Unit 1 – Polynomial and Rational Expressions

Practice test: solns.

$= [(2x+3)(2x+3)](2x+3)$ associate!

$= [4x^2+6x+6x+9](2x+3)$

$= (4x^2+12x+9)(2x+3)$

$= 8x^3 + 12x^2 + 24x^2 + 36x + 18x + 27$

$= 8x^3 + 36x^2 + 54x + 27$

1. Expand and Simplify

a) $(3a-4b)(2a-5ab+3b)$

$= 6a^2 - 15a^2b + 9ab - 8ab + 20ab^2 - 12b^2$

$= 6a^2 - 15a^2b + ab + 20ab^2 - 12b^2$

b) $(3x-5)^2$

$= (3x-5)(3x-5)$

$= 9x^2 - 15x - 15x + 25$

$= 9x^2 - 30x + 25$

square$_1$ $2 \times$ root$_1 \times$ root$_2$ square$_2$

c) $(2x+3)^3$

$= 8x^3 + 36x^2 + 54x + 27$

2. Factor by grouping

a) $3m^3 - 15m^2 - 2m + 10$

$= 3m^2(m-5) - 2(m-5)$

$= (m-5)(3m^2-2)$

b) $x^2 - 10x + 25 - 4y^2$ (*hint – square minus square*)

perfect square

(nothing like this on the actual test)

$= (x-5)^2 - 4y^2$

difference of squares

$= ((x-5)-2y)((x-5)+2y)$

3. Explain in your own words why we MUST state restrictions on Rational Expressions before doing any cancelling.

Yes - I expect you to use words explaining why we state restrictions. Be creative!

4. Simplify the following rational expressions: Bare solns - little to no explanations

a) $\dfrac{x^2-7x-60}{x^2-4}\times\dfrac{14-7x}{(x-12)^2}$

$x\neq 2,-2,12$

$=\dfrac{(x-12)(x+5)}{(x-2)(x+2)}\times\dfrac{-7(x-2)}{(x-12)^2}$

$=\dfrac{-7(x+5)}{(x+2)(x-12)}$

b) $\dfrac{-3x^2+108}{3x^2+2x-5}\times\dfrac{3x^2+x-10}{x^2+8x+12}$

$=\dfrac{-3(x-6)(x+6)}{(3x+5)(x-1)}\times\dfrac{(3x-5)(x+2)}{(x+6)(x+2)}$

$x\neq -\frac{5}{3},1,-6,-2$

$=\dfrac{-3(x-6)(3x-5)}{(3x+5)(x-1)}$

remember twist for division.

c) $\dfrac{x^2-10x+25}{2x^2-11x+5}\div\dfrac{x^2+7x+12}{2x^2+5x-3}$

$x\neq \frac{1}{2},5,-3,-4$

$=\dfrac{(x-5)^2}{(2x-1)(x-5)}\times\dfrac{(2x-1)(x+3)}{(x+3)(x+4)}$

$=\dfrac{x-5}{x+4}$

d) $\dfrac{2x}{x^2+x-6}+\dfrac{x-4}{x^2+2x-3}$

C.D. $(x+3)(x-2)(x-1)$

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

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

$x\neq -3,2,1$

$=\dfrac{3x^2-8x+8}{(x+3)(x-2)(x-1)}$

e) $\dfrac{2}{x^2+4x-60} - \dfrac{3}{x^2-36}$

$= \dfrac{2}{(x+10)(x-6)} - \dfrac{3}{(x-6)(x+6)}$

$= \dfrac{2(x+6) - 3(x+10)}{(x+10)(x-6)(x+6)}$ $x \neq -10, 6, -6$

$= \dfrac{-x-18}{(x+10)(x-6)(x+6)}$

f) $\dfrac{2x}{x^2-x-2} + \dfrac{x^2+3x-10}{x^2-5x+6} \times \dfrac{3x+12}{x^2+2x-8}$

$= \dfrac{2x}{(x-2)(x+1)} + \dfrac{(x+5)(x-2)}{(x-3)(x-2)} \times \dfrac{3(x+4)}{(x+4)(x-2)}$ $x \neq 2, -1, 3, -4$

$= \dfrac{2x(x-3) + 3(x+5)(x+1)}{(x-2)(x+1)(x-3)}$

$= \dfrac{5x^2 + 12x + 15}{(x-2)(x+1)(x-3)}$

skipped this line: ☺

$\dfrac{2x}{(x+2)(x+1)} + \dfrac{x+5}{x-3} \times \dfrac{3}{x-2}$