6-2: Adding and Subtracting Rational Expressions (Book 9.1)

Objectives:

1. **I can simplify a rational expression**
2. **I can add and subtract rational expressions.**

Add the following fractions:

$$\frac{2}{2}\cdot\frac{3}{5}+\frac{3}{10}=$$

LCD: 10

$$\frac{6}{10}+\frac{3}{10}=\boxed{\frac{9}{10}}$$

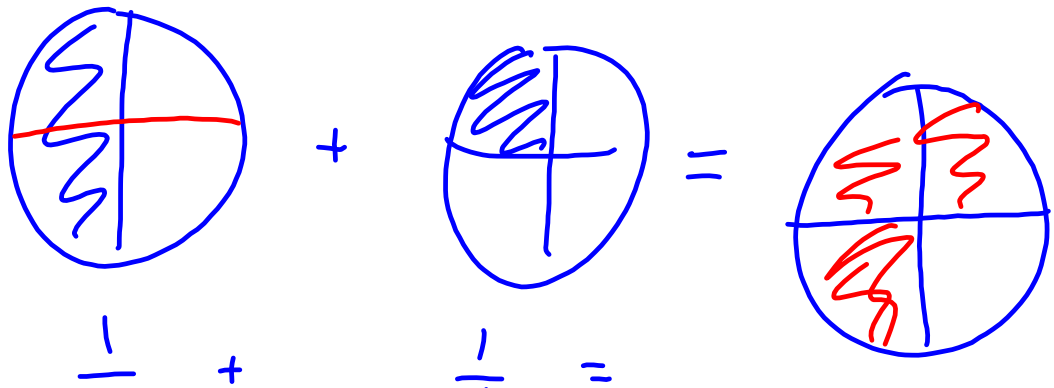
LCD: 28

$$\frac{7}{7}\cdot\frac{1}{4}+\frac{9\cdot 4}{7\cdot 4}=$$

$$\frac{7}{28}+\frac{36}{28}=\boxed{\frac{43}{28}}$$

What do you need?

COMMON DENOMINATOR



$\frac{1}{2} + \frac{1}{4} =$

$\frac{2}{4} + \frac{1}{4} = 3/4$

Perform the indicated operation. List excluded values first.

$$\frac{x^2 - 3x + 6}{x+3} + \frac{7x - 3}{x+3} = \boxed{\frac{x^2+4x+3}{x+3}} = \boxed{x+1}$$

$x \neq -3$

$$= \frac{(\cancel{x+3})(x+1)}{(\cancel{x+3})}$$

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

$x \neq -1$

$$\boxed{\frac{2x-8}{x+1}}$$

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

Find a common denominator

$$\frac{1}{6}-\frac{5}{8}$$

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

LCD: $24 = 2\cdot 3\cdot 2\cdot 2$

$$\frac{y}{y}\cdot\frac{4}{3x^2y^2} \text{ and } \frac{5}{3xy^3}\cdot\frac{x}{x}$$

$3\cdot x\cdot x\cdot y\cdot y$ $\quad$ $3\cdot x\cdot y\cdot y\cdot y$

LCD: $3\cdot x\cdot x\cdot y\cdot y\cdot y$

$\rightarrow 3x^2y^3$

Find a common denominator.

$$\frac{x-1}{x^2+4x+3} \text{ and } \frac{3x-5}{x^3+2x^2+x}$$

$(x+1)(x+3)$ $\quad$ $x(x^2+2x+1)$

$(x)(x+1)(x+1)$

LCD: $(x+1)(x+3)\cdot x(x+1)$

$x \neq -1, -3, 0$

$$\frac{4x-3}{x^2-5x-14} \text{ and } \frac{x+1}{x^2+4x+4}$$

$(x-7)(x+2)$ $\quad$ $(x+2)(x+2)$

LCD: $(x-7)(x+2)(x+2)$

Subtract and simplify. $\frac{1}{6}-\frac{5}{8}$

Perform the indicated operation. List excluded values first.

$$\frac{3}{8x^2}+\frac{1}{12x}$$

$2\cdot2\cdot2\cdot x\cdot x$ $\quad$ $2\cdot2\cdot3\cdot x$

LCD: $2\cdot2\cdot2\cdot x\cdot x\cdot 3 = 24x^2$

$$\frac{3}{3}\cdot\frac{3}{8x^2}+\frac{1}{12x}\cdot\frac{2x}{2x}=\frac{9}{24x^2}+\frac{2x}{24x^2}=\boxed{\frac{2x+9}{24x^2}}$$

$$\frac{3a}{3a}\cdot\frac{3}{10a}+\frac{4}{15a^2}\cdot\frac{2}{2}=\frac{9a}{30a^2}+\frac{8}{30a^2}=\frac{(9a+8)}{30a^2}$$

LCD: $30a^2$

$\boxed{a\neq 0}$

perform the indicated operation and simplify

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

LCD: $(x+3)(x+2)$

$x\neq -3,-2$

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

$$\frac{(x-4)}{(x-4)}\cdot\frac{(x-1)}{x^2+2x-8}+\frac{(x-1)}{x^2-16}\cdot\frac{(x-2)}{(x-2)}$$

$(x+4)(x-2)$ $\quad$ $(x+4)(x-4)$

$x\neq -4,2,4$

LCD: $(x+4)(x-2)(x-4)$

$$\frac{x-1}{2x^2+7x+6}+\frac{x-1}{x^2+6x+8}$$

$$\frac{2x-1}{2x^2-7x-4}-\frac{x-1}{2x^2+3x+1}$$

Perform the indicated operation. List excluded values first.

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

$(x+3)(x-3)$

LCD: $(x+3)(x-3)$

$x \neq -3, 3$

$$\frac{6}{(x+3)(x-3)}+\frac{(x^2-2x-3)}{(x+3)(x-3)}+\frac{(-x^2+1x+6)}{(x+3)(x-3)}$$

$$\boxed{\frac{-3x+9}{(x+3)(x-3)}} = \frac{-3\cancel{(x-3)}}{(x+3)\cancel{(x-3)}}$$

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

$(x+2)(x-2)$

Write a rational expression with the indicated excluded values.

$x = 4, x = 0$

(B) A freight train averages 30 miles per hour traveling to its destination with full cars and 40 miles per hour on the return trip with empty cars. Find the total time in terms of d. Use the formula $t = \frac{d}{r}$.

Let d represent the one-way distance.

Your Turn

9. A hiker averages 1.4 miles per hour when walking downhill on a mountain trail and 0.8 miles per hour on the return trip when walking uphill. Find the total time in terms of d. Use the formula $t = \frac{d}{r}$.