Notes & Steps

Key idea

A power (or exponent) tells you how many times to multiply a number by itself. A root asks: what number, multiplied by itself, gives the original?

Steps — evaluate powers

1. Identify the base (the big number) and the exponent (the small number).
2. Multiply the base by itself exponent times.
3. Example: $2^3 = 2 \times 2 \times 2 = 8$.

Steps — square roots

1. Ask: what number times itself equals the given?
2. Example: $\sqrt{25} = 5$ because $5 \times 5 = 25$.

Key facts

- $2 \times 2 \times 2 \times 2 = 2^4$
- $2^3 = 8$
- $3^2 = 9$
- $\sqrt{25} = 5$
- $4^1 = 4$ (any number to the power 1 is itself)
- $\sqrt{4} = 2$ (rational — an integer)

Common mistake

Thinking $2^3 = 6$ (multiplying base by exponent). Remember: $2^3 = 2 \times 2 \times 2 = 8$, not $2 \times 3 = 6$.

Try these

1. Write $2 \times 2 \times 2 \times 2$ using a power.
2. What is 2^3?
3. What is $\sqrt{25}$?

Notes & Steps

Example 1: square numbers

Evaluate 3^2.

$$3^2 = 3 \times 3 = 9$$

Answer: 9. 9 is called a square number.

Example 2: cube numbers

Calculate 5^3.

$$5^3 = 5 \times 5 \times 5 = 125$$

Answer: 125. 125 is called a cube number.

Try these

1. Evaluate 3^2.
2. Find $\sqrt{36}$.
3. Name one cube number.

Notes & Steps

Example 3: powers of 10

Calculate 10^3.

$$10^3 = 10 \times 10 \times 10 = 1000$$

Pattern: the exponent tells how many zeros.

Example 4: expressing as a power

Write 81 as a power of 3.

$$81 = 3 \times 3 \times 3 \times 3 = 3^4$$

Answer: 3^4.

Common mistake

Confusing -3^2 with $(-3)^2$. $-3^2 = -9$ (the square happens first). $(-3)^2 = 9$ (the whole negative is squared).