

Name: \_\_\_\_\_  
PC: Adding and Subtracting Rational Expressions

Date: \_\_\_\_\_  
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Do Now:  
Perform the indicated operation and simplify.

1.  $\frac{k^2 + 4k}{k^2 + 6k + 9} \cdot \frac{-k - 3}{8k + 32}$

$$\frac{k(k+4)}{(k+3)(k+3)} \cdot \frac{-(k+3)}{8(k+4)}$$

$$\frac{-k}{8(k+3)}, k \neq -3, -4$$

2.  $\frac{4(u^2 - 25)}{u - 2} \div \frac{4u - 20}{2u^2 - u - 6}$

$$\begin{aligned} &2u^2 - 4u + 3u - 6 \\ &2u(u-2) + 3(u-2) \\ &(2u+3)(u-2) \end{aligned}$$

$$\frac{4(u+5)(u-5)}{\cancel{u-2}} \cdot \frac{(2u+3)\cancel{(u-2)}}{4(u-5)}$$

$$(u+5)(2u+3), u \neq 2, 5, -\frac{3}{2}$$

Perform the indicated operation(s) and simplify.

$$1) \frac{u-v}{8v} + \frac{6u-3v}{8v} = \frac{(7u-4v)}{8v}, v \neq 0$$

$$3) \frac{5}{a^2+3a+2} + \frac{5a+1}{a^2+3a+2}$$

$$\frac{5a+6}{a^2+3a+2}$$

$$\frac{5a+6}{(a+2)(a+1)} \quad a \neq -1, -2$$

$$5) \frac{r+6}{3r-6} + \frac{r+1}{3r-6}$$

$$7) \frac{4 \cdot 6}{4(x-1)} + \frac{-5x(x-1)}{4(x-1)}$$

$$\frac{2r+7}{3r-6} = \frac{2r+7}{3(r-2)} \quad r \neq 2$$

$$\frac{24 - 5x^2 + 5x}{4(x-1)}$$

$$- (5x^2 - 5x - 24)$$

$$\frac{-5x^2 + 5x + 24}{4(x-1)}$$

$x \neq 1$

$$9) \frac{(x-3) \cdot 3}{(x-2)(x+7)} + \frac{4(x+7)}{(x-8)(x+7)}$$

$22(3x-2)$

$$\frac{4(3x-2) \cdot 7}{4(3x-2) \cdot 3} + \frac{-8(3)}{4(3x-2) \cdot 3}$$

reduce first

$$\text{OR } \frac{(3x-2) \cdot 7}{(3x-2) \cdot 3} + \frac{-8 \cdot 2}{4(3x-2) \cdot 3}$$

$$\frac{3x-24+4x+28}{(x+7)(x-8)}$$

$$\frac{7x+4}{(x+7)(x-8)} \quad x \neq -7, 8$$

$$\frac{84x-56-24}{12(3x-2)}$$

$$\frac{2|x-14-b}{3(3x-2)}$$

$$\frac{84x-80}{12(3x-2)}$$

$$\frac{2|x-20}{3(3x-2)} \quad x \neq \frac{2}{3}$$

$$\frac{4(2|x-20)}{12(3x-2)} = \frac{(2|x-20)}{3(3x-2)} \quad x \neq \frac{2}{3}$$

$$\frac{(2x+3) \cdot 2x}{(2x+3)(5x+4)} + \frac{6x(5x+4)}{(2x+3)(5x+4)}$$

$$\frac{(n-7) \cdot 7n}{(n-7)(n+1)} + \frac{8(n+1)}{(n-7)(n+1)}$$

$$\frac{4x^2 + 6x + 30x^2 + 24x}{(5x+4)(2x+3)}$$

$$\frac{7n^2 - 49n + 8n + 8}{(n+1)(n-7)}$$

$$\frac{34x^2 + 30x}{(5x+4)(2x+3)}$$

$$x \neq -\frac{3}{2}, -\frac{4}{5}$$

$$\frac{7n^2 - 41n + 8}{(n+1)(n-7)}$$

$$n \neq -1, 7$$

$$\frac{2x(17x+15)}{(5x+4)(2x+3)}$$

### Steps for Adding Rational Expressions

When the denominators are the same

1. Keep the denominator the same.
2. Rewrite as one fraction by combining like terms
3. Factor.
4. Reduce.

When the denominators are not the same

1. Find The **LCD**
2. Rewrite each fraction with that common denominator
3. Combine like terms in the numerator and rewrite as a single fraction
4. Factor
5. Reduce.

✿ To subtract, just change the subtraction to addition and negate the numerator that follows. Then you can follow the rules for addition. ✿

# Homework 09-26

Perform the indicated operation(s) and simplify.

$$1. \frac{\cancel{4x} \cdot \cancel{x+2}}{(x-2)\cancel{(x+2)}} \cdot \frac{1}{4} = \frac{1}{4(x-2)} \quad R$$

$x \neq \pm 2, 0$

$$2. \frac{x^2 - x - 12}{x^2 - 9} \div \frac{4-x}{3+x}$$

$$\frac{\cancel{(x-4)}\cancel{(x+3)}}{(x-3)\cancel{(x+3)}} \cdot \frac{3+x}{4-x} = \frac{-(x+3)}{(x-3)} \quad R$$

$x \neq 4, \pm 3$

$$3. \frac{\cancel{t-3}}{t^2+9} \cdot \frac{t+3}{\cancel{(t+3)}\cancel{(t-3)}} = \frac{1}{t^2+9}$$

R:  $t \neq \pm 3$

$$4. \frac{x^2 - x - 6}{x^2 + 2x} \cdot \frac{x^3 + x^2}{x^2 - 2x - 3}$$

$$\frac{\cancel{(x-3)}\cancel{(x+2)}}{x\cancel{(x+2)}} \cdot \frac{x^2\cancel{(x+1)}}{\cancel{(x-3)}\cancel{(x+1)}} = x \quad R$$

$x \neq 3, -1, 0, -2$

$$5. \frac{x^2 + 7x + 12}{x^2 + 3x + 2} \cdot \frac{x^2 + 5x + 6}{x^2 + 6x + 9} = \frac{x+4}{x+1}$$

$$\frac{\cancel{(x+2)}\cancel{(x+4)}}{\cancel{(x+2)}\cancel{(x+1)}} \cdot \frac{\cancel{(x+3)}\cancel{(x+2)}}{\cancel{(x+3)}\cancel{(x+3)}} = \frac{x+4}{x+1}$$

R:  $x \neq -2, -1, -3$

$$6. \frac{(x+1)^2}{x^2 - 10x + 25} \div \frac{4x+4}{x-5}$$

$$\frac{\cancel{(x+1)}\cancel{(x+1)}}{\cancel{(x-5)}\cancel{(x-5)}} \cdot \frac{\cancel{x-5}}{4\cancel{(x+1)}} = \frac{x+1}{4(x-5)} \quad R$$

$x \neq 5, 1$

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

$$\frac{\cancel{(2x+1)}\cancel{(x+1)}}{\cancel{(x+5)}\cancel{(x-3)}} \cdot \frac{\cancel{(2x-1)}\cancel{(x-3)}}{\cancel{(x+5)}\cancel{(x+1)}} = \frac{1}{(x+5)^2} \quad R$$

$x \neq -5, 3, -1, \frac{1}{2}$

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

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

8.  $\frac{4y^2-9}{2y^2+9y-18} \div \frac{2y^2+y-3}{y^2+5y+6}$

$$\frac{(2y+3)(2y-3)}{(2y-3)(y+6)} \cdot \frac{(y+3)(y+2)}{(2y+3)(y-1)} = \frac{(y+3)(y+2)}{(y+6)(y-1)} \quad R \quad y \neq -6, 1, \frac{-3}{2}, -3, -2$$

9.  $\frac{x^2+2x-3}{x^3+8x^2+16x} \cdot \frac{3x^2+12x}{x-1}$

$$\frac{(x+3)(x-1)}{x(x+4)(x+4)} \cdot \frac{3x(x+4)}{x-1} = \frac{3(x+3)}{(x+4)} \quad R \quad x \neq -4, 0$$

10.  $\frac{x^2+x^2-12x}{x^2-3x} \cdot \frac{3x^2-10x+3}{3x^2+11x-4}$

$$\frac{x(x+4)(x-3)}{x(x-3)} \cdot \frac{(3x-1)(x-3)}{(3x-1)(x+4)} = x-3 \quad R \quad x \neq 0, 3, \frac{1}{3}, -4$$

11.  $\frac{a^3-27}{a^2-9} \div \frac{a}{a+3}$

$$\frac{(a-3)(a^2+3a+9)}{(a-3)(a+3)} \cdot \frac{a+3}{a} = \frac{a^2+3a+9}{a} \quad R \quad a \neq \pm 3, 0$$

12.  $\frac{y^2+5y-24}{y^2-16} \cdot \frac{y^2+6y-40}{y^2+4y-21}$

$$\frac{(y+8)(y-3)}{(y-4)(y+4)} \cdot \frac{(y+10)(y-4)}{(y+7)(y-3)} = \frac{(y+8)(y+10)}{(y+4)(y+7)} \quad R \quad y \neq \pm 4, -7, 3$$

13.  $\frac{n^3+8}{n^2-4n-12} \div \frac{n^3-2n^2+4n}{n^3-6n^2}$

$$\frac{(n+2)(n^2-2n+4)}{(n-6)(n+2)} \cdot \frac{n^2(n-6)}{n(n^2-2n+4)} = n \quad R \quad n \neq 6, -2, 0, n^2-2n+4 \neq 0$$

14.  $\frac{2x^2-3x-2}{x^2-1} \div \frac{2x^2+5x+2}{x^2+x-2}$

$$\frac{(2x+1)(x-2)}{(x-1)(x+1)} \cdot \frac{(x+2)(x-1)}{(2x+1)(x+2)} = \frac{x-2}{x+1} \quad R \quad x \neq \pm 1, -\frac{1}{2}, -2$$