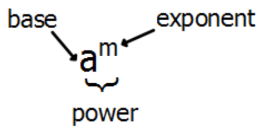
Algebra 1 Notes SOL A.2 (8.1 8.2) Power Properties Mrs. Grieser

Name: ________________________________ Block: _______ Date: ______________

Power Properties

Review:



1. Multiplying Powers with the Same Base (Product of Powers)

> Product of Powers Property
> Let *a* be a real number, and let *m* and *n* be positive integers.
> To multiply powers with the **same base**, **add** the exponents.
> $a^m \cdot a^n = a^{m+n}$

a) $2^6 \cdot 2^8 = 2^{6+8} = 2^{14}$

b) $(-3)^7 \cdot (-3) = (-3)^7 \cdot (-3)^1 =$ ________

c) $(-7)^3 \cdot (-7) \cdot (-7)^4 = (-7)^3 \cdot (-7)^1 \cdot (-7)^4 =$ ______

d) $m \cdot m^5 \cdot m^6 = m^1 \cdot m^5 \cdot m^6 =$ ___________

e) $x^2 \cdot y^2 =$ __________ (** CAREFUL! BASES MUST BE THE SAME TO ADD EXPONENTS**)

2. Power of a Power

> Power of a Power Property
> Let *a* be a real number, and let *m* and *n* be positive integers.
> To find a power of a power, multiply the exponents.
> $(a^m)^n = a^{mn}$

Examples: Simplify the expressions…

a) $(3^3)^6 = 3^{3 \cdot 6} = 3^{18}$

b) $[(-12)^7]^6 = (-12)^{7 \cdot 6} =$ __________

c) $(d^5)^2 = d^{5 \cdot 2} =$ __________

d) $[(x-3)^3]^4 = (x-3)^{3 \cdot 4} =$ _______________

3. Power of a Product

> Power of a Product Property
> Let *a* and *b* be real numbers, and let *m* be a positive integer.
> To find a power of a product, find the power of each factor and multiply.
> $(ab)^m = a^m b^m$

a) $(16 \cdot 21)^4 = 16^4 \cdot 21^4$

b) $(6mn)^3 = (6 \cdot m \cdot n)^3 =$ ________________

c) $(-5p)^3 = (-5 \cdot p)^3 =$ _______________

d) $-(2q)^4 = -(2^4 \cdot q^4) =$ _________________

4. Dividing Powers with the Same Base (Quotient of Powers)

Quotient of Powers Property

Let *a* be a nonzero real number, and let *m* and *n* be positive integers such that m > n.
To divide powers with the **same base**, **subtract** exponents.

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

a) $\frac{7^{13}}{7^8} = 7^{13-8} = 7^5$

b) $\frac{(-1)^6}{(-1)^2} = (-1)^{6-2} =$ ________________

c) $\frac{2^3 \cdot 2^9}{2^4} = \frac{2^{12}}{2^4} =$ ___________________

d) $\frac{1}{y^7} \cdot y^{18} = \frac{y^{18}}{y^7} =$ ________________

5. Power of a Quotient

Power of a Quotient Property

Let *a* and *b* be real numbers with b≠0, and let *m* be a positive integer.
To find a power of a quotient, find the power of the numerator and the power of the denominator and divide.

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

a) $\left(\frac{2x^3}{5y^2}\right)^2 = \frac{(2x^3)^2}{(5y^2)^2} = \frac{2^2(x^3)^2}{5^2(y^2)^2} = \frac{4x^6}{25y^4}$

b) $\left(\frac{3s^5}{t^4}\right)^3 = \frac{(3s^5)^3}{(t^4)^3} =$ ________________

c) $\frac{1}{3m^4} \cdot \left(\frac{3m^2n}{n^2}\right)^3 = \frac{1}{3m^4} \cdot \frac{3^3(m^2)^3n^3}{(n^2)^3} =$ ________

d) $\left(\frac{3j^3}{4k^5}\right)^2 \cdot \frac{k^3}{6j^2} = \frac{3^2(j^3)^2}{4^2(k^5)^2} \cdot \frac{k^3}{6j^2} = \frac{9j^6k^3}{16j^2k^{10}} =$ _______

You try: Simplify the expressions…

a) $8^3 \cdot 8^{11}$

b) $y^3 \cdot y \cdot y^2$

c) $(-10)^2 \cdot (-10) \cdot (-10)^5$

d) $(13^3)^{10}$

e) $(f^8)^2$

f) $[(-8)^7]^3$

g) $[(w + 8)^9]^2$

h) $(5 \cdot 18)^6$

i) $(-3x^2y^5)^2$

j) $(-3y^5)^8 \cdot 2y^2$

k) $x^3 \cdot \frac{1}{x^2}$

l) $\left(\frac{b}{c}\right)^7$

m) $\left(-\frac{3}{w}\right)^4$

n) $8^{13} \cdot \frac{1}{8^6}$

o) $\left(\frac{1}{5}\right)^7 \cdot 5^{17}$

p) $\left(\frac{m^7}{2n^{10}}\right)^6$