

Study Guide and Intervention

Powers and Exponents

Class Notes

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 $6 \cdot 6 \cdot 6$ using an exponent. Then find the value of the power.

The base is 6. Since 6 is a factor 3 times, the exponent is 3.

$$6 \cdot 6 \cdot 6 = 6^3 \text{ or } 216$$

EXAMPLE 2 Write 2^4 as a product. Then find the value of the product.

The base is 2. The exponent is 4. So, 2 is a factor 4 times.

$$2^4 = 2 \cdot 2 \cdot 2 \cdot 2 \text{ or } 16$$

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 of the power.

1. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

2. $9 \cdot 9$

3. $3 \cdot 3 \cdot 3$

4. $5 \cdot 5 \cdot 5$

5. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

6. $10 \cdot 10$

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

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