

Rational Expressions: LCD, Adding, and Subtracting

LCD

The **least common denominator (LCD)** is the simplest expression that is divisible by all given denominators. To find it, write the prime factorization of each denominator, and take the *most* number of each factor you see.

Ex 1.

Find the LCD of $\frac{1}{8x}$ and $\frac{3}{10x^2}$.

Ex 2.

Find the LCD of $\frac{6}{5x}$ and $\frac{4}{x^2-3x}$.

Ex 3.

Find the LCD of $\frac{1}{x^2-4x-5}$, $\frac{3}{x^2-x-20}$, and $\frac{1}{x^2-10x+25}$.

Ex 4.

Find the LCD of $\frac{1}{x-5}$ and $\frac{3}{5-x}$.

Ex 5.

Rewrite the following rational expression with the indicated denominator.

$$\frac{3}{8} = \frac{?}{40}$$

Ex 6.

Rewrite the following rational expression with the indicated denominator.

$$\frac{9x}{25} = \frac{?}{50x}$$

Ex 7.

Rewrite the following rational expression with the indicated denominator.

$$\frac{8}{3x+1} = \frac{?}{12x+4}$$

Ex 8.

Rewrite the following rational expression with the indicated denominator.

$$\frac{12x}{x^2+8x} = \frac{?}{x^3+4x^2-32x}$$

Adding and Subtracting

To add or subtract rational #'s with the same denominators, just add or subtract numerators:

$$\text{ex: } \frac{3}{7} + \frac{2}{7} = \frac{3+2}{7} = \frac{5}{7} \qquad \frac{3}{7} - \frac{2}{7} = \frac{3-2}{7} = \frac{1}{7}$$

With rational expressions, it's the same.

Ex 9.

Add. Write each answer in lowest terms.

$$\frac{3x}{x+1} + \frac{3}{x+1}$$

Ex 10.

Subtract. Write each answer in lowest terms.

$$\frac{2x}{x+5} - \frac{x+3}{x+5}$$

Different Denominators

Recall: When adding $\frac{1}{2}$ and $\frac{2}{3}$, we look for the _____, which is _____. Then we write equivalent fractions for both and add: $\frac{1}{2} + \frac{2}{3} = \frac{3}{6} + \frac{4}{6} = \frac{7}{6}$.

It's similar for rational expressions.

Ex 11.

Add. Write each answer in lowest terms.

$$\frac{7}{6x^2} + \frac{2}{9x}$$

Ex 12.

Subtract. Write each answer in lowest terms.

$$\frac{7}{5x^2+15x} - \frac{9}{x^2+6x+9}$$

Ex 13.

Subtract. Write each answer in lowest terms.

$$\frac{3x}{x-5} - \frac{2x-25}{5-x}$$

Practice

1. Find the LCD of $\frac{3x}{2x^2-10x}$ and $\frac{x+4}{x^2-25}$.

2. Find the LCD of $\frac{13}{x^2+7x}$, $\frac{-3}{5x+35}$, and $\frac{-4}{x^2+14x+49}$.

3. Rewrite the following rational expression with the indicated denominator.

$$\frac{-7x}{6x+18} = \frac{?}{24x+72}$$

4. Subtract. Write each answer in lowest terms.

$$\frac{3}{x+1} - \frac{4}{x}$$

5. Add. Write each answer in lowest terms.

$$\frac{x}{x^2+3x-4} + \frac{4x}{x^2+7x+12}$$

Q: When can you add two to eleven and get one as the correct answer?