

Checkpoint 2: Assess Your Understanding, pages 575–577

7.3

1. Multiple Choice Which difference of rational expressions simplifies

to $\frac{6 - 5x^2}{9x}$?

A. $\frac{2}{3x} - \frac{5x}{9}, x \neq 0$

B. $\frac{2}{3x} - \frac{5}{9x}, x \neq 0$

C. $\frac{5x}{9} - \frac{2}{3x}, x \neq 0$

D. $\frac{2}{3x} - \frac{5x^2}{9}, x \neq 0$

2. Simplify.

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

Common denominator: $6n^2$

$$= \frac{(n + 3) \cdot 3n}{2n \cdot 3n} - \frac{(n + 4) \cdot 2}{3n^2 \cdot 2}$$

$$= \frac{3n^2 + 9n}{6n^2} - \frac{2n + 8}{6n^2}$$

$$= \frac{3n^2 + 7n - 8}{6n^2}, n \neq 0$$

b) $\frac{-3}{fg^3} + \frac{4}{f^2g}$

Common denominator: f^2g^3

$$= \frac{-3 \cdot f}{fg^3 \cdot f} + \frac{4 \cdot g^2}{f^2g \cdot g^2}$$

$$= \frac{-3f + 4g^2}{f^2g^3}, f \neq 0, g \neq 0$$

3. Simplify.

a) $3 + \frac{x}{2} - \frac{x+2}{x}$

Common denominator: $2x$

$$\begin{aligned} &= \frac{3}{1} \cdot \frac{2x}{2x} + \frac{x}{2} \cdot \frac{x}{x} - \frac{x+2}{x} \cdot \frac{2}{2} \\ &= \frac{6x}{2x} + \frac{x^2}{2x} - \frac{2x+4}{2x} \\ &= \frac{x^2 + 4x - 4}{2x}, x \neq 0 \end{aligned}$$

b) $\frac{5}{3e} - \frac{6}{2e^2} + \frac{2}{e}$

Common denominator: $6e^2$

$$\begin{aligned} &= \frac{5}{3e} \cdot \frac{2e}{2e} - \frac{6}{2e^2} \cdot \frac{3}{3} + \frac{2}{e} \cdot \frac{6e}{6e} \\ &= \frac{10e}{6e^2} - \frac{18}{6e^2} + \frac{12e}{6e^2} \\ &= \frac{22e - 18}{6e^2} \\ &= \frac{11e - 9}{3e^2}, e \neq 0 \end{aligned}$$

7.4

4. **Multiple Choice** Which sum or difference of rational expressions is defined for all real values of the variable?

A. $\frac{1}{x} + \frac{2x}{x^2 + 1}$

B. $\frac{1}{x+1} + \frac{2x}{x^2 + 1}$

C. $x - \frac{2x}{x^2 - 1}$

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

5. Simplify.

a) $\frac{7}{t-9} + \frac{t+3}{9-t}$

$$\begin{aligned} &= \frac{7}{t-9} + \frac{t+3}{-(t-9)} \\ &= \frac{7}{t-9} - \frac{t+3}{t-9} \\ &= \frac{4-t}{t-9}, t \neq 9 \end{aligned}$$

b) $\frac{n+4}{n-2} - \frac{n-3}{n+1}$

Common denominator:

$$\begin{aligned} &(n-2)(n+1) \\ &= \frac{(n+4) \cdot (n+1)}{(n-2) \cdot (n+1)} \\ &\quad - \frac{(n-3) \cdot (n-2)}{(n+1) \cdot (n-2)} \\ &= \frac{n^2 + 5n + 4}{(n-2)(n+1)} \\ &\quad - \frac{n^2 - 5n + 6}{(n-2)(n+1)} \\ &= \frac{10n - 2}{(n-2)(n+1)} \\ &= \frac{2(5n-1)}{(n-2)(n+1)}, n \neq -1, 2 \end{aligned}$$

6. Simplify.

$$\begin{aligned}
 \text{a) } & \frac{2d}{d^2 - 6d + 8} + \frac{3}{d^2 - d - 2} \\
 &= \frac{2d}{(d-4)(d-2)} + \frac{3}{(d-2)(d+1)} \\
 &\text{Common denominator: } (d-4)(d-2)(d+1) \\
 &= \frac{2d}{(d-4)(d-2)} \cdot \frac{(d+1)}{(d+1)} \\
 &\quad + \frac{3}{(d-2)(d+1)} \cdot \frac{(d-4)}{(d-4)} \\
 &= \frac{2d^2 + 2d + 3d - 12}{(d-4)(d-2)(d+1)} \\
 &= \frac{2d^2 + 5d - 12}{(d-4)(d-2)(d+1)} \\
 &= \frac{(2d-3)(d+4)}{(d-4)(d-2)(d+1)} \\
 &d \neq -1, 2, 4
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } & \frac{8b-3}{b^2-7b+12} - \frac{2b+1}{4-b} \\
 &= \frac{8b-3}{(b-4)(b-3)} - \frac{2b+1}{-(b-4)} \\
 &= \frac{8b-3}{(b-4)(b-3)} + \frac{2b+1}{b-4} \\
 &\text{Common denominator: } (b-4)(b-3) \\
 &= \frac{8b-3}{(b-4)(b-3)} + \frac{(2b+1) \cdot (b-3)}{(b-4) \cdot (b-3)} \\
 &= \frac{8b-3}{(b-4)(b-3)} + \frac{2b^2-5b-3}{(b-4)(b-3)} \\
 &= \frac{2b^2+3b-6}{(b-4)(b-3)}, b \neq 3, 4
 \end{aligned}$$

7. Simplify.

$$\begin{aligned}
 & \frac{5}{4k-12} + \frac{4k}{k^2-9} - \frac{2}{k^2-6k+9} \\
 &= \frac{5}{4(k-3)} + \frac{4k}{(k-3)(k+3)} - \frac{2}{(k-3)(k-3)} \\
 &\text{Common denominator: } 4(k-3)^2(k+3) \\
 &= \frac{5}{4(k-3)} \cdot \frac{(k-3)(k+3)}{(k-3)(k+3)} + \frac{4k}{(k-3)(k+3)} \cdot \frac{4(k-3)}{4(k-3)} - \frac{2}{(k-3)(k-3)} \cdot \frac{4(k+3)}{4(k+3)} \\
 &= \frac{5(k^2-9)}{4(k-3)^2(k+3)} + \frac{4k(4k-12)}{4(k-3)^2(k+3)} - \frac{8(k+3)}{4(k-3)^2(k+3)} \\
 &= \frac{5k^2-45+16k^2-48k-8k-24}{4(k-3)^2(k+3)} \\
 &= \frac{21k^2-56k-69}{4(k-3)^2(k+3)}, k \neq -3, 3
 \end{aligned}$$