## Chapter 2 – Polynomial and Rational Expressions

## 2.6: Multiplying and Dividing Rational Expressions

This concept extends what we learned in section **2.4: Simplifying Rational Expressions**., BUT we are adding a small (but **ridiculously fun**) twist.

Now we will take more than one rational expression at a time, and MULTIPLY OR DIVIDE them. Since Rational Expressions are "like" fractions, we need to remind ourselves about the rules.

## **Multiplying Fractions**

Top v Top Bottom x Bottom 29 3 × 14 21 19 The Rule is: **Dividing Fractions** The Rule is:  $V_{OV}$  (AN TTurn it into a multiplication by multiply the 1<sup>ST</sup> (frection) by the reciprocal of the 2<sup>ND</sup>  $\frac{5}{3} \div \frac{7}{8} = \frac{5}{3} \times \frac{8}{7} = \frac{40}{21}$ 31

or dividue

When **multiplying**/rational expressions we need to do the following (familiar) things:

- 1) Factoring any polynomials which can be factored
- 2) Stating any restrictions on the variable(s)
- 3) Cancelling any common factors, top to bottom (even from one expression to the other)
- 4) Writing the rational expression in simplified form

When dividing rational expressions, we do the same four things, **BUT** when stating the restrictions, there is one small twist **BECAUSE WE ARE NOT ALLOWED TO DIVIDE BY** ZERO. (Sorry, I shouldn't be shouting, but this is important. It would be terrible if you divided by zero, and then were taken away by the math-cops for endangering the universe).

Examples a)  $\frac{3(x-2)}{b_x} \times \frac{b_y}{x-2}$ 270 2 = \_\_\_\_ Why have I coloured the denominators? b)  $\frac{x^{2}-25}{3x^{2}+x-2} \times \frac{6x^{2}-13x+6}{2x^{2}+7x-15}$   $= \frac{(x-5)(x+1)}{(x+1)(3x-4)} \times \frac{(2x-3)(3x-4)}{(2x-3)} \times \frac{7-1}{7+3}$   $= \frac{(7(-5))}{(x+1)} \times \frac{(2x-3)(3x-4)}{(2x-3)} \times \frac{7-1}{7+3}$   $= \frac{(7(-5))}{(x+1)} \times \frac{7x-2 \neq 0}{3x \neq +2}$   $= \frac{7x-2}{3}$   $= \frac{x+2}{3}$   $= \frac{x+2}{3}$   $= \frac{x+2}{3}$   $= \frac{x+2}{3}$   $= \frac{x+2}{3}$   $= \frac{x+2}{3}$ 

Additional reduction: 
$$Y - 4x - 2 = 0$$
, then  

$$= \frac{(2x+1)^{2}}{25x^{2}-1} + \frac{4x-2}{20x+4}$$

$$= \frac{(2x+1)^{2}}{(5x-1)(5x+1)} + \frac{-2(2x+1)}{4(5x+1)}$$

$$= \frac{(2x+1)^{K}}{(5x-1)(5x+1)} \times \frac{24(5x+1)}{-4(5x+1)} = -\frac{2(2x+1)}{(5x-1)}$$

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$$= -\frac{3(3y-2)}{2(3y+2)} \times \frac{2(3y+2)}{(5y+1)(3y+1)} = -\frac{3(3y-2)}{2(3y+2)}$$
Class/Homework  
Section 2.6  
Pg. 121 - 123 #3, 5, 6abc, 8 - 11