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Adding and Subtracting Rational Expressions

In order to add or subtract fractions, we must first find the LEAST COMMON DENOMINATOR or LCD.

a) $\frac{4\cdot 1}{4\cdot 3}+\frac{3\cdot 3}{4\cdot 3}=\frac{4}{12}+\frac{9}{12}$

LCD: 12

$=\boxed{\frac{13}{12}}$

b) $\frac{2\cdot 5}{2\cdot 2}-\frac{3}{4}=\frac{10}{4}-\frac{3}{4}$

LCD: 4

$=\boxed{\frac{7}{4}}$

Monomial Denominators-FIND A COMMON DENOMINATOR!

- determine what each denominator has that the other denominator is missing
- multiply top and bottom by whatever is missing-to give you the common denominator

Example 1: $\frac{1}{2x}+\frac{1}{2x}=\frac{2}{2X}=\boxed{\frac{1}{X}}$

LCD: 2X

Example 2: $\frac{-2}{x}-\frac{1}{x}=\boxed{\frac{-3}{X}}$

LCD: X

Example 3: $\frac{2\cdot 1}{2\cdot 6x}+\frac{2\cdot 4}{3x\cdot 4}-\frac{3\cdot 3}{4x\cdot 3}$

LCD: 12X

$\frac{2}{12X}+\frac{8}{12X}-\frac{9}{12X}$

$\boxed{\frac{1}{12X}}$

Example 4: $\frac{3y\cdot 3}{3y\cdot 7x^2y}+\frac{4\cdot x}{21xy^2\cdot x}$

LCD: $21x^2y^2$

$\frac{9y}{21x^2y^2}+\frac{4x}{21x^2y^2}$

$\boxed{\frac{9y+4x}{21x^2y^2}}$

Example 5: $\frac{3}{8x^3y^3}-\frac{1\cdot 2x^2y^2}{4xy\cdot 2x^2y^2}$

LCD: $8x^3y^3$

$\boxed{\frac{3-2x^2y^2}{8x^3y^3}}$

Example 6: $\frac{4}{4\cdot xy^2}+\frac{(5y+2)(2x-4)y}{4xy\cdot y}$

LCD: $4xy^2$

$\frac{20y+8+2xy-4y}{4xy^2}$

$\boxed{\frac{16y+8+2xy}{4xy^2}}$

Polynomial Denominators – FACTOR & FIND A COMMON DENOMINATOR!

- Always start by factoring polynomial denominators
- Multiply top and bottom by whatever is missing and then combine the numerators

Example 7: $\frac{-3x}{x^2-9}+\frac{4}{(x-3)(x+3)}$

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

$(x+3)(x-3)$ $\quad (x+3)$

$$\frac{-3x+4x+12}{(x+3)(x-3)}$$

$$\boxed{\frac{x+12}{(x+3)(x-3)}}$$

Example 8: $\frac{x}{(x-1)}+\frac{2x-1}{x^2-3x+2}$

LCD: $(x-1)(x-2)$

$(x-2)$ $\quad (x-1)(x-2)$

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

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

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

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

Example 9: $\frac{y}{2y+4}-\frac{3\cdot 2}{(y+2)2}$

$2(y+2)$

$$\boxed{\frac{y-6}{2(y+2)}}$$

Example 10: $\frac{w+12}{4w-16}-\frac{w+4}{2w-8}$

Example 11: $\frac{5x}{x^2-x-6}+\frac{4}{x^2+4x+4}$

$(x+2)(x+2)(x-3)$ $\quad (x+2)(x+2)(x-3)$

$$\frac{5x^2+10x-4x+12}{(x+2)(x+2)(x-3)}$$

$$\boxed{\frac{5x^2+6x+12}{(x+2)^2(x-3)}}$$

Example 12: $\frac{2x}{x^2-x-2}-\frac{4x}{x^2-3x+2}$

$(x+1)(x-2)$ $\quad (x-1)(x-2)$

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Name_____

Rational Expression Worksheet #12: Adding/Subtracting

Add or subtract these rational expressions. Show your common denominators and numerators on this sheet or separate paper. FACTOR denominators when possible.

1. $\frac{7}{3x}-\frac{2}{5}$ $\frac{-6x+35}{15x}$

2. $\frac{3}{2x+6}+\frac{4}{6x+18}$ $\frac{13}{6(x+3)}$

3. $\frac{3}{x+2}+\frac{4}{x-7}$ $\frac{7x-13}{(x-7)(x+2)}$

4. $\frac{1}{y+3}+\frac{4}{y^2+4y+3}$ $\frac{y+5}{(y+3)(y+1)}$

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

6. $\frac{2x+3}{5x-30}-\frac{3x+4}{x-6}$ $\frac{-13x-17}{5(x-6)}$

7. $\frac{2x}{x-11}+\frac{5}{x-11}$ $\frac{2x+5}{x-11}$

8. $\frac{6x-7}{x^2+6x+5}+\frac{4}{x+5}$ $\frac{10x-3}{(x+5)(x+1)}$