LESSON MAKER PRO

Powers in Action

Work with numbers from tiny chip parts to large data files.

HIGH SCHOOL · MT.CORE.NUM.REAL.2

MT.CORE.NUM.REAL.2 "Represent and perform operations within very large and very small numbers using scientific notation."

NAME _____ DATE _____

THE BIG IDEA

For a positive number in scientific notation, write $a \times 10^n$, where $1 \le a < 10$ and n is an integer. To multiply or divide, operate on the coefficients and add or subtract the exponents; to add or subtract, first match the powers of 10. If the result's coefficient is outside the range from 1 up to, but not including, 10, shift its decimal and adjust the exponent.

WORKED EXAMPLE

Multiply $(8 \times 10^5)(9 \times 10^{-8})$. Write the answer in scientific notation.

1. Multiply the coefficients: $8 \times 9 = 72$.
2. Add the exponents: $5 + (-8) = -3$.
3. Rewrite 72×10^{-3} as 7.2×10^{-2}.

Answer: 7.2×10^{-2}

PRACTICE 6 problems

1 Write 0.0000047 in scientific notation.

ANSWER _____

2 Write 6.2×10^7 in standard form.

ANSWER _____

3 Multiply $(1.5 \times 10^4)(4 \times 10^{-2})$. Write the answer in scientific notation.

ANSWER _____

4 Divide $(6.6 \times 10^{-3}) / (1.1 \times 10^2)$. Write the answer in scientific notation.

ANSWER _____

5 Add $(2.4 \times 10^6) + (3.1 \times 10^6)$. Write the answer in scientific notation.

ANSWER _____

6 Subtract $(4.5 \times 10^{-4}) - (1.5 \times 10^{-5})$. Write the answer in scientific notation.

ANSWER _____

APPLY IT Show your work

1 A short video file uses 1.2×10^7 bytes. A video platform stores 2.5×10^3 files of this size. How many bytes do the files use in all? Write your answer in scientific notation.

WORK SPACE

ANSWER _____

2 A row on a phone chip is 6×10^{-6} meters long. Each tiny switch takes 1.5×10^{-8} meters along the row. If there are no gaps, how many switches fit?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A cloud account has 1.6×10^{10} bytes free. You upload 3×10^3 photos, each using 4×10^6 bytes. How many free bytes remain? Write your answer in scientific notation.

WORK SPACE AND ANSWER

Powers in Action

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Write 0.0000047 in scientific notation.	**4.7×10^{-6}**
2	Write 6.2×10^{7} in standard form.	**62,000,000**
3	Multiply $(1.5 \times 10^{4})(4 \times 10^{-2})$. Write the answer in scientific notation.	**6×10^{2}**
4	Divide $(6.6 \times 10^{-3}) / (1.1 \times 10^{2})$. Write the answer in scientific notation.	**6×10^{-5}**
5	Add $(2.4 \times 10^{6}) + (3.1 \times 10^{6})$. Write the answer in scientific notation.	**5.5×10^{6}**
6	Subtract $(4.5 \times 10^{-4}) - (1.5 \times 10^{-5})$. Write the answer in scientific notation.	**4.35×10^{-4}**

PART 2 · APPLY IT

1. **3×10^{10} bytes** Multiply $1.2 \times 2.5 = 3$ and add the exponents, $7 + 3 = 10$.
2. **400 switches** Divide the row length by the length per switch: $(6 / 1.5) \times 10^{-6 - (-8)} = 4 \times 10^{2}$.

CHALLENGE

4×10^{9} bytes

The challenge upload uses 1.2×10^{10} bytes, leaving 4×10^{9} bytes. Require normalized scientific notation wherever the prompt requests it.