1-3 Study Guide and Intervention

Powers and Exponents

A product of prime factors can be written using exponents and a base. Numbers expressed using exponents are called **powers**.

Powers	Words	Expression	Value
4^2	4 to the second power or 4 squared	4×4	16
5^6	5 to the sixth power	$5 \times 5 \times 5 \times 5 \times 5 \times 5$	15,625
7^4	7 to the fourth power	$7 \times 7 \times 7 \times 7$	2,401
9^3	9 to the third power or 9 cubed	$9 \times 9 \times 9$	729

Example 1 **Write $6 \times 6 \times 6$ using an exponent. Then find the value.**

The base is 6. Since 6 is a factor 3 times, the exponent is 3.
$6 \times 6 \times 6 = 6^3$ or 216

Example 2 **Write 2^4 as a product of the same factor. Then find the value.**

The base is 2. The exponent is 4. So, 2 is a factor 4 times.
$2^4 = 2 \times 2 \times 2 \times 2$ or 16

Example 3 **Write the prime factorization of 225 using exponents.**

The prime factorization of 225 can be written as $3 \times 3 \times 5 \times 5$, or $3^2 \times 5^2$.

Exercises

Write each product using an exponent. Then find the value.

1. $2 \times 2 \times 2 \times 2 \times 2$

2. 9×9

3. $3 \times 3 \times 3$

4. $5 \times 5 \times 5$

5. $3 \times 3 \times 3 \times 3 \times 3$

6. 10×10

Write each power as a product of the same factor. Then find the value.

7. 7^2

8. 4^3

9. 8^4

10. 5^5

11. 2^8

12. 7^3

Write the prime factorization of each number using exponents.

13. 40

14. 75

15. 100

16. 147