MATHEMATICS · GRADES 10-12

Multiplying rational expressions

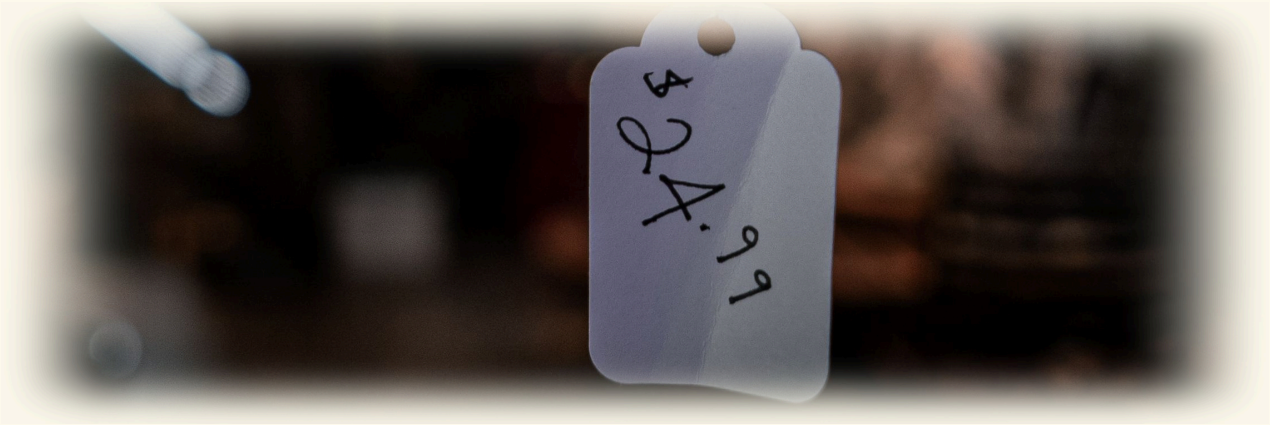
Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you multiply fractions that contain algebra, cancelling shared parts first to keep the numbers small. You use the same habit when you simplify a rate before you use it, like working out a cost per item before you multiply it up for a whole order. Cancelling first keeps the arithmetic small and easy, instead of multiplying big numbers together and then fighting to reduce them at the end.



Rule

Cancel shared factors first, then multiply the tops and the bottoms.

Cancelling before multiplying keeps the numbers small.

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Worked examples

EXAMPLE 1

Q Multiply $\left(\frac{x}{(x+1)}\right) \times \left(\frac{(x+1)}{(x-2)}\right)$

SOLUTION

Note the excluded values: x is not -1 and x is not 2.

Cancel the shared bracket (x + 1) from the top of one fraction and the bottom of the other.

Multiply what is left: $\frac{x}{(x-2)}$

EXAMPLE 2

Q Multiply $\left(\frac{2}{x}\right) \times \left(\frac{x^2}{4}\right)$

SOLUTION

Note the excluded value: x is not 0.

Cancel one x and the factor 2: $\left(\frac{1}{1}\right) \times \left(\frac{x}{2}\right)$.

Multiply: $\frac{x}{2}$

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Practice questions

1 Multiply $\left(\frac{3}{x}\right) \times \left(\frac{x}{5}\right)$.

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2 Multiply $\left(\frac{(x+2)}{x}\right) \times \left(\frac{x}{(x+2)}\right)$.

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3 Multiply $\left(\frac{2x}{3}\right) \times \left(\frac{9}{x}\right)$.

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4 Multiply $\left(\frac{2x}{(x+3)}\right) \times \left(\frac{(x+3)}{4}\right)$.

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5 Multiply $\left(\frac{5}{(x-2)}\right) \times \left(\frac{(x-2)}{10}\right)$.

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6 Multiply $\left(\frac{x^2}{2}\right) \times \left(\frac{4}{x}\right)$.

A x^2

B $2x$

C $4x$

D x

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7 Multiply $\left(\frac{(x+4)}{2}\right) \times \left(\frac{6}{(x+4)}\right)$.

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8 Multiply $\left(\frac{7}{x^2}\right) \times \left(\frac{x}{7}\right)$.

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9 Multiply $\left(\frac{(x+1)}{x}\right) \times \left(\frac{x^2}{(x+1)}\right)$.

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10 Multiply $(\frac{3x}{4}) \times (\frac{8}{(3x)})$.

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ANSWER KEY

1. $\frac{3}{5}$

2. 1

3. 6

4. $\frac{x}{2}$

5. $\frac{1}{2}$

6. $2x$

7. 3

8. $\frac{1}{x}$

9. x

10. 2

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