Name Schlansky

Mr. Schlansky

Date ____________

Algebra II

# *Fractional Equations with Factoring*

**Solve the following fractional equations and list the solutions as well as the extraneous solutions**

1. $\frac{1}{x-2}+\frac{4}{x+5}=\frac{7}{x^2+3x-10}$

F1: $x-2$
F2: $x+5$
LCD: $(x-2)(x+5)$

$1(x+5)+4(x-2)=7$
$x+5+4x-8=7$
$5x-3=7$
$5x=10$
$\cancel{x=2}$ reject

No solution

2 is an extraneous solution

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

F1: $x+2$
F2: $x-2$
LCD: $(x+2)(x-2)$

$x(x-2)+1=4(x+2)$
$x^2-2x+1=4x+8$
$x^2-6x-7=0$
$(x-7)(x+1)=0$
$x=7 \quad x=-1$

$\{-1,7\}$

No extraneous solutions

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

F1: 2
F2: $b+3$
F3: $b-3$
LCD: $2(b+3)(b-3)$

$2(b+3)-3(b-3)=2b$
$2b+6-3b+9=2b$
$-b+15=2b$
$15=3b$
$b=5$

$\{5\}$

No extraneous solutions

4. $\frac{a}{a-2}-\frac{8}{a+3}=\frac{10}{a^2+a-6}$

F1: $a+3$
F2: $a-2$
LCD: $(a+3)(a-2)$

$a(a+3)-8(a-2)=10$
$a^2+3a-8a+16=10$
$a^2-5a+16=10$
$a^2-5a+6=0$
$(a-3)(a-2)=0$
$a=3 \quad \cancel{a=2}$ reject

$\{3\}$

2 is an extraneous solution

5. $\frac{1}{y}+\frac{6}{y^2+2y}=\frac{5}{y+2}$

F1: $y$
F2: $y+2$
LCD: $y(y+2)$

$1(y+2)+6=5y$
$y+2+6=5y$
$y+8=5y$
$8=4y$
$2=y$

No extraneous solutions

6. $\frac{8}{x^2-121}=\frac{x}{x+11}-\frac{2}{x-11}$

F1: $x+11$
F2: $x-11$

$8=x(x-11)-2(x+11)$
$8=x^2-11x-2x-22$
$8=x^2-13x-22$
$0=x^2-13x-30$
$0=(x-15)(x+2)$
$x=15 \quad x=-2$

$\{-2,15\}$

No extraneous solutions

| | $x$ | $+2$ |
|---|---|---|
| $x$ | $x^2$ | $\cancel{+2x}$ |
| $-2$ | $\cancel{-2x}$ | $-4$ |

$x^2-4$

| | $x$ | $+1$ |
|---|---|---|
| $x$ | $x^2$ | $+x$ |
| $+3$ | $+3x$ | $+3$ |

$x^2+4x+3$

7. $\dfrac{1}{x-2}+\dfrac{x+2}{x+5}=\dfrac{3}{x^2+3x-10}$

F1: $x+5$
F2: $x-2$
LCD: $(x+5)(x-2)$

$(x+5)(x-2)$

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

$1(x+5)+(x+2)(x-2)=3$

$x+5+x^2-4=3$

$x^2+x+1=3$
$\quad\;\; -3 \quad -3$

$x^2+x-2=0$

$(x+2)(x-1)=0$

$x=-2 \quad x=1$

$\{-2,1\}$
No extraneous solutions

8. $\dfrac{x+1}{x+5}+\dfrac{18}{x^2+8x+15}=\dfrac{9}{x+3}$

F1: $x+5$
F2: $x+3$
LCD: $(x+5)(x+3)$

$(x+5)(x+3)$

$\dfrac{x+1}{\cancel{x+5}}+\dfrac{18}{\cancel{(x+5)(x+3)}}=\dfrac{9}{\cancel{x+3}}$

$(x+1)(x+3)+18=9(x+5)$

$x^2+4x+3+18=9x+45$

$x^2+4x+21=9x+45$
$\quad -9x-45 \quad -9x-45$

$x^2-5x-24=0$

$(x-8)(x+3)=0$

$x=8 \quad \cancel{x=-3}$ reject

$\{8\}$

$-3$ is an extraneous solution

9. $\dfrac{2}{x+3}-\dfrac{3}{4-x}=\dfrac{2x-2}{x^2-x-12}$

F1: $x+3$
F2: $(x-4)$
LCD: $(x+3)(x-4)$

$(x+3)(x-4)$

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

$2(x-4)+3(x+3)=2x-2$

$2x-8+3x+9=2x-2$

$5x+1=2x-2$
$-2x \quad -2x$

$3x+1=-2$
$\quad -1 \quad -1$

$\dfrac{3x}{3}=\dfrac{-3}{3}$

$x=-1$ ✓

$\{-1\}$
No extraneous solutions

10. $\dfrac{1}{x+3}-\dfrac{4}{3-x}=\dfrac{14}{x^2-9}$

F1: $x+3$
F2: $x-3$

$(x+3)(x-3)$

$\dfrac{1}{\cancel{x+3}}-\dfrac{4}{\cancel{3-x}}=\dfrac{14}{\cancel{(x+3)(x-3)}}$

$1(x-3)+4(x+3)=14$

$x-3+4x+12=14$

$5x+9=14$
$\quad -9 \quad -9$

$\dfrac{5x}{5}=\dfrac{5}{5}$

$x=1$ ✓

$\{1\}$
No extraneous solutions

11. Solve for x in simplest radical form: $\dfrac{6}{x}+\dfrac{x}{x-7}=\dfrac{12}{x^2-7x}$

F1: $x$
F2: $x-7$
LCD: $x(x-7)$

$x(x-7)$

$\left(\dfrac{6}{\cancel{x}}\right)+\left(\dfrac{x}{\cancel{x-7}}\right)=\left(\dfrac{12}{\cancel{x(x-7)}}\right)$

$6(x-7)+x^2=12$

$6x-42+x^2=12$
$\quad -12 \quad -12$

$x^2+6x-54=0$

$a=1$
$b=6$
$c=-54$

$x=\dfrac{-6\pm\sqrt{(6)^2-4(1)(-54)}}{2(1)}$

$x=\dfrac{-6\pm\sqrt{252}}{2}$

$x=\dfrac{-6\pm6\sqrt{7}}{2}$

$x=-3\pm3\sqrt{7}$

$\sqrt{252}$
PS: $\sqrt{36}$ NPS: $\sqrt{7}$
$6\sqrt{7}$

12. Solve for x in simplest radical form: $\dfrac{x}{x-5}-\dfrac{4}{x}=\dfrac{28}{x^2-5x}$

F1: $x$
F2: $x-5$
LCD: $x(x-5)$

$x(x-5)$

$\dfrac{x}{\cancel{x-5}}-\dfrac{4}{\cancel{x}}=\dfrac{28}{\cancel{x(x-5)}}$

$x^2-4(x-5)=28$

$x^2-4x+20=28$
$\quad -28 \quad -28$

$x^2-4x-8=0$

$a=1$
$b=-4$
$c=-8$

$x=\dfrac{4\pm\sqrt{(-4)^2-4(1)(-8)}}{2(1)}$

$x=\dfrac{4\pm\sqrt{48}}{2}$

$x=\dfrac{4\pm4\sqrt{3}}{2}$

$x=2\pm2\sqrt{3}$

$\sqrt{48}$
PS: $\sqrt{16}$ NPS: $\sqrt{3}$
$4\sqrt{3}$

13. Which of the following is true based on the equation $\frac{x}{x+3}+\frac{2}{x+1}=\frac{6}{x^2+4x+3}$?

FI: $x+3$
F2: $x+1$
LCD: $(x+3)(x+1)$

1) -3 is an extraneous solution
2) -1 is an extraneous solution
3) -3 and -1 are extraneous solutions
4) -3 and 0 are extraneous solutions

$$\cancel{(x+3)}(x+1)\frac{x}{\cancel{x+3}}+(x+3)\cancel{(x+1)}\frac{2}{\cancel{x+1}}=\cancel{(x+3)(x+1)}\frac{6}{\cancel{(x+3)(x+1)}}$$

$$x(x+1)+2(x+3)=6$$

$$x^2+x+2x+6=6$$

$$x^2+3x+6=6$$

$$-6\quad -6$$

$$x^2+3x=0$$

$$x(x+3)=0$$

$x=0$ | ~~$x=-3$~~ reject

-3 is extraneous solution

14. To solve $\frac{2x}{x-2}-\frac{11}{x}=\frac{8}{x^2-2x}$, Ren multiplied both sides by the least common denominator.

Which statement is true?

FI: $x$
F2: $x-2$
LCD: $x(x-2)$

1) 2 is an extraneous solution.
2) $\frac{7}{2}$ is an extraneous solution.
3) 0 and 2 are extraneous solutions.
4) This equation does not contain any extraneous solutions.

$$x\cancel{(x-2)}\frac{2x}{\cancel{x-2}}-\cancel{x}(x-2)\frac{11}{\cancel{x}}=\cancel{x(x-2)}\frac{8}{\cancel{x(x-2)}}$$

$$2x^2-11(x-2)=8$$

$$2x^2-11x+22=8$$

$$-8\quad -8$$

$$2x^2-11x+14=0$$

PT

$$x^2-11x+28$$

$$\left(x-\frac{7}{2}\right)\left(x-\frac{4}{2}\right)$$

$$(2x-7)(x-2)=0$$

$2x-7=0$ | ~~$x=2$~~ reject

$+7\quad +7$

$2x=7$

$\frac{2x}{2}=\frac{7}{2}$

$x=\frac{7}{2}$