Lesson 24: Multiplying and Dividing Rational Expressions

Classwork

**Example 1**

If , ,, and are rational expressions with , , then

Make a conjecture about the product . What will it be? Explain your conjecture and give evidence that it is correct.

Example 2

Find the following product:

Exercises 1–3

1. Summarize what you have learned so far with your neighbor.
2. Find the following product and reduce to lowest terms: .
3. Find the following product and reduce to lowest terms: .

If , ,, and are rational expressions with , , and , then

Example 3

Find the quotient and reduce to lowest terms: .

Exercises 4–5

1. Find the quotient and reduce to lowest terms: .

1. Simplify the rational expression.

Lesson Summary

In this lesson we extended multiplication and division of rational numbers to multiplication and division of rational expressions.

* To multiply two rational expressions, multiply the numerators together and multiply the denominators together, and then reduce to lowest terms.
* To divide one rational expression by another, multiply the first by the multiplicative inverse of the second, and reduce to lowest terms.
* To simplify a complex fraction, apply the process for dividing one rational expression by another.

Problem Set

1. Complete the following operations:

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| --- | --- | --- |
| * 1. Multiply by . | * 1. Divide by . | * 1. Multiply by . |
| * 1. Divide by . | * 1. Multiply by . | * 1. Multiply by . |

1. Simplify each of the following expressions.

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1. Simplify the following complex rational expressions.
2. Suppose that and , for , , , and . Show that the value of does not depend on the value of
3. Determine which of the following numbers is larger without using a calculator, or .

(Hint: We can compare two positive quantities and by computing the quotient . If , then . Likewise, if , then .)

1. One of two numbers can be represented by the rational expression , where and .
   1. Find a representation of the second number if the product of the two numbers is .
   2. Find a representation of the second number if the product of the two numbers is .