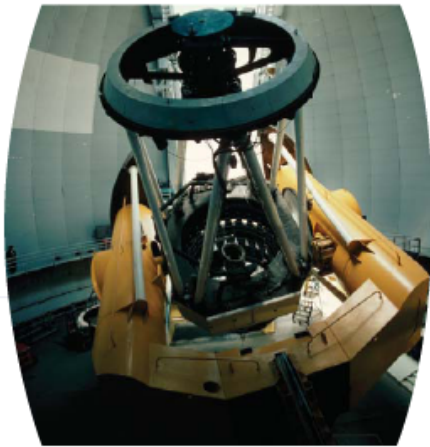


ADDITION & SUBTRACTION

of Rational Expressions

WHY IS THIS IMPORTANT?



Canada-France-Hawaii Telescope

Did You Know?

The Canada-France-Hawaii Telescope (CFHT) is a non-profit partnership that operates a 3.6-m telescope atop Mauna Kea in Hawaii. CFHT has played an important role in studying black holes.

Rational expressions are important in photography and in understanding telescopes, microscopes, and cameras. The lens equation can be written as $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$, where f is the focal length, u is the distance from the object to the lens, and v is the distance of the image from the lens. How could you simplify the expression on the right of the lens equation?

ADDITION & SUBTRACTION

of Rational Expressions

Remember how to add and subtract rational numbers?

$$\frac{5}{3} + \frac{7}{3}$$

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

$$\frac{1}{9} + \frac{1}{6}$$



Adding or Subtracting Rational Expressions

To add or subtract rational expressions, follow procedures similar to those used in adding or subtracting rational numbers.

Case 1: Denominators Are the Same



If two rational expressions have a common denominator, add or subtract the numerators and write the answer as a rational expression with the new numerator over the common denominator.

Case 2: Denominators Are Different



To add or subtract fractions when the denominators are different, you must write equivalent fractions with the same denominator.

$$\frac{10}{3x - 12} - \frac{3}{x - 4}$$



Why is it helpful to factor each denominator?



Addition and Subtraction

$$\frac{x}{5} + \frac{3}{5} =$$

$$\frac{x}{6} + \frac{2x}{9} =$$

Monomial Denominators:

$$\text{Ex. 1: } \frac{3}{a} - \frac{2}{b} =$$

$$\text{Ex. 2: } \frac{4}{5x} - \frac{3}{4x} - \frac{1}{10x} =$$

Addition and Subtraction

$$\text{Ex. 3: } \frac{5}{4ab} - \frac{2}{3a} + \frac{3}{2b}$$

$$\text{Ex. 4: } \frac{2x-1}{6} + \frac{3x+1}{4} - \frac{2x-5}{2}$$

LCD

Lowest Common Denominator

What is the LCD for $\frac{3}{x^2 - 9} + \frac{4}{x^2 - 6x + 9}$?

Why is it easier to use the lowest common denominator? Try it with and without the LCD to compare.

Factor each denominator.

$$\frac{3}{(x - 3)(x + 3)} + \frac{4}{(x - 3)(x - 3)}$$



The LCD must contain the greatest number of any factor that appears in the denominator of either fraction. If a factor appears once in either or both denominators, include it only once. If a factor appears twice in any denominator, include it twice.

The LCD is



http://www.khanacademy.org/math/algebra/rational-expressions/rational_expressions/v/adding-and-subtracting-rational-expressions



Addition and Subtraction

Next Level of Difficulty:

$$\text{Ex. 1: } \frac{5}{a+b} + \frac{3}{a-b} =$$

$$\text{Ex. 2: } \frac{3}{m-4} + \frac{2}{m+1} =$$

Addition and Subtraction

$$\text{Ex. 3: } \frac{3}{x^2 - 3x + 2} - \frac{5}{x^2 - 5x + 4}$$

$$\text{Ex. 4: } \frac{2x}{x^2 - 4} + \frac{5}{x-2}$$

Addition and Subtraction

$$\text{Ex. 5: } \frac{2a + 3}{a^2 + 2a - 3} - \frac{3}{2a + 6}$$



Check this out on page 335 of your text!



Key Ideas

- You can add or subtract rational expressions with the same denominator by adding or subtracting their numerators.

$$\begin{aligned}\frac{2x-1}{x+5} - \frac{x-4}{x+5} &= \frac{2x-1-(x-4)}{x+5} \\ &= \frac{2x-1-x+4}{x+5} \\ &= \frac{x+3}{x+5}, x \neq -5\end{aligned}$$

- You can add or subtract rational expressions with unlike denominators after you have written each as an equivalent expression with a common denominator.
- Although more than one common denominator is always possible, it is often easier to use the lowest common denominator (LCD).

Assignment



Text Pages 336 - 339

Questions

2,5,6,8,10,12,15,18,20