Unit 4 Worksheet 4 **Name:**______________________________
Solving Rational Equations **Date:**___________________ **Per:**________

[1-8] Solve the following equations and then state whether each equation has **no real solution**, **one real solution**, **two real solutions**, or **infinitely many solutions**.

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

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

3. $\frac{f(x)}{[f(x)]^2-8} = \frac{2}{f(x)}$ if $f(x) = x$

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

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

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

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

8. $\frac{6}{x-3} - \frac{6}{x} = \frac{18}{x^2-3x}$

[9-17] Solve the following equations and check for extraneous solutions.

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

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

11. $\frac{3}{f(x)} = \frac{f(x)+3}{f(x)} - 2$ if $f(x) = x - 3$

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

13. $\frac{f(x)+1}{f(x)} - \frac{2}{f(x)+1} = \frac{x-f(x)}{f(x)}$ if $f(x) = x - 1$

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

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

16. $\frac{2}{x^2-x} = \frac{1}{x-1}$

17. $\frac{x}{x-2} - \frac{2}{x-4} = \frac{4x-12}{x^2-6x+8}$

18. Given $f(x) = \frac{5}{x+2}$ and $g(x) = \frac{3}{x}$. Solve the equation $f(x) = g(x)$ algebraically.

19. Given $f(x) = \frac{7}{x-5}$ and $g(x) = \frac{4}{x-2}$. Solve the equation $f(x) - g(x) = 0$ algebraically.

20. Given $f(x) = \frac{x}{x+3}$ and $g(x) = \frac{8}{x+6}$. Solve the equation $(f - g)(x) = 0$ algebraically.

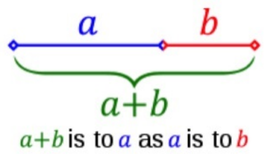
21. Given $f(x) = \frac{2}{x+1}$ and $g(x) = \frac{x-6}{x^2-1}$. Solve the equation $f(x) = g(x)$ algebraically.

22. Create and solve a rational equation that has 0 as an extraneous solution.

23. Create and solve a rational equation that has 2 as an extraneous solution.

EXTENSION:

1. Two lengths a and b, where $a > b$, are in *golden ratio* if the ratio of $a + b$ is to a is the same as a is to b. Symbolically, this is expressed as $\frac{a}{b} = \frac{a+b}{a}$. We denote this common ratio by the Greek letter *phi (pronounced "fee")* with symbol φ, so that if a and b are in common ratio, then $\varphi = \frac{a}{b} = \frac{a+b}{a}$. By setting $b = 1$, we find that $\varphi = a$ and φ is the positive number that satisfies the equation $\varphi = \frac{\varphi+1}{\varphi}$. Solve this equation to find the numerical value for φ.



2. Remember that if we use x to represent an integer, then the next integer can be represented by $x + 1$.

   a. Does there exist a pair of consecutive integers whose reciprocals sum to $\frac{5}{6}$? Explain how you know.

   b. Does there exist a pair of consecutive integers whose reciprocals sum to $\frac{3}{4}$? Explain how you know.

   c. Does there exist a pair of consecutive even integers whose reciprocals sum to $\frac{3}{4}$? Explain how you know.

   d. Does there exist a pair of consecutive even integers whose reciprocals sum to $\frac{5}{6}$? Explain how you know.