MATH 90 – CHAPTER 7 Name: .

7.1 Reducing Rational Expressions

Need To Know

- Idea of rational expressions w/ restrictions
- Review reducing number fraction
- Review polynomial factoring methods
- How to reduce rational expressions

Idea of Rational Expressions

A rational expression is simply a polynomial fraction.
The denominator can NOT be zero which requires us to place restriction on the x's we plug into the polynomials fractions.

$\frac{4}{x}$ $\frac{x}{5x-15}$ $\frac{x-5}{x^2+5x+6}$

Review Reducing Fraction

Reduce $\frac{18}{24}$

1. By shortcut

2. Show all steps

How to Reduce

1. Factor
2. Divide common factors

Review Factoring Polynomials

(A) Factor GCF

(B) Look at the Number of Terms

Two Terms – Use Formula

1. $A^2 - B^2 = (A + B)(A - B)$
2. $A^2 + B^2$ can't factor
3. $A^3 - B^3 = (A - B)(A^2 + AB + B^2)$
4. $A^3 + B^3 = (A + B)(A^2 - AB + B^2)$

Three Terms

Guess, check, and revise

Formulas

1. $A^2 + 2AB + B^2 = (A + B)^2$
2. $A^2 - 2AB + B^2 = (A - B)^2$

Four Terms

By Grouping Method

(c) Always Factor Completely. Try to factor more!

Reducing Rational Expressions

Reduce to lowest terms

$$\frac{45x^2y^3}{9x^5y} \qquad \frac{4x-12}{6x}$$

How to Reduce

1. Factor
2. Divide common factors

Reducing Rational Expressions

Reduce to lowest terms

$$\frac{5a+15}{10a^2-90} \qquad \frac{x^2-4}{x^2-2x-8}$$

How to Reduce

1. Factor
2. Divide common factors

Reducing Rational Expressions

Reduce to lowest terms

$$\frac{x-3}{3-x}$$

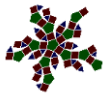
$$\frac{7a^2-7b^2}{3b^2-3a^2}$$

How to Reduce

1. Factor
2. Divide common factors

7.2 Rational Expression

Multiplication & Division



Need To Know

- Review reducing fractions (canceling)
- Review multiplication and division of fractions
- Multiplying and dividing rational expressions

Reducing Fractions (Canceling)

Reduce each:

$$\frac{4}{4} \qquad \frac{4}{12} \qquad \frac{a}{3\cdot a} \qquad \frac{6}{x+6} \qquad \frac{x+6}{x+6}$$

Multiplying Fractions - Review

Recall:

$$\frac{a}{b}\cdot\frac{c}{d}=\frac{ac}{bd}$$

Examples

$$\frac{10}{35}\cdot\frac{6}{20}$$

Multiply Factions

1. Reduce
   a) Factor
   b) Divide common factors
2. Multiply/simplify

Multiply Rational Expressions

Multiply Factions

1. Reduce
   a) Factor
   b) Divide common factors
2. Multiply/simplify

Multiply

$$\frac{2a+10}{a^3}\cdot\frac{a^2}{3a+15} \qquad \frac{x-5}{x+2}\cdot\frac{x^2-4}{3x-15}$$

Multiply Rational Expressions

Multiply Factions

1. Reduce
   a) Factor
   b) Divide common factors
2. Multiply/simplify

Multiply

$$\frac{x^2+5x+4}{x^2-6x+8}\cdot\frac{x^2+5x-14}{x^2+8x+7}$$

Dividing Fractions - Review

Recall:

$$\frac{a}{b}\div\frac{c}{d}=\frac{a}{b}\bullet\frac{d}{c}$$

Examples

$$\frac{9}{7}\div\frac{6}{35}$$

Divide Factions

1. Change division into multiplication
2. Multiply by the reciprocal of the second fraction

Divide Rational Expressions $\frac{a}{b}\div\frac{c}{d}=\frac{a}{b}\cdot\frac{d}{c}$

Divide

$$\frac{t-3}{t+2}\div\frac{4t-12}{t-1}$$

$$\frac{x^2-x-12}{x^2-16}\div\frac{x^2+6x+9}{2x+8}$$

7.6 and 7.7 Proportions

Need To Know

Special Focus on Proportions

- Idea of proportions
- How to solve proportion
- Solving proportion word problems

Ratios and Proportions

A **ratio** is a way to compare two numbers.

We write a ratio of a and b as: *a* to *b* or $\frac{a}{b}$

A **proportions** is an equation of two ratios.

Examples – Yes or No:

$\frac{12}{36}=\frac{1}{3}$ $\frac{2}{9}=\frac{8}{x}$ $\frac{3}{x}-\frac{5}{7}=\frac{2}{x^2}$

Solving Proportions

Solve proportions by cross multiplying the equations.

$\frac{a-4}{a+6}=\frac{1}{3}$ $\frac{1}{x+3}=\frac{4}{x-1}$

Solving Proportions

Solve proportions by cross multiplying the equations.

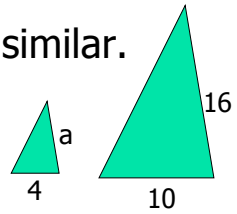
$$\frac{3}{w+7} = \frac{w+10}{w+7} \qquad \frac{x}{2} = \frac{18}{x}$$

Apply Proportions

Steps

1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

Triangles ABC and XYZ are similar.
Solve for side "a".



Tools

1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model

Apply Proportions

To estimate the number of trout in a lake, a naturalist catches, tags and releases 112 trout. Later, 82 trout are caught; 32 of the have tags. Estimate the number of trout in the lake.

Steps
1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

Tools
1. Keywords
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Steps
1. Familiarize
2. Translate
3. Carry out
4. Check
5. State answer

Apply Proportions

A manufacturer knows that during production, 8 out of 100 parts made are defective. If they plan to produce 1,650 parts, how many can they expect to be defective.

Tools
1. Keywords
2. Drawing
3. Simpler problem
4. Tables/Patterns
5. Charts
6. Guess
7. Verbal Model