Section 8.4 – Multiply and Divide Rational Expressions

Definition:

Simplifying Rational Expressions – a rational expression is in simplified form if its numerator and denominator have no common factors (other than one)

Ex. $\frac{15}{65} = \frac{3\cdot 5}{13\cdot 5} = \frac{3}{13}$ $\qquad \frac{4(x+3)}{(x-5)(x+3)} = \frac{4}{x-5}$

Note – this process may require factoring first before dividing

Example 1.) Simplify $\frac{x^2-2x-15}{x^2-9}$

$\frac{(x-5)(x+3)}{(x+3)(x-3)} = \frac{x-5}{x-3}$

Definition:

Multiplying Rational Expressions – multiply numerators, multiply denominators, and simplify if necessary

Ex. $\frac{2}{3}\cdot\frac{5}{7} = \frac{10}{21}$

Example 2.) Multiply $\frac{8x^3y}{2xy^2}\cdot\frac{7x^4y^3}{4y}$

$\frac{56x^{6}y^{4}}{8xy^{3}} = 7x^6y^1$

Example 3.) Multiply $\frac{3x-3x^2}{x^2+4x-5}\cdot\frac{x^2+x-20}{3x}$

$\frac{3x(1-x)}{(x+5)(x-1)}\cdot\frac{(x+5)(x-4)}{3x}$

$\frac{-1(x-1)(x-4)}{(x-1)} = -(x-4)$

$-x+4$

Example 4.) Multiply $\frac{x+2}{x^3-27}\cdot(x^2+3x+9)$

$\frac{x+2}{(x-3)(x^2+3x+9)}\cdot\frac{x^2+3x+9}{1}$

$\frac{x+2}{x-3}$

Diff of Cubes

$a^3-b^3 = (a-b)(a^2+ab+b^2)$

Sum of Cubes

$a^3+b^3 = (a+b)(a^2-ab+b^2)$