LESSON MAKER PRO

Power Up Place Value

Use place-value patterns to read and write powers of 10.

GRADE 6 · 6.NS.3.d

6.NS.3.d "Recognize and represent powers of 10 with whole number exponents by examining patterns in place value."

NAME _____ DATE _____

POWERS BUILD ZEROS

A power of 10 tells how many factors of 10 are multiplied. For 10^n, the exponent n also tells how many zeros are in the value when n is a whole number. Each time the exponent increases by 1, the value becomes 10 times as great.

WORKED EXAMPLE

Write 10^8 in standard form.

1. The exponent 8 means multiply eight factors of 10.
2. $10^8 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$.
3. The product is 1 followed by 8 zeros.
4. $10^8 = 100{,}000{,}000$.

Answer: 100,000,000

PRACTICE 6 problems

1 Write 10^3 in standard form.

ANSWER _____

2 Write 1,000,000 as a power of 10.

ANSWER _____

3 Complete the pattern: $10^2 = 100$, $10^3 = 1{,}000$, $10^4 =$ ___.

ANSWER _____

4 Write 70,000 as 7 multiplied by a power of 10.

ANSWER _____

5 How many times as great is 10^5 as 10^2?

ANSWER _____

6 Write 4,030,000 as a sum using its nonzero digits multiplied by powers of 10.

ANSWER _____

APPLY IT Show your work

1 A gaming club earns 10^2 points in round 1. In each new round, the club earns 10 times as many points as in the round before. How many points does the club earn in round 4? Write the answer as a power of 10 and in standard form.

WORK SPACE

ANSWER _____

2 A music app reports 10^6 song ratings in one day. Write this number in standard form. Then tell how many zeros are in the number.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A student says that $10^3 + 10^3 = 10^6$ because the exponents should be added. Is the student correct? Explain your reasoning and write the correct sum.

WORK SPACE AND ANSWER

ANSWER KEY

Power Up Place Value

GRADE 6 · 6.NS.3.d

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Write 10^3 in standard form.	**1,000**
2	Write 1,000,000 as a power of 10.	**10^6**
3	Complete the pattern: $10^2 = 100$, $10^3 = 1{,}000$, $10^4 =$ ___.	**10,000**
4	Write 70,000 as 7 multiplied by a power of 10.	**7×10^4**
5	How many times as great is 10^5 as 10^2?	**1,000 times**
6	Write 4,030,000 as a sum using its nonzero digits multiplied by powers of 10.	**$4 \times 10^6 + 3 \times 10^4$**

PART 2 · APPLY IT

1. **10^5 points, or 100,000 points** The exponent starts at 2 in round 1 and increases by 1 each round. Round 4 has 10^5 points, which is 100,000 points.
2. **1,000,000; 6 zeros** The exponent tells the number of zeros after the 1. So 10^6 is 1 followed by 6 zeros.

CHALLENGE

No. $10^3 + 10^3 = 1{,}000 + 1{,}000 = 2{,}000 = 2 \times 10^3$, not 10^6.

Accept equivalent multiplication notation, such as $7(10^4)$. For the challenge, accept any explanation that shows the two values are added as 1,000 + 1,000 and gives 2,000.