

TASK 1: Answer the following question.
What must be true to add fractions?

Common denominators

The KEY to RATIONAL EXPRESSIONS is FACTORING. FACTORING should ALWAYS be your FIRST STEP!

OBJECTIVE 1: Finding the LCD

STEPS:

1. Factor each denominator separately.
2. Bring one denominator into the LCD
3. Fill the LCD with whatever is missing from the other denominators.
4. Remember it is all or nothing. + and - group the terms as one inside ()

TASK 2: Find the LCD of the following rational expressions.

a) $\frac{1}{5x^2} & \frac{4}{10x}$

$5x^2 \quad 2.5x$

LCD: $5x \cdot x \cdot 2$

$10x^2$

b) $\frac{3x}{3x^2-9} & \frac{x+3}{x-3}$

$3(x^2-3)$

LCD: $3(x^2-3)(x-3)$

c) $\frac{x+3}{x^2-16} & \frac{x+5}{x^2+5x+4}$

$(x+4)(x-4) \quad (x+4)(x+1)$

LCD: $(x+4)(x-4)(x+1)$

d) $\frac{x+1}{x^2+3x+2} & \frac{x-1}{x^2+4x+4}$

$(x+2)(x+1) \quad (x+2)^2$

LCD: $(x+2)(x+1)(x+2)$

OBJECTIVE 2: Adding & Subtracting Rational Expressions

STEPS:

1. Factor the numerator & denominator completely
2. Find the LCD
3. Restrict the domain by setting the LCD = 0, then write it in interval notation.
4. Multiply by whatever is missing from the LCD to each fraction.
5. If subtraction, multiply the numerator of the second fraction by the negative and add the two numerators. KEEP THE LCD.
6. Factor or GCF again, if possible, then simplify if necessary.

TASK 3: Multiply the rational expressions below. Simplify your final answer completely.

a) $\frac{2}{3x} + \frac{5}{6x}$
 LCD: $6x$
 D: $(-\infty, 0) \cup (0, \infty)$

$\frac{4+5}{6x} = \frac{9}{6x} = \frac{3}{2x}$

c) $\frac{3}{x+2} + \frac{8}{x-2}$

LCD: $(x+2)(x-2)$
 $\frac{3(x-2) - 8(x+2)}{(x+2)(x-2)}$

$\frac{3x-6-8x-16}{(x+2)(x-2)}$
 $\frac{-5x-22}{(x+2)(x-2)}$

d) $\frac{x+2}{x-1} + \frac{x-3}{2x+1}$

LCD: $(x-1)(2x+1)$
 $\frac{(x+2)(2x+1) + (x-3)(x-1)}{(x-1)(2x+1)}$

$\frac{2x^2+5x+2+x^2-4x+3}{(x-1)(2x+1)}$
 $\frac{3x^2+x+5}{(x-1)(2x+1)}$

e) $\frac{8x}{x^2-9} + \frac{x-7}{x-3}$

LCD: $(x+3)(x-3)$
 $\frac{8x + (x-7)(x+3)}{(x+3)(x-3)}$

$\frac{8x+x^2-4x-21}{(x+3)(x-3)}$
 $\frac{x^2+4x-21}{(x+3)(x-3)} = \frac{x+7}{x-3}$

D: $(-\infty, -2) \cup (2, \infty)$
 $(-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$

Common mistakes:

Still need help with: