

ADD, SUBTRACT, and SIMPLIFY the following Rational Expressions.

$$1. \frac{5y}{4y^2} + \frac{12}{4y^2} + \frac{3y}{4y^2} = \frac{5y+12+3y}{4y^2}$$

$$= \frac{8y+12}{4y^2}$$

$$= \frac{\cancel{4}(y+3)}{\cancel{4}y^2}$$

$$1. \frac{y+3}{y^2}$$

$$2. \frac{9a^3}{3a^2} - \frac{6a}{3a^2} = \frac{9a^3-6a}{3a^2}$$

$$= \frac{\cancel{3a}(3a^2-2)}{\cancel{3}aa}$$

↓
a ≠ 0

$$2. \frac{3a^2-2}{a}$$

$$3. \frac{2t}{3t-12} - \frac{8}{3t-12} = \frac{2t-8}{3t-12}$$

$$= \frac{2(\cancel{t-4})}{3(\cancel{t-4})} = \frac{2}{3}$$

↓
t-4 ≠ 0
+4 +4
t ≠ 4

$$3. \frac{2}{3}; t \neq 4$$

$$4. \frac{w^2}{w^2-9} + \frac{2w-15}{w^2-9} = \frac{w^2+2w-15}{w^2-9}$$

$$= \frac{\cancel{(w-3)}(w+5)}{\cancel{(w+3)}(w-3)}$$

↓
w-3 ≠ 0
+3 +3
w ≠ 3

$$4. \frac{w+5}{w+3}; w \neq 3$$

$$5. \frac{a^2+10}{a^2-4} - \frac{7a}{a^2-4} = \frac{a^2+10-7a}{a^2-4}$$

$$= \frac{a^2-7a+10}{a^2-4}$$

10
1,10
-1,-10
2,5
-2,-5

$$= \frac{\cancel{(a-2)}(a-5)}{\cancel{(a+2)}(a-2)} = \frac{a-5}{a+2}$$

↓
a-2 ≠ 0
+2 +2
a ≠ 2

$$5. \frac{a-5}{a+2}; a \neq 2$$

$$6. \frac{y^2-13}{y^2-25} + \frac{3(1-y)}{y^2-25} = \frac{y^2-13+3(1-y)}{y^2-25}$$

$$= \frac{y^2-13+3-3y}{y^2-25}$$

-10
1,-10
-1,10
2,-5
-2,5

$$= \frac{y^2-3y-10}{y^2-25}$$

$$= \frac{\cancel{(y+2)}(y-5)}{\cancel{(y+5)}(y-5)} = \frac{y+2}{y+5}$$

↓
y-5 ≠ 0
+5 +5
y ≠ 5

$$6. \frac{y+2}{y+5}; y \neq 5$$

ADD, SUBTRACT, and SIMPLIFY the following Rational Expressions (need to first rewrite each with a common denominator).

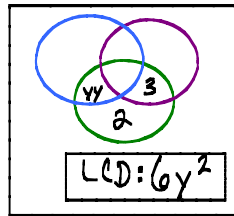
$$7. \frac{2}{y^2} + \frac{1}{3} - \frac{5}{6y^2}$$

$$y \cdot y \quad 3 \quad 3 \cdot 2 \cdot y \cdot y$$

$$= \frac{6 \cdot 2}{6 \cdot y^2} + \frac{2y^2 \cdot 1}{2y^2 \cdot 3} - \frac{5}{6y^2}$$

$$= \frac{12}{6y^2} + \frac{2y^2}{6y^2} - \frac{5}{6y^2} = \frac{12 + 2y^2 - 5}{6y^2}$$

$$= \frac{2y^2 + 7}{6y^2}$$



$$7. \frac{2y^2 + 7}{6y^2}$$

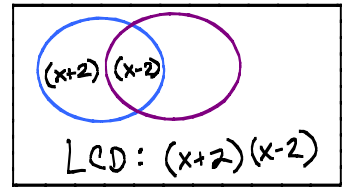
$$8. \frac{x^2 - 12}{x^2 - 4} + \frac{2}{x - 2}$$

$$\frac{(x+2)(x-2)}{(x+2)(x-2)} \quad \frac{(x-2)}{(x-2)}$$

$$= \frac{x^2 - 12}{(x+2)(x-2)} + \frac{(x+2) \cdot 2}{(x+2)(x-2)}$$

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

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



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

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

$$\frac{x+4}{x+2} ; x \neq 2$$

$$8. \frac{x+4}{x+2} ; x \neq 2$$

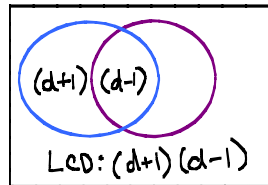
$$9. \frac{d}{d^2 - 1} - \frac{d}{d - 1}$$

$$\frac{(d+1)(d-1)}{(d+1)(d-1)} \quad \frac{(d-1)}{(d-1)}$$

$$= \frac{d}{(d+1)(d-1)} - \frac{(d+1)d}{(d+1)(d-1)}$$

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

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



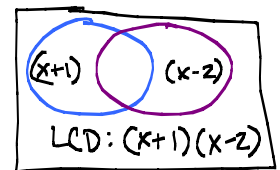
$$9. \frac{-d^2}{(d+1)(d-1)}$$

$$10. \frac{x}{x+1} + \frac{8}{x-2}$$

$$\frac{(x-2)}{(x-2)} \frac{x}{(x+1)} + \frac{(x+1)}{(x+1)} \frac{8}{(x-2)}$$

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

$$= \frac{x^2 + 6x + 8}{(x-2)(x+1)} = \frac{(x+2)(x+4)}{(x-2)(x+1)}$$



$$10. \frac{x^2 + 6x + 8}{x^2 - 1x - 2}$$

FACTORED FORM

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

EXPANDED FORM

$$11. \frac{3}{m+2} + \frac{m^2}{m^2 - 4} - \frac{1}{m-2}$$

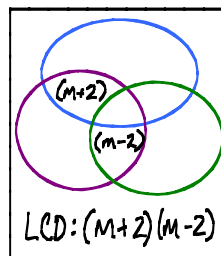
$$\frac{(m+2)}{(m+2)} \quad \frac{(m+2)(m-2)}{(m+2)(m-2)} \quad \frac{(m-2)}{(m-2)}$$

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

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

$$= \frac{3m - 6 + m^2 - m - 2}{(m+2)(m-2)} = \frac{m^2 + 2m - 8}{(m+2)(m-2)}$$

$$= \frac{\cancel{(m-2)}(m+4)}{\cancel{(m+2)}(m-2)} = \frac{m+4}{m-2}$$



$$11. \frac{m+4}{m-2} ; m \neq 2$$

$$12. \frac{6}{a^2 - 2a - 35} - \frac{2}{a^2 + 9a + 20}$$

$$\frac{(a+5)(a-7)}{(a+5)(a-7)} \quad \frac{(a+4)(a+5)}{(a+4)(a+5)}$$

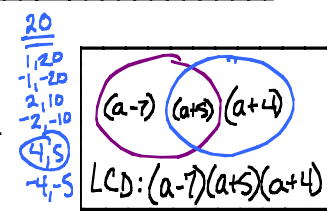
$$= \frac{6}{(a+5)(a-7)} - \frac{2}{(a+4)(a+5)}$$

$$= \frac{(a+4) \cdot 6}{(a+4)(a+5)(a-7)} - \frac{(a-7) \cdot 2}{(a-7)(a+4)(a+5)}$$

$$= \frac{6a + 24}{(a+4)(a+5)(a-7)} - \frac{2a - 14}{(a+4)(a+5)(a-7)}$$

$$= \frac{6a + 24 - 2a + 14}{(a+4)(a+5)(a-7)}$$

$$= \frac{4a + 38}{(a+4)(a+5)(a-7)} = \frac{2(2a + 19)}{(a+4)(a+5)(a-7)}$$



FOR EXPANDED FORM:

$$\frac{2(2a + 19)}{a^3 + 2a^2 - 43a - 140}$$

EXPANDED FORM

$$\downarrow$$

$$m-2 \neq 0$$

$$\begin{matrix} +2 & +2 \\ \hline m & \neq 2 \end{matrix}$$