9.1 Adding Rational expressions:

      like denominators

$$\frac{2}{3} + \frac{4}{3} = \frac{6}{3}$$

$$\frac{2y}{y+4} + \frac{3y}{y+4} = \frac{5y}{y+4}$$

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$$\frac{4x+11}{x^2-10x+16} + \frac{-3x-18}{x^2-10x+16} + \frac{-1}{x^2-10x+16}$$

$$= \frac{4x-3x+11-18-1}{x^2-10x+16} = \frac{x-8}{x^2-10x+16}$$

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

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9.2 Addition: monomial denominators

$$\frac{3}{3}\frac{2}{7} + \frac{7}{7}\frac{2}{3} = \frac{6}{21} + \frac{14}{21} = \frac{20}{21}$$

$$\left(\frac{2}{2}\right)\frac{2b}{7} + \frac{3b}{14} = \frac{4b}{14} + \frac{3b}{14} = \frac{7b}{14}$$

$$\left(\frac{3}{3}\right)\frac{2y+7}{4y} + \left(\frac{4}{4}\right)\frac{2y-1}{3y} = \frac{6y+21}{12y} + \frac{8y-4}{12y}$$

$$= \frac{14y+17}{12y}$$

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$$\frac{a+1}{3a} + \frac{5}{6a} + \frac{7a-5}{4a}$$

$$\frac{4}{4}\frac{a+1}{3a} + \frac{2}{2}\frac{5}{6a} + \frac{3}{3}\frac{7a-5}{4a}$$

$$\frac{4a+4}{12a} + \frac{10}{12a} + \frac{21a-15}{12a}$$

$$\frac{4a+4+10+21a-15}{12a} = \frac{25a-1}{12a}$$

3	4	6
6	8	12
9	12	18
12	16	24

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9.3 Addition: polynomial denominators

ex 1:

$$\frac{-3}{x^2-2x-15} + \frac{4}{x+3} + \frac{3}{x-5}$$

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

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

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

$$\frac{-3 + 4x-20 + 3x+9}{(x-5)(x+3)}$$

$$\frac{7x-14}{(x-5)(x+3)}$$

$$\frac{7(x-2)}{(x-5)(x+3)}$$

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Panel 1

ex2: $\dfrac{9x+14}{x^2+7x} + \dfrac{x}{x+7}$

$\dfrac{9x+14}{x(x+7)} + \dfrac{x}{(x+7)}\cdot\dfrac{x}{x}$

$\dfrac{9x+14}{x(x+7)} + \dfrac{x^2}{x(x+7)}$

$\dfrac{x^2+9x+14}{x(x+7)}$

$\dfrac{(x+2)(x+7)}{x(x+7)} = \dfrac{x+2}{x}$

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Panel 2

ex3 $\dfrac{a}{a^2-36} + \dfrac{a-4}{a^2-5a-6}$

$\dfrac{a}{(a+6)(a-6)} + \dfrac{a-4}{(a+1)(a-6)}$

$\dfrac{a}{(a+6)(a-6)}\dfrac{(a+1)}{(a+1)} + \dfrac{a-4}{(a+1)(a-6)}\dfrac{(a+6)}{(a+6)}$

$\dfrac{a^2+a}{\ } + \dfrac{a^2+6a-4a-24}{\ }$

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Panel 3

$\dfrac{a^2+a}{\ } + \dfrac{a^2+6a-4a-24}{\ }$

$\dfrac{2a^2+3a-24}{(a+6)(a-6)(a+1)}$

$\dfrac{2a^2+3a-24}{(a+6)(a-6)(a+1)}$

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Panel 4

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$\dfrac{3}{k^2-k-2} + \dfrac{3}{k-2} + \dfrac{7}{k+1}$

$\dfrac{3}{(k-2)(k+1)} + \dfrac{3}{(k-2)}\dfrac{(k+1)}{(k+1)} + \dfrac{7}{(k+1)}\dfrac{(k-2)}{(k-2)}$

$\dfrac{3}{(k-2)(k+1)} + \dfrac{3k+3}{(k-2)(k+1)} + \dfrac{7k-14}{(k+1)(k-2)}$

$\dfrac{10k-8}{(k-2)(k+1)}$

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Panel 5

9.4 Addition: special cases

$7 + \dfrac{2}{5m}$

$\dfrac{(5m)}{(5m)}\dfrac{7}{1} + \dfrac{2}{5m}$

$\dfrac{35m+2}{5m}$

$\dfrac{m(35m+2)}{or}$

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Panel 6

$\dfrac{2a+5}{4a} + \dfrac{a-1}{6a^3} + \dfrac{3-a}{3a^2}$

$4a$
$2 \cdot 2 \cdot a$
$3 \cdot 2 \cdot 2 \cdot a \cdot a \cdot a$

$\dfrac{2a+5}{4a}\left(\dfrac{3a^2}{3a^2}\right) + \dfrac{a-1}{6a^3}\left(\dfrac{2}{2}\right) + \dfrac{3-a}{3a^2}\left(\dfrac{4a}{4a}\right)$ $12a^3$ LCM

$\dfrac{6a^3+15a^2+2a-2+12a-4a^2}{12a^3}$

$\dfrac{6a^3+11a^2+14a-2}{12a^3}$

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9.5 Subtracting Rational expressions

$$\frac{x}{x^2-5x+4} - \frac{2}{x-4}$$

$$\frac{x}{x^2-5x+4} + \frac{-2}{x-4}$$

$$-\frac{a}{b}$$

$$\frac{-a}{b}$$

$$\frac{a}{-b}$$

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$$\frac{a^2-22}{a^2-9a+20} - \frac{a-2}{a-5} \qquad -1(a-2)$$

$$\frac{a^2-22}{(a-5)(a-4)} + \frac{-a+2}{(a-5)}\frac{(a-4)}{(a-4)}$$

$$\frac{a^2-22-a^2+4a+2a-8}{(a-5)(a-4)}$$

$$\frac{6a-30}{(a-5)(a-4)} \Rightarrow \frac{6(a-5)}{(a-5)(a-4)} \Rightarrow \frac{6}{a-4}$$

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9.6 Simplifying: the -1 technique

$$\frac{6x}{x^2-49} + \frac{3}{7-x}$$

$$\frac{6x}{(x-7)(x+7)} + \frac{3}{(7-x)}\frac{(x-7)(-1)}{(x+7)(-1)}$$

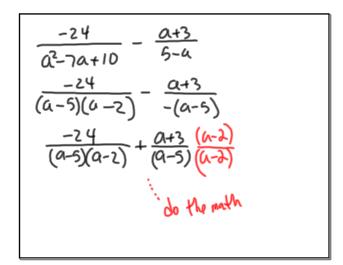$$\frac{6x + -3x -21}{(x-7)(x+7)} \Rightarrow \frac{3x-21}{(\ )(\ )} \Rightarrow \frac{3(x-7)}{(x-7)(x+7)}$$

$$\boxed{\frac{3}{x+7}}$$

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$$\frac{6x}{x^2-49} + \frac{3}{7-x} \qquad 7-x = -1(x-7)$$

$$\frac{6x}{(x+7)(x-7)} + \frac{3}{(x-7)(-1)}$$

$$\frac{6x}{(x+7)(x-7)} + \frac{-3}{(x-7)}\frac{(x+7)}{(x+7)}$$

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$$\frac{-24}{a^2-7a+10} - \frac{a+3}{5-a}$$

$$\frac{-24}{(a-5)(a-2)} - \frac{a+3}{-(a-5)}$$

$$\frac{-24}{(a-5)(a-2)} + \frac{a+3}{(a-5)}\frac{(a-2)}{(a-2)}$$

do the math

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9.7 Dividing by a monomial

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9.8 Dividing by a binomial

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