



Name _____ Date _____

Powers and Exponents (pages 28–31)

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 your writing. 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.

Order of Operations with Powers

1. Do all powers before other operations.
2. Multiply and divide in order from left to right.
3. Add and subtract in order from left to right.

EXAMPLES

- A** Write $7 \cdot 7 \cdot 7$ using exponents.

The base is 7. Since 7 is a factor three times, the exponent is 3.
 $7 \cdot 7 \cdot 7 = 7^3$

- B** Write 9^2 as a product, then evaluate.

The base is 9. The exponent 2 means that 9 is a factor two times.
 $9^2 = 9 \cdot 9$
 $= 81$

- C** Evaluate $2 \cdot 3^3$.

$2 \cdot 3^3 = 2 \cdot 27$ Evaluate 3^3 first. $3^3 = 3 \cdot 3 \cdot 3$ or 27
 $= 54$ Multiply 2 and 27.

Try These Together

1. Write $21 \cdot 21 \cdot 21$ using exponents.

HINT: How many factors are there?

2. Evaluate $12 - 2^3$.

HINT: Do the power first.

PRACTICE

Write each product using exponents.

3. $12 \cdot 12$

4. $5 \cdot 5 \cdot 5 \cdot 5$

5. $q \cdot q \cdot q \cdot q \cdot q$

6. $2 \cdot 2 \cdot 2 \cdot 7 \cdot 7$

7. $13 \cdot 13 \cdot 8 \cdot 8 \cdot 8 \cdot 8$

8. $y \cdot z \cdot z \cdot z$

Write each power as a product.

9. 6^4

10. 36^2

11. $s^4 \cdot t^5$

12. $a^2 \cdot b^2 \cdot c^3$

Evaluate each expression.

13. 10^3

14. 2^4

15. 13^2

16. 5 cubed

17. $3^5 - 10$

18. $6 \cdot 4^2 + 4$

- 19. Population** The U.S. Census Bureau estimated in 1999 that there were about 10^7 60 to 64-year-olds living in the United States. About how many people is this?



- 20. Standardized Test Practice** Evaluate $2^3 \cdot 10 + 6$.

A 86

B 128

C 236

D 46

Answers: 1. $2 \cdot 13$ 2. 4 3. 12^2 4. 5^4 5. q^5 6. $2 \cdot 2^2 \cdot 7$ 7. $13^2 \cdot 8^2$ 8. yz^3 9. $6 \cdot 6 \cdot 6 \cdot 6$ 10. $36 \cdot 36$ 11. $s \cdot s \cdot s \cdot s \cdot s \cdot t \cdot t \cdot t \cdot t \cdot t$ 12. $a \cdot a \cdot b \cdot b \cdot c \cdot c \cdot c$ 13. 1,000 14. 16 15. 169 16. 125 17. 233 18. 100 19. 10,000,000 20. A