ADDING & SUBTRACTING Rational Expressions

(*with **UNLIKE BASES**)

$\frac{1}{8}+\left(\frac{2}{4}\right)^2$

$\frac{1}{8}+\frac{2}{8}=\frac{3}{8}$

$3\left(\frac{1}{8}\right)+\left(\frac{2}{3}\right)^8$

$\frac{3}{24}+\frac{16}{24}=\frac{19}{24}$

common denominator:

8, 16, 24, 32

3, 6, 9, 12, 15, 18, 21, 24

❶	Find a common denominator!
❷	Rewrite the fractions using the common denominator. Adjust each numerator to reflect the change in the denominator.
❸	Add/Subtract the numerators and keep the common denominator.
❹	Simplify (if needed).

Example 1: $\left(\frac{x}{3}\right)^2+\left(\frac{x}{2}\right)^3$

LCD = 6

$\frac{2x}{6}+\frac{3x}{6}=\frac{5x}{6}$

Example 2: $5\left(\frac{a+10}{6}\right)-\left(\frac{2a-1}{30}\right)$

$\frac{5a+50}{30}-\frac{(2a-1)}{30}$

$\frac{3(a+17)}{30}=\frac{a+17}{10}$

Example 3: $\frac{k+24}{5k+20}+\left(\frac{k}{k+4}\right)^5$

$5(k+4)$

$\frac{k+24+5k}{5(k+4)}=\frac{6k+24}{5(k+4)}$

$\frac{6}{5}=\frac{6(k+4)}{5(k+4)}$

Example 4: $\left(\frac{4r}{r-1}\right)^{(r+6)}-\frac{28r}{r^2+5r-6}$

$\frac{4r^2+24r-28r}{(r+6)(r-1)}$

$\frac{(4r^2-4r)}{(r+6)(r-1)}=\frac{4r(r-1)}{(r+6)(r-1)}$

YOU TRY!

Find each sum or difference. Write each answer in simplest form.

1. $\left(\frac{4}{5p}\right)^3-\frac{7}{15p}$

$\frac{12}{15p}-\frac{7}{15p}=\frac{5}{15p}=\frac{1}{3p}$

2. $\frac{9}{4c}+\left(\frac{3}{2e}\right)^2$

$\frac{9}{4c}+\frac{6}{4c}=\frac{15}{4c}$

3. $\left(\frac{y}{2}\right)^{15}-\left(\frac{y}{5}\right)^6-\left(\frac{y}{6}\right)^5$ common denom. = 30

$\frac{15y}{30}-\frac{6y}{30}-\frac{5y}{30}=\frac{4y}{30}=\frac{y}{15}$

4. $\left(\frac{9x}{5}\right)^4-\left(\frac{3x}{4}\right)^5+\left(\frac{7x}{10}\right)^2$ common denom. = 20

$\frac{36x}{20}-\frac{15x}{20}+\frac{14x}{20}=\frac{35x}{20}=\frac{7x}{4}$

5. $\left(\frac{y-2}{3}\right)^2+\frac{y+1}{6}$

$\frac{2y-4+(y+1)}{6}=\frac{(3y-3)}{6}$

$\frac{3(y-1)}{6}=\frac{y-1}{2}$

6. $\left(\frac{5n+9}{12}\right)^4-\left(\frac{2n+8}{16}\right)^3$ common denom. = 48

$\frac{20n+36}{48}-\frac{6n+24}{48}=\frac{(14n+12)}{48}$

$\frac{7n+6}{24}=\frac{2(7n+6)}{48}$

7. $\frac{1}{x-7}+\frac{6}{2x-14}$	**8.** $\frac{6k}{k^2-9}+\frac{k}{k+3}$
9. $\frac{w}{w+2}-\frac{8}{w^2-4}$	**10.** $\frac{1}{m-5}+\frac{2m-19}{m^2-m-20}$ $(m-5)(m+4)$ $\frac{m+4}{(m+4)(m-5)}+\frac{2m-19}{(m-5)(m+4)}=\frac{(3m-15)}{(m-5)(m-4)}$ $\frac{3}{m-4}=\frac{3(m-5)}{(m-4)(m-5)}$
11. $\frac{g^2+4g}{g^2+6g+8}+\frac{3}{g+2}$	**12.** $\frac{4a}{a^2+6a+5}+\frac{1}{a+1}$

13. $\dfrac{5}{p^2-p-6}+\dfrac{1}{p+2}$

14. $\dfrac{4}{4z-1}+\dfrac{8z-15}{4z^2+11z-3}$

15. $\dfrac{r^2+8r-12}{2r^2-5r-3}-\dfrac{3}{r-3}$

16. $\dfrac{5x}{x+2}-\dfrac{x}{x-1}+\dfrac{3}{x^2+x-2}$

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

$=\dfrac{4x^2-7x+3}{(x+2)(x-1)}$

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

Date: _____ **Per:** _____ **Homework 5:** Adding and Subtracting Rational Expressions (Unlike Bases)

**** This is a 2-page document! ****

Directions: Find each sum or difference. Make sure your answer is simplified.

1. $\frac{7y}{6}-\frac{y}{2}+\frac{2y}{9}$

2. $\frac{3}{4x}+\frac{1}{20x}$ $\quad \frac{15}{20x}+\frac{1}{20x}=\frac{16}{20x}=\frac{4}{5x}$ (÷4)

3. $\frac{m-1}{2}-\frac{3m+1}{18}$

4. $\frac{12}{4k-20}-\frac{1}{k-5}$ (×4)

$4(k-5)$

$\frac{12}{4(k-5)}-\frac{4}{4(k-5)}=\frac{8}{4(k-5)}=\frac{2}{k-5}$

5. $\frac{x-4}{3x-3}+\frac{1}{x-1}$

6. $\frac{y}{y-8}-\frac{6y+80}{(y^2-64)}$ $(y+8)$

$(y+8)(y-8)$

$\frac{y^2+8y}{(y+8)(y-8)}-\frac{6y+80}{(y+8)(y-8)}=\frac{y^2+2y-80}{(y+8)(y-8)}$

$10 \times -8 = -80$, $10+(-8)=2$

$\frac{(y+10)(y-8)}{(y+8)(y-8)}$

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

8. $\frac{3w}{w^2-4w} - \left(\frac{1}{w-4}\right)^w$

$w(w-4)$

$\frac{3w}{w(w-4)} - \frac{w}{w(w-4)} = \frac{2w}{w(w-4)}$

$\frac{2}{w-4}$

9. $\frac{3}{x+1} - \frac{6}{x^2+4x+3}$

10. $\frac{1}{g-6} + \frac{g-17}{g^2-g-30}$

$(g+5)$ -30 -6 5 -1

$(g-6)(g+5)$

$\frac{g+5}{(g+5)(g-6)} + \frac{g-17}{(g-6)(g+5)} = \frac{(2g-12)}{(g-6)(g+5)}$

$\frac{2}{g+5} = \frac{2(g-6)}{(g-6)(g+5)}$

11. $\frac{8y-26}{y^2-4y-21} - \frac{3}{y-7}$

12. $\frac{x^2-3x-1}{2x^2+5x+2} + \frac{x}{2x+1}$ $(x+2)$

$(2x+1)(x+2)$ 4 1 5

$2x$ 1

x | $2x^2$ | $1x$

2 | $4x$ | 2

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

-2 1 -2 -1

$2x+1$

x | $2x^2$ | $1x$

-1 | $-2x$ | -1

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

13. $\frac{17}{6a}-\frac{11}{2a}+\frac{1}{3a}$	**14.** $\frac{n-13}{n+2}+\frac{n^2-1}{n^2-4n-12}-\frac{2n-5}{n-6}$ $\frac{n^2-19n+78+(n^2-1)-(2n^2-n-10)}{(n-6)(n+2)}$ $\frac{-18n+87}{(n-6)(n+2)}$
15. $\frac{9r-12}{r^2-16}-\frac{r+3}{5r^2+15r}\cdot\frac{15r^2}{r^2+4r}$	**16.** $\left(\frac{v+3}{v+2}+\frac{6}{v-8}\right)\div\frac{2v^2+9v+4}{2v^2+5v+2}$ $\frac{v^2-5v-24+6v+12}{(v-8)(v+2)}$ $\frac{v^2+v-12}{(v-8)(v+2)}$ $\frac{(v+4)(v-3)}{(v-8)(v+2)}\times\frac{(2v+1)(v+2)}{(2v+1)(v+4)}=\frac{v-3}{v-8}$