Powers, Exponents, Scientific Notation

MaxStudy

Parts of a Power

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This is the base This is the exponent Combined, the base and the exponent is called a power.

Rules of Exponents

The following slides will talk about the six rules of exponents and some mistakes that are made with them.

- Rule 1: A base that is is raised to the zero power always equals one.
- ♦ Examples:
- $\diamond 10^{0} = 1$ 77 $^{0} = 1$
- Mistakes made with this rule:

The answer should be 1.

A common mistake might be written as a x 0 equals zero. The problem might be wrote like this:

- When a base is raised to the first power, it equals the base.
- ♦ Examples:
- $\diamond 701^{1} = 701 \qquad 14 = 14^{1}$
- ♦ Mistakes made with this rule:
- A mistake might be that someone writes: that a 1 = 1 and the problem might be written like this like this:
 - > The answers should be 27.

- Output When a positive number is raised to a power, the answer is positive.
- ♦ Examples:
- $\diamond 5^4 = 625$ $2 = 64^6$
- ♦ Mistakes made with this rule:

A mistake made with this rule might be that a is solved by doing a x 3 and it might be solved in the following way:

> The answer should be 9.

- When a negative number is raised to an even power the answer is positive.
- ♦ Examples:
- $(-3)^2 = (-3 \times -3) = 9$
- $(-9)_4 = (-9 \times -9 \times -9 \times -9) = 6561$
- ♦ Mistakes made with this rule:
- Many times when you see a negative base and an even exponent, you think that the answer is negative.
 - For example some people might do this :
- ♦ $6^{\circ} = (-6 \times -6 \times -6 \times -6 \times -6 \times -6) = -46,6$ ♦ The answer should be 46, 656

- When a negative base is raised to an odd power, the answer will be negative.
- ♦ Examples:
- ♦ Mistakes made with this rule:
- - The answer should be -512

- Negative exponents represent decimals or fractions
- ♦ Examples:
- $\diamond 4^{-5} = \underline{1} = \underline{1}$ $4^{-5} = 1024$

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Mistakes made with this rule: A mistake that can be made with this rule is when the exponent is written as a fraction, the exponent is left negative. Also, a Mistake might be that the final answer is left as an exponent without solving the final answer.

 $\begin{array}{l} 2^{-4} = 1 \\ 7^{-4} \end{array}$ The answer should be: $\begin{array}{l} 2^{-4} = 1 \\ 7^{-4} = 1 \end{array} = -\frac{1}{7} \\ 7^{-4} = 2.401 \end{array}$

- Scientific Notation is a shorter way to write a very large or a very small number.
- ♦ Examples:
- ♦ 5,670,000,000,000
- You move the decimal place over to the left, until you have a decimal with the only number before the decimal in the ones place.
 Scientific Notation = 5.67 x 10

♦ Another example:

- ◊ 0.000008564
- You move the decimal place over to the right, until you have a decimal with the only number before the decimal in the ones place. You will write exponent with a negative power because it is a decimal
 Scientific Notation =

- A mistake that can be made with Scientific Notation:
- Write 2,345,600,000,000 in scientific notation.
- \diamond Scientific Notation = 23.456 x 10⁻¹⁰

The scientific notation is wrong because first, there is not only a number in the ones place on the left side of the decimal, but there is a number in the tens place. Second, in the exponent, the amount of places you moved the decimal point is wrong.

The scientific notation will be re-written as: 2.3456 (with only one number to the left of the exponent) \times 10¹² (the correct amount of places the decimal point moved.