Secondary III Unit 4 Review Name: Key

Unit 4 Review

Multiply or divide the following rational expressions and find the excluded vales.

Keep, Change, Flip

1. Divide $\frac{x+2}{x-4} \div \frac{x}{3x-12}$ $\quad 3x-12 = 3(x-4)$

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

$x \neq 4, 0$

2. Multiply $\frac{(x-5)(x+1)}{3x+15} \cdot \frac{4}{(x-3)(x+1)}$ $\quad 3x+15 = 3(x-5)$

$= \frac{4}{3(x-3)}$

$x \neq 5, 3, -1$

K, C, F

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

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

$x \neq -2, 4$

7. Divide $\frac{x+3}{x+2} \div \frac{x^2+3x}{2x-4}$

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

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

Add or subtract the following expressions, simplify the results, and note the excluded values.

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

LCD: $(x-1)$

$= \frac{2-x}{x-1}$ or $\frac{-x+2}{x-1}$

$x \neq 1$

9. $\frac{6x+6}{(x+3)(x-3)} + \frac{x+3}{(x+3)}$

LCD: $(x+3)(x-3)$

$x \neq -3, 3$

$\frac{6x+6}{(x+3)(x-3)} + \frac{(x+3)}{(x+3)} \cdot \frac{(x-3)}{(x-3)} = \frac{6x+6}{(x+3)(x-3)} + \frac{x^2-9}{(x+3)(x-3)}$

$\frac{6x+6+x^2-9}{(x+3)(x-3)} = \frac{x^2+6x-3}{(x+3)(x-3)}$

10. $\frac{1}{(3+x)} + \frac{3-x}{x}$ $\quad \frac{-x^2+x+9}{x(x+3)}$

LCD: $(3+x)(x)$

$x \neq -3, 0$

$\frac{x}{(3+x)(x)} + \frac{(3-x)(3+x)}{x(3+x)} = \frac{x+9-x^2}{x(3+x)}$

11. $\frac{4}{x(x-1)} - \frac{x+2}{x-1}$ $\quad \frac{4-(x^2+2x)}{x(x-1)} =$

LCD: $x(x-1)$

$x \neq 0, 1$

$\frac{4}{x(x-1)} - \frac{(x+2)}{(x-1)} \cdot \frac{x}{x}$ $\quad \frac{-x^2-2x+4}{x(x-1)}$

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Find the LCD of the following rational equations:

12. $\frac{5}{(x-2)(x-1)} - \frac{1}{x-2} = 0$

LCD: $(x-2)(x-1)$

13. $\frac{x+2}{x} - \frac{4}{x-1} + \frac{2}{x^2-x} = 0$

$x(x-1)$

LCD: $x(x-1)$

Solve algebraically the following rational equations. State any extraneous solutions.

14. $\frac{3x}{7} = \frac{4x+1}{9}$

Cross Multiply

$9(3x) = 7(4x+1)$

$27x = 28x + 7$

$-28x \quad -28x$

$-x = 7$

$\frac{-x}{-1} = \frac{7}{-1}$

$x = -7$

No extraneous solutions

15. $\frac{x+5}{10} = \frac{-5}{x-6}$

Cross Multiply

$(x+5)(x-6) = -5(10)$

$x^2 - 6x + 5x - 30 = -50$

$x^2 - x - 30 = -50$

$+50 \quad +50$

$x^2 - x + 20 = 0$

$x \neq 6$

No solution

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

Kill the Denominator

LCD: $(x-1)(x-3)$

$x \neq 1, 3$

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

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

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

$x^2 - 2x - 1 = 2$

$-2 \quad -2$

$x^2 - 2x - 3 = 0$

$(x-3)(x+1) = 0$

$x = 3, -1$

$x = -1$

17. $\frac{3}{x+2} + \frac{3}{2(x+2)} = \frac{x}{2(x+2)}$

Kill the Denominator

LCD: $(x+2)(2)$

$x \neq -2$

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

$6 + 3 = x$

$9 = x$

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use a graphing calculator to find zeros!

Kill the Denominator

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

LCD: $6(x-2)(3)$

$x \neq 2$

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

$3x^2-6x+18 = 6x+24$

$-6x \quad -24 \quad -6x \quad -24$

$3x^2-12x-6=0$

$3(x^2-4x-2)=0$

$x = 4.45, -0.45$

19. A restaurant has two pastry ovens, one large and one small. When both ovens are used, it takes about 3 hours to bake the bread needed for the day. When only the large oven is used, it takes about 4 hours to bake the bread for the day. About how long would it take to bake the bread for the day if only the small oven were used?

Big + Small = Together

B + S = T

$\frac{1}{4}+\frac{1}{x}=\frac{1}{3}$

LCD: $12x$

$3\frac{12x}{4} + \frac{12x}{x} = 4\frac{12x}{3}$

$3x+12=4x$

$-3x \quad -3x$

$12 = x$

12 hours

Review Questions:

20. Given the zeros x=-1 and 3(multiplicity 2), write a function in factored form.

$f(x)=(x+1)(x-3)^2$

21. Describe the end behavior of f(x) using limits as $x \to -\infty$ and as $x \to \infty$:

$f(x)=x(4x-1)^2(x+3)^4$

Degree: $m1 + m2 + m4 = 7$.

Leading coefficient: +.

End Behavior: L ↓ R ↑

Left:

As $x \to -\infty$, $y \to -\infty$

Right:

As $x \to +\infty$, $y \to +\infty$

Degree \ Leading Coefficient	+	−
Even (match)	↑↑	↓↓
Odd (opposite)	↓↑	↑↓