

Power of a Power & Power of a Product Properties WORKSHEET  
Simplify. Your answer should contain only positive exponents.

Period: \_\_\_\_\_

1)  $(3^3)^4$

$(3^3)^4$

Write the original problem

$3^{3 \cdot 4}$

A power to a power can MULTIPLY exponents

$3^{12}$

Multiply exponents

3)  $(2b^3)^2$

$(2b^3)^2$

Write the original problem

$(2^1)^2(b^3)^2$

Power of a Product Properties

$2^{1 \cdot 2} \cdot b^{3 \cdot 2}$

A power to a power can MULTIPLY exponents

$2^2 \cdot b^6$

Multiply exponents

$4b^6$

Simplify

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

$(3a^4)^3$

Write the original problem

$(3^1)^3(a^4)^3$

Power of a Product Properties

$3^{1 \cdot 3} \cdot a^{4 \cdot 3}$

A power to a power can MULTIPLY exponents

$3^3 \cdot a^{12}$

Multiply exponents

$27a^{12}$

Simplify

7)  $(2n^3)^4$

$(2n^3)^4$

Write the original problem

$(2^1)^4(n^3)^4$

Power of a Product Properties

$2^{1 \cdot 4} \cdot n^{3 \cdot 4}$

A power to a power can MULTIPLY exponents

$2^4 \cdot n^{12}$

Multiply exponents

$16n^{12}$

Simplify

9)  $(4v^4)^2$

$(4v^4)^2$

Write the original problem

$(4^1)^2(v^4)^2$

Power of a Product Properties

$4^{1 \cdot 2} \cdot v^{4 \cdot 2}$

A power to a power can MULTIPLY exponents

$4^2 \cdot v^8$

Multiply exponents

$16v^8$

Simplify

11)  $(2x^3y^3)^2$

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

Write the original problem

$(2^1)^2(x^3)^2(y^3)^2$

Power of a Product Properties

$2^{1 \cdot 2} \cdot x^{3 \cdot 2} \cdot y^{3 \cdot 2}$

A power to a power can MULTIPLY exponents

$2^2 \cdot x^6 \cdot y^6$

Multiply exponents

$4x^6y^6$

Simplify

13)  $(3xy)^2$

$(3xy)^2$

Write the original problem

$(3^1)^2(x^1)^2(y^1)^2$

Power of a Product Properties

$3^{1 \cdot 2} \cdot x^{1 \cdot 2} \cdot y^{1 \cdot 2}$

A power to a power can MULTIPLY exponents

$3^2 \cdot x^2 \cdot y^2$

Multiply exponents

$9x^2y^2$

Simplify

15)  $(3qp^4)^4$

$(3qp^4)^4$

Write the original problem

$(3^1)^4(q^1)^4(p^4)^4$

Power of a Product Properties

$3^{1 \cdot 4} \cdot q^{1 \cdot 4} \cdot p^{4 \cdot 4}$

A power to a power can MULTIPLY exponents

$3^4 \cdot q^4 \cdot p^{16}$

Multiply exponents

$81q^4p^{16}$

Simplify

17)  $(4kh^2j^4)^3$

$(4kh^2j^4)^3$

Write the original problem

$(4^1)^3(k^1)^3(h^2)^3(j^4)^3$

Power of a Product Properties

$4^{1 \cdot 3} \cdot k^{1 \cdot 3} \cdot h^{2 \cdot 3} \cdot j^{4 \cdot 3}$

A power to a power can MULTIPLY exponents

$4^3 \cdot k^3 \cdot h^6 \cdot j^{12}$

Multiply exponents

$64h^6j^{12}k^3$

Simplify

19)  $(2x^2y^2z^4)^4$

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

Write the original problem

$(2^1)^4(x^2)^4(y^2)^4(z^4)^4$

Power of a Product Properties

$2^{1 \cdot 4} \cdot x^{2 \cdot 4} \cdot y^{2 \cdot 4} \cdot z^{4 \cdot 4}$

A power to a power can MULTIPLY exponents

$2^4 \cdot x^8 \cdot y^8 \cdot z^{16}$

Multiply exponents

$16x^8y^8z^{16}$

Simplify

21)  $(2^2 \cdot (2^3)^2)^2$

$(2^2 \cdot (2^3)^2)^2$

Write the original problem

$(2^2)^2((2^3)^2)^2$

Power of a Product Properties

$2^{2 \cdot 2} \cdot 2^{3 \cdot 2 \cdot 2}$

A power to a power can MULTIPLY exponents

$2^4 \cdot 2^{12}$

Multiply exponents

$2^{4+12}$

Multiplying powers with the same base can ADD exponents

$2^{16}$

Add exponents

23)  $(2a^3)^3 \cdot 2a$

$(2a^3)^3 \cdot 2a$

Write the original problem

$(2^1)^3(a^3)^3 \cdot 2a^1$

Power of a Product Properties

$2^{1 \cdot 3} \cdot a^{3 \cdot 3} \cdot 2a^1$

A power to a power can MULTIPLY exponents

$2^3 \cdot a^9 \cdot 2a^1$

Multiply exponents

$8 \cdot a^9 \cdot 2a^1$

Simplify

$8 \cdot 2 \cdot a^{9+1}$

Regroup coefficients and Variables

Multiplying powers with the same base can ADD exponents

$16a^{10}$

Simplify

25)  $(2p^2 \cdot p^3)^3$

$(2p^2 \cdot p^3)^3$

Write the original problem

$(2p^{2+3})^3$

Multiplying powers with the same base can ADD exponents

$(2p^5)^3$

ADD exponents

$2^{1 \cdot 3} \cdot p^{5 \cdot 3}$

Power of a Product Properties

$2^3 \cdot p^{15}$

Multiply exponents

$8p^{15}$

Simplify

27)  $2mn^4 \cdot (2m^2n^4)^2$

$2mn^4 \cdot (2m^2n^4)^2$

Write the original problem

$2^1m^1n^4 \cdot 2^{1 \cdot 2} \cdot m^{2 \cdot 2} \cdot n^{4 \cdot 2}$

Power of a Product Properties

$2^1m^1n^4 \cdot 2^2 \cdot m^4 \cdot n^8$

Multiply exponents

$2^1 \cdot 2^2 \cdot m^1m^4 \cdot n^4n^8$

Regroup coefficients and Variables

$2^{1+2} \cdot m^{1+4} \cdot n^{4+8}$

Multiplying powers with the same base can ADD exponents

$2^3 \cdot m^5 \cdot n^{12}$

ADD exponents

$8m^5n^{12}$

Simplify

$$29) yx^3 \cdot (2x^2)^3$$

$$yx^3 \cdot (2x^2)^3$$

Write the original problem

$$y^1x^3 \cdot 2^{1 \cdot 3} \cdot x^{2 \cdot 3}$$

Power of a Product Properties

$$y^1x^3 \cdot 2^3 \cdot x^6$$

Multiply exponents

$$2^3 \cdot x^3x^6 \cdot y^1$$

Regroup coefficients and Variables

$$2^3 \cdot x^{3+6} \cdot y^1$$

Multiplying powers with the same base can ADD exponents

$$2^3 \cdot x^9 \cdot y^1$$

ADD exponents

$$8x^9y$$

Simplify

$$31) 2p^2q^2 \cdot 2m^2p^3(m^3p^3q^4)^3$$

$$2p^2q^2 \cdot 2m^2p^3(m^3p^3q^4)^3$$

Write the original problem

$$2^1p^2q^2 \cdot 2^1m^2p^3 \cdot m^{3 \cdot 3}p^{3 \cdot 3}q^{4 \cdot 3}$$

Power of a Product Properties

$$2^1p^2q^2 \cdot 2^1m^2p^3 \cdot m^9p^9q^{12}$$

Multiply exponents

$$2^1 \cdot 2^1 \cdot m^2m^9 \cdot p^2p^3p^9 \cdot q^2q^{12}$$

Regroup coefficients and Variables

$$2^{1+1} \cdot m^{2+9} \cdot p^{2+3+9} \cdot q^{2+12}$$

Multiplying powers with the same base can ADD exponents

$$2^2 \cdot m^{11} \cdot p^{14} \cdot q^{14}$$

ADD exponents

$$4m^{11}p^{14}q^{14}$$

Simplify

$$33) (2p^3q^3)^4 \cdot 2pq^2$$

$$(2p^3q^3)^4 \cdot 2pq^2$$

Write the original problem

$$2^{1 \cdot 4}p^{3 \cdot 4}q^{3 \cdot 4} \cdot 2^1p^1q^2$$

Power of a Product Properties

$$2^4p^{12}q^{12} \cdot 2^1p^1q^2$$

Multiply exponents

$$2^4 \cdot 2^1 \cdot p^{12}p^1 \cdot q^{12}q^2$$

Regroup coefficients and Variables

$$2^{4+1} \cdot p^{12+1} \cdot q^{12+2}$$

Multiplying powers with the same base can ADD exponents

$$2^5 \cdot p^{13} \cdot q^{14}$$

ADD exponents

$$32p^{13}q^{14}$$

Simplify