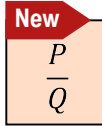


TOPIC: SIMPLIFYING RATIONAL EXPRESSIONS

Intro to Rational Expressions and Functions



◆ A **rational expression** has a _____ in the numerator (P) & denominator (Q):

► A **rational function** is defined by a rational expression.

Recall	Rational Number	New	Rational Expression/Function
	<p>Quotient of two</p> <p>[INTEGERS POLYNOMIALS]</p> $\frac{11}{35}$ <p>$\neq 0$</p>		<p>Quotient of two</p> <p>[INTEGERS POLYNOMIALS]</p> $\frac{4x}{x-2}$ <p>$\neq 0$; x cannot be ____</p> <p><i>Rational Expression</i></p> <p><i>Rational Function</i></p>

◆ Since the denominator of the rational function $\neq 0$, the domain excludes any x -value that makes the denom 0.

EXAMPLE

For the expression $f(x) = \frac{x-1}{2x-6}$, answer the following.

(A) Find the domain. *Hint: Set the denom = 0 & solve for x .*

(B) Evaluate at $x = 2$.

Set builder: { _____ | x is a real number, _____ }

Interval: _____

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PRACTICE

Determine the domain of the function below. Write in interval notation.

(A)

$$f(x) = \frac{5}{x}$$

(B)

$$f(x) = \frac{7}{x-3}$$

(C)

$$f(x) = \frac{x+1}{x^2-9}$$

PRACTICE

Evaluate the rational expression for the given value of x .

(A)

$$\frac{12}{x+3}, \quad x = -1$$

(B)

$$\frac{x^2-4}{x^2-x-6}, \quad x = 2$$

(C)

$$\frac{3x}{x^2+x-6}, \quad x = -2$$

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PRACTICE

Determine the domain of the function $h(x)$.

$$h(x) = \frac{x^2 - 2x - 8}{x^2 - 5x + 4}$$

PRACTICE

Given the function below, evaluate $f(2)$.

$$f(x) = \frac{3}{11 - x}$$

PRACTICE

Given the function below, evaluate $f(2)$.

$$f(x) = \frac{3x + 4}{x^2 + 7x + 20}$$

TOPIC: SIMPLIFYING RATIONAL EXPRESSIONS

Simplifying Rational Expressions

◆ To simplify a rational expression, _____ numerator & denominator completely and _____ common factors.

Recall	Simplify Rational #s	New	Simplify Rational Expressions
	$\frac{28}{35}$		$\frac{28x^3}{35x^5}$
	Factor completely: $\frac{7 \cdot 4}{7 \cdot 5}$		Factor completely:
	Cancel common factors: $\frac{\cancel{7} \cdot 4}{\cancel{7} \cdot 5}$		Cancel common factors:
	Simplified answer: $\frac{4}{5}$		Simplified answer:

EXAMPLE

Simplify the following expressions.

(A)
$$\frac{(x+2)(x-2)}{(x+6)(x+2)}$$

(B)
$$\frac{x-5}{3x^2-15x}$$

TOPIC: SIMPLIFYING RATIONAL EXPRESSIONS

PRACTICE

Simplify the rational expression by factoring.

(A)

$$\frac{6x}{12x}$$

(B)

$$\frac{x^2 - 9}{x^2 - 3x}$$

(C)

$$\frac{x^2 - 4x}{x^2 - 2x - 8}$$

PRACTICE

Simplify each expression.

(A)

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

(B)

$$\frac{x^2 - 10x + 24}{(4 - x)(6 - x)}$$

TOPIC: SIMPLIFYING RATIONAL EXPRESSIONS

EXAMPLE

Write three equivalent expressions of the rational expression below:

$$\frac{-x^2 + 4x}{x^2 - 2x}$$

EXAMPLE

Which of the following rational expressions is equal to -5 ?

(A) $\frac{10x}{2x}$

(B) $\frac{25 - 5x}{x}$

(C) $-\frac{15x}{3(-x)}$

(D) $\frac{20 - 5x}{(x - 4)}$

PRACTICE

Simplify the rational expression below:

$$\frac{x^2 + 5x + 6}{x^2 + 7x + 10}$$