

7.4 Adding and Subtracting Rational Expressions



Learning Standards
HSA-APR.D.6
HSA-APR.D.7

Essential Question How can you determine the domain of the sum or difference of two rational expressions?

You can add and subtract rational expressions in much the same way that you add and subtract fractions.

$$\frac{x}{x+1} + \frac{2}{x+1} = \frac{x+2}{x+1} \quad \text{Sum of rational expressions}$$

$$\frac{1}{x} - \frac{1}{2x} = \frac{2}{2x} - \frac{1}{2x} = \frac{1}{2x} \quad \text{Difference of rational expressions}$$

EXPLORATION 1 Adding and Subtracting Rational Expressions

Work with a partner. Find the sum or difference of the two rational expressions. Then match the sum or difference with its domain. Explain your reasoning.

Sum or Difference	Domain
a. $\frac{1}{x-1} + \frac{3}{x-1} =$ <input style="width: 80px; height: 20px;" type="text"/>	A. all real numbers except -2
b. $\frac{1}{x-1} + \frac{1}{x} =$ <input style="width: 80px; height: 20px;" type="text"/>	B. all real numbers except -1 and 1
c. $\frac{1}{x-2} + \frac{1}{2-x} =$ <input style="width: 80px; height: 20px;" type="text"/>	C. all real numbers except 1
d. $\frac{1}{x-1} + \frac{-1}{x+1} =$ <input style="width: 80px; height: 20px;" type="text"/>	D. all real numbers except 0
e. $\frac{x}{x+2} - \frac{x+1}{2+x} =$ <input style="width: 80px; height: 20px;" type="text"/>	E. all real numbers except -2 and 1
f. $\frac{x}{x-2} - \frac{x+1}{x} =$ <input style="width: 80px; height: 20px;" type="text"/>	F. all real numbers except 0 and 1
g. $\frac{x}{x+2} - \frac{x}{x-1} =$ <input style="width: 80px; height: 20px;" type="text"/>	G. all real numbers except 2
h. $\frac{x+2}{x} - \frac{x+1}{x} =$ <input style="width: 80px; height: 20px;" type="text"/>	H. all real numbers except 0 and 2

CONSTRUCTING VIABLE ARGUMENTS

To be proficient in math, you need to justify your conclusions and communicate them to others.

EXPLORATION 2 Writing a Sum or Difference

Work with a partner. Write a sum or difference of rational expressions that has the given domain. Justify your answer.

- a. all real numbers except -1 b. all real numbers except -1 and 3
c. all real numbers except $-1, 0,$ and 3

Communicate Your Answer

3. How can you determine the domain of the sum or difference of two rational expressions?
4. Your friend found a sum as follows. Describe and correct the error(s).

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