2.2B Operations with Rational Expressions (Adding and Subtracting)

A concrete example:

$$= \frac{3}{4} + \frac{7}{4}$$

$$= \frac{10}{4}$$

$$= \frac{5}{3}$$

A concrete example:

$$\frac{2}{2} \frac{7}{9} - \frac{5}{6} \frac{3}{3} = \frac{14}{18} - \frac{15}{18}$$

$$= -\frac{1}{18}$$

Ex. 1 Simplify. State restrictions.

a)
$$\frac{3}{y^2} - \frac{2}{y^2} + \frac{6}{y^2}$$

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

$$= \frac{3}{y^2} + \frac{6}{y^2}$$

- 1. Find the lowest common denominator and create equivalent rational expressions.
- 2. Add or subtract the numerators but do not change the denominators.
 - 3. Reduce by any common factors.
 - 4. State the restrictions.

b)
$$\frac{(5x-1)}{2} \cdot \frac{(7x+2)^3}{(4)^3}$$
 c)

$$= \frac{10x-2}{12} - \frac{21x+6}{12}$$

$$= \frac{10x-2-(21x+6)}{12}$$

$$= \frac{10x-2-21x-6}{12}$$

$$= -\frac{10x-8}{12}$$

c)
$$\frac{5}{x^2 - 4} - \frac{3}{4 - x^2} \times \frac{1}{x^2 - 4}$$

$$x^2 - 4 \text{ and } 4 - x^2$$
 are opposites!
$$= \frac{5}{x^2 - 4} - \frac{-3}{x^2 - 4}$$

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

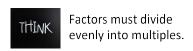
$$= \frac{8}{(x+2)(x-2)}$$

$$1 \times \neq \pm 2$$

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Finding the LCD

$$4x^{3} = 4 \cdot 2 \cdot \cancel{\times} \cdot \cancel{\times} \cdot \cancel{\times} = 8 \times^{3}$$
$$8x = 8 \cdot \cancel{\times} \cdot \cancel{\times} \cdot \cancel{\times} = 8 \times^{3}$$



Ex. 2 Simplify and state the restrictions.

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

= $\frac{8x-2 - (x^2+3x^3)}{8x^3}$
= $\frac{8x-2-x^2-3x^3}{8x^3}$
= $\frac{-3x^3-x^2+8x-2}{8x^3}$, $x \neq 0$

PROCESS

- Find the lowest common denominator and create equivalent rational expressions.
- 2. Add or subtract the numerators but do not change the denominators.
 - 3. Reduce by any common factors.
 - 4. State the restrictions.

b)
$$\frac{4x+4}{5x^2+15x+10} + \frac{1}{x+3}$$
 FACTOR!

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

$$= \frac{4(\chi+1)}{5(\chi+2)(\chi+1)} + \frac{1}{\chi+3}$$

$$= \frac{(\chi+3)}{(\chi+3)} + \frac{1}{\chi+3} + \frac{5(\chi+2)}{\chi+3} + \frac{1}{\chi+3} + \frac{5(\chi+2)}{\chi+3} + \frac{1}{\chi+3} + \frac{5(\chi+2)}{\chi+3}$$

$$= \frac{4(\chi+3)}{5(\chi+2)(\chi+3)} + \frac{1}{\chi+3} + \frac{5(\chi+2)}{\chi+3}$$

$$= \frac{4(\chi+3)}{5(\chi+2)(\chi+3)} + \frac{1}{\chi+3} + \frac$$

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

$$= \frac{(2x-3)(x-2) - 3(1-4x)}{(2x-3)(x+1)} = \frac{2x^2 - 4x - 3x + 6 - 3 + 12x}{(2x-3)(x+1)} = \frac{2x^2 + 5x + 3}{(2x-3)(x+1)} = \frac{2x^2 + 5x + 3}{(2x-3)(x+1)} = \frac{2x+3}{(2x-3)(x+1)} = \frac{2x+3}{2x-3} + x \neq -1, \frac{3}{2}$$

d)
$$\frac{7}{6x-6} + \frac{2x^2}{(x-1)^2} \div \frac{4x}{x^2-1}$$

$$= \frac{7}{6(x-1)} + \frac{2x^2}{(x-1)^x} \cdot \frac{(x+1)(x-1)}{24x}$$

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

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

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

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

HOMEWORK Page 93 #C3, 7bdfh, &ad, 9bd, 11c, 19

+ Additional HW Handout Lesson 2.2B