

Exponent Power Lab

Multiply, divide, and interpret scientific notation.

GRADE 8 • NY-8.EE.4

NY-8.EE.4 "Perform multiplication and division with numbers expressed in scientific notation, including problems where both standard decimal form and scientific notation are used..."

NAME _____

DATE _____

POWER RULES

When you multiply numbers in scientific notation, multiply the coefficients and add the exponents. When you divide, divide the coefficients and subtract the exponents. Rewrite the result so the coefficient is at least 1 and less than 10.

WORKED EXAMPLE

Multiply: $(3.2 \times 10^5)(4 \times 10^{-3})$

1. Multiply the coefficients: $3.2 \times 4 = 12.8$.
2. Add the exponents: $5 + (-3) = 2$.
3. Write the product as 12.8×10^2 .
4. Move the decimal one place left and increase the exponent by 1.

Answer: 1.28×10^3

PRACTICE 6 problems

1 Multiply: $(6 \times 10^4)(7 \times 10^8)$

ANSWER _____

2 Divide: $(9.6 \times 10^{-9}) / (1.6 \times 10^{-4})$

ANSWER _____

3 Multiply: $0.00008 \times (7 \times 10^6)$. Write the answer in scientific notation.

ANSWER _____

4 Divide: $(9 \times 10^{11}) / 0.03$. Write the answer in scientific notation.

ANSWER _____

5 A calculator shows $6.05E-8$. Write this number in standard decimal form.

ANSWER _____

6 A bacterium is 0.000004 meter long. Write its length in scientific notation in meters. Then express the length in micrometers. Use $1 \text{ micrometer} = 1 \times 10^{-6} \text{ meter}$.

ANSWER _____

APPLY IT Show your work

- 1** A game download contains 3.2×10^9 bytes. Each byte has 8 bits. How many bits are in the download? Write your answer in scientific notation.

WORK SPACE

ANSWER _____

- 2** Each pixel in a phone camera sensor is 1.5×10^{-6} meter wide. A row has 2×10^3 pixels placed edge to edge. What is the row's width in scientific notation in meters and in millimeters? Use $1 \text{ mm} = 1 \times 10^{-3} \text{ m}$.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Calculate $(4.8 \times 10^{-6})(7.5 \times 10^9) / (1.2 \times 10^2)$. Write the answer in scientific notation and explain why it must be rewritten after the first calculation.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Multiply: $(6 \times 10^4)(7 \times 10^8)$	4.2×10^{13}
2	Divide: $(9.6 \times 10^{-9}) / (1.6 \times 10^{-4})$	6×10^{-5}
3	Multiply: $0.00008 \times (7 \times 10^6)$. Write the answer in scientific notation.	5.6×10^2
4	Divide: $(9 \times 10^{11}) / 0.03$. Write the answer in scientific notation.	3×10^{13}
5	A calculator shows 6.05E-8. Write this number in standard decimal form.	0.0000000605
6	A bacterium is 0.000004 meter long. Write its length in scientific notation in meters. Then express the length in micrometers. Use 1 micrometer = 1×10^{-6} meter.	4×10^{-6} m; 4 micrometers

PART 2 • APPLY IT

- 2.56×10^{10} bits** Multiply 3.2 by 8 to get 25.6, then keep the factor of 10^9 . Rewrite 25.6×10^9 as scientific notation.
- 3×10^{-3} m; 3 mm** Multiply the coefficients, 1.5×2 , and add the exponents, $-6 + 3$. A length of 3×10^{-3} meter is 3 millimeters.

CHALLENGE

3×10^2 . The coefficients give $4.8 \times 7.5 / 1.2 = 30$, and the exponents give $-6 + 9 - 2 = 1$, so the first result is 30×10^1 . It is rewritten because 30 is not a valid scientific notation coefficient.

Accept equivalent forms only when the prompt does not specifically require scientific notation or standard decimal form. In scientific notation, the coefficient must be at least 1 and less than 10.