Section 5-1: Monomials

Lesson 15

At the end of this lesson, you should be able to:

* Multiply and divide monomials.

Lesson 15: Monomials Positive Exponents

Exponents are used in algebraic expressions called monomials.

A monomial is an expression that is a number, a variable or the product of a number and one or more variables.

Some examples of monomials are:

$5c$, $-a$, 17, x^3, $\frac{1}{2}x^4y^2$

Definitions

~ **Constants**: Monomials that contain no variables. (just a #)

~ **Coefficient**: The number that is multiplied by the variable.

$3x$

↑ coeff.

Rules of Powers

A POWER is an expression in the form of x^n.

Multiplying Powers:

For any real number a and integers m and n,

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

ex: $3^2 \cdot 3^3 = 3^5$

Dividing Powers:

For any real number a, except a=0, and integers m and n,

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

ex: $\frac{2^5}{2^1} = 2^4$

ex: $\frac{x^3}{x^2} = x$

Properties of Powers

Suppose m and n are integers and a and b are real numbers. Then the following properties hold.

Power of a Power: $(a^m)^n = a^{mn}$ ex: $(x^3)^2 = x^6$

Power of a Product: $(ab)^m = a^m b^m$

ex: $(3x)^2 = 3^2 x^2$

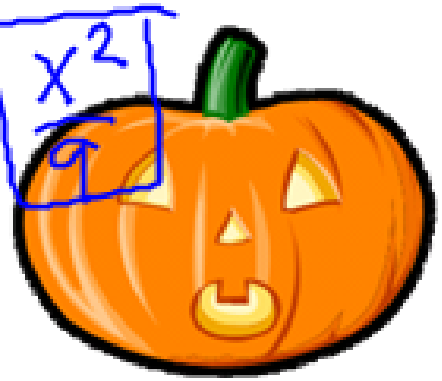
$= 9x^2$

Properties of Powers

Suppose m and n are integers and a and b are real numbers. Then the following properties hold.

Power of a Quotient: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

ex: $\left(\frac{x}{3}\right)^2 = \frac{x^2}{9}$



Zero Exponents: $\frac{a^m}{a^m} = a^0 = 1$

$\frac{3^2}{3^2} = 3^0 = 1$

ex: $(4x^2y)^0 = 1$

ex: $4x^2y^0 = 4x^2(1) = 4x^2$

Lesson 15: Monomials Positive Exponents

Simplify each expression.

Ex 1: $(2x^2y^3)(-5x^4y^2) = (2)(-5)\ (x^2)(x^4)(y^3)(y^2)$

$= -10x^6y^5$

Lesson 15: Monomials Positive Exponents

Simplify.

Ex 2: $(2ab^2)(-4a^3b^3c)$

$= -8a^4b^5c$

Lesson 15: Monomials Positive Exponents

Simplify.

Ex 3: $(6a^3b^2)^0 = \boxed{1}$

Simplify.

Ex 4: $(t^3)^4$ $= t^{12}$

$t^3 \cdot t^3 \cdot t^3 \cdot t^3$

Lesson 15: Monomials Positive Exponents

Simplify.

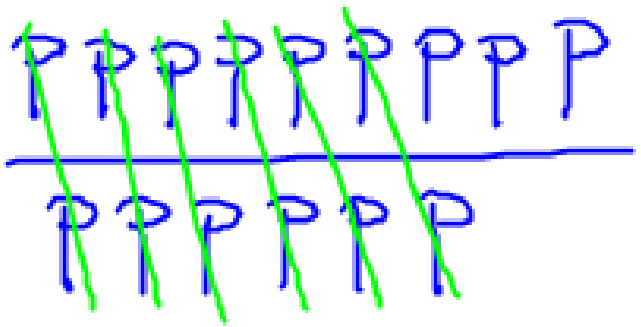
Ex 5: $(t^3w^6)^3$ $= \boxed{t^9 w^{18}}$

$(t^3)^3 \cdot (w^6)^3$

Lesson 15: Monomials Positive Exponents

Simplify.

Ex 6: $\dfrac{p^9}{p^6} = p^3$



Lesson 15: Monomials Positive Exponents

Simplify.

Ex 7: $\dfrac{5x^3y^2}{x^3y} = 5y$

---

ex: $\dfrac{y^2}{y^5} = \dfrac{1}{y^3}$

Simplify.

Ex 8: $\dfrac{-2c^3d^6}{24c^2d^2}$ $= -\dfrac{1c^1d^4}{12}$

$-\frac{1}{12}cd^4$ or $\frac{-cd^4}{12}$

or $\frac{-1cd^4}{12}$

Lesson 15: Monomials Positive Exponents 

Simplify.

Ex 9: $\dfrac{16}{x^0 + y^0} = \dfrac{16}{1+1} = \dfrac{16}{2} = \boxed{8}$

Simplify.

Ex 10: $\left(\dfrac{-4x^{3n}}{x^{2n}z^{2}}\right)^{3} = \dfrac{(-4x^{3n})^{3}}{(x^{2n}z^{2})^{3}} = \dfrac{(-4)^{3}(x^{3n})^{3}}{(x^{2n})^{3}(z^{2})^{3}}$

$= \dfrac{-64x^{9n}}{x^{6n}z^{6}} = \boxed{\dfrac{-64x^{3n}}{z^{6}}}$

Assignment 15

Due next class period