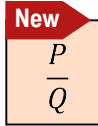


TOPIC: SIMPLIFYING RATIONAL EXPRESSIONS

Intro to Rational Expressions



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

▶ Recall: The denominator of a fraction *cannot* be _____.

| Recall | Rational Number | New | Rational Expression |
|--------|---|-----|---|
| | Quotient of two [INTEGERS POLYNOMIALS] $\frac{11}{35}$ $\neq 0$ | | Quotient of two [INTEGERS POLYNOMIALS] $\frac{4x}{x-2}$ $\neq 0; x \text{ cannot be } \underline{\hspace{1cm}}$ |

◆ To find where *any* rational expression is _____, set the denominator equal to zero and solve for x .

EXAMPLE

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

(A) Find the x -value(s) for which it is undefined.

(B) Evaluate at $x = 2$.

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PRACTICE

For which value(s) of x is the rational expression undefined?

(A) $\frac{5}{x}$

(B) $\frac{7}{x-3}$

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

PRACTICE

Evaluate the rational expression for the given value of x .

(A) $\frac{12}{x+3}$, $x = -1$

(B) $\frac{x^2-4}{x^2-x-6}$, $x = 2$

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

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

EXAMPLE

Write three equivalent expressions of the rational expression below:

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

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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:

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