Homework 5.2: Adding & Subtracting Rationals

Name: _Keig!_

Math 3

Directions: Simplify each sum or difference. State any restrictions on the variables.

1. $\dfrac{6y-4}{y^2-5} + \dfrac{3y+1}{y^2-5}$ CD: y^2-5

$\dfrac{3(3y-1)}{y^2-5}$ $y \neq \pm\sqrt{5}$

2. $\dfrac{2y+1}{3y} + \dfrac{5y+4}{3y}$ CD: $3y$

$\dfrac{7y+5}{3y}$ $y \neq 0$

3. $\dfrac{x^2}{5} + \dfrac{x^2}{5}$ CD: 5

$\dfrac{2x^2}{5}$ NO restrictions

4. $\dfrac{3}{8x^3y^3} - \dfrac{1}{4xy}$ CD: $8x^3y^3$

$\dfrac{3-2x^2y^2}{8x^3y^3}$ $x \neq 0$ $y \neq 0$

5. $\dfrac{6}{5x^2y} + \dfrac{5}{10xy^2}$ CD: $10x^2y^2$

$\dfrac{12y+5x}{10x^2y^2}$ $x \neq 0$ $y \neq 0$

6. $\dfrac{12}{xy^3} - \dfrac{9}{xy^3}$ CD: xy^3

$\dfrac{3}{xy^3}$ $x \neq 0$ $y \neq 0$

Directions: Simplify each sum or difference. State any restrictions on the variables.

7. $-\dfrac{2}{n+4} - \dfrac{n^2}{n^2-16}$ CD: $(n+4)(n-4)$

$\dfrac{-1(n-2)}{n-4}$ $n \neq \pm 4$

8. $\dfrac{x+2}{x^2+4x+4} + \dfrac{2}{x+2}$ CD: $(x+2)$

$\dfrac{3}{x+2}$ $x \neq -2$

9. $\dfrac{4}{x^2-25} + \dfrac{6}{x^2+6x+5}$ CD: $(x+5)(x-5)(x+1)$

$\dfrac{2(5x-13)}{(x+5)(x-5)(x+1)}$ $x \neq \pm 5, -1$

10. $\dfrac{y}{4y+8} - \dfrac{1}{y^2+2y}$ CD: $4y(y+2)$

$\dfrac{y-2}{4y}$ $y \neq -2, 0$

Directions: Simplify the complex fractions. State any restrictions on the variables.

11. $\dfrac{\frac{2}{x}}{\frac{3}{y}}$ $\dfrac{2y}{3x}$ $x \neq 0$ $y \neq 0$

12. $\dfrac{1+\frac{2}{x}}{4-\frac{6}{x}}$ $\dfrac{x+2}{2(2x-3)}$ $x \neq \frac{3}{2}, 0$

13. $\dfrac{\frac{3}{x+1}}{\frac{5}{x-1}}$ $\dfrac{3(x-1)}{5(x+1)}$ $x \neq \pm 1$

14. $\dfrac{\frac{4}{x^2-1}}{\frac{3}{x+1}}$ $\dfrac{4}{3(x-1)}$ $x \neq \pm 1$

15. Angela simplified the following rational expressions. She correctly simplified one out of the three problems. Determine which one she answered correctly. Also, identify and correct where she went wrong in the other two problems.

a. $\dfrac{5x}{(x-3)} + \dfrac{2}{(x-1)}$

b. $\dfrac{x}{(x+3)} - \dfrac{4(x+3)}{(x-1)}$

c. $\dfrac{(x+1)(x-2)}{(x+2)} \times \dfrac{(x+5)}{(x-2)(x+2)}$

$\dfrac{5x(x-1)}{(x-3)(x-1)} + \dfrac{2(x-3)}{(x-3)(x-1)}$

$\dfrac{x}{1} - \dfrac{4}{(x-1)}$

$\dfrac{(x+1)(x-2)(x+5)}{(x+2)(x-2)(x+2)}$

Forgot to distribute 5x to the -1

$\dfrac{5x^2 \boxed{-x} + 2x - 6}{(x-3)(x-1)}$

$\dfrac{x(x-1)}{(x-1)} - \dfrac{4}{(x-1)}$

$\dfrac{(x+1)(x+5)}{(x+2)(x+2)}$

$\dfrac{5x^2 + x - 6}{(x-3)(x-1)}$

$\dfrac{x^2 - x - 4}{(x-1)}$

$\dfrac{x^2 + 6x + 5}{x^2 + 4x + 4}$

a) $\dfrac{7x-11}{(x-3)(x-1)}$ ← correct Answer

Didn't multiply $\dfrac{x}{x+3}$ by $(x-1)$ and they canceled $(x+3)$ s

c is correct!

b) $\dfrac{x^2 - 5x + 2}{(x+3)(x-1)}$ ← Correct Answer

16. Which is the least common denominator of fractions that have denominators $5x + 10$ and $25x^2 - 100$?

$5(x+2)$

$25(x^2 - 4) = 25(x+2)(x-2)$

(A) $5(x-2)$

(B) $5(x^2 - 20)$

$25(x^2 - 4)$

(D) $75(x+2)(x^2 - 4)$

17. Which expression equals $\dfrac{\frac{2}{x} + 6}{\frac{1}{y}}$?

$\dfrac{2}{x} + \dfrac{6x}{x} = \dfrac{2+6x}{x}$

$= \dfrac{2+6x}{x} \cdot \dfrac{y}{1}$

$= \dfrac{2y + 6xy}{x}$

(F) $\dfrac{12y}{x}$

(G) $\dfrac{2y + 6xy}{x}$

(H) $\dfrac{6x + 2}{xy}$

(I) $\dfrac{x}{2y + 6xy}$

18. Which expression equals $\dfrac{4}{x^2 - 3x} + \dfrac{6}{3x - 9}$?

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

(B) $\dfrac{10}{x^2 - 9}$

(C) $\dfrac{4x + 18}{3x(x-3)}$

(D) $\dfrac{2}{x}$

$\dfrac{4(3)}{3x(x-3)} + \dfrac{6x}{3(x-3)x} = \dfrac{12 + 6x}{3x(x-3)} = \dfrac{6(x+2)}{3x(x-3)} = \dfrac{2(x+2)}{x(x-3)}$

19. Subtract $3 - \dfrac{1}{x^2 + 5}$. Write your answer in simplest form. State any restrictions on the variable.

$\dfrac{3(x^2+5) - 1}{x^2 + 5} = \dfrac{3x^2 + 15 - 1}{x^2 + 5} = \boxed{\dfrac{3x^2 + 14}{x^2 + 5}}$ $x \neq \pm\sqrt{5}$

1. $\dfrac{6y-4+3y+1}{y^2-5} = \dfrac{9y-3}{y^2-5} = \dfrac{3(3y-1)}{y^2-5}$ $y \neq \pm\sqrt{5}$

2. $\dfrac{2y+1+5y+4}{3y} = \dfrac{7y+5}{3y}$ $y \neq 0$

3. $\dfrac{x^2+x^2}{5} = \dfrac{2x^2}{5}$

4. $\dfrac{3}{8x^3y^3} - \dfrac{1}{4xy}\dfrac{(2x^2y^2)}{(2x^2y^2)} = \dfrac{3-2x^2y^2}{8x^3y^3}$ $x \neq 0$ $y \neq 0$

5. $\dfrac{(2y)6}{(2y)5x^2y} + \dfrac{5(x)}{10xy^2(x)} = \dfrac{12y+5x}{10x^2y^2}$ $x \neq 0$ $y \neq 0$

6. $\dfrac{12+-9}{xy^3} = \dfrac{3}{xy^3}$ $x \neq 0$ $y \neq 0$

7. $\dfrac{-2(n-4)}{(n+4)(n-4)} + \dfrac{-n^2}{(n+4)(n-4)} = \dfrac{-2n+8-n^2}{(n+4)(n-4)} = \dfrac{-1(n^2+2n-8)}{(n+4)(n-4)}$

   $\dfrac{-1(n+4)(n-2)}{(n+4)(n-4)} = \dfrac{-1(n-2)}{n-4}$ $n \neq \pm 4$

8. $\dfrac{x+2}{(x+2)(x+2)} + \dfrac{2}{x+2} = \dfrac{1+2}{x+2} = \dfrac{3}{x+2}$ $x \neq -2$

9. $\dfrac{4(x+1)}{(x+5)(x-5)(x+1)} + \dfrac{6(x-5)}{(x+5)(x+1)(x-5)} = \dfrac{4x+4+6x-30}{(x+5)(x-5)(x+1)} = \dfrac{10x-26}{(x+5)(x-5)(x+1)}$

10. $\dfrac{y(y)}{4(y+2)(y)} + \dfrac{-1(4)}{y(y+2)(4)} = \dfrac{y^2-4}{4y(y+2)} = \dfrac{(y+2)(y-2)}{4y(y+2)} = \dfrac{y-2}{4y}, \quad y \neq -2, 0$

11. $\dfrac{2}{x} \cdot \dfrac{4}{3} = \dfrac{2y}{3x} \quad \begin{array}{l} x \neq 0 \\ y \neq 0 \end{array}$

12. $\dfrac{\frac{x+2}{x}}{\frac{4x-6}{x}} = \dfrac{x+2}{x} \cdot \dfrac{x}{4x-6} = \dfrac{x+2}{4x-6} \quad x \neq 3/2, 0$

13. $\dfrac{3}{x+1} \cdot \dfrac{x-1}{5} = \dfrac{3(x-1)}{5(x+1)} \quad x \neq \pm 1$

14. $\dfrac{4}{(x+1)(x-1)} \cdot \dfrac{(x+1)}{3} = \dfrac{4}{3(x-1)} \quad x \neq \pm 1$

15. a) $\dfrac{5x(x-1)}{(x-3)(x+1)} + \dfrac{2(x-3)}{(x-3)(x-1)} = \dfrac{5x^2-5x+2x-6}{(x-3)(x-1)} = \dfrac{5x^2-3x-6}{(x-3)(x-1)}$

b) $\dfrac{x(x-1)-4(x+3)}{(x+3)(x-1)} = \dfrac{x^2-x-4x-12}{(x+3)(x-1)} = \dfrac{x^2-5x-12}{(x+3)(x-1)}$