

Powers and Exponents

Name Answer Key
 Period _____ Date _____



A power can be used to show a number multiplied by itself.

$3 \times 3 \times 3 \times 3$ can be written 3^4 . It is read, "3 to the fourth power."

The *exponent*, 4, tells you how many times the *base*, 3, is used as a factor. Base \longrightarrow 3 \longleftarrow exponent

Example 1 Write $2 \cdot 2 \cdot 3 \cdot 2 \cdot 2 \cdot 3$ using exponents.

There are four factors of 2 and two factors of 3.

$$2 \cdot 2 \cdot 3 \cdot 2 \cdot 2 \cdot 3 = 2^4 \cdot 3^2$$

Multiply to find the value of expressions with exponents.

Examples 2 Evaluate 3^4 .

$$3^4 = 3 \cdot 3 \cdot 3 \cdot 3 \\ = 81$$

Example 3

Evaluate $2^4 \cdot 3^3$.

$$2^4 \cdot 3^3 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \\ = 16 \cdot 9 \\ = 144$$

Write each expression using exponents.

1. $7 \cdot 7 \cdot 7 \cdot 6 \cdot 6 \cdot 6 \cdot 6$

$$7^3 \cdot 6^4$$

2. $2 \cdot 2 \cdot 5 \cdot 5 \cdot 9 \cdot 9$

$$2^2 \cdot 5^2 \cdot 9^2$$

3. $10 \cdot 10 \cdot 8 \cdot 8$

$$10^2 \cdot 8^2$$

4. $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$

$$4^6$$

Evaluate each expression.

5. 10^5

$$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \\ = 100,000$$

6. 2^5

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \\ = 32$$

7. 7^2

$$7 \cdot 7 \\ = 49$$

8. $3^3 \cdot 4^2$

$$3 \cdot 3 \cdot 3 \cdot 4 \cdot 4 \\ 27 \cdot 16 = 432$$

9. $1^9 \cdot 5^2$

$$1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 5 \cdot 5 \\ 1 \cdot 25 = 25$$

10. $100^2 \cdot 6^2$

$$100 \cdot 100 \cdot 6 \cdot 6 \\ 10,000 \cdot 36 = 360,000$$

11. $2^4 \cdot 1^6$

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \\ 4 \cdot 4 \cdot 1 = 16$$

12. 9^1

$$9$$

13. 6^0

$$1$$

$$\begin{array}{r} 4 \\ 27 \\ 16 \\ \hline 432 \end{array}$$