frac{15 \pm 5}{50} \Rightarrow x_1 = \frac{20}{50} = \frac{2}{5}; x_2 = \frac{10}{50} = \frac{1}{5}$$

17.- $8x^2 - 2x - 3 = 0$

Solución:

$$8x^2 - 2x - 3 = 0 \Rightarrow x = \frac{2 \pm \sqrt{(2)^2 + 4(8)(3)}}{16} = \frac{2 \pm \sqrt{4 + 96}}{16} = \frac{2 \pm 10}{16} \Rightarrow$$

$$\Rightarrow x_1 = \frac{12}{16} = \frac{3}{4}; x_2 = \frac{-8}{16} = -\frac{1}{2}$$

18.- $105 = x + 2x^2$

Solución:

$$105 = x + 2x^2 \Rightarrow 2x^2 + x - 105 = 0 \Rightarrow x = \frac{-1 \pm \sqrt{1 + 4(2)(105)}}{4} \Rightarrow$$

$$\Rightarrow x = \frac{-1 \pm \sqrt{1 + 840}}{4} = \frac{-1 \pm \sqrt{841}}{4} = \frac{-1 \pm 29}{4} \Rightarrow x_1 = \frac{28}{4} = 7; x_2 = -\frac{30}{4} = -\frac{15}{2}$$

EJERCICIO # 266.

Resolver las ecuaciones siguientes, llevándolas a la forma $ax^2 + bx + c = 0$ y aplicando la fórmula general:

1.- $x(x+3) = 5x + 3$

Solución:

$$x(x+3)=5x+3 \Rightarrow x^2+3x=5x+3 \Rightarrow x^2-2x-3=0 \Rightarrow$$

$$\Rightarrow x=\frac{2\pm\sqrt{(2)^2+4(3)}}{2}=\frac{2\pm\sqrt{16}}{2}=\frac{2\pm4}{2}\Rightarrow x_1=\frac{6}{2}=3;x_2=\frac{-2}{2}=-1$$

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

Solución:

$$3(3x-2)=(x+4)(4-x)\Rightarrow 9x^2-6=16-x^2\Rightarrow 10x^2-22=0\Rightarrow x^2=\frac{22}{10}=\frac{11}{5}\Rightarrow x=\pm\sqrt{\frac{11}{5}}$$

3.- $9x+1=3(x^2-5)-(x-3)(x+2)$

Solución:

$$9x+1=3(x^2-5)-(x-3)(x+2)\Rightarrow 9x+1=3x^2-15-(x^2-x-6)\Rightarrow$$

$$\Rightarrow 9x+1=3x^2-15-x^2+x+6\Rightarrow 2x^2-8x-10=0\Rightarrow x=\frac{8\pm\sqrt{(8)+4(2)(10)}}{4}\Rightarrow$$

$$\Rightarrow x=\frac{8\pm\sqrt{64+80}}{4}=\frac{8\pm\sqrt{144}}{4}=\frac{8\pm12}{4}\Rightarrow x_1=\frac{20}{4}=5;x_2=\frac{-4}{4}=-1$$

4.- $(2x-3)^2-(x+5)^2=-23$

Solución:

$$(2x-3)^2-(x+5)^2=-23\Rightarrow(4x^2-12x+9)-(x^2+10x+25)=-23\Rightarrow$$

$$\Rightarrow 3x^2-22x-16=-23\Rightarrow 3x^2-22x+7=0\Rightarrow x=\frac{22\pm\sqrt{(22)^2-4(3)(7)}}{6}\Rightarrow$$

$$\Rightarrow x=\frac{22\pm\sqrt{484-84}}{6}=\frac{22\pm\sqrt{400}}{6}=\frac{22\pm20}{6}\Rightarrow$$

$$\Rightarrow x_1=\frac{42}{6}=7;x_2=\frac{2}{6}=\frac{1}{3}$$

5.- $25(x+2)^2=(x-7)^2-81$

Solución:

$$25(x+2)^2 = (x-7)^2 - 81 \Rightarrow 25(x^2+4x+4) = (x^2-14x+49) - 81 \Rightarrow$$

$$\Rightarrow 24x^2 + 114x + 132 = 0 \Rightarrow 4x^2 + 19x + 22 = 0 \Rightarrow x = \frac{-19 \pm \sqrt{(19)^2 - 4(4)(22)}}{8} \Rightarrow$$

$$x = \frac{-19 \pm \sqrt{361 - 352}}{8} = \frac{-19 \pm 3}{8} \Rightarrow x_1 = -\frac{16}{8} = -2 ; x_2 = -\frac{22}{8} = -\frac{11}{4}$$

6.- $3x(x-2) - (x-6) = 23(x-3)$

Solución:

$$3x(x-2) - (x-6) = 23(x-3) \Rightarrow 3x^2 - 6x - x + 6 = 23x - 69 \Rightarrow$$

$$\Rightarrow 3x^2 - 30x + 75 = 0 \Rightarrow x = \frac{30 \pm \sqrt{(30)^2 - 4(3)(75)}}{6} \Rightarrow x = \frac{30 \pm \sqrt{900 - 900}}{6} \Rightarrow$$

$$\Rightarrow x = \frac{30}{6} = 5$$

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

Solución:

$$7(x-3) - 5(x^2 - 1) = x^2 - 5(x+2) \Rightarrow$$
$$\Rightarrow 7x - 21 - 5x^2 + 5 = x^2 - 5x - 10 \Rightarrow 6x^2 - 12x + 6 = 0 \Rightarrow$$

$$\Rightarrow x^2 - 2x + 1 = 0 \Rightarrow x = \frac{2 \pm \sqrt{4 - 4(1)}}{2} = \frac{2}{2} = 1$$

8.- $(x-5)^2 - (x-6)^2 = (2x-3)^2 - 118$

Solución:

$$(x-5)^2 - (x-6)^2 = (2x-3)^2 - 118 \Rightarrow$$
$$\Rightarrow (x^2 - 10x + 25) - (x^2 - 12x + 36) = (4x^2 - 12x + 9) - 118 \Rightarrow$$

$$\Rightarrow 4x^2 - 14x - 170 = 0 \Rightarrow x = \frac{14 \pm \sqrt{(14)^2 + 4(4)(170)}}{8} = \frac{14 \pm \sqrt{196 + 2720}}{8} \Rightarrow$$

$$\Rightarrow x = \frac{14 \pm \sqrt{2916}}{8} = \frac{14 \pm 54}{8} \Rightarrow x_1 = \frac{68}{8} = \frac{17}{2} ; x_2 = -\frac{40}{8} = -5$$

9.- $(5x-2)^2 - (3x+1)^2 - x^2 - 60 = 0$

Solución:

$$(5x-2)^2 - (3x+1)^2 - x^2 - 60 = 0 \Rightarrow$$

$$(25x^2 - 20x + 4) - (9x^2 + 6x + 1) - x^2 - 60 = 0 \Rightarrow$$

$$\Rightarrow 15x^2 - 26x - 57 = 0 \Rightarrow x = \frac{26 \pm \sqrt{(26)^2 + 4(15)(57)}}{30} \Rightarrow$$

$$\Rightarrow x = \frac{26 \pm \sqrt{676 + 3420}}{30} = \frac{26 \pm \sqrt{4096}}{30} = \frac{30 \pm 64}{30} \Rightarrow$$

$$\Rightarrow x_1 = \frac{94}{30} = \frac{47}{15}; x_2 = -\frac{34}{30} = -\frac{17}{15}$$

10.- $(x+4)^3 - (x-3)^3 = 343$

Solución:

$$(x+4)^3 - (x-3)^3 = 343 \Rightarrow$$

$$\Rightarrow (x^3 + 12x^2 + 48x + 64) - (x^3 - 9x^2 + 27x - 27) = 343 \Rightarrow$$

$$\Rightarrow 21x^2 + 21x - 252 = 0 \Rightarrow x^2 + x - 12 = 0 \Rightarrow (x+4)(x-3) = 0$$

$$\Rightarrow x_1 = -4; x_2 = 3$$

También:

$$x^2 + x - 12 = 0 \Rightarrow x = \frac{-1 \pm \sqrt{1 + 4(12)}}{2} = \frac{-1 \pm 7}{2} \Rightarrow$$

$$\Rightarrow x_1 = -\frac{8}{2} = -4; x_2 = \frac{6}{2} = 3$$

11.- $(x+2)^2 - (x-1)^2 = x(3x+4) + 8$

Solución:

$$(x+2)^2 - (x-1)^2 = x(3x+4) + 8 \Rightarrow$$

$$\Rightarrow (x^3 + 6x^2 + 12x + 8) - (x^3 - 3x^2 + 3x - 1) = 3x^2 + 4x + 8 \Rightarrow$$

$$\Rightarrow 9x^2 + 9x + 9 = 3x^2 + 4x + 8 \Rightarrow 6x^2 + 5x + 1 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{-5 \pm \sqrt{25 - 24}}{12} = \frac{-5 \pm 1}{12} \Rightarrow x_1 = -\frac{1}{2}; x_2 = -\frac{4}{12} = -\frac{1}{3}$$

12.- $(5x-4)^2 - (3x+5)(2x-1) = 20x(x-2) + 27$

Solución:

$$(5x-4)^2-(3x+5)(2x-1)=20x(x-2)+27 \Rightarrow$$

$$\Rightarrow 25x^2-40x+16-(6x^2+7x-5)=20x^2-40x+27 \Rightarrow$$

$$\Rightarrow x^2+7x+6=0 \Rightarrow x=\frac{-7\pm\sqrt{49-4(6)}}{2}=\frac{-7\pm5}{2}\Rightarrow$$

$$\Rightarrow x_1=-\frac{2}{2}=-1; x_2=-\frac{12}{2}=-6$$

EJERCICIO # 267.

Resolver las siguientes ecuaciones:

1.- $x^2-3x+2=0$

Solución:

$$x^2-3x+2=0 \Rightarrow x=\frac{3\pm\sqrt{(3)^2-4(2)}}{2}=\frac{3\pm1}{2}\Rightarrow x_1=2; x_2=1$$

2.- $x^2-2x-15=0$

Solución:

$$x^2-2x-15=0 \Rightarrow x=\frac{2\pm\sqrt{(2)^2+4(15)}}{2}=\frac{2\pm8}{2}\Rightarrow x_1=5; x_2=-3$$

3.- $x^2=19x-88$

Solución:

$$x^2=19x-88 \Rightarrow x^2-19x+88=0 \Rightarrow x=\frac{19\pm\sqrt{(19)^2-4(88)}}{2}\Rightarrow$$

$$\Rightarrow x=\frac{19\pm\sqrt{361-352}}{2}=\frac{19\pm3}{2}\Rightarrow x_1=11; x_2=8$$

4.- $x^2+4x=285$

Solución:

$$x^2 + 4x = 285 \Rightarrow x^2 + 4x - 285 = 0 \Rightarrow x = \frac{-4 \pm \sqrt{(4)^2 + 4(285)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{-4 \pm \sqrt{16 + 1140}}{2} = \frac{-4 \pm \sqrt{1156}}{2} = \frac{-4 \pm 34}{2} \Rightarrow x_1 = 15; x_2 = -19$$

5.- $5x(x-1) - 2(2x^2 - 7x) = -8$

Solución:

$$5x(x-1) - 2(2x^2 - 7x) = -8 \Rightarrow$$

$$\Rightarrow 5x^2 - 5x - 4x^2 + 14x = -8 \Rightarrow x^2 + 9x + 8 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{-9 \pm \sqrt{(9)^2 - 4(8)}}{2} = \frac{-9 \pm \sqrt{49}}{2} = \frac{-9 \pm 7}{2} \Rightarrow$$

$$\Rightarrow x_1 = \frac{-2}{2} = -1; x_2 = \frac{-16}{2} = -8$$

6.- $x^2 - (7x + 6) = x + 59$

Solución:

$$x^2 - (7x + 6) = x + 59 \Rightarrow x^2 - 8x - 65 = 0 \Rightarrow x = \frac{8 \pm \sqrt{(8)^2 + 4(65)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{8 \pm \sqrt{64 + 260}}{2} = \frac{8 \pm \sqrt{324}}{2} = \frac{8 \pm 18}{2} \Rightarrow x_1 = \frac{26}{2} = 13; x_2 = \frac{-10}{2} = -5$$

7.- $(x-1)^2 + 11x + 199 = 3x^2 - (x-2)^2$

Solución:

$$(x-1)^2 + 11x + 199 = 3x^2 - (x-2)^2 \Rightarrow$$

$$\Rightarrow x^2 - 2x + 1 + 11x + 199 = 3x^2 - (x^2 - 4x + 4) \Rightarrow$$

$$\Rightarrow x^2 - 5x - 204 = 0 \Rightarrow x = \frac{5 \pm \sqrt{(5)^2 + 4(204)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{5 \pm \sqrt{841}}{2} = \frac{5 \pm 29}{2} \Rightarrow x_1 = \frac{34}{2} = 17; x_2 = -\frac{24}{2} = -12$$

8.- $(x-2)(x+2)-7(x-1)=21$

Solución:

$$(x-2)(x+2)-7(x-1)=21 \Rightarrow x^2-4-7x+7=21 \Rightarrow$$

$$\Rightarrow x^2-7x-18=0 \Rightarrow x=\frac{7\pm\sqrt{(7)^2+4(18)}}{2}=\frac{7\pm\sqrt{121}}{2} \Rightarrow$$

$$\Rightarrow x=\frac{7\pm 11}{2} \Rightarrow x_1=\frac{18}{2}=9; x_2=\frac{-4}{2}=-2$$

9.- $2x^2-(x-2)(x+5)=7(x+3)$

Solución:

$$2x^2-(x-2)(x+5)=7(x+3) \Rightarrow 2x^2-(x^2+3x-10)=7x+21 \Rightarrow$$

$$\Rightarrow x^2-3x+10=7x+21 \Rightarrow x^2-10x-11=0 \Rightarrow x=\frac{10\pm\sqrt{100+44}}{2} \Rightarrow$$

$$\Rightarrow x=\frac{10\pm 12}{2} \Rightarrow x_1=\frac{22}{2}=11; x_2=\frac{-2}{2}=-1$$

10.- $(x-1)(x+2)-(2x-3)(x+4)-x+14=0$

Solución:

$$(x-1)(x+2)-(2x-3)(x+4)-x+14=0 \Rightarrow$$

$$\Rightarrow x^2+x-2-(2x^2+5x-12)-x+14=0 \Rightarrow$$

$$\Rightarrow -x^2-5x+24=0 \Rightarrow x^2+5x-24=0 \Rightarrow x=\frac{-5\pm\sqrt{25+4(24)}}{2} \Rightarrow$$

$$\Rightarrow x=\frac{-5\pm\sqrt{121}}{2}=\frac{-5\pm 11}{2} \Rightarrow x_1=\frac{6}{2}=3; x_2=\frac{-16}{2}=-8$$

EJERCICIO #268.

1.- $\dfrac{x^2}{5}-\dfrac{x}{2}=\dfrac{3}{10}$

Solución:

Multiplicando ambos miembros de la igualdad por 10:

$$\frac{x^2}{5} - \frac{x}{2} = \frac{3}{10} \Rightarrow 2x^2 - 5x = 3 \Rightarrow 2x^2 - 5x - 3 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{5 \pm \sqrt{(5)^2 + 4(2)(3)}}{4} = \frac{5 \pm \sqrt{25 + 24}}{4} = \frac{5 \pm \sqrt{49}}{4} = \frac{5 \pm 7}{4} \Rightarrow$$

$$\Rightarrow x_1 = \frac{12}{4} = 3; x_2 = \frac{-2}{4} = -\frac{1}{2}$$

2.- $4x - \dfrac{13}{x} = \dfrac{3}{2}$

Solución:

$$4x - \frac{13}{x} = \frac{3}{2} \Rightarrow 2x\left(4x - \frac{13}{x}\right) = 2x\left(\frac{3}{2}\right) \Rightarrow 8x^2 - 26 = 3x \Rightarrow$$

$$\Rightarrow 8x^2 - 3x - 26 = 0 \Rightarrow x = \frac{3 \pm \sqrt{9 + 4(8)(26)}}{16} = \frac{3 \pm \sqrt{841}}{16} = \frac{3 \pm 29}{16} \Rightarrow$$

$$\Rightarrow x_1 = \frac{32}{16} = 2; x_2 = -\frac{26}{16} = -\frac{13}{8}$$

3.- $\dfrac{x^2}{6} - \dfrac{x}{2} = 3(x-5)$

Solución:

$$\frac{x^2}{6} - \frac{x}{2} = 3(x-5) \Rightarrow 6\left(\frac{x^2}{6} - \frac{x}{2}\right) = 6[3(x-5)] \Rightarrow$$

$$\Rightarrow x^2 - 3x = 18x - 90 \Rightarrow x^2 - 21x + 90 = 0 \Rightarrow x = \frac{21 \pm \sqrt{(21)^2 - 4(90)}}{2} =$$

$$x = \frac{21 \pm \sqrt{441 - 360}}{2} = \frac{21 \pm \sqrt{81}}{2} = \frac{21 \pm 9}{2} \Rightarrow x_1 = \frac{30}{2} = 15; x_2 = \frac{12}{2} = 6$$

4.- $\dfrac{1}{4}(x-4) + \dfrac{2}{5}(x-5) = \dfrac{1}{5}(x^2 - 53)$

Solución:

$$\frac{1}{4}(x-4)+\frac{2}{5}(x-5)=\frac{1}{5}(x^2-53)\Rightarrow 20\left[\frac{1}{4}(x-4)+\frac{2}{5}(x-5)\right]=20\left[\frac{1}{5}(x^2-53)\right]\Rightarrow$$

$$\Rightarrow 5x-20+8x-40=4x^2-212\Rightarrow 4x^2+13x-152=0\Rightarrow$$

$$\Rightarrow x=\frac{-13\pm\sqrt{(13)^2+4(4)(152)}}{8}=\frac{-13\pm\sqrt{169+2432}}{8}=\frac{-13\pm 51}{8}\Rightarrow$$

$$\Rightarrow x_1=\frac{38}{8}=\frac{19}{4};x_2=-\frac{64}{8}=-8$$

5.- $\dfrac{5}{x}-\dfrac{1}{(x+2)}=1$

Solución:

$$\frac{5}{x}-\frac{1}{(x+2)}=1\Rightarrow x(x+2)\left[\frac{5}{x}-\frac{1}{(x+2)}\right]=x(x+2)(1)\Rightarrow$$

$$\Rightarrow 5(x+2)-x=x(x+2)\Rightarrow 5x+10-x=x^2+2x\Rightarrow$$

$$\Rightarrow x^2-2x-10=0\Rightarrow x=\frac{2\pm\sqrt{(2)^2+4(10)}}{2}=\frac{2\pm 2\sqrt{11}}{2}=1\pm\sqrt{11}\Rightarrow$$

$$\Rightarrow x_1=1+\sqrt{11};x_2=1-\sqrt{11}$$

6.- $\dfrac{15}{x}-\dfrac{11x+5}{x^2}=-1$

Solución:

$$\frac{15}{x}-\frac{11x+5}{x^2}=-1\Rightarrow x^2\left[\frac{15}{x}-\frac{11x+5}{x^2}\right]=x^2(-1)\Rightarrow$$

$$\Rightarrow 15x-11x-5=-x^2\Rightarrow x^2+4x-5=0\Rightarrow x=\frac{-4\pm\sqrt{(4)^2+4(5)}}{2}\Rightarrow$$

$$\Rightarrow\frac{-4\pm 6}{2}\Rightarrow x_1=\frac{2}{2}=1;x_2=\frac{-10}{2}=-5$$

7.- $\dfrac{8x}{3x+5}+\dfrac{5x-1}{x+1}=3$

Solución:

$$\frac{8x}{3x+5}+\frac{5x-1}{x+1}=3 \Rightarrow (3x+5)(x+1)\left[\frac{8x}{3x+5}+\frac{5x-1}{x+1}\right]=(3x+5)(x+1)(3) \Rightarrow$$

$$\Rightarrow 8x(x+1)+(5x-1)(3x+5)=3(3x+5)(x+1) \Rightarrow$$

$$\Rightarrow 8x^2+8x+15x^2+22x-5=9x^2+24x+15 \Rightarrow$$

$$\Rightarrow 14x^2+6x-20=0 \Rightarrow 7x^2+3x-10=0 \Rightarrow x=\frac{-3\pm\sqrt{(3)^2+280}}{14}=\frac{-3\pm17}{14} \Rightarrow$$

$$\Rightarrow x_1=\frac{14}{14}=1; x_2=\frac{-20}{14}=-\frac{10}{7}$$

8.- $\dfrac{1}{x-2}-\dfrac{1}{x-1}=\dfrac{1}{6}$

Solución:

$$\frac{1}{x-2}-\frac{1}{x-1}=\frac{1}{6} \Rightarrow 6(x-1)(x-2)\left[\frac{1}{x-2}-\frac{1}{x-1}\right]=6(x-1)(x-2)\left(\frac{1}{6}\right) \Rightarrow$$

$$\Rightarrow 6(x-1)-6(x-2)=(x-1)(x-2) \Rightarrow 6x-6-6x+12=x^2-3x+2 \Rightarrow$$

$$\Rightarrow x^2-3x-4=0 \Rightarrow x=\frac{3\pm\sqrt{(3)^2+4(4)}}{2}=\frac{3\pm5}{2} \Rightarrow x_1=\frac{8}{2}=4; x_2=-\frac{2}{2}=-1$$

9.- $1-\dfrac{2x-3}{x+5}=\dfrac{x-2}{10}$

Solución:

$$1-\frac{2x-3}{x+5}=\frac{x-2}{10} \Rightarrow \frac{x+5-2x+3}{x+5}=\frac{x-2}{10} \Rightarrow \frac{8-x}{x+5}=\frac{x-2}{10} \Rightarrow$$

$$\Rightarrow 80-10x=x^2+3x-10 \Rightarrow x^2+13x-90=0 \Rightarrow$$

$$\Rightarrow x=\frac{-13\pm\sqrt{(13)^2+4(90)}}{2}=\frac{-11\pm\sqrt{169+360}}{2}=\frac{-13\pm\sqrt{529}}{2}=\frac{-13\pm23}{2} \Rightarrow$$

$$\Rightarrow x_1=\frac{10}{2}=5; x_2=-\frac{36}{2}=-18$$

10.- $\dfrac{x-13}{x}=5-\dfrac{10(5x+3)}{x^2}$

Solución:

$$\frac{x-13}{x} = 5 - \frac{10(5x+3)}{x^2} \Rightarrow x^2\left(\frac{x-13}{x}\right) = x^2\left[5 - \frac{10(5x+3)}{x^2}\right] \Rightarrow$$

$$\Rightarrow x^2 - 13x = 5x^2 - 50x - 30 \Rightarrow 4x^2 - 37x - 30 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{37 \pm \sqrt{(37)^2 + 4(4)(30)}}{8} = \frac{37 \pm \sqrt{1369 + 480}}{8} \Rightarrow$$

$$\Rightarrow x = \frac{37 \pm \sqrt{1849}}{8} = \frac{37 \pm 43}{8} \Rightarrow x_1 = \frac{80}{8} = 10; x_2 = -\frac{6}{8} = -\frac{3}{4}$$

11.- $\dfrac{x}{x-2} - \dfrac{x-2}{x} = \dfrac{5}{2}$

Solución:

$$\frac{x}{x-2} - \frac{x-2}{x} = \frac{5}{2} \Rightarrow 2x(x-2)\left[\frac{x}{x-2} - \frac{(x-2)}{x}\right] = 2x(x-2)\cdot\frac{5}{2} \Rightarrow$$

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

$$\Rightarrow 5x^2 - 14x + 8 = 0 \Rightarrow x = \frac{14 \pm \sqrt{(14)^2 - 4(5)(8)}}{10} = \frac{14 \pm \sqrt{196 - 160}}{10} \Rightarrow$$

$$\Rightarrow x = \frac{14 \pm \sqrt{36}}{10} = \frac{14 \pm 6}{10} \Rightarrow x_1 = \frac{20}{10} = 2; x_2 = \frac{8}{10} = \frac{4}{5}$$

12.- $\dfrac{4x^2}{x-1} - \dfrac{1-3x}{4} = \dfrac{20x}{3}$

Solución:

$$\frac{4x^2}{x-1} - \frac{1-3x}{4} = \frac{20x}{3} \Rightarrow 12(x-1)\left[\frac{4x^2}{x-1} - \frac{1-3x}{4}\right] = 12(x-1)\left(\frac{20x}{3}\right) \Rightarrow$$

$$\Rightarrow 48x^2 - 3(x-1)(1-3x) = 80x(x-1) \Rightarrow 48x^2 - 3(x - 3x^2 - 1 + 3x) = 80x^2 - 80x \Rightarrow$$

$$\Rightarrow 48x^2 + 9x^2 - 12x + 3 = 80x^2 - 80x \Rightarrow 23x^2 - 68x - 3 = 0 \Rightarrow x = \frac{68 \pm \sqrt{(68)^2 + 4(23)(3)}}{46} \Rightarrow$$

$$\Rightarrow \frac{68 \pm \sqrt{4624 + 276}}{46} = \frac{68 \pm \sqrt{4900}}{46} = \frac{68 \pm 70}{46} \Rightarrow x_1 = \frac{138}{46} = 3; x_2 = \frac{-2}{46} = -\frac{1}{23}$$

13.- $\dfrac{3x-1}{x} - \dfrac{2x}{2x-1} - \dfrac{7}{6} = 0$

Solución:

$$\frac{3x-1}{x} - \frac{2x}{2x-1} - \frac{7}{6} = 0 \Rightarrow 6x(2x-1)\left[\frac{3x-1}{x} - \frac{2x}{2x-1} - \frac{7}{6}\right] = 0 \Rightarrow$$

$$\Rightarrow 6(2x-1)(3x-1) - 12x^2 - 7x(2x-1) = 0 \Rightarrow$$

$$\Rightarrow 6(6x^2 - 2x - 3x + 1) - 12x^2 - 14x^2 + 7x = 0 \Rightarrow$$

$$\Rightarrow 10x^2 - 23x + 6 = 0 \Rightarrow x = \frac{23 \pm \sqrt{(23)^2 - 4(10)(6)}}{20} \Rightarrow$$

$$\Rightarrow x = \frac{23 \pm \sqrt{529 - 240}}{20} = \frac{23 \pm \sqrt{289}}{20} \Rightarrow x = \frac{23 \pm 17}{20} \Rightarrow x_1 = \frac{40}{20} = 2; x_2 = \frac{6}{20} = \frac{3}{10}$$

14.- $\dfrac{5x-8}{x-1} = \dfrac{7x-4}{x+2}$

Solución:

$$\frac{5x-8}{x-1} = \frac{7x-4}{x+2} \Rightarrow (5x-8)(x+2) = (7x-4)(x-1) \Rightarrow$$

$$\Rightarrow 5x^2 + 10x - 8x - 16 = 7x^2 - 7x - 4x + 4 \Rightarrow$$

$$\Rightarrow 2x^2 - 13x + 20 = 0 \Rightarrow x = \frac{13 \pm \sqrt{(13)^2 - 4(2)(20)}}{4} \Rightarrow$$

$$\Rightarrow x = \frac{13 \pm \sqrt{169 - 160}}{4} = \frac{13 \pm 3}{4} \Rightarrow x_1 = \frac{16}{4} = 4; x_2 = \frac{10}{4} = \frac{5}{2}$$

15.- $\dfrac{x+3}{2x-1} - \dfrac{5x-1}{4x+7} = 0$

Solución:

$$\frac{x+3}{2x-1} - \frac{5x-1}{4x+7} = 0 \Rightarrow \frac{x+3}{2x-1} = \frac{5x-1}{4x+7} \Rightarrow (x+3)(4x+7) = (2x-1)(5x-1) \Rightarrow$$

$$\Rightarrow 4x^2 + 7x + 12x + 21 = 10x^2 - 2x - 5x + 1 \Rightarrow$$

$$\Rightarrow 6x^2 - 26x - 20 = 0 \Rightarrow 3x^2 - 13x - 10 = 0 \Rightarrow x = \frac{13 \pm \sqrt{(13)^2 + 4(3)(10)}}{6} \Rightarrow$$

$$\Rightarrow x = \frac{13 \pm \sqrt{169 + 120}}{6} = \frac{13 \pm \sqrt{289}}{6} = \frac{13 \pm 17}{6} \Rightarrow x_1 = 5; x_2 = \frac{-4}{6} = -\frac{2}{3}$$

16.- $\dfrac{1}{4-x} - \dfrac{1}{6} = \dfrac{1}{x+1}$

Solución:

$\dfrac{1}{4-x} - \dfrac{1}{6} = \dfrac{1}{x+1} \Rightarrow 6(4-x)(x+1)\left[\dfrac{1}{4-x} - \dfrac{1}{6}\right] = 6(4-x)(x+1)\left(\dfrac{1}{x+1}\right) \Rightarrow$

$\Rightarrow 6(x+1) - (4-x)(x+1) = 6(4-x) \Rightarrow$

$\Rightarrow 6x+6 - (4x+4-x^2-x) = 24-6x \Rightarrow x^2+3x+2 = 24-6x \Rightarrow x^2+9x-22=0 \Rightarrow$

$\Rightarrow x = \dfrac{-9 \pm \sqrt{(9)^2 + 4(22)}}{2} = \dfrac{-9 \pm \sqrt{81+88}}{2} = \dfrac{-9 \pm \sqrt{169}}{2} = \dfrac{-9 \pm 13}{2} \Rightarrow x_1 = \dfrac{4}{2} = 2; x_2 = -\dfrac{22}{2} = -11$

17.- $\dfrac{x+4}{x+5} - \dfrac{x+2}{x+3} = \dfrac{1}{24}$

Solución:

$\dfrac{x+4}{x+5} - \dfrac{x+2}{x+3} = \dfrac{1}{24} \Rightarrow 24(x+5)(x+3)\left[\dfrac{x+4}{x+5} - \dfrac{x+2}{x+3}\right] = 24(x+5)(x+3)\left(\dfrac{1}{24}\right) \Rightarrow$

$\Rightarrow 24(x+3)(x+4) - 24(x+2)(x+5) = (x+3)(x+5) \Rightarrow$

$\Rightarrow 24(x^2+7x+12) - 24(x^2+7x+10) = x^2+8x+15 \Rightarrow$

$\Rightarrow 48 = x^2+8x+15 \Rightarrow x^2+8x-33=0 \Rightarrow x = \dfrac{-8 \pm \sqrt{(8)^2 + 4(33)}}{2} \Rightarrow$

$\Rightarrow \dfrac{-8 \pm \sqrt{64+132}}{2} = \dfrac{-8 \pm \sqrt{196}}{2} = \dfrac{-8 \pm 14}{2} \Rightarrow x_1 = \dfrac{6}{2} = 3; x_2 = -\dfrac{22}{2} = -11$

18.- $\dfrac{5}{x^2-1} - \dfrac{6}{x+1} = \dfrac{29}{8}$

Solución:

$$\frac{5}{x^2-1}-\frac{6}{x+1}=\frac{29}{8} \Rightarrow 8\left(x^2-1\right)\left[\frac{5}{x^2-1}-\frac{6}{x+1}\right]=8\left(x^2-1\right)\cdot\frac{29}{8} \Rightarrow$$

$$\Rightarrow 40-48\left(x-1\right)=29\left(x^2-1\right) \Rightarrow 40-48x+48=29x^2-29 \Rightarrow$$

$$\Rightarrow 29x^2+48x-77=0 \Rightarrow x=\frac{-48\pm\sqrt{\left(48\right)^2+4\left(29\right)\left(77\right)}}{96} \Rightarrow$$

$$\Rightarrow \frac{-48\pm\sqrt{2304+8932}}{96}=\frac{-48\pm\sqrt{11236}}{96}=\frac{-48\pm106}{96} \Rightarrow$$

$$\Rightarrow x_1=\frac{58}{48}=\frac{29}{24}; x_2=-\frac{154}{48}=-\frac{77}{24}$$

19.- $\dfrac{x-1}{x+1}+\dfrac{x+1}{x-1}=\dfrac{2x+9}{x+3}$

Solución:

$$\frac{x-1}{x+1}+\frac{x+1}{x-1}=\frac{2x+9}{x+3} \Rightarrow \left(x^2-1\right)\left(x+3\right)\left[\frac{x-1}{x+1}+\frac{x+1}{x-1}\right]=\left(x^2-1\right)\left(x+3\right)\left(\frac{2x+9}{x+3}\right) \Rightarrow$$

$$\Rightarrow \left(x+3\right)\left(x-1\right)^2+\left(x+3\right)\left(x+1\right)^2=\left(x^2-1\right)\left(2x+9\right) \Rightarrow$$

$$\Rightarrow \left(x+3\right)\left(x^2-2x+1\right)+\left(x+3\right)\left(x^2+2x+1\right)=\left(x^2-1\right)\left(2x+9\right) \Rightarrow$$

$$\Rightarrow x^3-2x^2+x+3x^2-6x+3+x^3+2x^2+x+3x^2+6x+3=2x^3+9x^2-2x-9 \Rightarrow$$

$$\Rightarrow 3x^2-4x-15=0 \Rightarrow x=\frac{4\pm\sqrt{\left(4\right)^2+4\left(3\right)\left(15\right)}}{6}=\frac{4\pm\sqrt{16+180}}{6}=\frac{4\pm\sqrt{196}}{6}=\frac{4\pm14}{6} \Rightarrow$$

$$\Rightarrow x_1=\frac{18}{6}=3; x_2=-\frac{10}{6}=-\frac{5}{3}$$

20.- $\dfrac{3}{x+2}-\dfrac{1}{x-2}=\dfrac{1}{x+1}$

Solución:

$$\frac{3}{x+2} - \frac{1}{x-2} = \frac{1}{x+1} \Rightarrow (x^2-4)(x+1)\left[\frac{3}{x+2} - \frac{1}{x-2}\right] = (x^2-4)(x+1)\left(\frac{1}{x+1}\right) \Rightarrow$$

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

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

$$\Rightarrow 3x^2-3x-6-x^2-3x-2 = x^2-4 \Rightarrow x^2-6x-4 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{6\pm\sqrt{(6)^2+4(4)}}{2} = \frac{6\pm\sqrt{36+16}}{2} = \frac{6\pm\sqrt{52}}{2} = \frac{6\pm2\sqrt{13}}{2} = 3\pm\sqrt{13} \Rightarrow$$

$$\Rightarrow x_1 = 3+\sqrt{13}; x_2 = 3-\sqrt{13}$$

EJERCICIO # 270:

Resolver las siguientes ecuaciones literales:

$$Ax^2+Bx+C = 0 \Rightarrow x = \frac{-B\pm\sqrt{B^2-4AC}}{2A}$$

1.- $x^2+2ax-35a^2 = 0$

Solución:

$$x^2+2ax-35a^2 = 0 \Rightarrow x = \frac{-2a\pm\sqrt{(2a)^2+4(35a^2)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{-2a\pm\sqrt{4a^2+4\cdot35\cdot a^2}}{2} = \frac{-2a\pm2a\sqrt{1+35}}{2} = -a\pm6a \Rightarrow$$

$$\Rightarrow x_1 = 5a; x_2 = -7a$$

2.- $10x^2 = 36a^2-9ax$

Solución:

$$10x^2 = 36a^2-9ax \Rightarrow 10x^2+9ax-36a^2 = 0 \Rightarrow x = \frac{-9a\pm\sqrt{(9a)^2+4(10)(36a^2)}}{20} \Rightarrow$$

$$\Rightarrow x = \frac{-9a\pm\sqrt{81a^2+1440a^2}}{20} = \frac{-9a\pm\sqrt{81a^2+1440a^2}}{20} = \frac{-9a\pm\sqrt{1521a^2}}{20} = \frac{-9a\pm39a}{20} \Rightarrow$$

$$\Rightarrow x_1 = \frac{-9a+39a}{20} = \frac{30a}{20} = \frac{3a}{2}; x_2 = \frac{-9a-39a}{20} = -\frac{48a}{20} = -\frac{12a}{5}$$

3.- $a^2x^2+abx-2b^2 = 0$

Solución:

$$a^2x^2 + abx - 2b^2 = 0 \Rightarrow x = \frac{-ab \pm \sqrt{(ab)^2 + 4(a^2)(2b^2)}}{2a^2} \Rightarrow$$

$$\Rightarrow x = \frac{-ab \pm ab\sqrt{1+8}}{2a^2} = \frac{-ab \pm ab\sqrt{9}}{2a^2} = \frac{-ab \pm 3ab}{2a^2} \Rightarrow$$

$$\Rightarrow x_1 = \frac{2ab}{2a^2} = \frac{b}{a} ; x_2 = -\frac{4ab}{2a^2} = -\frac{2b}{a}$$

4.- $89bx = 42x^2 + 22b^2$

Solución:

$$89bx = 42x^2 + 22b^2 \Rightarrow 42x^2 - 89bx + 22b^2 \Rightarrow$$

$$\Rightarrow x = \frac{89b \pm \sqrt{(89b)^2 - 4(42)(22b^2)}}{84} = \frac{89b \pm \sqrt{7921b^2 - 3696b^2}}{84} \Rightarrow$$

$$\Rightarrow x = \frac{89b \pm \sqrt{4225b^2}}{84} = \frac{89b \pm 65b}{84} \Rightarrow x_1 = \frac{154b}{84} = \frac{77b}{42} = \frac{11b}{6} ; x_2 = \frac{24b}{42} = \frac{4b}{7}$$

5.- $x^2 + ax = 20a^2$

Solución:

$$x^2 + ax = 20a^2 \Rightarrow x^2 + ax - 20a^2 = 0 \Rightarrow x = \frac{-a \pm \sqrt{(a)^2 + 4(20a^2)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{-a \pm a\sqrt{81}}{2} \Rightarrow x_1 = \frac{-a + 9a}{2} = \frac{8a}{2} = 4a ; x_2 = -\frac{10a}{2} = -5a$$

6.- $2x^2 = abx + 3a^2b^2$

Solución:

$$2x^2 = abx + 3a^2b^2 \Rightarrow 2x^2 - abx - 3a^2b^2 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{ab \pm \sqrt{(ab)^2 + 4(2)(3a^2b^2)}}{4} = \frac{ab \pm ab\sqrt{1+24}}{4} \Rightarrow$$

$$\Rightarrow x = \frac{ab \pm ab\sqrt{25}}{4} \Rightarrow \frac{ab \pm 5ab}{4} \Rightarrow x_1 = \frac{6ab}{4} = \frac{3ab}{2} ; x_2 = -\frac{4ab}{4} = -ab$$

7.- $b^2x^2 + 2abx = 3a^2$

Solución:

$$b^2x^2 + 2abx = 3a^2 \Rightarrow b^2x^2 + 2abx - 3a^2 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{-2ab \pm \sqrt{(2ab)^2 + 4(b^2)(3a^2)}}{2b^2} = \frac{-2ab \pm \sqrt{4a^2b^2 + 12a^2b^2}}{2b^2} \Rightarrow$$

$$\Rightarrow x = \frac{-2ab \pm 2ab\sqrt{1+3}}{2b^2} = \frac{-2ab \pm 4ab}{2b^2} = \frac{-a \pm 2a}{b} \Rightarrow$$

$$\Rightarrow x_1 = \frac{a}{b}; x_2 = -\frac{3a}{b}$$

8.- $x^2 + ax - bx = ab$

Solución:

$$x^2 + ax - bx = ab \Rightarrow x^2 + (a-b)x - ab = 0 \Rightarrow x = \frac{-(a-b) \pm \sqrt{(a-b)^2 + 4(ab)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{b - a \pm \sqrt{a^2 - 2ab + b^2 + 4ab}}{2} = \frac{b - a \pm \sqrt{(a+b)^2}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{b - a \pm (a+b)}{2} \Rightarrow x_1 = b; x_2 = -a$$

9.- $x^2 - 2ax = 6ab - 3bx$

Solución:

$$x^2 - 2ax = 6ab - 3bx \Rightarrow x^2 - (2a - 3b)x - 6ab = 0 \Rightarrow$$

$$\Rightarrow x = \frac{(2a - 3b) \pm \sqrt{(2a - 3b)^2 + 4(6ab)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{(2a - 3b) \pm \sqrt{4a^2 - 12ab + 9b^2 + 24ab}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{(2a - 3b) \pm \sqrt{(2a + 3b)^2}}{2} = \frac{(2a - 3b) \pm (2a + 3b)}{2} \Rightarrow x_1 = \frac{4a}{2}; x_2 = -\frac{4b}{2} = -2b$$

10.- $3(2x^2 - mx) + 4nx - 2mn = 0$

Solución:

$$3\left(2x^2 - mx\right) + 4nx - 2mn = 0 \Rightarrow 6x^2 - 3mx + 4nx - 2mn = 0 \Rightarrow$$

$$\Rightarrow 6x^2 + \left(4n - 3m\right)x - 2mn = 0 \Rightarrow x = \frac{\left(3m - 4n\right) \pm \sqrt{\left(4n - 3m\right)^2 + 4(6)(2mn)}}{12} \Rightarrow$$

$$\Rightarrow x = \frac{\left(3m - 4n\right) \pm \sqrt{\left(4n + 3m\right)^2}}{2} = \frac{3m - 4n \pm \left(4n + 3m\right)}{2} \Rightarrow$$

$$\Rightarrow x_1 = \frac{6m}{2} = 3m; x_2 = -\frac{8n}{2} = -4n$$

11.- $x^2 - a^2 - bx - ab = 0$

Solución:

$$x^2 - a^2 - bx - ab = 0 \Rightarrow x^2 - bx - \left(a^2 + ab\right) = 0 \Rightarrow$$

$$\Rightarrow x = \frac{b \pm \sqrt{\left(b\right)^2 + 4\left(a^2 + ab\right)}}{2} = \frac{b \pm \sqrt{\left(2a + b\right)^2}}{2} = \frac{b \pm \left(2a + b\right)}{2} \Rightarrow$$

$$\Rightarrow x_1 = \frac{2\left(a + b\right)}{2} = a + b; x_2 = -\frac{2a}{2} = -a$$

12.- $abx^2 - x\left(b - 2a\right) = 2$

Solución:

$$abx^2 - x\left(b - 2a\right) = 2 \Rightarrow abx^2 - \left(b - 2a\right)x - 2 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{\left(b - 2a\right) \pm \sqrt{\left(b - 2a\right)^2 + 4\left(ab\right)(2)}}{2ab} = \frac{\left(b - 2a\right) \pm \sqrt{\left(b + 2a\right)^2}}{2ab} \Rightarrow$$

$$\Rightarrow x = \frac{\left(b - 2a\right) \pm \left(b + 2a\right)}{2ab} \Rightarrow x_1 = \frac{2b}{2ab} = \frac{1}{a}; x_2 - \frac{4a}{2ab} = -\frac{2}{b}$$

13.- $x^2 - 2ax + a^2 - b^2 = 0$

Solución:

$$x^2 - 2ax + a^2 - b^2 = 0 \Rightarrow x = \frac{2a \pm \sqrt{\left(2a\right)^2 - 4\left(a^2 - b^2\right)}}{2} \Rightarrow$$

$$\Rightarrow \frac{2a \pm 2b}{2} = a \pm b \Rightarrow x_1 = a + b; x_2 = a - b$$

14.- $4x\left(x - b\right) + b^2 = 4m^2$

Solución:

$$4x(x-b)+b^2=4m^2 \Rightarrow 4x^2-4bx+\left(b^2-4m^2\right)=0 \Rightarrow x=\frac{4b\pm\sqrt{\left(4b\right)^2-4(4)\left(b^2-4m\right)}}{8} \Rightarrow$$

$$\Rightarrow x=\frac{4b\pm\sqrt{16b^2-16b^2+64m^2}}{8}=\frac{4b\pm 8m}{8} \Rightarrow x_1=\frac{b}{2}+m; x_2=\frac{b}{2}-m$$

15.- $x^2-b^2+4a^2-4ax=0$

Solución:

$$x^2-b^2+4a^2-4ax=0 \Rightarrow x^2-4ax+\left(4a^2-b^2\right)=0 \Rightarrow$$

$$\Rightarrow x=\frac{4a\pm\sqrt{\left(4a\right)^2-4\left(4a^2-b^2\right)}}{2}=\frac{4a\pm\sqrt{4b^2}}{2}=2a\pm b \Rightarrow$$

$$\Rightarrow x_1=2a+b; x_2=2a-b$$

16.- $x^2-(a+2)x=-2a$

Solución:

$$x^2-(a+2)x=-2a \Rightarrow x^2-(a+2)x+2a=0 \Rightarrow$$

$$\Rightarrow x=\frac{(a+2)\pm\sqrt{(a+2)^2-4(2a)}}{2}=\frac{(a+2)\pm\sqrt{(a-2)^2}}{2} \Rightarrow$$

$$\Rightarrow x=\frac{(a+2)\pm(a-2)}{2} \Rightarrow x_1=\frac{2a}{2}=a; x_2=-\frac{4}{2}=2$$

17.- $x^2+2x(4-3a)=48a$

Solución:

$$x^2+2x(4-3a)=48a \Rightarrow x^2+2(4-3a)x-48a=0 \Rightarrow$$

$$\Rightarrow x=\frac{-2(4-3a)\pm\sqrt{\left[2(4-3a)\right]^2+4(48a)}}{2} \Rightarrow$$

$$\Rightarrow x=\frac{-2(4-3a)\pm 2\sqrt{(4-3a)^2+48a}}{2}=-(4-3a)\pm\sqrt{(4+3a)^2} \Rightarrow$$

$$\Rightarrow x=(3a-4)\pm(4+3a) \Rightarrow x_1=6a; x_2=-8$$

18.- $x^2-2x=m^2+2m$

Solución:

$$x^2 - 2x = m^2 + 2m \Rightarrow x^2 - 2x - \left(m^2 + 2m\right) = 0 \Rightarrow$$

$$\Rightarrow x = \frac{2 \pm \sqrt{(2)^2 + 4\left(m^2 + 2m\right)}}{2} = \frac{2 \pm 2\sqrt{1 + m^2 + 2m}}{2} \Rightarrow$$

$$\Rightarrow x = 1 \pm \sqrt{(m+1)^2} = 1 \pm (m+1) \Rightarrow x_1 = 2 + m; x_2 = -m$$

19.- $x^2 + m^2 x (m-2) = 2m^5$

Solución:

$$x^2 + m^2 x (m-2) = 2m^5 \Rightarrow x^2 + m^2 (m-2) x - 2m^5 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{m^2(2-m) \pm \sqrt{\left[m^2(m-2)\right]^2 + 4\left(2m^5\right)}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{m^2(2-m) \pm m^2\sqrt{(m-2)^2 + 8m}}{2} \Rightarrow$$

$$\Rightarrow x = \frac{m^2(2-m) \pm m^2\sqrt{(m+2)^2}}{2} = \frac{m^2}{2}\left[(2-m) \pm (m+2)\right] \Rightarrow$$

$$\Rightarrow x_1 = \left(\frac{m^2}{2}\right)(4) = 2m^2; x_2 = \left(\frac{m^2}{2}\right)(-2m) = -m^3$$

20.- $6x^2 - 15ax = 2bx - 5ab$

Solución:

$$6x^2 - 15ax = 2bx - 5ab \Rightarrow 6x^2 - (15a + 2b)x + 5ab = 0 \Rightarrow$$

$$\Rightarrow x = \frac{(15a + 2b) \pm \sqrt{(15a + 2b)^2 - 4(6)(5ab)}}{12} \Rightarrow$$

$$x = \frac{(15a + 2b) \pm \sqrt{(15a - 2b)^2}}{12} = \frac{(15a + 2b) \pm (15a - 2b)}{12} \Rightarrow$$

$$\Rightarrow x_1 = \frac{30a}{12} = \frac{5a}{2}; x_2 = \frac{4b}{12} = \frac{b}{3}$$

21.- $\dfrac{3x}{4} + \dfrac{a}{2} - \dfrac{x^2}{2a} = 0$

Solución:

$$\frac{3x}{4}+\frac{a}{2}-\frac{x^2}{2a} \Rightarrow 4a\left(\frac{3x}{4}+\frac{a}{2}-\frac{x^2}{2a}\right)=0 \Rightarrow 3ax+2a^2-2x^2=0 \Rightarrow$$

$$\Rightarrow 2x^2-3ax-2a^2=0 \Rightarrow x=\frac{3a\pm\sqrt{(3a)^2+4(2)(2a^2)}}{4}=\frac{3a\pm\sqrt{25a^2}}{4} \Rightarrow$$

$$\Rightarrow x=\frac{3a\pm 5a}{4} \Rightarrow x_1=\frac{8a}{4}=2a; x_2=-\frac{2a}{4}=-\frac{a}{2}$$

22.- $\dfrac{2x-b}{2}=\dfrac{2bx-b^2}{3x}$

Solución:

$$\frac{2x-b}{2}=\frac{2bx-b^2}{3x} \Rightarrow 6x^2-3bx=4bx-2b^2 \Rightarrow$$

$$\Rightarrow 6x^2-7bx+2b^2=0 \Rightarrow x=\frac{7b\pm\sqrt{(7b)^2-4(6)(2b^2)}}{12} \Rightarrow$$

$$\Rightarrow x=\frac{7b\pm\sqrt{49b^2-48b^2}}{12} \Rightarrow x=\frac{7b\pm b}{12} \Rightarrow x_1=\frac{8b}{12}=\frac{2b}{3}; x_2=\frac{6b}{12}=\frac{b}{2}$$

23.- $\dfrac{a+x}{a-x}+\dfrac{a-2x}{a+x}=-4$

Solución:

$$\frac{a+x}{a-x}+\frac{a-2x}{a+x}=-4 \Rightarrow (a^2-x^2)\left[\frac{a+x}{a-x}+\frac{a-2x}{a+x}\right]=-4(a^2-x^2) \Rightarrow$$

$$\Rightarrow (a+x)^2+(a-x)(a-2x)=-4(a^2-x^2) \Rightarrow (a^2+2ax+x^2)+(a^2-3ax+2x^2)=-4a^2+4x^2 \Rightarrow$$

$$\Rightarrow x^2+ax-6a^2=0 \Rightarrow x=\frac{-a\pm\sqrt{a^2+4(6a^2)}}{2}=\frac{-a\pm\sqrt{25a^2}}{2}=\frac{-a\pm 5a}{2} \Rightarrow$$

$$\Rightarrow x_1=\frac{4a}{2}=2a; x_2=-\frac{6a}{2}=-3a$$

24.- $\dfrac{x^2}{x-1}=\dfrac{a^2}{2(a-2)}$

Solución:

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

$$\Rightarrow 2(a-2)x^2 - a^2x + a^2 = 0 \Rightarrow x = \frac{a^2 \pm \sqrt{a^4 - 4\left[2(a-2)(a^2)\right]}}{4(a-2)} \Rightarrow$$

$$\Rightarrow x = \frac{a^2 \pm \sqrt{a^4 - 8a^3 + 16a^2}}{4(a-2)} = \frac{a^2 \pm \sqrt{a^2(a^2 - 8a + 16)}}{4(a-2)} = \frac{a^2 \pm a(a-4)}{4(a-2)} \Rightarrow$$

$$\Rightarrow x_1 = \frac{2a^2 - 4a}{4(a-2)} = \frac{2a(a-2)}{4(a-2)} = \frac{2a}{4} = \frac{a}{2}; x_2 = \frac{4a}{4(a-2)} = \frac{a}{a-2}$$

25.- $x + \dfrac{2}{x} = \dfrac{1}{a} + 2a$

Solución:

$$x + \frac{2}{x} = \frac{1}{a} + 2a \Rightarrow ax\left(x + \frac{2}{x}\right) = ax\left(\frac{1}{a} + 2a\right) \Rightarrow ax^2 + 2a = x + 2a^2x \Rightarrow$$

$$\Rightarrow ax^2 - (1 + 2a^2)x + 2a = 0 \Rightarrow x = \frac{(1+2a^2) \pm \sqrt{(1+2a^2)^2 - 4(a)(2a)}}{2a} \Rightarrow$$

$$\Rightarrow x = \frac{(1+2a^2) \pm \sqrt{(1-2a^2)^2}}{2a} = \frac{(1+2a^2) \pm (1-2a^2)}{2a} \Rightarrow$$

$$\Rightarrow x = \frac{2}{2a} = \frac{1}{a}; x_2 = \frac{4a^2}{2a} = 2a$$

26.- $\dfrac{2x-b}{b} - \dfrac{x}{x+b} = \dfrac{2x}{4b}$

Solución:

$$\frac{2x-b}{b} - \frac{x}{x+b} = \frac{x}{2b} \Rightarrow 2b(x+b)\left[\frac{2x-b}{b} - \frac{x}{x+b}\right] = 2b(x+b)\left(\frac{x}{2b}\right) \Rightarrow$$

$$\Rightarrow 2(x+b)(2x-b) - 2b(x) = x(x+b) \Rightarrow 2(2x^2 + xb - b^2) = x^2 + xb \Rightarrow$$

$$\Rightarrow 4x^2 + 2bx - 2b^2 = x^2 + bx \Rightarrow 3x^2 + bx - 2b^2 = 0 \Rightarrow$$

$$\Rightarrow x = \frac{-b \pm \sqrt{b^2 + 4(3)(2b^2)}}{6} = \frac{-b \pm 5b}{6} \Rightarrow x_1 = \frac{4b}{6} = \frac{2b}{3}; x_2 = \frac{-6b}{6} = -b$$