

Lesson A
Products of Powers and Powers of Powers

Vocabulary: Review

$$\textcircled{4x^2}$$

1) Name the variable

x

2) Name the coefficient

4

3) Name the exponent

2

4) Name the base

x

Part 1: Products of Powers

Examples:

Rule:

When you multiply powers with the same base → Keep base
add exponents

1) $x^2 \cdot x^3$
 x^5

2) $3^3 \cdot 3^2$
 3^5

3) $y^3 \cdot y$
 y^4

4) $(x^2y)(x^3y^3)$
 x^5y^4

If there is a coefficient:

Steps:

- 1) multiply coefficients
- 2) add exponents

5) $(5x^2)(3x^3)$
 $15x^5$

6) $(-6ab^3)(-2a^2b^7)$
 $12a^3b^{10}$

7) $(3ab)(-5a^2bc^3)$
 $-15a^3b^2c^3$

8) $(2x^{-6}y^5)(-5x^2y^{-3})$
 $-10x^{-4}y^2$
 $\frac{-10y^2}{x^4}$ ²

Try These:

1) $(a^5)(a^2)$

a^7

2) $(m^8)(m^4)$

m^{12}

3) $(-8mp^5)(-m^2p)$

$8m^3p^6$

4) $(a^5)(d^3)$

a^5d^3

5) $(6x^{-2}y^4)(-3x^3y^{-1})$

$-18x^1y^3$

6) $(4x^3y^5)(4x^3y^5)$

$16x^6y^{10}$

Part 2: Powers of Powers

$(x^2)^3$

Rule:

- 1) Expand out
- 2) mult coeff
- 3) add exponents.

Examples:

1) $(x^3)^2$

$(x^3)(x^3)$
 x^6

2) $(2a)^4$

$(2a)(2a)(2a)(2a)$
 $16a^4$

3) $(-2y^3)^3$

$(-2y^3)(-2y^3)(-2y^3)$
 $-8y^9$

4) $(4x^4y)^2$

$(4x^4y)(4x^4y)$
 $16x^8y^2$

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

$(-3x^2y)(-3x^2y)$
 $9x^4y^2$

6) $(7ab)^2 (a^4b)^3$

$(7ab)(7ab)(a^4b)(a^4b)(a^4b)$
 (a^4b)

*7) $(-3ab)^3 (a^{-2}b^4)^2$

$(-3ab)(-3ab)(-3ab)(a^{-2}b^4)(a^{-2}b^4)$
 $-27a^{-1}b^{11} = \frac{-27b^{11}}{a}$

$49a^{16}b^6$

8) $(x^5)^4$

$(x^5)(x^5)(x^5)(x^5)$
 x^{20}

9) $(a^3)^4$

$(a^3)(a^3)(a^3)(a^3)$
 a^{12}

10) $(-3x^6)^3$

$(-3x^6)(-3x^6)(-3x^6)$
 $-27x^{18}$

11) $(-2xy)^3$

$(-2xy)(-2xy)(-2xy)$
 $-8x^3y^3$

12) $(2a^{-4}b^5c^3)^2$

$(2a^{-4}b^5c^3)(2a^{-4}b^5c^3)$
 $4a^{-8}b^{10}c^6$

~~13) $(a^4)^3$~~

$\frac{4b^{10}c^6}{a^8}$

14) $(-8xy)(x^5y)^2(x^7y)$

$(-8xy)(x^5y)(x^5y)(x^7y)$
 $-8x^{18}y^4$