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Livestream #2

September 2, 2025

Grade 10
Algebra
Rational Expressions

Goals

- Simplifying rational expressions, non-permissible values.
- Multiplying rational expressions.
- Dividing rational expressions.
- Adding and subtracting rational expressions.

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Simplifying Rational Expressions

Simplify the following rational expressions.

State the non-permissible values.

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

2. $\dfrac{x^2 - x - 6}{x^2 - 9}$

3. $\dfrac{25 - x^2}{2x^2 - 9x - 5}$

4. $\dfrac{16x^2 - 9y^2}{8x - 6y}$

5. $\dfrac{6x^2 - 4xy}{-3x^2 + 2xy}$

Multiplying Rational Expressions

Mutiply and simplify the following rational expressions.

State the non-permissible values.

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

2. $\dfrac{2x+6}{x^2+7x+10} \cdot \dfrac{x^2+3x-10}{x^2-4}$

3. $\dfrac{x^2-9}{x^2-4x+4} \cdot \dfrac{6-3x}{2x+6}$

4. $\dfrac{3t-12}{2t+6} \cdot \dfrac{4t+20}{8-2t}$

5. $\dfrac{x+3}{x^2-2x-15} \cdot \dfrac{2x-10}{2x^2+15x+7}$

Dividing Rational Expressions

Divide and simplify the following rational expressions.

State the non-permissible values.

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

2. $\dfrac{x^2+3x-10}{x^2-4x+4} \div \dfrac{x^2+2x-15}{3x-6}$

3. $\dfrac{2x^2-14x+24}{4x^2-64} \div \dfrac{x^2-8x+15}{2x^2-11x+5}$

4. $\dfrac{7a^2-28a}{a-4} \div 5a^2$

5. $\dfrac{5x+5}{x^2+2x-3} \cdot \dfrac{2x+1}{x^2+2x-15} \div \dfrac{2x^2+3x+1}{x^2-9}$

Adding and Subtracting Rational Expressions

Add or subtract the following rational expressions.

State the non-permissible values.

1. $\dfrac{y+5}{8} - \dfrac{3y+1}{8}$

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

3. $\dfrac{3}{2x-4} + \dfrac{5}{3x-6}$

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

5. $\dfrac{9}{y+3} - \dfrac{4}{y^2+6y+9}$

6. $\dfrac{x+5}{x^2-2x-15} - \dfrac{5x-2}{x-5}$

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

8. $\dfrac{2h}{h^2-4} + \dfrac{h}{h^2+4h+4} - \dfrac{2}{h-2}$

Answers

Simplifying Rational Expressions

1.	$\frac{x-2}{x}$	NPV's	$x = -2, 0$
2.	$\frac{x+2}{x+3}$	NPV's	$x = -3, 3$
3.	$\frac{-(x+5)}{2x+1}$	NPV's	$x = -\frac{1}{2}, 5$
4.	$\frac{4x+3y}{2}$	NPV's	$4x = 3y$
5.	-2	NPV's	$x = 0, 3x = 2y$

Answers

Multiplying Rational Expressions

1. $\dfrac{2y-1}{3y+1}$ NPV's $y = -\dfrac{1}{2}, -\dfrac{1}{3}, \dfrac{1}{3}$

2. $\dfrac{2(x+3)}{(x+2)^2}$ NPV's $x = -5, -2, 2$

3. $\dfrac{-3(x-3)}{2(x-2)}$ NPV's $x = -3, 2$

4. $\dfrac{-3(t+5)}{t+3}$ NPV's $t = -3, 4$

5. $\dfrac{2}{(2x+1)(x+7)}$ NPV's $x = -7, -3, -\dfrac{1}{2}, 5$

Dividing Rational Expressions

1. $\dfrac{x}{2x-1}$ NPV's $x = -3, -\dfrac{1}{2}, \dfrac{1}{2}$

2. $\dfrac{3}{x-3}$ NPV's $x = -5, 2, 3$

3. $\dfrac{2x-1}{2(x+4)}$ NPV's $x = -4, \dfrac{1}{2}, 3, 4, 5$

4. $\dfrac{7}{5a}$ NPV's $a = 0, 4$

5. $\dfrac{5}{(x-1)(x+5)}$ NPV's $x = -5, -3, -1, -\dfrac{1}{2}, 1, 3$

Answers

Adding and Subtracting Rational Expressions

1. $\dfrac{-(y-2)}{4}$ NPV's none

2. $x+5$ NPV's $x=3$

3. $\dfrac{19}{6(x-2)}$ NPV's $x=2$

4. $\dfrac{7x+1}{(x-2)(x+3)}$ NPV's $x=-3,2$

5. $\dfrac{9y+23}{(y+3)^2}$ NPV's $y=-3$

6. $\dfrac{-5x^2-12x+11}{(x-5)(x+3)}$ NPV's $x=-3,5$

7. $\dfrac{x^2+5x+1}{(x+1)^2(x+2)}$ NPV's $x=-1,-2$

8. $\dfrac{h^2-6h-8}{(h-2)(h+2)^2}$ NPV's $h=-2,2$