Shelby County Schools

Extended Learning Packet

Algebra I

Review 106

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OBJECTIVE: Simplifying rational expressions   **MATERIALS:** None

Example

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

$3x + 6 = 3(x + 2)$ ← Factor the numerator.

$2x + 4 = 2(x + 2)$ ← Factor the denominator.

$\qquad = \dfrac{3(x + 2)}{2(x + 2)}$ ← Rewrite the expression in terms of the factors.

$\qquad = \dfrac{3\cancel{(x + 2)}}{2\cancel{(x + 2)}}$ ← Mark through common factors in the numerator and denominator. These two factors cancel because any number divided by itself equals 1.

$\qquad = \dfrac{3}{2}$ ← Simplify.

Example

Simplify $\dfrac{4x - 24}{x^2 - 9x + 18}$.

$4x - 24 = 4(x - 6)$ ← Factor the numerator.

$x^2 - 9x + 18 = (x - 6)(x - 3)$ ← Factor the denominator.

$\qquad = \dfrac{4(x - 6)}{(x - 6)(x - 3)}$ ← Rewrite the expression in terms of the factors.

$\qquad = \dfrac{4\cancel{(x - 6)}}{\cancel{(x - 6)}(x - 3)}$ ← Mark through common factors in the numerator and denominator. These two factors cancel because any number divided by itself is 1.

$\qquad = \dfrac{4}{x - 3}$ ← Simplify.

Exercises

Simplify each expression.

1. $\dfrac{5x - 15}{3x - 9}$

2. $\dfrac{x + 7}{2x + 14}$

3. $\dfrac{2x - 2}{x - 1}$

4. $\dfrac{5x - 20}{x^2 - 16}$

5. $\dfrac{x^2 - 6x - 16}{x^2 - x - 6}$

6. $\dfrac{6x^2 + 3x}{2x^2 + 11x + 5}$

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Review 107

OBJECTIVE: Multiplying and dividing rational expressions	MATERIALS: None

When multiplying rational expressions, look for common factors.

Example

Multiply $\dfrac{3x - 6}{5x - 20} \cdot \dfrac{10x - 40}{27x - 54}$.

$$\dfrac{3x - 6}{5x - 20} \cdot \dfrac{10x - 40}{27x - 54} = \dfrac{3(x - 2)}{5(x - 4)} \cdot \dfrac{10(x - 4)}{27(x - 2)} \quad \longleftarrow \text{ Factor each expression.}$$

$$= \dfrac{\cancel{3}(\cancel{x - 2})}{\cancel{5}(\cancel{x - 4})} \cdot \dfrac{10^2(\cancel{x - 4})}{27_9(\cancel{x - 2})} \quad \longleftarrow \text{ Divide out common factors and reduce fractions.}$$

$$= \dfrac{2}{9} \quad \longleftarrow \text{ Simplify.}$$

When dividing rational expressions, multiply by the reciprocal. The reciprocal of a fraction is the fraction with the numerator and denominator interchanged.

Example

Divide $\dfrac{x^2 + x}{3x - 15} \div \dfrac{x^2 + 2x + 1}{6x - 30}$.

$$\dfrac{x^2 + x}{3x - 15} \div \dfrac{x^2 + 2x + 1}{6x - 30} = \dfrac{x^2 + x}{3x - 15} \cdot \dfrac{6x - 30}{x^2 + 2x + 1} \quad \longleftarrow \text{ Multiply by the reciprocal.}$$

$$= \dfrac{x(x + 1)}{3(x - 5)} \cdot \dfrac{6(x - 5)}{(x + 1)(x + 1)} \quad \longleftarrow \text{ Factor the numerators and denominators.}$$

$$= \dfrac{x(\cancel{x + 1})}{\cancel{3}(\cancel{x - 5})} \cdot \dfrac{6^2(\cancel{x - 5})}{(\cancel{x + 1})(x + 1)} \quad \longleftarrow \text{ Divide out common factors.}$$

$$= \dfrac{2x}{x + 1} \quad \longleftarrow \text{ Simplify.}$$

Exercises

Simplify.

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

2. $\dfrac{x^2 + x}{x^2 + 8x + 7} \cdot (x + 7)$

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

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

5. $\dfrac{x^2 - x - 30}{6x - 36} \div \dfrac{5x + 25}{x}$

6. $\dfrac{x^2 - 9}{x^2 + 4x - 12} \div \dfrac{x^2 + 2x - 3}{x^2 + 5x - 6}$

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Review 108

OBJECTIVE: Dividing polynomials   **MATERIALS:** None

The procedure for dividing two polynomials is similar to the one for dividing whole numbers.

If the dividend or the divisor has missing terms, remember to insert these terms with zero coefficients.

Example

$(x^2 - 5x + 8) \div (x - 3)$

$$\begin{array}{r} x \\ x - 3 \overline{)x^2 - 5x + 8} \\ \underline{x^2 - 3x} \\ -2x + 8 \end{array}$$

⟵ **Think** $x\overline{)x^2} = \frac{x^2}{x} = x.$

⟵ **Multiply** $x(x - 3) = x^2 - 3x.$

⟵ **Subtract** $(x^2 - 5x) - (x^2 - 3x) = -2x,$ **and bring down the 8.**

Repeat the process.

$$\begin{array}{r} x - 2 \\ x - 3 \overline{)x^2 - 5x + 8} \\ \underline{x^2 - 3x} \\ -2x + 8 \\ \underline{-2x + 6} \\ 2 \end{array}$$

⟵ **Think** $x\overline{)-2x} = \frac{-2x}{x} = -2.$

⟵ **Multiply** $-2(x - 3) = -2x + 6.$

⟵ **Subtract** $(-2x + 8) - (-2x + 6) = 2.$ **The remainder is 2.**

The answer is $x - 2 + \dfrac{2}{x - 3}.$

Exercises

Divide.

1. $(x^2 + 5x + 6) \div (x + 3)$

2. $(2x^2 + 5x - 1) \div (2x - 1)$

3. $(x^3 - 8) \div (x + 2)$

4. $(x^3 - 2x + 1) \div (x - 1)$

5. $(x^2 - 8x + 16) \div (x - 4)$

6. $(6x^2 + 42x + 60) \div (x + 4)$

7. $(2x^2 - 2x - 24) \div (x + 3)$

8. $(2x^3 + 17x^2 + 38x + 15) \div (x + 5)$

9. $(x^3 + 7x^2 + 8x - 16) \div (x - 2)$

10. $(4x^3 + 22x^2 + 36x + 18) \div (x + 3)$

Algebra I Educational Websites and Web Resources

Title of Resource	Web Address	Description	Student Access
eMathInstruction	https://www.youtube.com/watch?v=ynSh9bG4eyY	Students will be able to view a video that corresponds to the worksheets provided.	Students will need to agree to the terms outlined by the website for free access
Khan Academy	https://www.khanacademy.org	Students will be able to get additional practice with skills in various subjects and test prep.	Students will need to sign up for a free account if they do not already have an account, however, the videos are accessible.