Chapter 8 – 3: NOTES

Key

Adding Rational Expressions

Basic definition for adding rational numbers with a common denominator:

If a, b, and c are integers and b is not zero, then $\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}$.

Equivalent fractions are fractions with different denominators that name the same number.

The **LCD**, **least common denominator**, is the least common multiple of a set of denominators. The **LCD** can be determined by inspection or by writing the product of the highest power for each factor in any given polynomial.

Adding rational expressions:

1. Determine if the given rational expressions have a common denominator.
2. If not, find the LCD.
3. Rewrite the given rational expressions as equivalent rational expressions using the LCD in the denominators.
4. Apply the basic definition for adding rational numbers with a common denominator.
5. Express result in simplest form.

Warm-up 1. Add and simplify:

a) $\frac{2x}{x+2}+\frac{4}{x+2}=\frac{2x+}{x+2}=\frac{2(x+2)}{x+2}=2$

b) $\frac{3}{2x^2}+\frac{x}{5}$ The LCD is $10x^2$.

$=\frac{3(5)}{2x^2(5)}+\frac{x(2x)}{5(2x)}=\frac{15}{10x^2}+\frac{2x^2}{10x^2}=\frac{2x^2+15}{10x^2}$

c) $\frac{3}{2x+1}+\frac{2}{x-5}$ The LCD is $(2x+1)(x-5)$.

$=\frac{3\ (x-5)}{(2x+1)(x-5)}+\frac{2\ (2x+1)}{(x-5)(2x+1)}=\frac{3x-15}{(x-5)(2x+1)}+\frac{4x+2}{(x-5)(2x+1)}=\frac{7x-13}{(x-5)(2x+1)}$

Key

Problems - Add and express in simplest form:

1. $-\frac{2}{5}+\frac{3}{20}+\frac{7}{8} = \frac{5}{8}$

LCD = 40

2. $\frac{n+6}{9}+\frac{2n-1}{12} = \frac{10n+21}{36}$

LCD = 36

3. $4+\frac{8}{2x-1} = \frac{8x+4}{2x-1}$

LCD = 2x−1

4. $\frac{4x-12}{x^2-9}+\frac{x+1}{x+3} = \frac{x+5}{x^2-9}$

LCD = x^2-9

Subtracting Rational Expressions

Basic definition for subtracting rational numbers with a common denominator:

If a, b, and c are integers and b is not zero, then $\frac{a}{b}-\frac{c}{b}=\frac{a-c}{b}$.

Subtracting rational expressions:

1. Determine if the given rational expressions have a common denominator.
2. If not, find the LCD.
3. Rewrite the given rational expressions as equivalent rational expressions using the LCD in the denominator.
4. Apply the basic definition for subtracting rational numbers with a common denominator.
5. Express in simplest form.

Warm-up 2. Subtract and simplify:

a) $\frac{4m}{m-5}-\frac{20}{m-5}=\frac{(4m)-(20)}{m-5}=\frac{4(m-5)}{(m-5)} = 4$

b) $\frac{2x}{x+3}-\frac{5}{x}=\frac{(2x)(x)}{(x+3)(x)}-\frac{(5)(x+3)}{(x)(x+3)}$ The LCD is $\underline{x(x+3)}$.

$=\frac{(4x^2)}{x(x+3)}-\frac{(5x+15)}{x(x+3)}=\frac{(4x^2)-(5x+15)}{x(x+3)}=\frac{4x^2-5x-15}{x(x+3)}$