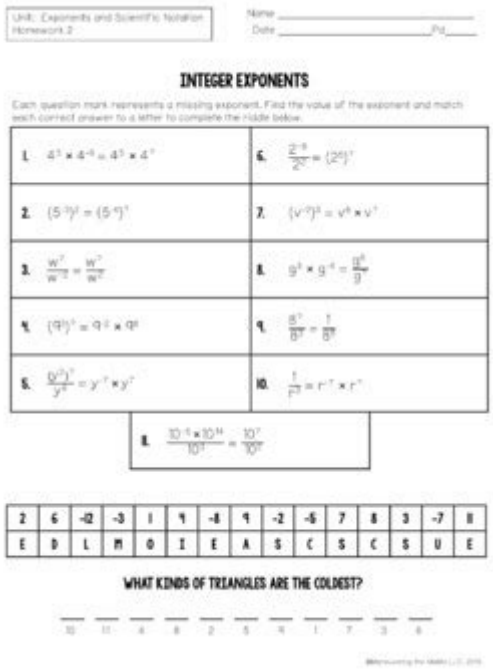
Exponents And Scientific Notation Homework 2 Answer Key



INTEGER EXPONENTS

WHAT KINDS OF TRIANGLES ARE THE COLDEST?

Exponents and scientific notation homework 2 answer key is an essential resource for students who are learning how to manipulate numbers in exponential form and express large or small quantities succinctly. Understanding the concepts of exponents and scientific notation is crucial in various fields, including mathematics, science, and engineering. This article will provide a comprehensive overview of exponents, scientific notation, and a detailed breakdown of the answer key to help students master these concepts.

Understanding Exponents

Exponents are a shorthand way to represent repeated multiplication of a number by itself. For example, a^n means that the base a is multiplied by itself n times.

Basic Properties of Exponents

Here are some fundamental properties of exponents that students should be familiar with:

1. Product of Powers: $a^m \cdot a^n = a^{m+n}$
2. Quotient of Powers: $\frac{a^m}{a^n} = a^{m-n}$ (where $a \neq 0$)
3. Power of a Power: $(a^m)^n = a^{m \cdot n}$
4. Power of a Product: $(ab)^n = a^n \cdot b^n$
5. Power of a Quotient: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ (where $b \neq 0$)

6. Zero Exponent: $a^0 = 1$ (where $a \neq 0$)
7. Negative Exponent: $a^{-n} = \frac{1}{a^n}$ (where $a \neq 0$)

Examples of Exponent Problems

1. Simplify $3^2 \cdot 3^3$:
$$
3^2 \cdot 3^3 = 3^{2+3} = 3^5 = 243
$$

2. Simplify $\frac{5^4}{5^2}$:
$$
\frac{5^4}{5^2} = 5^{4-2} = 5^2 = 25
$$

3. Simplify $(2^3)^2$:
$$
(2^3)^2 = 2^{3 \cdot 2} = 2^6 = 64
$$

Understanding Scientific Notation

Scientific notation is a method of expressing very large or very small numbers in a compact form. It is particularly useful in scientific disciplines where such numbers frequently occur.

Structure of Scientific Notation

A number is written in scientific notation as follows:
$$
N = a \times 10^n
$$
- Where:
- $1 \leq |a| < 10$ (the coefficient)
- n is an integer (the exponent)

Converting Numbers to Scientific Notation

To convert a number to scientific notation, follow these steps:

1. Move the decimal point in the number to the right or left until only one non-zero digit remains to the left of the decimal.
2. Count the number of places the decimal has moved. This will be the exponent n:
- If you move the decimal to the left, n is positive.

- If you move it to the right, n is negative.
3. Write the number as $a \times 10^n$.

Examples of Converting to Scientific Notation

1. Convert 4500 to scientific notation:
- Move the decimal 3 places to the left: 4.5
- $n = 3$
- Answer: 4.5×10^3

2. Convert 0.00032 to scientific notation:
- Move the decimal 4 places to the right: 3.2
- $n = -4$
- Answer: 3.2×10^{-4}

Scientific Notation Operations

Performing operations with numbers in scientific notation requires an understanding of how to manipulate both the coefficients and the exponents.

Multiplication in Scientific Notation

To multiply two numbers in scientific notation:
$$
(a \times 10^m) \cdot (b \times 10^n) = (a \cdot b) \times 10^{m+n}
$$

Example:
Multiply 3.0×10^4 and 2.0×10^3:
$$
(3.0 \cdot 2.0) \times 10^{4+3} = 6.0 \times 10^7
$$

Division in Scientific Notation

To divide two numbers in scientific notation:
$$
\frac{a \times 10^m}{b \times 10^n} = \frac{a}{b} \times 10^{m-n}
$$

Example:
Divide 6.0×10^7 by 3.0×10^2:
$$
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\frac{6.0}{3.0} \times 10^{7-2} = 2.0 \times 10^5
\]

Answer Key for Homework 2

Below is a hypothetical answer key for a homework assignment focusing on exponents and scientific notation.

Problem Set:

1. Simplify \(2^5 \cdot 2^3\)
- Answer: \(2^{5+3} = 2^8 = 256\)

2. Simplify \(\frac{10^6}{10^2}\)
- Answer: \(10^{6-2} = 10^4 = 10000\)

3. Calculate \((3^2)^3\)
- Answer: \(3^{2 \cdot 3} = 3^6 = 729\)

4. Convert 0.00045 to scientific notation.
- Answer: \(4.5 \times 10^{-4}\)

5. Convert 670000 to scientific notation.
- Answer: \(6.7 \times 10^{5}\)

6. Multiply \(1.5 \times 10^3\) and \(2.0 \times 10^2\).
- Answer: \(3.0 \times 10^{5}\)

7. Divide \(4.8 \times 10^6\) by \(1.2 \times 10^3\).
- Answer: \(4.0 \times 10^{3}\)

8. Simplify \(x^5 \cdot x^2\).
- Answer: \(x^{5+2} = x^7\)

9. Simplify \(\frac{y^8}{y^3}\).
- Answer: \(y^{8-3} = y^5\)

10. Evaluate \(10^0\).
- Answer: \(1\)

Conclusion

The mastery of exponents and scientific notation is crucial for academic success in various scientific and mathematical fields. By understanding the properties of exponents, the structure of scientific notation, and practicing conversion and operations, students can significantly enhance their numerical comprehension. The provided answer key serves as a valuable tool for assessing

understanding and facilitating further learning. With continued practice, students will find these concepts not only useful but also empowering in their academic pursuits.

Frequently Asked Questions

What are exponents in mathematics?

Exponents represent the number of times a base is multiplied by itself. For example, 3^4 means 3 multiplied by itself 4 times, which equals 81.

How do you convert a number into scientific notation?

To convert a number into scientific notation, you express it as a product of a number between 1 and 10 and a power of 10. For example, 4500 can be written as 4.5 x 10^3.

What is the basic rule for multiplying numbers with exponents?

When multiplying numbers with the same base, you add the exponents. For example, a^m a^n = a^(m+n).

What is the answer key for homework 2 on exponents and scientific notation?

The answer key will vary based on the specific problems given in homework 2. Check your teacher's guidelines or resources for the accurate answer key.

How do you divide numbers with exponents?

When dividing numbers with the same base, you subtract the exponents. For example, a^m / a^n = a^(m-n).

What is a common mistake when working with exponents?

A common mistake is misapplying the exponent rules, such as forgetting to add exponents when multiplying or incorrectly subtracting exponents when dividing.

How can scientific notation be useful in real life?

Scientific notation is useful for simplifying large or small numbers, making them easier to read and calculate, especially in fields like science and engineering.

What is the rule for raising a power to another power?

When raising a power to another power, you multiply the exponents. For example, (a^m)^n = a^(mn).

How do you handle negative exponents in calculations?

A negative exponent indicates a reciprocal. For example, a^(-n) = 1/(a^n).

Can you give an example of a problem involving scientific notation?

Sure! Convert 0.00056 to scientific notation: 5.6 x 10^(-4).

Exponents And Scientific Notation Homework 2 Answer Key

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