

Lesson 12-3: Multiplying and Dividing Rational Expressions

Part 1: Multiplying Rational Expressions

1. 080117b, P.I. A.A.18

If the length of a rectangular garden is represented by $\frac{x^2 + 2x}{x^2 + 2x - 15}$ and its width is represented by $\frac{2x - 6}{2x + 4}$, which expression represents the area of the garden?

- [A] $x + 5$ [B] $\frac{x}{x + 5}$
[C] x [D] $\frac{x^2 + 2x}{2(x + 5)}$

2. 060124b, P.I. A.A.18

A rectangular prism has a length of $\frac{2x^2 + 2x - 24}{4x^2 + x}$, a width of $\frac{x^2 + x - 6}{x + 4}$, and a height of $\frac{8x^2 + 2x}{x^2 - 9}$. For all values of x for which it is defined, express, in terms of x , the volume of the prism in simplest form.

Part 2: Dividing Rational Expressions

3. 080022a, P.I. A.A.18

Perform the indicated operation and express the result in simplest terms: $\frac{x}{x + 3} \div \frac{3x}{x^2 - 9}$

4. 060727b, P.I. A2.A.16

If $f(x) = \frac{3x^2 - 27}{18x + 30}$ and $g(x) = \frac{x^2 - 7x + 12}{3x^2 - 7x - 20}$, find $f(x) \div g(x)$ for all values of x for which the expression is defined and express your answer in simplest form.

5. 010434b, P.I. A.A.18

Express in simplest form:

$$\frac{4x + 8}{x + 1} \cdot \frac{2 - x}{3x - 15} \div \frac{x^2 - 4}{2x^2 - 8x - 10}$$

6. 010733b, P.I. A.A.18

Perform the indicated operations and simplify completely:

$$\frac{x^2 - 9}{x^2 - 5x} \cdot \frac{5x - x^2}{x^2 - x - 12} \div \frac{x - 4}{x^2 - 8x + 16}$$

[1] B

[2] $4(x - 2)$ or $4x - 8$, and appropriate work is shown.

[1] The problem is factored correctly but not reduced to simplest form.

or [1] Only two of the expressions are factored correctly, but an appropriate answer is found.

or [1] $4(x - 2)$ or $4x - 8$, but no work is shown.

[0] Only the formula for volume is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[2] obviously incorrect procedure.

[2] $\frac{x-3}{3}$ and multiplication by the reciprocal, correct factoring, and canceling are shown.

[1] The difference of two squares,

$x^2 - 9 = (x + 3)(x - 3)$, is factored correctly.

or [1] Appropriate work is shown, but the final answer is incorrect.

or [1] $\frac{x-3}{3}$ but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[3] incorrect procedure.

[4] $\frac{x+3}{2}$, and appropriate work is shown.

[3] Appropriate work is shown, but one computational, factoring, or simplification error is made.

[2] Appropriate work is shown, but two or more computational, factoring, or simplification errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as failing to multiply by the reciprocal of $g(x)$ or trying to solve for x .

[1] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.

or [1] $\frac{x+3}{2}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[6] $-\frac{8}{3}$, and appropriate work is shown.

[5] Appropriate work is shown, but one computational error is made.

[4] Appropriate work is shown, but two or more computational errors are made.

[3] Appropriate work is shown, but one conceptual error is made, such as not factoring out -1 when canceling out $2 - x$.

[2] Appropriate work is shown, but one conceptual error and one computational error are made.

[1] $-\frac{8}{3}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[5] incorrect procedure.

[6] $-(x-3)$, $-x+3$, or $3-x$, and appropriate work is shown.

[5] Appropriate work is shown, but one computational, factoring, or simplification error is made.

[4] Appropriate work is shown, but two computational, factoring, or simplification errors are made.

or [4] $x-3$, and appropriate work is shown.

[3] Appropriate work is shown, but three or more computational, factoring, or simplification errors are made.

or [3] Appropriate work is shown, but one conceptual error is made, such as not multiplying by the multiplicative inverse.

[2] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.

[1] $-(x-3)$, $-x+3$, or $3-x$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[6] incorrect procedure.