

1. Multiply the two rational expressions then state any restrictions on the domain. Simplify completely.

$$\frac{x^2+6x-7}{x^2+5x} \cdot \frac{x^2+12x+35}{2x^2+7x-9} = \frac{(x+7)(x+7)}{x(2x+9)} \text{ or } \frac{(x+7)^2}{x(2x+9)}$$

$$\text{Restrictions: } x \neq 0, -5, \frac{-9}{2}, 1$$

Step 1: Factor To factor both numerators and denominators, I used the diamond and GCF.	$\frac{(x+7)(x-1)}{x(x+5)} \cdot \frac{(x+5)(x+7)}{(2x+9)(x-1)}$
Step 2: List Restrictions To get the restrictions, I set each of the factors of the denominator equal to zero and solved.	$x = 0$ $x + 5 = 0 \rightarrow x = -5$ $2x + 9 = 0 \rightarrow 2x = -9 \rightarrow x = \frac{-9}{2}$ $x - 1 = 0 \rightarrow x = 1$
Step 3: Simplify I checked to see if anything would reduce immediately and didn't see anything.	
Step 4: Multiply When multiplying fractions, tops multiply with tops and bottoms with bottoms.	$\frac{(x+7)(x-1)(x+5)(x+7)}{x(x+5)(2x+9)(x-1)}$
Step 5: Simplify Again! The common factor of (x+5) and (x-1) reduced.	$\frac{(x+7)(\cancel{x-1})(x+5)(x+7)}{x(x+5)(2x+9)(\cancel{x-1})} = \frac{(x+7)(x+7)}{x(2x+9)}$

2. Divide the two rational expressions then state any restrictions on the domain. Simplify completely.

$$\frac{(y+4)(y+1)}{y^2-49} \div \frac{(2y-3)(y+4)}{y^2+9y+14} = \frac{(y+1)(y+2)}{(y-7)(2y-3)}$$

$$\text{Restrictions: } y \neq -7, 7, -2, \frac{3}{2}, -4$$

Step 1: Factor To factor both denominators, I used the diamond and difference of squares. The numerators were already in factored form.	$\frac{(y+4)(y+1)}{(y+7)(y-7)} \div \frac{(2y-3)(y+4)}{(y+7)(y+2)}$
Step 2: List Restrictions To get the restrictions, I set each of the factors of the denominator equal to zero and solved.	$y + 7 = 0 \rightarrow y = -7$ $y - 7 = 0 \rightarrow y = 7$ $y + 2 = 0 \rightarrow y = -2$
Step 3: Simplify I checked to see if anything would reduce immediately and didn't see anything.	
Step 4: Multiply I rewrote the problem as multiplication by using the reciprocal of the second rational expression. When multiplying fractions, tops multiply with tops and bottoms with bottoms.	$\frac{(y+4)(y+1)}{(y+7)(y-7)} \cdot \frac{(y+7)(y+2)}{(2y-3)(y+4)} = \frac{(y+4)(y+1)(y+7)(y+2)}{(y+7)(y-7)(2y-3)(y+4)}$
Step 5: Simplify Again! The common factor of (y+4) and (y+7) reduced.	$\frac{\cancel{(y+4)}(y+1)(\cancel{y+7})(y+2)}{\cancel{(y+7)}(y-7)(2y-3)\cancel{(y+4)}} = \frac{(y+1)(y+2)}{(y-7)(2y-3)}$

Additional Practice on back →

Additional Practice:

1. Find the restrictions for each denominator.

a) $\frac{(m+3)(m-5)}{(2m+1)(m-7)}$ $m \neq$

b) $\frac{(9x-1)(9x+1)}{x(x+3)(9x+1)}$ $x \neq$

2. Multiply the expressions together. Leave your answers in factored form. Reduce where possible.

a) $\frac{(z-1)(3z+2)}{z(z+1)} \cdot \frac{(z-1)(z+1)}{(3z-2)(3z+2)}$

b) $\frac{w^2+5w+4}{w^2-16} \cdot \frac{w^2-3w-4}{w^2-1}$

3. Write each division problem as multiplication then multiply. Leave answers in reduced factored form.

a) $\frac{x-1}{x+2} \div \frac{1}{x+2}$

What restrictions are there for the values of x?

b) $\frac{(r-3)(2r+5)}{(r-2)(r+2)} \div \frac{(r-3)(r+3)}{(2r+5)(r+2)}$

What restrictions are there for the values of r?

c) $\frac{v^2-6v+8}{v+1} \div \frac{v^2-4}{v^2-1}$

What restrictions are there for the values of v?

