6.3 Adding and Subtracting Rational Expressions

$$\frac{5}{6} - \frac{3}{8}$$

(1) common denominator

(2) add or subtract numerator

$$\frac{20}{24} - \frac{9}{24}$$

$$\frac{11}{24}$$

$$\frac{1}{2} + \frac{2}{3}$$

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

$$\frac{7}{6}$$

Example 2

Add or Subtract Rational Expressions With Unlike Denominators

Simplify. Express your answers in simplest form.

a) $\frac{2x}{xy} + \frac{4}{x^2} - 3, x \neq 0, y \neq 0$

$$\frac{2x \cdot x}{xy \cdot x} + \frac{4y}{x^2y} - \frac{3x^2y}{1 \cdot x^2y}$$

$$\frac{2x^2 + 4y - 3x^2y}{x^2y} \qquad x \neq 0 \quad y \neq 0$$

b) $\dfrac{y^2-20}{y^2-4}+\dfrac{y-2}{y+2}, y \neq \pm 2$

$\dfrac{y^2-20}{(y+2)(y-2)} + \dfrac{y-2}{y+2}\left(\dfrac{y-2}{y-2}\right)$

$\dfrac{y^2-20}{(y+2)(y-2)} + \dfrac{y^2-4y+4}{(y+2)(y-2)}$

$\dfrac{2y^2-4y-16}{(y+2)(y-2)}$

$\dfrac{2(y^2-2y-8)}{(y+2)(y-2)}$

$\dfrac{2(y-4)(y+2)}{(y+2)(y-2)}$

$\dfrac{2(y-4)}{y-2}$ $\quad y \neq \pm 2$

c) $\dfrac{1+\frac{1}{x}}{x-\frac{1}{x}}, x \neq 0, x \neq \pm 1$

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

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

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

$$\frac{x+1}{x} \cdot \frac{x}{(x+1)(x-1)} \qquad \frac{1}{x-1} \qquad x \neq 0, 1, -1$$

Your Turn

Simplify. What are the non-permissible values?

a) $\frac{4}{p^2 - 1} + \frac{3}{p + 1}$

$$\frac{4}{(p+1)(p-1)} + \frac{3}{(p+1)}\left(\frac{p-1}{p-1}\right)$$

$$\frac{4}{(p+1)(p-1)} + \frac{3p-3}{(p+1)(p-1)}$$

$$\frac{3p+1}{(p+1)(p-1)} \qquad p \neq \pm 1$$

b) $\dfrac{x-1}{x^2+x-6} - \dfrac{x-2}{x^2+4x+3}$

$\left(\dfrac{x+1}{x+1}\right)\dfrac{(x-1)}{(x+3)(x-2)} - \dfrac{x-2}{(x+3)(x+1)}\left(\dfrac{x-2}{x-2}\right)$

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

$$\frac{4x-5}{(x+3)(x+1)(x-2)} \qquad x \neq -3, -1, 2$$

c) $\dfrac{2-\frac{4}{y}}{y-\frac{4}{y}}$

$$\frac{\frac{2y}{y}-\frac{4}{y}}{\frac{y^2}{y}-\frac{4}{y}}$$

$$\frac{2y-4}{y} \div \frac{y^2-4}{y}$$

$$\frac{2(y-2)}{y} \cdot \frac{y}{(y+2)(y-2)}$$

$$\boxed{\frac{2}{y+2} \quad y \neq 0, 2, -2}$$

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Wednesday: 15,18,23,25,26 pgs.338-340

Enjoy your Long Weekend!