Homework Qs

Note Title 10/14/2015

Scientific Notation:

$3,281,300$ becomes 3.2813×10^{6}

0.000009781 becomes 9.781×10^{-6}

4.2 #27 $\dfrac{6^{11}}{6} = \boxed{6^{10}}$

4.2 #77 $\left(\dfrac{x^{-2}}{x^{-5}}\right)^{3} = \dfrac{x^{-6}}{x^{-15}} = \dfrac{x^{15}}{x^{6}} = \dfrac{x^{9}}{1} = \boxed{x^{9}}$

4.2 #79 $\left(\dfrac{2a^{-3}b^{2}}{4a^{-5}b^{6}}\right)^{-2} = \dfrac{2^{-2}a^{6}b^{-4}}{4^{-2}a^{10}b^{-12}} = \dfrac{a^{6}}{2^{2}} \cdot \dfrac{4^{2}}{b^{4}} \cdot \dfrac{b^{12}}{a^{10}}$

$= \dfrac{\cancel{16}^{4}\, a^{6}b^{12}}{\cancel{4}_{1}\, a^{10}b^{4}} = \boxed{\dfrac{4b^{8}}{a^{4}}}$

4.2 #85 $\dfrac{(3x^{-2}y^{-4})(4x^{3}y^{-2})^{-2}}{(3x^{3}y^{-2})^{-2}} = \dfrac{3x^{-2}y^{-4} \cdot 4^{-2}x^{-6}y^{4}}{3^{-2}x^{-6}y^{4}}$

$= \dfrac{3}{x^{2}y^{4} \cdot 4^{2}x^{6}} \cdot \dfrac{y^{4} \cdot 3^{2}x^{6}}{y^{4}}$

$= \dfrac{3 \cdot 9\, x^{6}y^{4}}{16x^{8}y^{8}} = \boxed{\dfrac{27}{16x^{2}y^{4}}}$

Note on 4.3: Multiplying numbers in scientific notation.

Ex: $(3.1 \times 10^4)(7.2 \times 10^6)$

$= 22.32 \times 10^{10}$

$= \boxed{2.232 \times 10^{11}}$

$$\begin{array}{r} 3.1 \\ \times\ 7.2 \\ \hline 62 \\ 217 \\ \hline 22.32 \end{array}$$

4.3: You may turn it in Monday for the bonus

4.4: Addition and subtraction of Polynomials

Ex: $(5x^2 + 7x - 3) + (-6x^3 + 5x^2 - 9x - 10)$

$= 5x^2 + 7x - 3 - 6x^3 + 5x^2 - 9x - 10$

$= \boxed{-6x^3 + 10x^2 - 2x - 13}$

Ex: $(4x^3 + 7x^2 - 1) - (-x^2 - 8x + 6)$

$= 4x^3 + 7x^2 - 1 - 1(-x^2 - 8x + 6)$

$= 4x^3 + 7x^2 - 1 + x^2 + 8x - 6$

$= \boxed{4x^3 + 8x^2 + 8x - 7}$

4.5: Multiplication of Polynomials

Example: $3x^2(5x^3 - 8x^2 + 7)$

$= 3x^2(5x^3) + 3x^2(-8x^2) + 3x^2(7)$

$= 15x^5 - 24x^4 + 21x^2$

Ex: $-5x^2y^3(-4xy^5 + 7x^2y^2 - x^3y + y^4)$

$= -5x^2y^3(-4xy^5) - 5x^2y^3(7x^2y^2) - 5x^2y^3(-x^3y) - 5x^2y^3(y^4)$

$= 20x^3y^8 - 35x^4y^5 + 5x^5y^4 - 5x^2y^7$

Ex: $4x^3(3x^2 - 1 + 6x^2)$

$= 4x^3(9x^2 - 1)$

$= \boxed{36x^5 - 4x^3}$

Problem from 4.3:

Ex: $x^2\left(2 + \frac{5}{x}\right)$

$= 2x^2 + x^2\left(\frac{5}{x}\right)$

$= 2x^2 + \frac{5x^2}{x} = 2x^2 + \frac{5x}{1} = \boxed{2x^2 + 5x}$

Ex: $2x^3y\left(\frac{1}{x^2} + \frac{1}{x} + \frac{1}{y}\right)$

$= 2x^3y\left(\frac{1}{x^2}\right) + 2x^3y\left(\frac{1}{x}\right) + 2x^3y\left(\frac{1}{y}\right) = \frac{2x^3y}{x^2} + \frac{2x^3y}{x} + \frac{2x^3y}{y}$

$= \frac{2xy}{1} + \frac{2x^2y}{1} + \frac{2x^3}{1} = \boxed{2xy + 2x^2y + 2x^3}$

Back to 4.5...

Multiplying Polynomials that have 2 or more terms:

Recall: distributive property:

$$c(a+b) = ca + cb = ac + bc$$

$$(a+b)(c) = ac + bc$$

Ex: $(4x+5)(x-7)$

$= 4x(x-7) + 5(x-7)$

$= 4x^2 - 28x + 5x - 35$

$= \boxed{4x^2 - 23x - 35}$

Ex: $(2x-1)(6x-5)$

$= 2x(6x-5) - 1(6x-5)$

$= 12x^2 - 10x - 6x + 5$

$= \boxed{12x^2 - 16x + 5}$

Ex: $(-3x-5)(4x^2+x-3)$

$= -3x(4x^2+x-3) - 5(4x^2+x-3)$

$= -12x^3 - 3x^2 + 9x - 20x^2 - 5x + 15$

$= \boxed{-12x^3 - 23x^2 + 4x + 15}$

Ex: $(x^2-7x-1)(2x^2-5x-6)$

$= x^2(2x^2-5x-6) - 7x(2x^2-5x-6) - 1(2x^2-5x-6)$

$= 2x^4 - 5x^3 - 6x^2$

$\quad -14x^3 + 35x^2 + 42x$

$\quad\quad -2x^2 + 5x + 6$

$= \boxed{2x^4 - 19x^3 + 27x^2 + 47x + 6}$

4.6: Special Products

Ex: $(2x+5)(2x-5)$

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

$= 4x^2 - 10x + 10x - 25$

$= \boxed{4x^2 - 25}$

Difference of 2 squares pattern:

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

$a(a-b) + b(a-b)$

$= a^2 - ab + ab - b^2 = a^2 - b^2$

Ex:

F	First	for multiplying a binomial times a binomial
O	Outer	
I	Inner	
L	Last	

Ex: $(2x+3)(-4x-8)$

$2x(-4x) + 2x(-8) + 3(-4x) + 3(-8)$

First, outer, inner, Last

$= -8x^2 - 16x - 12x - 24 = \boxed{-8x^2 - 28x - 24}$