

GUIA DE TRABAJO

Materia: Matemáticas Guía # 47.

Tema: Operaciones con fracciones. Suma. (Baldor).

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:

PREGUNTAS:

Ejercicios # 126, simplificar:

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

Solución:

$$\frac{\left(\frac{12}{4}\right) \times (x-2) + \left(\frac{12}{6}\right) \times (3x+2)}{12} = \frac{3(x-2) + 2(3x+2)}{12} = \frac{3x-6+6x+4}{12} =$$
$$= \frac{9x-2}{12}$$

$$2.- \frac{2}{5a^2} + \frac{1}{3ab} =$$

Solución:

$$\frac{\left(\frac{15a^2b}{5a^2}\right) \times 2 + \left(\frac{15a^2b}{3ab}\right) \times 1}{15a^2b} = \frac{6b+5a}{15a^2b}$$

3.- $\frac{a-2b}{15a} + \frac{b-a}{20b} =$

Solución:

$$\frac{\left(\frac{60ab}{15a}\right)(a-2b) + \left(\frac{60ab}{20b}\right)(b-a)}{60ab} = \frac{4b(a-2b) + 3a(b-a)}{60ab} \Rightarrow$$

$$\Rightarrow \frac{4ab - 8b^2 + 3ab - 3a^2}{60ab} = \frac{7ab - 3a^2 - 8b^2}{60ab}$$

4.- $\frac{a+3b}{3ab} + \frac{a^2b-4ab^2}{5a^2b^2} =$

Solución:

$$\frac{\left(\frac{15a^2b^2}{3ab}\right)(a+3b) + \left(\frac{15a^2b^2}{5a^2b^2}\right)(a^2b-4ab^2)}{15a^2b^2} = \frac{5ab(a+3b) + 3(a^2b-4ab^2)}{15a^2b^2} \Rightarrow$$

$$\Rightarrow \frac{5a^2b + 15ab^2 + 3a^2b - 12ab^2}{15a^2b^2} = \frac{8a^2b + 3ab^2}{15a^2b^2} = \frac{8a+3b}{15ab}$$

5.- $\frac{a-1}{8} + \frac{2a}{6} + \frac{3a+4}{12} =$

Solución:

$$\frac{\left(\frac{12}{3}\right)(a-1) + \left(\frac{12}{6}\right)(2a) + \left(\frac{12}{12}\right)(3a+4)}{12} = \frac{4(a-1) + 2 \times 2a + 3a+4}{12} =$$

$$= \frac{4a - 4 + 4a + 3a + 4}{12} = \frac{11a}{12}$$

6.- $\frac{n}{m^2} + \frac{3}{mn} + \frac{2}{m} =$

Solución:

$$\frac{\left(\frac{m^2n}{m^2}\right)(n) + \left(\frac{m^2n}{mn}\right)(3) + \left(\frac{m^2n}{m}\right)(2)}{m^2n} = \frac{n^2 + 3m + 2mn}{m^2n}$$

$$7.- \frac{1-x}{2x} + \frac{x+2}{x^2} + \frac{1}{3ax^2} =$$

Solución:

$$\frac{\left(\frac{6ax^2}{2x}\right)(1-x) + \left(\frac{6ax^2}{x^2}\right)(x+2) + \left(\frac{6ax^2}{3ax^2}\right)(1)}{6ax^2} = \frac{3ax(1-x) + 6a(x+2) + 2(1)}{6ax^2} =$$

$$\frac{3ax - 3ax^2 + 6ax + 12a + 2}{6ax^2} = \frac{9ax - 3ax^2 + 12a + 2}{6ax^2}$$

$$8.- \frac{2a-3}{3a} + \frac{3x+2}{10x} + \frac{x-a}{5ax} =$$

Solución:

$$\frac{\left(\frac{30ax}{3a}\right)(2a-3) + \left(\frac{30ax}{10x}\right)(3x+2) + \left(\frac{30ax}{5ax}\right)(x-a)}{30ax} = \frac{10x(2a-3) + 3a(3x+2) + 6(x-a)}{30ax} =$$

$$\frac{20ax - 30x + 9ax + 6a + 6x - 6a}{30ax} = \frac{29ax - 24x}{30ax} = \frac{29a - 24}{30a}$$

$$9.- \frac{3}{5} + \frac{x+2}{2x} + \frac{x^2+2}{6x^2} =$$

Solución:

$$\frac{\left(\frac{30x^2}{5}\right)(3) + \left(\frac{30x^2}{2x}\right)(x+2) + \left(\frac{30x^2}{6x^2}\right)(x^2+2)}{30x^2} = \frac{18x^2 + 15x^2 + 30x + 5x^2 + 10}{30x^2} =$$

$$= \frac{38x^2 + 30x + 10}{30x^2} = \frac{19x^2 + 15x + 5}{15x^2}$$

$$10.- \frac{x-y}{12} + \frac{2x+y}{15} + \frac{y-4x}{30} =$$

Solución:

$$\begin{aligned} & \frac{\left(\frac{60}{12}\right)(x-y) + \left(\frac{60}{15}\right)(2x+y) + \left(\frac{60}{30}\right)(y-4x)}{60} = \frac{5(x-y) + 4(2x+y) + 2(y-4x)}{60} = \\ & = \frac{5x - 5y + 8x + 4y + 2y - 8x}{60} = \frac{5x + y}{60} \end{aligned}$$

11.- $\frac{m-n}{mn} + \frac{n-a}{na} + \frac{2a-m}{am} =$

Solución:

$$\begin{aligned} & \frac{\left(\frac{amn}{mn}\right)(m-n) + \left(\frac{amn}{na}\right)(n-a) + \left(\frac{amn}{am}\right)(2a-m)}{amn} = \frac{a(m-n) + m(n-a) + n(2a-m)}{amn} = \\ & = \frac{am - an + mn - ma + 2an - mn}{amn} = \frac{an}{amn} = \frac{1}{m} \end{aligned}$$

12.- $\frac{x+2}{3x} + \frac{x^2-2}{5x^2} + \frac{2-x^3}{9x^3} =$

Solución:

$$\begin{aligned} & \frac{\left(\frac{45x^3}{3x}\right)(x+2) + \left(\frac{45x^3}{5x^2}\right)(x^2-2) + \left(\frac{45x^3}{9x^3}\right)(2-x^3)}{45x^3} = \frac{15x^2(x+2) + 9x(x^2-2) + 5(2-x^3)}{45x^3} = \\ & = \frac{15x^3 + 30x^2 + 9x^2 - 18x + 10 - 5x^3}{45x^3} = \frac{15x^3 + 34x^2 - 18x + 10}{45x^3} \end{aligned}$$

13.- $\frac{1}{ab} + \frac{b^2-a^2}{ab^3} + \frac{ab+b^2}{a^2b^2} =$

Solución:

$$\begin{aligned} & \frac{\left(\frac{a^2b^3}{ab}\right)(1) + \left(\frac{a^2b^3}{ab^3}\right)(b^2-a^2) + \left(\frac{a^2b^3}{a^2b^2}\right)(ab+b^2)}{a^2b^3} = \frac{ab^2 + ab^2 - a^3 + ab^2 + b^3}{a^2b^3} = \\ & = \frac{b^3 + 3ab^2 - a^3}{a^2b^3} \end{aligned}$$

14.- $\frac{a+3b}{ab} + \frac{2a-3m}{am} + \frac{3}{a} =$

Solución:

$$\frac{\left(\frac{abm}{ab}\right)(a+3b) + \left(\frac{abm}{am}\right)(2a-3m) + \left(\frac{abm}{a}\right)(3)}{abm} = \frac{m(a+3b) + b(2a-3m) + 3bm}{abm} =$$
$$= \frac{am + 3bm + 2ab - 3bm + 3bm}{abm} = \frac{am + 3bm + 2ab}{abm}$$

Suma de fracciones con denominadores compuestos. Ejercicio 127.

1.- $\frac{1}{a+1} + \frac{1}{a-1} =$

Solución:

$$\frac{a-1+a+1}{a^2-1} = \frac{2a}{a^2-1}$$

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

Solución:

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

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

Solución:

$$\frac{3(2x+5) + 6(1-x)}{(1-x)(2x+5)} = \frac{6x+15+6-6x}{(1-x)(2x+5)} = \frac{21}{(1-x)(2x+5)}$$

4.- $\frac{x}{x-y} + \frac{x}{x+y} =$

Solución:

$$\frac{x(x+y) + x(x-y)}{x^2 - y^2} = \frac{x^2 + xy + x^2 - xy}{x^2 - y^2} = \frac{2x^2}{x^2 - y^2}$$

$$5.- \frac{m+3}{m-3} + \frac{m+2}{m-2} =$$

Solución:

$$\frac{(m-2)(m+3) + (m-3)(m+2)}{(m-3)(m-2)} = \frac{(m^2 + m - 6) + (m^2 - m - 6)}{(m-3)(m-2)} =$$
$$= \frac{2m^2 - 12}{(m-3)(m-2)}$$

$$6.- \frac{x+y}{x-y} + \frac{x-y}{x+y} =$$

Solución:

$$\frac{(x+y)^2 + (x-y)^2}{x^2 - y^2} = \frac{2x^2 + 2y^2}{x^2 - y^2}$$

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

Solución:

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

$$8.- \frac{2}{x-5} + \frac{3x}{x^2-25} =$$

Solución:

$$\frac{2}{x-5} + \frac{3x}{(x+5)(x-5)} = \frac{2(x+5) + 3x}{(x+5)(x-5)} = \frac{5x+10}{x^2-25}$$

$$9.- \frac{1}{3x-2y} + \frac{x-y}{9x^2-4y^2} =$$

Solución:

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

10.- $\frac{x+a}{x+3a} + \frac{3a^2-x^2}{x^2-9a^2} =$

Solución:

$$\frac{x+a}{x+3a} + \frac{3a^2-x^2}{(x+3a)(x-3a)} = \frac{(x+a)(x-3a)+3a^2-x^2}{(x^2-9a^2)} = \frac{x^2-3ax+ax-3a^2+3a^2-x^2}{(x^2-9a^2)} = \frac{-2ax}{x^2-9a^2} = \frac{2ax}{9a^2-x^2}$$

11.- $\frac{a}{1-a^2} + \frac{a}{1+a^2} =$

Solución:

$$\frac{a(1+a^2)+a(1-a^2)}{(1-a^2)(1+a^2)} = \frac{a+a^3+a-a^3}{1-a^4} = \frac{2a}{1-a^4}$$

12.- $\frac{2}{a^2-ab} + \frac{2}{ab+b^2} =$

Solución:

$$\frac{2}{a(a-b)} + \frac{2}{b(a+b)} = \frac{2(b)(a+b)+2(a)(a-b)}{ab(a^2-b^2)} = \frac{2ab+2b^2+2a^2-2ab}{ab(a^2-b^2)} = \frac{2(a^2+b^2)}{ab(a^2-b^2)}$$

13.- $\frac{ab}{9a^2-b^2} + \frac{a}{3a+b} =$

Solución:

$$\frac{ab}{(3a+b)(3a-b)} + \frac{a}{3a+b} = \frac{ab+a(3a-b)}{9a^2-b^2} = \frac{ab+3a^2-ab}{9a^2-b^2} = \frac{3a^2}{9a^2-b^2}$$

14.- $\frac{1}{a^2-b^2} + \frac{1}{(a-b)^2} =$

Solución:

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

15.- $\frac{3}{x^2+y^2} + \frac{2}{(x+y)^2} =$

Solución:

$$\begin{aligned} \frac{3(x+y)^2 + 2(x^2+y^2)}{(x^2+y^2)(x+y)^2} &= \frac{3(x^2+2xy+y^2) + 2x^2 + 2y^2}{(x^2+y^2)(x+y)^2} = \\ &= \frac{3x^2 + 6xy + 3y^2 + 2x^2 + 2y^2}{(x^2+y^2)(x+y)^2} = \frac{5x^2 + 6xy + 5y^2}{(x^2+y^2)(x+y)^2} \end{aligned}$$

16.- $\frac{x}{a^2-ax} + \frac{a+x}{ax} + \frac{a}{ax-x^2} =$

Solución:

$$\begin{aligned} \frac{x}{a(a-x)} + \frac{a+x}{ax} + \frac{a}{x(a-x)} &= \frac{x^2 + (a+x)(a-x) + a^2}{ax(a-x)} = \\ &= \frac{x^2 + a^2 - x^2 + a^2}{ax(a-x)} = \frac{2a^2}{ax(a-x)} = \frac{2a}{x(a-x)} \end{aligned}$$

17.- $\frac{3}{2x+4} + \frac{x-1}{2x-4} + \frac{x+8}{x^2-4} =$

Solución:

$$\begin{aligned} \frac{3}{2(x+2)} + \frac{x-1}{2(x-2)} + \frac{x+8}{(x+2)(x-2)} &= \frac{3(x-2) + (x-1)(x+2) + 2(x+8)}{2(x+2)(x-2)} = \\ &= \frac{3x-6+x^2+2x-x-2+2x+16}{2(x^2-4)} = \frac{x^2+6x+8}{2(x^2-4)} = \\ &= \frac{(x+2)(x+4)}{2(x+2)(x-2)} = \frac{x+4}{2(x-2)} \end{aligned}$$

18.- $\frac{1}{x+x^2} + \frac{1}{x-x^2} + \frac{x+3}{1-x^2} =$

Solución:

$$\begin{aligned} \frac{1}{x(1+x)} + \frac{1}{x(1-x)} + \frac{x+3}{(1+x)(1-x)} &= \frac{(1-x) + (1+x) + x(x+3)}{x(1-x^2)} = \\ &= \frac{2+x^2+3x}{x(1+x)(1-x)} = \frac{(x+1)(x+2)}{x(1+x)(1-x)} = \frac{x+2}{x(1-x)} \end{aligned}$$

19.- $\frac{x-y}{x+y} + \frac{x+y}{x-y} + \frac{4xy}{x^2-y^2} =$

Solución:

$$\begin{aligned} \frac{(x-y)^2 + (x+y)^2 + 4xy}{x^2-y^2} &= \frac{x^2-2xy+y^2+x^2+2xy+y^2+4xy}{x^2-y^2} = \\ &= \frac{2x^2+2y^2+4xy}{(x+y)(x-y)} = \frac{2(x^2+y^2+2xy)}{(x+y)(x-y)} = \frac{2(x+y)^2}{(x+y)(x-y)} = \frac{2(x+y)}{(x-y)} \end{aligned}$$

20.- $\frac{1}{a-5} + \frac{a}{a^2-4a-5} + \frac{a+5}{a^2+2a+1} =$

Solución:

$$\begin{aligned} \frac{1}{a-5} + \frac{a}{(a+1)(a-5)} + \frac{a+5}{(a+1)^2} &= \frac{(a+1)^2 + a(a+1) + (a+5)(a-5)}{(a-5)(a+1)^2} = \\ &= \frac{a^2+2a+1+a^2+a+a^2-25}{(a-5)(a+1)^2} = \frac{3a^2+3a-24}{(a-5)(a+1)^2} \end{aligned}$$

$$21.- \frac{3}{a} + \frac{2}{5a-3} + \frac{1-85a}{25a^2-9} =$$

Solución:

$$\frac{3(25a^2-9) + (a)(5a+3)(2) + a(1-85a)}{a(25a^2-9)} = \frac{75a^2 - 27 + 10a^2 + 6a + a - 85a^2}{a(25a^2-9)} =$$

$$= \frac{7a-27}{a(25a^2-9)}$$

$$22.- \frac{x+1}{10} + \frac{x-3}{5x-10} + \frac{x-2}{2} =$$

Solución:

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

$$= \frac{x^2 - x - 2 + 2x - 6 + 5x^2 - 20x + 20}{10(x-2)} = \frac{6x^2 - 19x + 12}{10(x-2)}$$

$$23.- \frac{x+5}{x^2+x-12} + \frac{x+4}{x^2+2x-15} + \frac{x-3}{x^2+9x+20} =$$

Solución:

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

$$= \frac{(x+5)^2 + (x+4)^2 + (x-3)^2}{(x-3)(x+4)(x+5)} = \frac{x^2 + 10x + 25 + x^2 + 8x + 16 + x^2 - 6x + 9}{(x-3)(x+4)(x+5)} =$$

$$= \frac{3x^2 + 12x + 50}{(x-3)(x+4)(x+5)}$$

$$24.- \frac{1}{x-2} + \frac{1-2x^2}{x^3-8} + \frac{x}{x^2+2x+4} =$$

Solución:

Recordar que $\frac{b^3 + a^3}{b + a} = b^2 - ab + a^2$; $\frac{b^3 - a^3}{b - a} = b^2 + ab + a^2$

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

Luego:

$$\frac{(x^2+2x+4)+(1-2x^2)+x(x-2)}{x^3-8} = \frac{5}{x^3-8}$$

$$25.- \frac{2}{(a+1)} + \frac{a}{(a+1)^2} + \frac{a+1}{(a+1)^3} =$$

Solución:

$$\begin{aligned} \frac{2(a+1)^2+a(a+1)+(a+1)}{(a+1)^3} &= \frac{2(a^2+2a+1)+a^2+a+a+1}{(a+1)^3} = \\ &= \frac{2a^2+4a+2+a^2+a+a+1}{(a+1)^3} = \frac{3a^2+6a+3}{(a+1)^3} = \frac{3(a^2+2a+1)}{(a+1)^3} = \\ &= \frac{3(a+1)^2}{(a+1)^3} = \frac{3}{a+1} \end{aligned}$$

$$26.- \frac{2x}{3x^2+11x+6} + \frac{x+1}{x^2-9} + \frac{1}{3x+2} =$$

Solución:

Empezaremos por factorizar la siguiente expresión:

$$\begin{aligned} 3x^2+11x+6 &\Rightarrow \frac{3 \times (3x^2+11x+6)}{3} = \frac{9x^2+11(3x)+18}{3} = \\ &= \frac{(3x)^2+11(3x)+18}{3} = \frac{(3x+2)(3x+9)}{3} \end{aligned}$$

Luego:

$$\begin{aligned} \frac{2x}{(3x+2)(3x+9)} + \frac{x+1}{x^2-9} + \frac{1}{3x+2} &= \frac{6x}{3(3x+2)(x+3)} + \frac{x+1}{(x+3)(x-3)} + \frac{1}{3x+2} = \\ &= \frac{2x}{(3x+2)(x+3)} + \frac{x+1}{(x+3)(x-3)} + \frac{1}{(3x+2)} = \frac{2x(x-3)+(x+1)(3x+2)+(x^2-9)}{(3x+2)(x+3)(x-3)} = \\ &= \frac{2x^2-6x+3x^2+2x+3x+2+x^2-9}{(3x+2)(x+3)(x-3)} = \frac{6x^2-x-7}{(3x+2)(x+3)(x-3)} \end{aligned}$$

$$27.- \frac{x^2-4}{x^3+1} + \frac{1}{x+1} + \frac{3}{x^2-x+1} =$$

Solución:

Recordar que $\frac{b^3+a^3}{b+a} = b^2-ab+a^2$; $\frac{b^3-a^3}{b-a} = b^2+ab+a^2$

Luego:

$$x^3+1=(x+1)(x^2-x+1); \text{ entonces:}$$

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

$$28.- \frac{1}{x-1} + \frac{1}{(x-1)(x+2)} + \frac{(x+1)}{(x-1)(x+2)(x+3)} =$$

Solución:

$$\begin{aligned} \frac{(x+2)(x+3)+(x+3)+(x+1)}{(x-1)(x+2)(x+3)} &= \frac{x^2+5x+6+x+3+x+1}{(x-1)(x+2)(x+3)} = \\ &= \frac{x^2+7x+10}{(x-1)(x+2)(x+3)} = \frac{(x+2)(x+5)}{(x-1)(x+2)(x+3)} = \frac{(x+5)}{(x-1)(x+3)} \end{aligned}$$

$$29.- \frac{x-2}{2x^2-5x-3} + \frac{x-3}{2x^2-3x-2} + \frac{2x-1}{x^2-5x+6} =$$

Solución:

Empezaremos por factorizar cada uno de los denominadores:

(a).-

$$\begin{aligned} 2x^2-5x-3 &\Rightarrow \frac{2(2x^2-5x-3)}{2} \Rightarrow \frac{(2x)^2-5(2x)-6}{2} = \\ &= \frac{(2x+1)(2x-6)}{2} = \frac{(2x+1)2(x-3)}{2} = (2x+1)(x-3) \end{aligned}$$

(b).-

$$2x^2 - 3x - 2 \Rightarrow \frac{2(2x^2 - 3x - 2)}{2} = \frac{(2x)^2 - 3(2x) - 4}{2} =$$

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

©.-

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

Luego, se puede escribir la expresión original como:

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

$$= \frac{x^2 - 4x + 4 + x^2 - 6x + 9 + 4x^2 - 1}{(2x+1)(x-2)(x-3)} = \frac{6x^2 - 10x + 12}{(2x+1)(x-2)(x-3)}$$

$$30.- \frac{a-2}{a-1} + \frac{a+3}{a+2} + \frac{a+1}{a-3} =$$

Solución:

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

$$= \frac{(a^2 - 4)(a-3) + (a-1)(a^2 - 9) + (a^2 - 1)(a+2)}{(a-1)(a+2)(a-3)} =$$

$$= \frac{a^3 - 3a^2 - 4a + 12 + a^3 - 9a - a^2 + 9 + a^3 + 2a^2 - a - 2}{(a-1)(a+2)(a-3)} =$$

$$= \frac{3a^3 - 2a^2 - 14a + 19}{(a-1)(a+2)(a-3)}$$