



Name _____ Date _____

Powers and Exponents (Pages 8–10)

When you multiply two or more numbers, each number is called a **factor** of the product. When the same factor is repeated, you can use an **exponent** to simplify the notation. An exponent tells you how many times a number, called the **base**, is used as a factor. A **power** is a number that is expressed using exponents.

Example of a Power	$5^4 = 5 \times 5 \times 5 \times 5$	five to the fourth power
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EXAMPLES

A Write $4 \cdot 4 \cdot 7 \cdot 4 \cdot 7$ using exponents.

Use the commutative property to rearrange the factors. Then use the associative property to group them.

$$4 \cdot 4 \cdot 4 \cdot 7 \cdot 7 \\ = (4 \cdot 4 \cdot 4) \cdot (7 \cdot 7) = 4^3 \cdot 7^2$$

B Evaluate 6^4 .

$$6^4 = 6 \cdot 6 \cdot 6 \cdot 6 \\ = 36 \cdot 36 \\ = 1,296$$

Try These Together

- Write $5 \cdot 5 \cdot 5$ using exponents.
HINT: How many times is each factor used?
- Write $3 \cdot 3$ using exponents.
- Evaluate 2^3 .
HINT: Write each power as a product.
- Evaluate 5^2 .

PRACTICE

Write each expression using exponents.

- $8 \cdot 8 \cdot 8 \cdot 8$
- $1 \cdot 1$
- $7 \cdot 7 \cdot 6 \cdot 6$
- $2 \cdot 2 \cdot 2 \cdot 4 \cdot 4$
- $10 \cdot 10 \cdot 9 \cdot 9 \cdot 9$
- $a \cdot a \cdot a \cdot b$

Evaluate each expression.

- 9^1
- 3^5
- $1^3 \cdot 2^4$
- $6^2 \cdot 4^3$
- $3^3 \cdot 2^2 \cdot 4^1$
- $4 \cdot 5^2 \cdot 3^2$

17. Sports The Tour de France is one of the most difficult bicycle races in the world. Cyclists ride about 3.2×10^3 kilometers through France's countryside and mountains. Express this number without exponents.



18. Standardized Test Practice How can $8 \cdot 8 \cdot 8 \cdot p \cdot p \cdot 3$ be written using exponents?

- A** $3^p \cdot 64 \cdot p$ **B** $6^4 \cdot p^2 \cdot 3$ **C** $8^3 \cdot p^2 \cdot 3$ **D** $8^2 \cdot p^3 \cdot 3$

Answers: 1. 9^1 2. 3^5 3. $1^3 \cdot 2^4$ 4. $6^2 \cdot 4^3$ 5. $3^3 \cdot 2^2 \cdot 4^1$ 6. $4 \cdot 5^2 \cdot 3^2$ 7. $8 \cdot 8 \cdot 8 \cdot p \cdot p \cdot 3$ 8. $8^3 \cdot p^2 \cdot 3$ 9. 10^3 10. 10^3 11. 10^3 12. 10^3 13. 10^3 14. $2,304$ 15. 432 16. 900 17. $3,200$ 18. C