



What is true about the factors of a number written in exponential notation? [All of the factors are the same.]

Numbers involving exponents can be written in three different forms.

Exponential notation	5^3
Expanded form	$5 \times 5 \times 5$
Standard form	125

When might you want to use exponential notation rather than expanded form? [Use exponential notation when the exponent is large. It can be faster than writing out the repeated multiplication in expanded form.]

Prevent Misconceptions

Some students may wrongly multiply the base by the exponent to find the standard form of a number written in exponential notation. Encourage students to write the number in expanded form first and then in standard form to avoid this error.

The **base** is the number to be multiplied.

The **exponent** is the number that tells how many times the base is used as a factor.



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3 Independent Practice

Remind students that a base is the number to be multiplied, and the exponent is the number that tells how many times the base is used as a factor. Use Exercise 9 as an example. **What is the base?** [9] **What is the exponent?** [3] **So how many times is the base used as a factor?** [3 times]

Independent Practice

In 8 through 14, write in exponential notation.

8. $10 \times 10 \times 10 \times 10 \times 10$ 9. $9 \times 9 \times 9$ 10. 81×81 11. $5 \times 5 \times 5 \times 5$
 10^5 9^3 81^2 5^4
12. $7 \times 7 \times 7$ 13. $13 \times 13 \times 13 \times 13 \times 13$ 14. $6 \times 6 \times 6 \times 6$
 7^3 13^5 6^4

In 15 through 22, write in expanded form.

15. 17^2 16. 35 squared 17. 4^3 18. 7^6
 See margin. 35×35 $4 \times 4 \times 4$ $7 \times 7 \times 7 \times 7 \times 7 \times 7$
19. 55^4 20. 11^6 21. 8 cubed 22. 1^9
 See margin. See margin. $8 \times 8 \times 8$ See margin.

In 23 through 30 write in standard form.

23. 5^4 24. 10^3 25. $4 \times 4 \times 4$ 26. 12 squared
 625 1000 64 144
27. 1^{10} 28. 2^6 29. 3 cubed 30. 9^4
 1 64 27 6561

Problem Solving

Exercise	Content
31	Communicate Math Understanding Meaning of Exponential Notation
32	Square Numbers
33a	Multiplication (10×10)
33b	Write Numbers in Exponential Notation
34	Write Numbers in Standard Form

Students use underlying processes and mathematical tools for Exercises 31–34. Remind students to check for reasonableness when solving each problem.

Exercise 31

Explain to students that an exponent is also called a power. **8 raised to the fourth power means 8^4 . How many times is 8 used as a factor?** [4 times]

Exercise 34

Test-Taking Tip: Make Smart Choices Encourage students to eliminate wrong answers. **What is the standard form of 2^5 ?** [64] **What answers can you eliminate based on this information?** [Choices A, B, and D]

Problem Solving

31. **Writing to Explain** Why is the standard form of 8^2 NOT equal to 16?
 $8^2 = 8 \times 8$ which is 64, not 16.
33. Darnell earned \$10 each week for 10 weeks walking a neighbor's dog.
 a. How much did he earn?
 $\$100$
 b. Write the amount Darnell earned using exponential notation.
 10^2

32. **Number Sense** Find the number that equals 81 when it is squared.
 9
34. Which of the following, when written in standard form, is equal to the standard form of 2^5 ?
 A 6^2 B 3^4 C 8^2 D 4^4

15. $17 \times 17 \times 17 \times 17 \times 17$
 18. $7 \times 7 \times 7 \times 7 \times 7 \times 7$
 19. $55 \times 55 \times 55 \times 55$
 20. $11 \times 11 \times 11 \times 11 \times 11 \times 11$
 22. $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1$