LESSON MAKER PRO

Big Numbers, Real Uses

Compute with scientific notation and choose units that make sense.

GRADE 8 · 8.NOS.B.5.b

8.NOS.B.5.b "Use scientific notation to model and compute with real-world quantities, choose appropriate units, and interpret their meaning based on the context."

NAME _____ DATE _____

MULTIPLY, DIVIDE, INTERPRET

To multiply quantities in scientific notation, multiply the decimal factors and add the exponents. To divide, divide the decimal factors and subtract the exponents. Rewrite the result with a decimal factor from 1 up to, but not including, 10, and use units that answer the question.

WORKED EXAMPLE

A video backup transfers 4.8×10^8 bytes in 1.6×10^2 seconds. What is its transfer rate in bytes per second?

1. Divide bytes by seconds: $(4.8 \times 10^8) / (1.6 \times 10^2)$.
2. Divide the decimal factors: 4.8 / 1.6 = 3.
3. Subtract the exponents: 8 - 2 = 6.

Answer: 3×10^6 bytes per second

PRACTICE 6 problems

1 Each game replay uses 2×10^6 bytes. How many bytes do 3×10^3 replays use?

ANSWER _____

2 A channel gets 7.2×10^7 views over 9×10^2 days. If it gets the same number of views each day, how many views does it get per day?

ANSWER _____

3 A phone has 1.5×10^9 bytes of space for songs. Each song uses 3×10^6 bytes. How many songs fit?

ANSWER _____

4 One wave of red light is about 6×10^{-7} meters long. How far do 4×10^6 of these waves reach when placed end to end?

ANSWER _____

5 A game update is 9×10^9 bytes. It downloads at 3×10^6 bytes per second. How many minutes does the download take? There are 60 seconds in a minute.

ANSWER _____

6 A batch of 4×10^2 small batteries has a total mass of 8×10^5 milligrams. What is the mass of one battery in milligrams and in grams? Use 1 gram = 10^3 milligrams.

ANSWER _____

APPLY IT Show your work

1 During a game livestream, 3×10^5 fans each send 4×10^4 bytes of chat messages. How many gigabytes of messages do they send altogether? Use 1 gigabyte = 10^9 bytes.

WORK SPACE

ANSWER _____

2 At a cycling fundraiser, 8×10^2 riders travel a combined 2.4×10^7 meters. If each rider travels the same distance, how many kilometers does each ride? Use 1 kilometer = 10^3 meters.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two friends download the same 7.2×10^9-byte update. Ari downloads at 6×10^6 bytes per second, and Bo downloads at 4×10^6 bytes per second. How many minutes sooner does Ari finish? Explain using both download times. There are 60 seconds in a minute.

WORK SPACE AND ANSWER

ANSWER KEY

Big Numbers, Real Uses

GRADE 8 · 8.NOS.B.5.b

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Each game replay uses 2×10^6 bytes. How many bytes do 3×10^3 replays use?	**6×10^9 bytes**
2	A channel gets 7.2×10^7 views over 9×10^2 days. If it gets the same number of views each day, how many views does it get per day?	**8×10^4 views per day**
3	A phone has 1.5×10^9 bytes of space for songs. Each song uses 3×10^6 bytes. How many songs fit?	**5×10^2 songs**
4	One wave of red light is about 6×10^{-7} meters long. How far do 4×10^6 of these waves reach when placed end to end?	**2.4 meters**
5	A game update is 9×10^9 bytes. It downloads at 3×10^6 bytes per second. How many minutes does the download take? There are 60 seconds in a minute.	**50 minutes**
6	A batch of 4×10^2 small batteries has a total mass of 8×10^5 milligrams. What is the mass of one battery in milligrams and in grams? Use 1 gram = 10^3 milligrams.	**2×10^3 milligrams; 2 grams**

PART 2 · APPLY IT

1. **12 gigabytes** Multiply to get 1.2×10^{10} bytes. Divide by 10^9 bytes per gigabyte to get 12 gigabytes.
2. **30 kilometers per rider** Divide the total distance by the number of riders to get 3×10^4 meters per rider. Divide by 10^3 meters per kilometer to get 30 kilometers per rider.

CHALLENGE

Ari finishes 10 minutes sooner. Ari takes 1.2×10^3 seconds, or 20 minutes. Bo takes 1.8×10^3 seconds, or 30 minutes.

Accept equivalent exact forms, such as 500 songs for 5×10^2 songs. Require units where the question asks for them.