

Exponents and Monomials

Introduction

This lesson gives a rapid introduction to exponents and monomials, and can be used as a review. Concepts are introduced briefly, and examples given. Emphasis is placed on reading and writing monomials. A comprehensive worksheet is given at the end of the lesson.

Standards Assessed

California Content Standards for Algebra 1-Grades Eight Through Twelve:

- 2.0 Students understand and use such operations as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. They understand and use the rules of exponents.

Exponents

The result of multiplying a number by itself several times can be abbreviated using exponents.

An example is the expression

$$10^4.$$

The number 10 is called the **base** and 4 the **exponent**.

$$\text{base} \rightarrow 10^4 \leftarrow \text{exponent}$$

The **exponent** tells how many times the **base** appears in the product:

$$10^4 = 10 \cdot 10 \cdot 10 \cdot 10.$$

Examples:

$$\begin{array}{ll} 5 \cdot 5 \cdot 5 & \text{can be written as } 5^3 \\ 4 \cdot 4 & \text{can be written as } 4^2 \\ 7 & \text{can be written as } 7^1 \end{array}$$

Reading and Writing Exponents

The expression a^b is read “ a to the b th power”, or more commonly “ a to the b th”. Here are some examples.

10^4 “ten to the 4th power”

2^3 “two to the 3rd power”

x^5 “ x to the 5th power”

There are two common special cases. When a number is raised to the second (2nd) or third (3rd) power, we use the words “squared” and “cubed”. For example,

10^2 “ten to the 2nd power” “ten-squared”

2^3 “two to the 3rd power” “two-cubed”

Monomials

A monomial is a product of variables and real numbers. It is usually written with the real number (called the **coefficient**) on the left.

For example, $12x^3$ is a monomial, and its coefficient is 12. Remember that $12x^3$ means $12 \cdot x \cdot x \cdot x$.

Reading and Writing Monomials

When reading a monomial, the coefficient and variables are read from left to right. So $2x$ is read “two x ” and $12x^3y^2$ is read “twelve x -cubed y -squared”. Factors and exponents are read from left to right. For example,

$2x$ is read “two x ”

x^2 is read “ x -squared”

Worksheet on Exponents

Write using Exponents.

1. $10 \cdot 10 \cdot 10 \cdot 10 = 10^4$

3. $5 =$

2. $3 \cdot 3 \cdot 3 =$

4. $6 \cdot 6 =$

Write in words.

5. 2^3 *two-cubed*

7. 4^4

6. 3^2

8. 3^{13}

Write the corresponding mathematical expression.

9. five to the fourth power: 5^4

11. sixteen-squared:

10. thirteen to the 5th:

12. twenty one-cubed:

Identify the coefficient of each monomial.

monomial coefficient

13. $12x^3$ 12

14. $123xyz^2$

15. xw^2z^4

Write in words.

16. $3x^2y^3$ *three x-squared y-cubed*

18. $12xy$

17. $4abc$

19. $16x^3y^7$

Write a corresponding mathematical expression.

20. thirty six x -squared y to the 6th: $36x^2y^6$

22. forty q -squared:

21. three x to the 7th power:

22. five x y -cubed: