BE-18 WEDNESDAY 10-17-07

① Define a "monomial."

② $(4xy^3z^2)(-3xy^9z^2)$

③ $\left(\frac{2x}{5}\right)\left(\frac{5x}{2}\right)$

④ Solve: $2(x-1) \leq -3(2-2x)$

TAKE OUT HOMEWORK:

Pg. 837 Larson 8-1 #1 to 9.

ANSGE WB

#3 Page 32 #1 #4 Pg 42 #5

Ch 8-2 Dividing Monomials

Ex) $\frac{x^5}{x^2} = \frac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x}$

$= \frac{\cancel{x}^{1}\cancel{x}^{1} \cdot x \cdot x \cdot x}{\cancel{x}\cancel{x}} = \boxed{x^3}$

Do you see the shortcut?

$$\boxed{\frac{a^m}{a^n} = a^{m-n}}$$ Division Rule (for exponents)

Ex) $\frac{x^{10}}{x^2} = \boxed{x^8}$

Ex) $\frac{25x^{15}y^2}{5x^3y} = \boxed{5x^{12}y}$

Is there a shortcut for raising a power to a power?

Ex) $\left[(3)^2\right]^3$

$= 3^2 \cdot 3^2 \cdot 3^2$

$= (3 \cdot 3)(3 \cdot 3)(3 \cdot 3) = \boxed{3^6}$

Do you see the shortcut?

$\boxed{(a^m)^N = a^{m \cdot N}}$ Power to a Power Rule (for exponents)

Ex) $(5^2)^5 = \boxed{5^{10}}$

Ex) $\left[(2^3)^2\right]^8 = \boxed{2^{48}}$

"Group to a Power" Rule

Ex) $(2xy)^3 = 2^3x^3y^3 = \boxed{8x^3y^3}$

Raising the exponent in to EACH number or variable.

Ex) $(4x)^2 = \boxed{16x^2}$

Ex) $\left(\frac{2x}{y}\right)^4 = \frac{16x^4}{y^4}$

Ex) $(5x^4y^2z)^3 = 125x^{12}y^6z^3$

Look again at the Division Rule for Exponents: Ex) $\frac{x^8}{x^3} = x^{8-3} = x^5$

This is fine when the top exponent is bigger than the bottom exponent.

But there are 2 special cases:

Case 1 - the top and bottom exponent are equal.

Ex) $\frac{x^8}{x^8} = x^{8-8} = x^0$

But $\frac{x^8}{x^8}$ has to $= 1$

So $x^0 = 1$

$\boxed{a^0 = 1}$ Zero Exponent Rule

Anything to the 0 power $= 1$ except $0^0 = 0$

CASE 2 – the bottom exponent is bigger than the top.

Ex) $\frac{x^3}{x^8} = x^{3-8} = x^{-5}$

BUT $\frac{x^3}{x^8} = \frac{\cancel{x}\cancel{x}\cancel{x}}{\cancel{x}\cancel{x}\cancel{x}xxxxx} = \frac{1}{x^5}$

So $x^{-5} = \frac{1}{x^5}$

$$a^{-N} = \frac{1}{a^N}$$ Negative Exponent Rule

Ex) $x^{-2} = \frac{1}{x^2}$

Ex) $10^{-1} = \frac{1}{10^1} = \frac{1}{10}$

Summary of Exponent Rules

Multiplication Rule

$$a^m \cdot a^N = a^{m+N}$$

Ex) $(x^4y^3)(x^5y) = x^9y^4$

Ex) $8^3 \cdot 8^7 = 8^{10}$

Division Rule ($m > N$)

$$\frac{a^m}{a^N} = a^{m-N}$$

Ex) $\frac{x^8}{x^3} = x^5$

Ex) $\frac{5^{12}}{5^4} = 5^8$

Zero Exponent Rule

(Division Rule where $m = N$)

$$a^0 = 1$$

Except for $0^0 = 0$

Ex) $(4x^3y)^0 = 1$

Ex) $5^0 = 1$

Negative Exponent Rule

(Division Rule where $m < N$)

$$a^{-N} = \frac{1}{a^N}$$

Ex) $5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

Ex) $4x^{-3} = 4 \cdot \frac{1}{x^3} = \frac{4}{x^3}$

Never leave a negative exponent

Power To a Power Rule

$$(a^m)^N = a^{m \cdot N}$$

Ex) $(5^2)^5 = 5^{10}$

Ex) $[(4^3)^2]^6 = [4^6]^6 = 4^{36}$

Group To a Power Rule

$$(ab)^N = a^N b^N$$

OR

$$\left(\frac{a}{b}\right)^N = \frac{a^N}{b^N}$$

Ex) $(4x)^2 = 4^2x^2 = 16x^2$

Ex) $\left(\frac{2x}{y}\right)^3 = \frac{2^3x^2}{y^3} = \frac{8x^2}{y^3}$

Ch. 8-1 ; 8-2 Examples

Ex 3 P411 $\left[(3^2)^3\right]^2 = (3^6)^2 = \boxed{3^{12}}$

Ex 4 P412 $(4ab)^2 = \boxed{16a^2b^2}$

Ex 5 P412 $\left(\frac{1}{3}xy^4\right)^2\left[(-6y)^2\right]^3$ * Challenge

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Ex 1 Pg 417 $\frac{a^5b^8}{ab^3} = \boxed{a^4b^5}$

Ex 2 Pg 418 $\left(\frac{2p^2}{3}\right)^4 = \boxed{\frac{16p^8}{81}}$

Ex 3 Pg 419 (a) $\left(-\frac{3x^5y}{8xy^7}\right)^0 = \boxed{1}$

(b) $\frac{t^3s^0}{t} = \boxed{t^2}$

Ex 4 Pg 420

(a) $\dfrac{b^{-3}c^2}{d^{-5}} = \dfrac{\frac{1}{b^3}c^2}{\frac{1}{d^5}}$

$= \dfrac{c^2}{b^3} \cdot \dfrac{d^5}{1} = \boxed{\dfrac{c^2 d^5}{b^3}}$

(b) $\dfrac{-3a^{-4}b^7}{21a^2b^7c^{-5}} = \dfrac{-1a^{-6}}{7c^{-5}}$

$-\dfrac{1}{7} \cdot \dfrac{\frac{1}{a^6}}{\frac{1}{c^5}} = -\dfrac{1}{7} \cdot \dfrac{1}{a^6} \cdot \dfrac{c^5}{1} = \boxed{\dfrac{-1c^5}{7a^6}}$

or $\boxed{\dfrac{-c^5}{7a^6}}$

HW: Pg 413 # 27 to 30

Pg 421 # 14 to 22