

Your Friend Says That Theproduct Of 4.8×10^8 And 2×10^{-3} Is 9.6×10^{-5} .Is This Answer Correct? Explain.(Help

Your Friend Says That Theproduct Of 4.8×10^8 And 2×10^{-3} Is 9.6×10^{-5} . Is This Answer Correct? Explain.(Help

Introduction

When working with scientific notation, understanding how to correctly multiply numbers expressed in this form is essential, especially in fields like mathematics, science, and engineering. A common question students face involves verifying the correctness of a multiplication result involving powers of ten. In this case, your friend claims that multiplying 4.8×10^8 by 2×10^{-3} yields 9.6×10^{-5} . To determine if this is accurate, we'll methodically analyze the multiplication process, review the rules of exponents and scientific notation, and verify the correctness of the provided answer.

Understanding Scientific Notation and Multiplication Rules

What is Scientific Notation?

Scientific notation is a way to express very large or very small numbers compactly. A number in scientific notation is written as:

- $a \times 10^b$, where:
- a is a decimal number called the coefficient, typically between 1 and 10.
- b is an integer called the exponent or power of ten.

For example:

- 4.8×10^8 is a large number.
- 2×10^{-3} is a small number.

Rules for Multiplying Scientific Notation

When multiplying numbers in scientific notation, two main rules apply:

1. Multiply the coefficients:
 - Multiply the decimal parts (numbers before the $\times 10^b$).
2. Add the exponents:
 - Add the powers of ten.

Mathematically:

$$-(a \times 10^b) \times (c \times 10^d) = (a \times c) \times 10^{(b + d)}$$

Step-by-Step Multiplication Process

Let's analyze the multiplication of 4.8×10^8 and 2×10^{-3} .

Step 1: Multiply the coefficients

- Coefficient 1: 4.8
- Coefficient 2: 2

Multiplying these:

$$- 4.8 \times 2 = 9.6$$

Step 2: Add the exponents

- Exponent 1: 8
- Exponent 2: -3

Adding these:

$$- 8 + (-3) = 8 - 3 = 5$$

So, the combined power of ten:

$$- 10^{(8 + (-3))} = 10^5$$

Step 3: Write the product in scientific notation

Putting the results together:

$$- 9.6 \times 10^5$$

Comparing the Result with the Given Answer

Your friend's answer is 9.6×10^{-5} . Our calculation shows the correct product should be 9.6×10^5 .

Observation:

- The calculated answer (9.6×10^5) is vastly different from the suggested answer (9.6×10^{-5}).
- The key mistake appears to be in the exponent: instead of 10^5 , your friend has 10^{-5} .

Is the Given Answer Correct?

Answer: No, the answer provided by your friend, 9.6×10^{-5} , is not correct.

Reason:

- The correct multiplication of 4.8×10^8 and 2×10^{-3} is 9.6×10^5 .

Common Mistakes and Clarifications

Mistake 1: Confusing the Addition of Exponents

- Some may mistakenly subtract exponents or fail to add them properly.
- Remember: when multiplying powers of ten, add the exponents.

Mistake 2: Misplacing the Sign of the Exponent

- Swapping the sign (positive or negative) can lead to large errors.
- For example, confusing 10^5 with 10^{-5} drastically changes the magnitude of the number.

Mistake 3: Misreading the Question

- Ensure the coefficients and exponents are correctly identified before calculations.

Visualizing the Numbers

To better understand the scale of these numbers, consider their approximate values:

- $4.8 \times 10^8 \approx 480,000,000$
- $2 \times 10^{-3} \approx 0.002$

Multiplying:

- $480,000,000 \times 0.002 = 480,000$

Expressed in scientific notation:

- $480,000 = 4.8 \times 10^5$

This confirms our calculation aligns with the previous step.

Conclusion

In summary, the correct multiplication of 4.8×10^8 and 2×10^{-3} results in 9.6×10^5 , not 9.6×10^{-5} . The initial answer provided by your friend is incorrect, likely due to a mistake in handling the exponents. Understanding and applying the fundamental rules of scientific notation—multiplying coefficients and adding exponents—is essential for accurate calculations. Always double-check the signs of exponents and ensure proper addition or subtraction when working with powers of ten.

Final Tips for Working with Scientific Notation

1. Always identify the coefficients and exponents separately.
2. Remember that multiplying powers of ten involves adding exponents.
3. Keep track of the signs (positive or negative) of the exponents.
4. Convert scientific notation to standard form if it helps visualize the magnitude.
5. Practice with various examples to strengthen understanding.

By mastering these concepts, you'll confidently handle scientific notation calculations and verify answers accurately.

Frequently Asked Questions

Is the product of 4.8×10^8 and 2×10^{-3} equal to 9.6×10^{-5} ?

Let's check by multiplying the coefficients and adding the exponents: $4.8 \times 2 = 9.6$ and $10^8 \times 10^{-3} = 10^{(8 + (-3))} = 10^5$. So, the product is 9.6×10^5 , not 9.6×10^{-5} . Therefore, the given answer is incorrect.

How do you correctly multiply two numbers in scientific notation?

To multiply numbers in scientific notation, multiply their coefficients and add their exponents. For example, $(a \times 10^m) \times (b \times 10^n) = (a \times b) \times 10^{(m + n)}$.

What is the correct product of 4.8×10^8 and 2×10^{-3} ?

The correct product is $(4.8 \times 2) \times 10^{(8 + (-3))} = 9.6 \times 10^5$.

Why is the answer 9.6×10^{-5} incorrect for the given multiplication?

Because when multiplying 4.8×10^8 and 2×10^{-3} , the exponents add up to 10^5 , not 10^{-5} . The answer 9.6×10^{-5} suggests a mistake in exponent addition.

What are common mistakes when multiplying scientific notation?

Common mistakes include adding exponents instead of subtracting when dividing, or incorrectly multiplying coefficients or adding exponents when they should be subtracted. Always follow the multiplication rule: coefficients multiplied, exponents added.

Can the product 9.6×10^{-5} be obtained from multiplying 4.8×10^8 and 2×10^{-3} ?

No, because the actual product is 9.6×10^5 , not 9.6×10^{-5} . The calculation shows the exponents should add to 5, not produce a negative exponent.

How should scientific notation be correctly used to verify the product?

Convert both numbers into scientific notation, multiply the coefficients, and add the exponents. Check whether the resulting coefficient and exponent match the given answer to verify correctness.

What is the importance of understanding exponents in scientific notation?

Understanding exponents helps accurately perform operations like multiplication and division in scientific notation, preventing errors such as incorrect exponent addition or subtraction.

What is the lesson learned from the incorrect answer 9.6×10^{-5} ?

The lesson is to carefully add exponents when multiplying powers of 10 and ensure the coefficients are multiplied correctly. Always double-check calculations to avoid common mistakes in scientific notation.

Additional Resources

Understanding Scientific Notation and Multiplication of Numbers in Scientific Notation

When dealing with very large or very small numbers, scientific notation becomes an essential tool. It simplifies calculations, improves clarity, and helps avoid errors. In this detailed review, we will analyze the statement made by your friend regarding the multiplication of two numbers in scientific notation, verify its correctness, and explain the concepts involved step by step.

Introduction to Scientific Notation

Scientific notation is a way to express numbers as the product of a coefficient (a number usually between 1 and 10) and a power of ten. The general form is:

$$N = a \times 10^b$$

where:

- a is the coefficient ($1 \leq |a| < 10$),
- b is an integer, called the exponent.

Example:

The number 480,000,000 can be written as:

$$[4.8 \times 10^8]$$

Similarly, very small numbers like 0.002 can be written as:

$$[2 \times 10^{-3}]$$

Given Numbers and Their Scientific Notation

Your friend provided two numbers:

- First number: (4.8×10^8)
- Second number: (2×10^{-3})

The multiplication problem is:

$$[(4.8 \times 10^8) \times (2 \times 10^{-3})]$$

Step-by-Step Calculation of the Product

Let's examine how to multiply these two numbers in scientific notation systematically.

Step 1: Separate the Coefficients and the Powers of Ten

The multiplication can be viewed as:

$$[(4.8 \times 2) \times (10^8 \times 10^{-3})]$$

This separates the coefficients from the powers of ten, allowing us to handle each part independently.

Step 2: Multiply the Coefficients

Calculate:

$$[4.8 \times 2 = 9.6]$$

Step 3: Apply the Law of Exponents for Powers of Ten

Recall the rule:

$$10^a \times 10^b = 10^{a + b}$$

Applying this:

$$10^8 \times 10^{-3} = 10^{8 + (-3)} = 10^5$$

Step 4: Write the Final Result

Putting it all together:

$$9.6 \times 10^5$$

This is the product of the original numbers in scientific notation.

Comparison with Your Friend's Answer

Your friend claimed that:

$$4.8 \times 10^8 \times 2 \times 10^{-3} = 9.6 \times 10^{-5}$$

Let's analyze whether this is correct or not.

Observation:

- The calculated product is:

$$9.6 \times 10^5$$

- Your friend's answer is:

$$9.6 \times 10^{-5}$$

Since these two numbers differ significantly, it's crucial to understand where the discrepancy arises.

Understanding the Discrepancy: Is the Answer Correct?

Answer:

No, your friend's answer is not correct.

Explanation:

- The correct calculation yields:

$$[9.6 \times 10^5]$$

- The answer provided by your friend:

$$[9.6 \times 10^{-5}]$$

is off by a factor of (10^{10}) . This indicates that your friend has either made an error in applying the laws of exponents or misread the problem.

Why Did the Error Occur? Analyzing the Mistake

Understanding the common pitfalls helps prevent similar mistakes in the future.

Possible Causes:

1. Misinterpretation of the Exponents:

The key error appears to be in the exponent of 10. Your friend might have incorrectly subtracted the exponents or mistakenly placed the negative sign.

2. Incorrect Application of Exponent Rules:

The rule for multiplying powers of ten is addition, not subtraction. If your friend subtracted $(8 - (-3) = 8 + 3 = 11)$, that would be incorrect in this context.

3. Typographical or Transcription Error:

It's possible that during calculation or transcription, the exponent was miswritten as (-5) instead of (5) .

Deep Dive into Exponent Rules and How to Avoid Errors

A thorough understanding of exponent rules is vital for accurate calculations. Here are the fundamental rules and tips:

Fundamental Rules for Exponents

- Product of Powers:

$$a^m \times a^n = a^{m+n}$$

- Quotient of Powers:

$$\frac{a^m}{a^n} = a^{m-n} \quad (\text{for } a \neq 0)$$

- Power of a Power:

$$(a^m)^n = a^{m \times n}$$

- Multiplying Numbers in Scientific Notation:

- Multiply the coefficients.

- Add the exponents.

Important:

When multiplying numbers with the same base (like 10), use the addition rule for exponents.

Best Practices to Prevent Mistakes

- Double-check the sign of exponents:

Make sure to follow the laws carefully, especially when negative exponents are involved.

- Keep the steps organized:

Write each step separately — multiply coefficients first, then handle the exponents.

- Use parentheses and brackets:

To clearly separate parts of the calculation and avoid confusion.

- Verify with reverse calculation:

After computing, check if the answer makes sense by dividing the product by one of the original numbers.

Additional Clarification: The Nature of the Numbers Involved

Understanding the physical meaning of the numbers can also reinforce correctness:

- (4.8×10^8) represents 480 million.
- (2×10^{-3}) represents 0.002.

Multiplying these:

$$[480,000,000 \times 0.002 = 960,000]$$

Expressed in scientific notation:

$$[960,000 = 9.6 \times 10^5]$$

which confirms our calculation.

Summary and Final Verdict

To summarize:

- Calculation of the product:
$$[(4.8 \times 10^8) \times (2 \times 10^{-3}) = 9.6 \times 10^5]$$
- Your friend's answer:
$$[9.6 \times 10^{-5}]$$
- Assessment:
Incorrect. The correct answer is (9.6×10^5) , not (9.6×10^{-5}) .

Final Advice for Students and Learners

- Always revisit the fundamental rules of exponents before performing calculations.
- Practice multiple problems involving scientific notation to become comfortable with the laws.
- Use step-by-step methods and organize your work to minimize errors.
- When in doubt, verify your result by estimating or reversing the calculation.
- Remember that the sign and magnitude of exponents are critical; small errors can lead to large discrepancies.

Conclusion

Understanding and correctly applying the rules of scientific notation are crucial for accurate calculations involving very large or very small numbers. In this specific case, the correct product of (4.8×10^8) and (2×10^{-3}) is not (9.6×10^{-5}) , but rather (9.6×10^5) .

By mastering these principles, students can confidently handle similar problems and avoid common pitfalls. Remember, precision and clarity in applying mathematical laws are key to solving scientific notation problems efficiently and accurately.

Feel free to revisit this explanation whenever you encounter similar problems, and keep practicing scientific notation to build your confidence!

[Your Friend Says That Theproduct Of 4 8 X 108 And 2 X 10 3 Is 9 6 X 10 5 Is This Answer Correct Explain Help](#)

Your Friend Says That Theproduct Of 4 8 X 108 And 2 X 10 3 Is 9 6 X 10 5 Is This Answer Correct Explain Help

Related Articles

- [Describe How Wendell Can Use All Six Pieces Of Wood To Create Either Two Rectangular Gardens Or Two Triangular](#)
- [Two Point Charges Q And -q Are Located On The Z Axis At Z +a And Z--a, Respectively. \(a\) Find The Electrostatic](#)
- [A Rectangle Has Sides Measuring \(6x+4\) Units And \(2x+11\) Units. Part A: What Is The Expression That Represents](#)

[Back to Home](#)