

Study the box below. Follow the directions and write the answer in the space provided.

<p><b>Rule:</b> An exponent tells the number of times a base is multiplied by itself.</p> <p><math>9 \cdot 9 \cdot 9 \cdot 9 = 9^4</math></p> <p style="margin-left: 100px;"> <math>\xrightarrow{\text{exponent}}</math>  <math>\xrightarrow{\text{base}}</math> </p>	<p><b>Examples:</b></p> <p><math>4^3 = 4 \cdot 4 \cdot 4</math>      Expanded form</p> <p><math>2 \cdot 4 \cdot 2 \cdot 4 = 2^2 \cdot 4^2</math>      Exponential form</p> <p><math>5^2 = 25</math>      Simplified</p>
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Write each problem in expanded form.

1.  $7^6$

3.  $x^3$

5.  $8^9 \cdot 9$

2.  $4^5$

4.  $a^2 \cdot b^2$

6.  $2^2 \cdot 3^5$

Write each problem in exponential form.

7.  $5 \cdot 5$

10.  $10 \cdot 9 \cdot 9 \cdot 10$

13.  $m \cdot n \cdot m \cdot m$

8.  $11 \cdot 11 \cdot 11$

11.  $2 \cdot 2 \cdot 4 \cdot 3 \cdot 3$

14.  $x \cdot y \cdot x \cdot y$

9.  $6 \cdot 6 \cdot 6$

12.  $3 \cdot 2 \cdot 3$

15.  $a \cdot a \cdot a$

Simplify each problem.

16.  $7^2$

18.  $2^5 \cdot 3^2 \cdot 4^3$

20.  $12^2 + 9^2$

17.  $4^4 + 3$

19.  $8^2 \cdot 3^2$

21.  $4^2 \cdot 6^3 \cdot 8^0$

Study the box below. Simplify. Write the answers in exponent form in the space provided.

**Rules:**

To multiply powers with like bases, add the exponents. Use the sum as the exponent with the base.

To divide powers with like bases, subtract the exponents. Use the difference as the exponent with the base.

**Examples:**

$$4^4 \cdot 4^5 = 4^{4+5} = 4^9$$

$$\frac{3^6}{3^2} = 3^{6-2} = 3^4$$

1.  $2^3 \cdot 2^5$

7.  $4^2 \cdot 4^2$

13.  $x^3 \cdot x^6$

2.  $5^8 \cdot 5^2$

8.  $9^2 \cdot 9 \cdot 9^3$

14.  $m \cdot m^3 \cdot m^4$

3.  $8^3 \cdot 8^4$

9.  $3 \cdot 3^4 \cdot 3^3$

15.  $c^5 \cdot c^2$

4.  $\frac{10^3}{10}$

10.  $\frac{5^4}{5^4}$

16.  $\frac{y^5}{y^4}$

5.  $\frac{7^5}{7^4}$

11.  $\frac{11^8}{11^5}$

17.  $\frac{a^7}{a^4}$

6.  $\frac{6^4}{6^2}$

12.  $\frac{4^3}{4^2}$

18.  $\frac{b^5}{b^4}$