Dividing Rational Expressions Guide

① Flip the numerator and denominator of THE SECOND of the fractions, then switch the division (÷) sign to a multiplication (•) sign

② Factor out each numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Example:

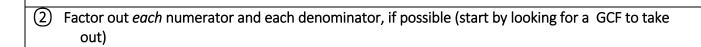| |
|---|
| Find the quotient: $\dfrac{2x^2+2x}{4x} \div \dfrac{x+1}{3x^2}$ |
| ① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

 Flipping the second fraction and changing the division sign to a multiplication sign, we now have: $\dfrac{2x^2+2x}{4x} \bullet \dfrac{3x^2}{x+1}$ |
| ② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

 The only thing we are able to factor is $2x^2 + 2x$ → since the GCF is 2x, we get $2x(x + 1)$

 So, we now have: $\dfrac{2x(x+1)}{4x} \bullet \dfrac{3x^2}{x+1}$ |
| ③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

 Set up: $\dfrac{2x(x+1)(3x^2)}{4x(x+1)}$ *Cancel out common factors/terms:*

 Both the numerator and the denominator have the factor $(x + 1)$, so we can cancel each:

 $\dfrac{2x(x\cancel{+1})(3x^2)}{4x(x\cancel{+1})}$ |
| ④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

 We are left with $\dfrac{2x(3x^2)}{4x}$ and we can multiply the terms in the numerator to get $\dfrac{6x^3}{4x}$ |
| ⑤ Take out (factor out) any remaining common terms in the numerator and denominator

 The GCF of 6 and 4 is 2, and the GCF of the x's is just x, so the GCF of the numerator and denominator is 2x → take a 2x out of the numerator and denominator and we're left with: $\boxed{\dfrac{3x^2}{2}}$ |

Find the quotient: $\dfrac{8x-16}{5x^2} \div \dfrac{4x-8}{10x}$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Find the quotient: $\dfrac{2x+2}{3x^2} \div \dfrac{x+1}{4}$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Find the quotient: $\dfrac{4x-24}{3x+15} \div \dfrac{3x-18}{x+5}$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Find the quotient: $\dfrac{x^2+4x}{4x} \div \dfrac{x^2+x-12}{x-3}$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Find the quotient: $\dfrac{x^2-2x-48}{4x^2+24x} \div \dfrac{x-8}{8x+24}$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Find the quotient: $\dfrac{2x\text{-}14}{x^2\text{-}4x\text{-}21} \div (x+3)$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Find the quotient: $\dfrac{4x^2}{5} \div \dfrac{8x}{10}$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator

Find the quotient: $\dfrac{8x-16}{5x^2} \div \dfrac{4x-8}{10x}$

① Flip the numerator and denominator of THE SECOND fraction, then change the ÷ sign to a • sign

② Factor out *each* numerator and each denominator, if possible (start by looking for a GCF to take out)

③ "Set up" to multiply by putting each item in the numerator and each item in the denominator next to one another to be multiplied, and then cancel out common terms/factors

④ Multiply what's left in the numerator, and multiply what's left in the denominator, if possible.

⑤ Take out (factor out) any remaining common terms in the numerator and denominator