

1.2 Powers and Exponents

ESSENTIAL QUESTION

How can you use repeated factors in real-life situations?

COMMON CORE STATE STANDARDS

6.EE.1 Write and evaluate numerical expressions involving whole-number exponents.

base $\rightarrow 2^4 \leftarrow$ Exponent \leftarrow POWER

$$2 \cdot 2 \cdot 2 \cdot 2 = 16$$

In a power, the exponent tells you how many times to multiply the base times itself.

Power	Words
3^2	Three <i>squared</i> , or three to the second
3^3	Three <i>cubed</i> , or three to the third
3^4	Three to the fourth

EXAMPLE 1 Writing Expressions as Powers

Write each product as a power.

a. $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5$

b. $12 \times 12 \times 12 = 12^3$

On Your Own

Write the product as a power.

1. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 6^6$

2. $15 \times 15 \times 15 \times 15 = 15^4$

EXAMPLE 2 Finding Values of Powers

Find the value of each power.

a. $7^2 = 7 \cdot 7 = 49$

b. $5^3 = 5 \cdot 5 \cdot 5 = 125$

● On Your Own

Find the value of the power.

1. $6^3 = 6 \cdot 6 \cdot 6 = 216$

2. $9^2 = 9 \cdot 9 = 81$

● On Your Own

Find the value of the power.

3. $3^4 = 3 \cdot 3 \cdot 3 \cdot 3 = 81$

4. $12^2 = 12 \cdot 12 = 144$

Perfect
Squares

$1^2 = 1$

$6^2 = 36$

$2^2 = 4$

$7^2 = 49$

$3^2 = 9$

$8^2 = 64$

$4^2 = 16$

$9^2 = 81$

$5^2 = 25$

$10^2 = 100$

PERFECT SQUARE → The square of a whole number.

EXAMPLE 3 Identifying Perfect Squares

Determine whether each number is a perfect square.

a. 64 yes

b. 20 no

On Your Own

Determine where the number is a perfect square.

1. 25 yes
2. 2 no
3. 99 no
4. 100 yes

EXAMPLE 4 Real-Life Application

A game board is a square with a side length of 20 inches. What is the area of the game board?



20 in.

Area of Square
= side \times side

$$A = 20^2$$

$$A = 400 \text{ in}^2$$

the Area of the
gameboard is 400 in^2 .

On Your Own

What is the area of the square traffic sign in square inches? In square feet?

$A = 24^2 = 576 \text{ in}^2$



CLOSURE

The theoretical ride capacity for Skyrush (at Hershey Par, PA) is 1350 riders per hour. There are 2 trains with 32 drivers each. How many rides is this per hour?