LESSON MAKER PRO

Powers in Action

Calculate with scientific notation in everyday situations.

GRADE 8 · 8.AF.A.6

8.AF.A.6 "Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. a..."

NAME _____ DATE _____

THE BIG IDEA

To multiply numbers in scientific notation, multiply the coefficients and add the exponents. To divide, divide the coefficients and subtract the exponents. To add or subtract, first use the same power of 10. Write each final answer with a coefficient at least 1 and less than 10. On a screen, E means "times 10 to the power of."

WORKED EXAMPLE

Divide (7.5×10^8) by (2.5×10^3). Write the answer in scientific notation.

1. Divide the coefficients: 7.5 / 2.5 = 3.
2. Subtract the exponents: 8 - 3 = 5.
3. Combine the results: 3×10^5.

Answer: 3×10^5

PRACTICE 6 problems

1 Multiply $(3 \times 10^7)(2 \times 10^2)$. Write the answer in scientific notation.

ANSWER _____

2 Divide (8.4×10^{-5}) by (2×10^{-2}). Write the answer in scientific notation.

ANSWER _____

3 Add $6 \times 10^4 + 9 \times 10^3$. Write the answer in scientific notation.

ANSWER _____

4 Divide 0.00032 by (8×10^{-6}). Write the answer in scientific notation.

ANSWER _____

5 A screen shows a length of 3.6E-7 meters. Write the length in scientific notation. Then express it in nanometers, where 1 nanometer = 10^{-9} meters.

ANSWER _____

6 A trip is 2.8×10^6 meters long. Which unit is more useful for this trip, kilometers or millimeters? Give the distance in that unit using scientific notation. Use 1 kilometer = 10^3 meters.

ANSWER _____

APPLY IT Show your work

1 During a game event, 1.2×10^6 players each send one 500-byte update. How many megabytes of data do they send in all? Use 1 megabyte = 10^6 bytes.

WORK SPACE

ANSWER _____

2 A phone has 3.2×10^{10} bytes of free space. A game download uses 6.5×10^9 bytes. How many bytes of free space remain? Write your answer in scientific notation.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A science app reports the thickness of a spider silk strand as 4E-6 meters. A human hair is 8×10^{-5} meters thick. Write the app's reading in scientific notation. Then find how many times as thick the hair is as the silk, and show your calculation.

WORK SPACE AND ANSWER

ANSWER KEY

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Multiply $(3 \times 10^7)(2 \times 10^2)$. Write the answer in scientific notation.	**6×10^9**
2	Divide (8.4×10^{-5}) by (2×10^{-2}). Write the answer in scientific notation.	**4.2×10^{-3}**
3	Add $6 \times 10^4 + 9 \times 10^3$. Write the answer in scientific notation.	**6.9×10^4**
4	Divide 0.00032 by (8×10^{-6}). Write the answer in scientific notation.	**4×10^1**
5	A screen shows a length of 3.6E-7 meters. Write the length in scientific notation. Then express it in nanometers, where 1 nanometer = 10^{-9} meters.	**3.6×10^{-7} meters; 360 nanometers**
6	A trip is 2.8×10^6 meters long. Which unit is more useful for this trip, kilometers or millimeters? Give the distance in that unit using scientific notation. Use 1 kilometer = 10^3 meters.	**Kilometers; 2.8×10^3 kilometers**

PART 2 · APPLY IT

1. **600 megabytes** Multiply $(1.2 \times 10^6)(500)$ to get 6×10^8 bytes. Divide by 10^6 bytes per megabyte to get 600 megabytes.
2. **2.55×10^{10} bytes** Rewrite 6.5×10^9 as 0.65×10^{10}. Then subtract: $(3.2 - 0.65) \times 10^{10} = 2.55 \times 10^{10}$ bytes.

CHALLENGE

4E-6 meters = 4×10^{-6} meters. $(8 \times 10^{-5}) / (4 \times 10^{-6}) = 2 \times 10^1 = 20$, so the hair is 20 times as thick.

Accept equivalent values for the word problems and the nanometer conversion. Practice problems 1 through 4 and the phone-space problem specifically ask for scientific notation.