Algebra 2 Name:_____

Unit 8 – Day 1 – Simplify Rational Expressions Period:_____Date:_____

Match the rational expression with its simplified form.

1. $\frac{x^2-9x+14}{x^2-5x-14}$ **B**

2. $\frac{x^2+5x-14}{x^2-4x+4}$ **C**

A. $\frac{x-2}{x+7}$ **B.** $\frac{x-2}{x+2}$ **C.** $\frac{x+7}{x-2}$

Simplify the rational expression, if possible.

3. $\frac{4x^2}{20x^2-12x}$ $\frac{x}{5x-3}$

4. $\frac{x^2-x-20}{x^2+2x-15}$ $\frac{(x-5)(x+4)}{(x+5)(x-3)}$

5. $\frac{x^2+2x-24}{x^2+7x+6}$ $\frac{x-4}{x+1}$

6. $\frac{x^2-11x+24}{x^2-3x-40}$ $\frac{x-3}{x+5}$

7. $\frac{x^2-36}{x^2+12x+36}$ $\frac{x-6}{x+6}$

8. $\frac{2x^2+2x-4}{x^2-5x-14}$ $\frac{2(x-1)}{x-7}$

9. $\dfrac{x-4}{x^3-64}$ $\quad \dfrac{1}{x^2+4x+16}$

10. $\dfrac{8x^2+10x-3}{6x^2+13x+6}$

$\dfrac{4x-1}{3x+2}$

11. $\dfrac{x^3-5x^2-3x+15}{x^2-8x+15}$

$\dfrac{x^2-3}{x-3}$

Algebra 2 Name:_____

Unit 8 – Day 2 – Multiply Rational Expressions Period:_____Date:_____

Multiply the expressions. Simplify the result.

1. $\frac{5x^3y}{x^2y^2} \bullet \frac{y^3}{15x^2}$ $\frac{y^2}{3x}$

2. $\frac{48x^5y^3}{y^4} \bullet \frac{x^2y}{6x^3y^2}$ $\frac{8x^4}{y^2}$

3. $\frac{x(x-3)}{x-2} \bullet \frac{(x+3)(x-2)}{x}$ x^2-9 *or* $(x-3)(x+3)$

4. $\frac{4(x+5)}{x^2} \bullet \frac{x(x+1)}{2(x+5)}$ $\frac{2(x+1)}{x}$

5. $\frac{x+5}{4x-16} \bullet \frac{2x^2-32}{x^2-25}$ $\frac{x+4}{2(x-5)}$

6. $\frac{x^2+3x-4}{x^2+4x+4} \bullet \frac{2x^2+4x}{x^2-4x+3}$ $\frac{2x(x+4)}{(x+2)(x-3)}$

7. $\dfrac{x^2-3x-10}{x^2-2x-15} \bullet (x^2+10x+21)$

$(x+2)(x+7)$

8 $\dfrac{x^2+5x-36}{x^2-49} \bullet (x^2-11x+28)$.

$\dfrac{(x+9)(x-4)^2}{x+7}$

9. $\dfrac{4x^2+20x}{x^3+4x^2} \bullet (x^2+8x+16)$

$\dfrac{4(x+5)(x+4)}{x}$

<u>Find the product.</u>

10. $x(x^2+4x-7)$ x^3+4x^2-7x

11. $(x+9)(x-5)$ $x^2+4x-45$

Algebra 2 Name:_____

Unit 8 – Day 3 – Divide Rational Expressions Period:_____Date:_____

Divide the expressions. Simplify the result.

1. $\frac{5x^2y^3}{x^7} \div \frac{30xy^4}{y^3}$ $\frac{y^2}{6x^6}$

2. $\frac{8x^2y^2z}{xz^3} \div \frac{10xy}{x^4z}$ $\frac{4x^4y}{5z}$

3. $\frac{(x+3)(x-2)}{x(x+1)} \div \frac{x+3}{x}$ $\frac{x-2}{x+1}$

4. $\frac{8x^2}{x+4} \div \frac{x}{2(x-4)}$ $\frac{16x(x-4)}{(x+4)}$

5. $\frac{x^2-6x-27}{2x^2+2x} \div \frac{x^2-14x+45}{x^2}$ $\frac{x(x+3)}{2(x-5)(x+1)}$

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

7. $\frac{3x^2+13x+4}{x^2-4} \div \frac{4x+16}{x+2}$ $\frac{3x+1}{4(x-2)}$

8. $\dfrac{x^2-x-2}{x^2+4x-5} \div \dfrac{x-2}{5x+25}$ $\dfrac{5(x+1)}{x-1}$

9. $\dfrac{x^2-8x+15}{x^2+4x} \div (x^2-x-20)$ $\dfrac{x-3}{x(x+4)^2}$

10. $\dfrac{x^2+12x+32}{6x+42} \div \dfrac{x^2+4x}{x^2-49}$ $\dfrac{(x+8)(x-7)}{6x}$

<u>Multiply the following polynomials</u>

11. $(x+2)(x^2-6x+10)$

$x^3-4x^2-2x+20$

12. $(3x-7)(x^2-5x)$

$3x^3-22x^2+35x$

13. $(x+5)(x^3+8x^2)$

$x^4+13x^3+40x^2$

Algebra 2 Name:_____

Unit 8 – Day 4 – Rational Expressions Review Period:_____Date:_____

Find the value or values, which would make the following rational expressions undefined.

1. $\dfrac{x^4}{2x-7}$

2. $\dfrac{6y^2-24}{y^2-3y-4}$

1. $\dfrac{7}{2}$

2. $y=-1$, $y=4$

State the domain of the following functions.

3. $h(a)=\dfrac{3a^2-12a}{9a}$

4. $f(x)=\dfrac{6x^2-24}{x^2-3x-4}$

3. $\mathbb{R}\ x\neq 0$

4. $\mathbb{R}\ x\neq 4$, $\mathbb{R}\ x\neq -1$, $\mathbb{R}\ x\neq 0$

5. $j(x)=\dfrac{4x-12}{4x^2+2x}$

5. $\mathbb{R}\ x\neq -\dfrac{1}{2}$

Simplify the following expressions completely.

6. $\dfrac{8xy^2}{24x^3y}$

7. $\dfrac{x^2-5x}{x^2+9x-5x-45}$

6. $\dfrac{y}{3x^2}$

7. $\dfrac{x}{x+9}$

8. $\dfrac{7y^2-14y}{7y}$

9. $\dfrac{a^2-1}{a^2+4a+3}$

8. $y-2$

9. $\dfrac{a-1}{a+3}$

10. $\dfrac{6x^2-24}{x^2-5x-14}$

11. $\dfrac{x^2-y^2}{x-y}$

12. $\dfrac{24st^2}{8s^4t^3} \bullet \dfrac{12s^3t^2}{36s^2t}$

13. $\dfrac{12a^2b}{4} \bullet \dfrac{4a+8b}{20a^2b^3}$

14. $\dfrac{2a^2+a}{4a^2-1} \bullet \dfrac{6a-3}{4a}$

15. $\dfrac{xy}{3x-3y} \bullet \dfrac{x^2-xy}{xy}$

16. $\dfrac{x+2}{x^2+x} \bullet \dfrac{x^2}{2x^3+10x^2+12x}$

17. $\dfrac{6a}{a-4} \div \dfrac{a^2-7a}{a^2-11a+28}$

18. $\dfrac{a^2-a-12}{a^2} \div (a+3)$

19. $\dfrac{5m}{m+1} \div \dfrac{25m^2}{m^2+2m+1}$

20. $\dfrac{x^2+5x}{3x-21} \div \dfrac{x}{x-7}$

21. $\dfrac{y^2-9}{3y^2} \bullet \dfrac{12y}{2y+6}$

10. $\dfrac{6(x-2)}{x-7}$

11. $x+y$

12. $\dfrac{1}{s^2}$

13. $\dfrac{3(a+2b)}{5b^2}$

14. $\dfrac{3}{4}$

15. $\dfrac{x}{3}$

16. $\dfrac{1}{2(x+1)(x+3)}$

17. 6

18. $\dfrac{a-4}{a^2}$

19. $\dfrac{m+1}{5m}$

20. $\dfrac{x+5}{3}$

21. $\dfrac{2(y-3)}{y}$

Algebra 2 Name:_____

Unit 8 – Day 5 – Add/Subtract Rationals with Common Denom Period:_____Date:_____

Find each sum or difference. Write your answers in simplest form.

1. $\frac{2x}{5} + \frac{4x}{5}$ $\frac{6x}{5}$

2. $\frac{5a}{2} - \frac{a}{2}$ $2a$

3. $\frac{3n}{10} - \frac{7n}{10}$ $-\frac{2n}{5}$

4. $\frac{9z}{z} - \frac{8z}{z}$ 1

5. $\frac{b+3}{6} - \frac{b}{6}$ $\frac{1}{2}$

6. $\frac{2t}{3} - \frac{t-6}{3}$ $\frac{t+6}{3}$

7. $\frac{2w+5}{9w} + \frac{w+4}{9w}$ $\frac{w+3}{3w}$

8. $\frac{6r-5}{8} + \frac{2r+2}{8}$ $\frac{8r-3}{8}$

9. $\frac{c+8}{4} - \frac{c+6}{4}$ $\frac{1}{2}$

10. $\frac{4}{x+2} + \frac{2x}{x+2}$ 2

11. $\frac{k+14}{5} - \frac{k-14}{5}$ $\frac{28}{5}$

12. $\frac{r}{r-5} - \frac{5}{r-5}$ 1

13. $\frac{r^2}{r+s}-\frac{s^2}{r+s}$ $r-s$

14. $\frac{a^2+14}{a-6}-\frac{9a-4}{a-6}$ $a-3$

15. $\frac{4r}{r-6}-\frac{24}{6-r}$ $\frac{4(r+6)}{r-6}$

16. $\frac{4r}{r-6}+\frac{24}{6-r}$ 4

17. $\frac{4n^2}{2n-3}+\frac{9}{3-2n}$ $2n+3$

18. $\frac{81}{g+9}-\frac{g^2}{g+9}$ $9-g$

19. $\frac{4x-3}{x-1}-\frac{x^2-2}{1-x}$ $x+5$

20. $\frac{3k^2}{k+1}+\frac{3k}{k+1}$ $3k$

21. $\frac{7x-2}{x^2-1}-\frac{x+4}{x^2-1}$

$\frac{6}{x+1}$

22. $\frac{y^2}{y+5}-\frac{3y+10}{y+5}$ $\frac{(y-5)(y+2)}{y+5}$

23. $\frac{a^2-6}{a-6}+\frac{7a-12}{6-a}$

$a-1$

24. $\frac{3x+y}{x^2-16y^2}-\frac{x+9y}{x^2-16y^2}$

$\frac{2}{x+4y}$

Algebra 2 Name:_____

Unit 8 – Day 6 – Add/Subtract Rational Expressions Period:_____Date:_____

Find each sum or difference in simplest form.

1. $\frac{r}{5}+\frac{3r}{10}$ $\frac{r}{2}$

2. $\frac{19}{20x}-\frac{4}{4x}$ $\frac{-1}{20x}$

3. $\frac{8}{y}-\frac{6}{y^2}$ $\frac{8y-6}{y^2}$

4. $\frac{-3}{8a^2}+\frac{54}{2a}$ $\frac{216a-3}{8a^2}$

5. $\frac{7}{xy}-\frac{-9}{yz}$ $\frac{7z+9x}{xyz}$

6. $\frac{-7}{6x^2y}-\frac{10}{3xy^2}$ $\frac{-7y-20x}{6x^2y^2}$

7. $\frac{x-2}{x}+\frac{4}{x+3}$ $\frac{(x+6)(x-1)}{x(x+3)}$

8. $\frac{k}{k-5}+\frac{k-1}{k+5}$ $\frac{2k^2+k+5}{(k+5)(k-5)}$

9. $\frac{2a+6}{a^2-9}+\frac{3}{a+3}$ $\frac{5a-3}{(a-3)(a+3)}$

10. $\frac{10}{a-b}-\frac{6b}{a^2-b^2}$

$\frac{10a-4b}{(a+b)(a-b)}$

11. $\frac{3}{2h^2-2h}+\frac{5}{2h-2}$

$\frac{5h-3}{2h^2-2h}$

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

$\frac{12x+7}{(x+2)^2}$

13. $\dfrac{6}{x^2-4x-5}+\dfrac{1}{x+1}$

$\dfrac{1}{x-5}$

14. $\dfrac{6}{5y^2-45}-\dfrac{8}{3-y}$

$\dfrac{40y+126}{5(y+3)(y-3)}$

15. $\dfrac{x+3}{x^2-2x-8}-\dfrac{x-5}{x^2-12x+32}$

$\dfrac{-2x-14}{(x-4)(x+2)(x-8)}$

16. $\dfrac{3x+3}{x^2-5x-6}\bullet\dfrac{x^2-36}{3x}$

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

Algebra 2 Name:_____

Unit 8 – Day 7 – Complex Fractions Period:_____Date:_____

<u>Simplify each of the following complex fractions</u>.

<u>Simplify each of the following complex fractions</u>.

1. $\dfrac{\frac{1}{2}-\frac{2}{5}}{\frac{1}{3}+\frac{3}{4}}=$

$\dfrac{6}{65}$

2. $\dfrac{\frac{x}{6}-\frac{x}{3}}{\frac{x}{5}-\frac{7}{10}}$

$\dfrac{-5x}{6x-21}$

3. $\dfrac{\frac{5}{x+4}}{\frac{1}{x+4}+\frac{2}{x}}$

$\dfrac{5x}{3x+8}$

4. $\dfrac{\frac{1}{3x^2-3}}{\frac{5}{x+1}-\frac{x+4}{x^2+3x-4}}$

$\dfrac{1}{12x-18}$

Algebra 2 Name:_____

Unit 8 – Day 8 – Solving Rational Equations Period:_____Date:_____

<u>Solve each equation by cross multiplying. Check for *extraneous* solutions!</u>

1. $\frac{x}{4}=\frac{9}{4x}$ $x=\pm 3$

2. $\frac{x^2+3}{7x}=\frac{x+1}{6}$ $x=-9$ $x=2$

3. $\frac{4}{x+1}=\frac{x-1}{x+5}$ $x=7$ $x=-3$

4. $\frac{x+7}{x-3}=3$ $x=8$

5. $\frac{x-1}{x+6}=\frac{x-1}{2x-1}$ $x=1$ $x=7$

6. $\frac{x}{x+1}=\frac{3}{x+1}$ $x=3$

7. $\frac{3x+6}{x^2-4}=\frac{x+1}{x-2}$ *No Solution*

8. **Volleyball** So far in your volleyball match, you have put into play 37 of 44 serves you have attempted. Solve the equation $\frac{90}{100}=\frac{37+x}{44+x}$ to find the number of consecutive serves you need to put into play in order to raise your service percentage to 90%

$x=26$

Algebra 2 Name:_____

Unit 8 – Day 9 – Solving Rationals (LCD Method) Period:_____Date:_____

Do on a separate sheet of paper

Solve each equation by cross multiplying. Check for *extraneous* solutions!

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

2. $\frac{4}{x} + x = 5$ $x = 1$ $x = 4$

3. $\frac{1}{2x} + \frac{3}{x+7} = \frac{-1}{x}$ $x = -\frac{7}{3}$

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

5. $\frac{2}{x-3} + \frac{1}{x} = \frac{x-1}{x-3}$ $x = 1$

6. $\frac{18}{x^2 - 3x} - \frac{6}{x-3} = \frac{5}{x}$ *NO Solution*

7. Give an example of a rational expression equation that you would, A) use proportions or cross-multiplication to solve, and B) use balancing the denominator method to solve.

A. *One Fraction On Either Side*

B. *Many Fractions*

Algebra 2 Name:_____

Unit 8 – Day 10 – Day 7 – 9 Review Period:_____Date:_____

<u>Simplify each of the following complex fractions</u>.

1. $\dfrac{\frac{3}{5}+\frac{12}{5}}{\frac{1}{4}-\frac{1}{2}}$ -12

2. $\dfrac{\frac{2}{y}+\frac{1}{y}}{3}$ $\dfrac{1}{y}$

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

4. $\dfrac{\frac{2}{x}-\frac{2}{3x}}{\frac{1}{x}-\frac{5}{6x}}$ 8

5. $\dfrac{\frac{x+2}{x^2+8x+15}}{\frac{x-4}{x+3}}$ $\dfrac{x+2}{(x+5)(x-4)}$

6. $\dfrac{\frac{1}{2x-5}-\frac{7}{8x-20}}{\frac{x}{2x-5}}$ $-\dfrac{3}{4x}$

7. $\frac{1}{3}=\frac{x+4}{x+2}$ $x=-5$

8. $\frac{2y}{y}=\frac{3y+5}{4y}$ $y=1$

9. $x=\frac{2}{x-1}$ $x=-1$ $x=2$

10. $\frac{3}{x-1}=\frac{2}{x-4}$ $x=10$

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

12. $\frac{x+4}{x-5}=\frac{x-3}{x+6}$ $x=-\frac{1}{2}$

13. $\frac{x^2+2x+2}{x-1}=\frac{2x+3}{x-1}$ $x=-1$

14. $\frac{4}{x-1}+3x=11$ $x=\frac{5}{3}$ $x=3$

15. $\frac{x}{30}-\frac{1}{5x}=\frac{1}{6}$ $x=-1$ $x=6$

16. $x+\frac{8}{x}=6$ $x=2$ $x=4$

17. $\frac{2}{x}+\frac{x-2}{4}=\frac{23}{4x}$ $x=-3$ $x=5$

18. $\frac{3x}{x-1}+\frac{2x}{x-6}=\frac{5x^2-15x+20}{x^2-7x+6}$ $x=-4$

Algebra 2 Name:_____

Unit 8 – Day 11 – Inverse Variation Period:_____Date:_____

Complete the following tables, and decide if *x* and *y* vary inversely.

1.

x	1	2	3	5	6	15
y	25.5	12.75	8.50	5.10	4.25	1.70
Work	**25.5**	**25.5**	**25.5**	**25.5**	**25.5**	**25.5**

Yes / No

2.

x	6.6	5.5	4.4	3.3	2.2	1.1
y	3	5	7	9	11	13
Work	**19.8**	**27.5**	**30.8**	**36.3**	**24.2**	**14.3**

Yes / No

3.

x	***y***
1	6
2	12
5	30
7	42

Yes / No

4.

x	***y***
2	10
4	5
5	4
20	1

Yes / No

5.

x	***y***
0.2	25
0.5	62.5
2	250
3	375

Yes / No

Suppose that *x* and *y* vary inversely. Write an equation that models each inverse variation. Then find *y* when *x* = 10.

6. $x = 7$ when $y = 2$

$k = 14$

$y = \frac{7}{10}$

7. $x = 4$ when $y = 0.2$

$k = .8$

$y = .08$

8. $x = 2$ when $y = 5$

$k = 10$

$y = 1$

9. If x and y vary inversely and $x = 1.5$ when $y = 8$, what is the value of y when $x = -5$? Round your answer to the nearest tenth if necessary.

$k = 12$

$y = -2$

10. The amount of time it takes for an ice cube to melt varies inversely to the air temperature in degrees. At 20° Celsius, the ice will melt in 20 minutes. How long will it take the ice to melt if the temperature is 30° Celsius?

$$k = 400$$

$$y = \frac{40}{3} = 13.33$$

11. The length of a pipe in a panpipe ℓ, in feet, is inversely proportional to its pitch p, in hertz. The inverse variation is modeled by the equation $p = \frac{497}{\ell}$. Find the length of pipe required to produce a pitch of 220 Hz.

$$\ell = 2.26$$