

Math-3A

Lesson 4-2

Add and Subtract Rational
Expressions

No common denominator.

$$\frac{(2x-1)}{\textcircled{2}\underline{x}} + \frac{(x-2)}{\textcircled{3}\underline{x}}$$

Multiply the left side fraction by one in the form of 3/3

Multiply the right side fraction by one in the form of 2/2

$$\frac{3}{3} * \frac{(2x-1)}{2x} + \frac{(x-2)}{3x} * \frac{2}{2} = \frac{3(2x-1)}{2*3*x} + \frac{2(x-2)}{2*3*x}$$

$$= \frac{3(2x-1) + 2(x-2)}{6x} = \frac{6x-3+2x-4}{6x} = \frac{8x-7}{6x}$$

Can you factor this into two fractions multiplied together?

$$\frac{x}{3} - \frac{x+1}{6}$$

$$\frac{2}{2} * \frac{x}{3} - \frac{(x+1)}{6} = \frac{2x}{6} - \frac{(x+1)}{6}$$

$$= \frac{2x - (x+1)}{6}$$

$$= \frac{2x - x - 1}{6}$$

$$= \frac{x - 1}{6}$$

$$\begin{aligned}
\frac{x-1}{2x} + \frac{2x+3}{x} &= \frac{(x-1)}{2x} + \left(\frac{2}{2}\right) * \frac{(2x+3)}{x} \\
&= \frac{(x-1)}{2x} + \frac{2(2x+3)}{2x} &= \frac{(x-1)}{2x} + \frac{(4x+6)}{2x} \\
&= \frac{(x-1) + (4x+6)}{2x} &= \frac{5x+5}{2x}
\end{aligned}$$

Can you factor this into two fractions multiplied together?

$$\frac{3x+1}{2x} - \frac{1}{5} = \frac{5}{5} * \frac{(3x+1)}{2x} - \frac{1}{5} * \frac{2x}{2x}$$

$$= \frac{5(3x+1)}{10x} - \frac{2x}{10x} = \frac{5(3x+1) - 2x}{10x}$$

$$= \frac{15x + 5 - 2x}{10x} = \frac{13x + 5}{10x}$$

Can you factor this into two fractions multiplied together?

$$\frac{12}{x^2 + 5x - 24} + \frac{3}{x - 3}$$

(step by step)

What is the factored version of the left denominator?

$$\frac{12}{(x + 8)(x - 3)} + \frac{3}{(x - 3)}$$

What is the least common denominator? $(x + 8)(x - 3)$

$$\frac{12}{(x+8)(x-3)} + \frac{3}{(x-3)}$$

$$= \frac{12}{(x+8)(x-3)} + \frac{3}{(x-3)} * \frac{(x+8)}{(x+8)}$$

$$= \frac{12 + 3(x+8)}{(x+8)(x-3)} = \frac{12 + 3x + 24}{(x+8)(x-3)} = \frac{3x + 36}{(x+8)(x-3)}$$

$$= \frac{3(x+12)}{(x+8)(x-3)}$$

Can you factor this into two fractions multiplied together?

$$\begin{aligned} \frac{(x+1)}{x^2-2x-3} + \frac{2}{x-3} &= \frac{(x+1)}{(x+1)(x-3)} + \frac{2}{x-3} \\ &= \frac{1}{x-3} + \frac{2}{x-3} = \frac{3}{x-3} \end{aligned}$$

Simplify the complex fraction. $\frac{\frac{1}{2}}{\frac{5}{6}} = \frac{1}{2} \div \frac{5}{6}$

Division: Division by a number is the same thing as...

Multiplication by the reciprocal of the number.

$$\frac{\frac{1}{2}}{\frac{5}{6}} = \frac{1}{2} \div \frac{5}{6} = \frac{1}{2} * \frac{6}{5} = \frac{3}{5}$$

Simplifying complex fractions:

Complex Fraction is a fraction in the numerator and a fraction in the denominator.

$$\frac{\frac{2}{3}}{\frac{4}{5}} = \frac{2}{3} \div \frac{4}{5} = \frac{2}{3} * \frac{5}{4} = \frac{\cancel{2}}{\cancel{2}} * \frac{5}{3 * 2} = \frac{5}{6}$$

How do you divide fractions?

Multiply by reciprocal.

Simplify the complex fraction.

$$\frac{\frac{5}{x+4}}{\frac{3}{x+4}} = \frac{5}{x+4} \div \frac{3}{x+4} = \frac{5}{(x+4)} * \frac{(x+4)}{3} = \frac{\cancel{(x+4)}}{\cancel{(x+4)}} * \frac{5}{3}$$

Put binomials into parentheses!

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

Simplify the complex fraction.

$$\frac{\frac{x}{x+2}}{\frac{3}{x+3}} = \frac{x}{x+2} \div \frac{3}{x+3} = \frac{x}{x+2} * \frac{x+3}{3}$$
$$= \frac{x}{x+2} * \frac{x+3}{3} = \frac{x(x+3)}{3(x+2)}$$

Combine the numerator fractions into one fraction.

$$\frac{\frac{x}{3} - 6}{2 + \frac{3}{x}} = \frac{\frac{x}{3} - \frac{6}{1}}{2 + \frac{3}{x}} = \frac{\frac{x-18}{3}}{2 + \frac{3}{x}}$$

2. Combine the denominator fractions into one fraction.

$$\frac{\frac{x-18}{3}}{\frac{2x+3}{x}} = \frac{x-18}{3} * \frac{x}{2x+3} = \frac{x(x-18)}{3(2x+3)}$$

Simplify the complex fraction.

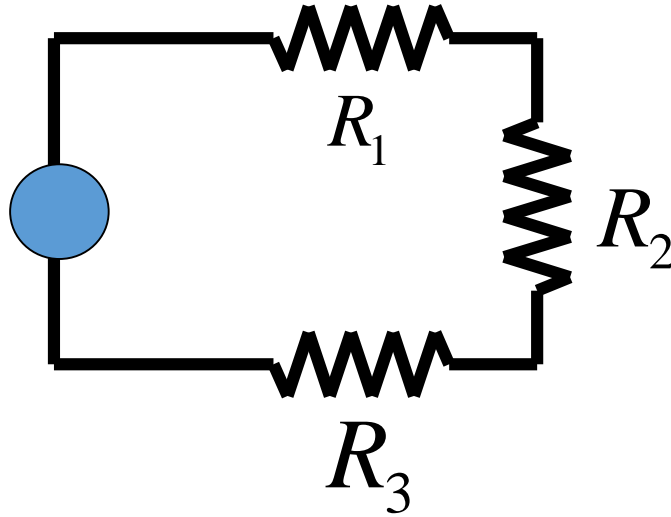
$$\frac{\frac{1}{x} + \frac{2}{3x}}{\frac{3}{x+4}}$$

$$\frac{4}{x-3} - \frac{2x}{x^2-9}$$

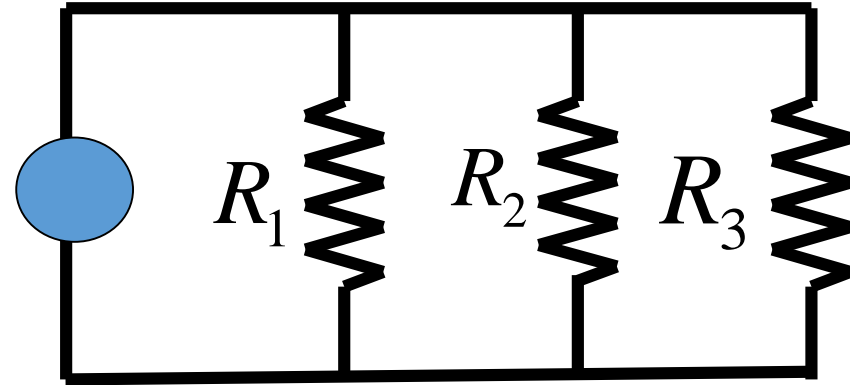
$$\frac{2}{x-3} - \frac{3}{x+2}$$

$$R_{total} = R_1 + R_2 + R_3$$

Voltage Source



$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

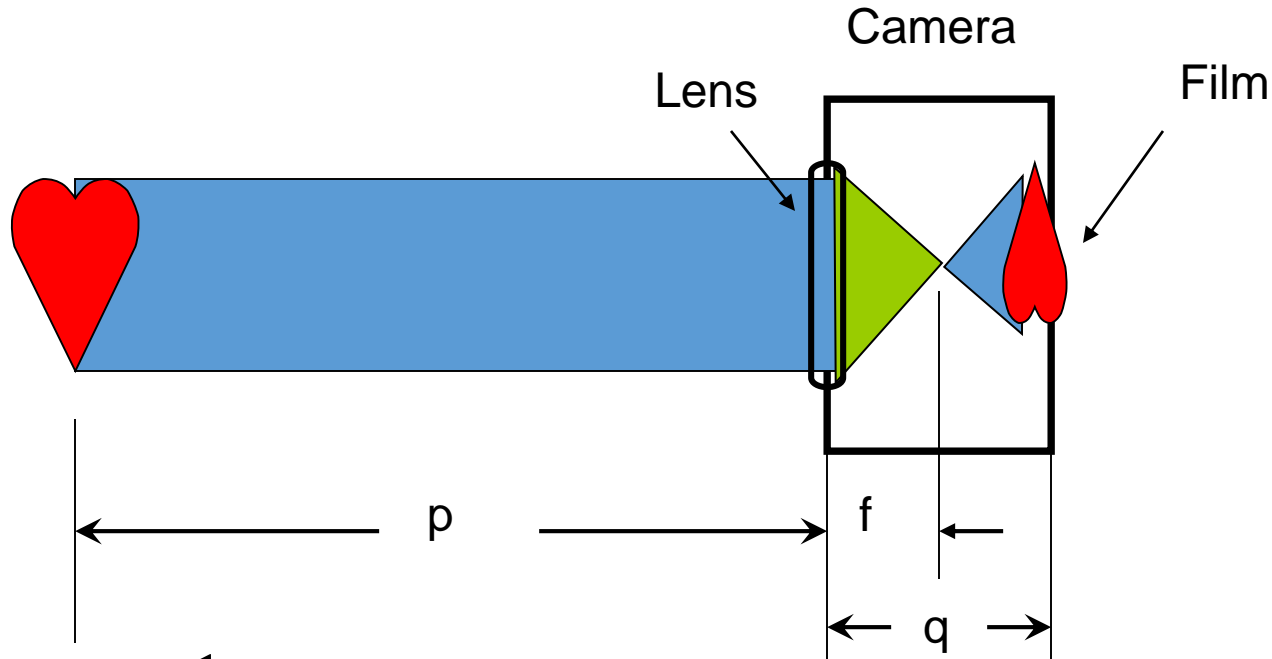


$$\frac{1}{R_T} = \frac{R_2 R_3}{R_1 R_2 R_3} + \frac{R_1 R_3}{R_1 R_2 R_3} + \frac{R_1 R_2}{R_1 R_2 R_3}$$

$$\frac{1}{R_T} = \frac{R_2 R_3 + R_1 R_3 + R_1 R_2}{R_1 R_2 R_3}$$

$$R_T = \frac{R_1 R_2 R_3}{R_2 R_3 + R_1 R_3 + R_1 R_2}$$

Focal length of a telescope/microscope



$$f = \frac{1}{\frac{1}{p} + \frac{1}{q}}$$

$$f = \frac{1}{\frac{q+p}{pq}}$$

$$f = \frac{pq}{q+p}$$