Rational Expressions – Multiply/Divide

Algorithm

1. **factor the numerators and denominator**
2. **invert the divisor, if its division**
3. **divide out common factors**

Example $\dfrac{x^2-1}{x^2+5x+6} \div \dfrac{x^2+3x-4}{x^2+7x+12}$

1. $\dfrac{(x+1)(x-1)}{(x+3)(x+2)} \div \dfrac{(x+4)(x-1)}{(x+4)(x+3)}$

2. $\dfrac{(x+1)(x-1)}{(x+3)(x+2)} * \dfrac{(x+4)(x+3)}{(x+4)(x-1)}$

3. $\dfrac{(x+1)\cancel{(x-1)}}{\cancel{(x+3)}(x+2)} * \dfrac{\cancel{(x+4)}\cancel{(x+3)}}{\cancel{(x+4)}\cancel{(x-1)}} = \dfrac{x+1}{x+2}$

Simplify the following rational expressions.

1. $\dfrac{x^2-4}{x^2+5x+6} \cdot \dfrac{x^2-9}{x^2+4x+3}$

2. $\dfrac{x^2+7x+12}{x^2+9x+20} \cdot \dfrac{x^2+7x+10}{x^2-16}$

3. $$\frac{x^2+11x+10}{x^2-3x-4} \cdot \frac{x^2-7x+12}{x^2+8x-20}$$

4. $$\frac{x^2+4x-12}{x^2-8x+12} \cdot \frac{x^2-4}{x^2+2x}$$

5. $$\frac{(x+2)(x+3)}{(x-1)(x+1)} \div \frac{(\boldsymbol{x+3})(\boldsymbol{x-3})}{(\boldsymbol{x+1})(\boldsymbol{x+5})}$$

6. $$\frac{2x^2+x-3}{2x^2+7x+6} \div \frac{x^2-2x+1}{x^2-4}$$

7. $$\frac{4x^2+3x-1}{x^2-1} \div \frac{16x^2-1}{x^2-1}$$

8. $$\frac{6x^2-5x-6}{10x^2-13x-3} \div \frac{3x^2+14x+8}{5x^2+6x+1}$$