EXPONENTS, FACTORS AND FRACTIONS

- In a mathematical expression where the same number is multiplied many times, it is often useful to write the number as a base with an **exponent**. The exponent represents the number of times to multiply the number, or base.

- When a number is represented in this way it is called a **power**.

- Large numbers can often be rewritten as a product of prime numbers. This is called **prime factorization**. The number, 384, written with prime factorization is $3 \cdot 2^7$.

- Exponents are also used to evaluate numbers. **Any number to a zero exponent is 1** and **any number to a negative exponent is a number less than 1**.

- Exponents are used in **scientific notation** to make very large or very sm

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- Simplifying fractions can also be used to compare and order fractions with different denominators.

- Mixed numbers and improper fractions can also be simplified in order to compare with other fractions.

How to use exponents, factors and fractions:

- **Prime factorization** is the process of breaking a number into its prime numbers and then writing them as a product. The use of exponents is common with prime factorization. To find the prime factorization of a number, break it into two numbers that are its factors. By repeating the process, until all the numbers are prime, the result will be the product of the prime numbers.

  Example: What is the prime factorization of 120? 120

  10 12

  5 2 3 4

  2 2

The **prime factorization** of 120 is $5 \cdot 2 \cdot 3 \cdot 2 \cdot 2 = 5 \cdot 3 \cdot 2^3$

- To **solv** ber of times ir l, ^, and then a r ponent. If a nur number is raise makes the ans

  Example: What is 5^-2? $5^{-2} \rightarrow 1/5^2 \rightarrow 1/25$

- **Scientific notation** rewrites very large or very small numbers using powers of 10.

  Example: 3,254,000 in scientific notation is 3.254 x 10^6

  .000000978 in scientific notation is 9.78 x 10^-7

- If the number is smaller than 1, the exponent will be negative. If the number is larger than 1, the exponent will be positive.

- **Simplifying fractions** uses the greatest common factor, or GCF. If a fraction is very large, look for the GCF of both the numerator and denominator. Then divide both the numerator and denominator by that factor.

- When **comparing and ordering fractions**, the GCF is used to change the denominators of unlike fractions to denominators of like fractions.

  Example: Compare 6/16, 4/32 and 7/8 → 12/32, 4/32 and 28/32

- The fractions all can be changed to a denominator of 32. The fraction 6/16 becomes 12/32 and the fraction 7/8 becomes 28/32. When they have the same denominator, they can be compared, the smallest is 4/32, then 6/16 and the largest is 7/8.

- A **mixed number** can be changed into a fraction by multiplying the denominator by the whole number and then adding the numerator, this nu nator stays th

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Try This!

What is the **prime factorization** of 72, 96, and 384?

Simplify the following fractions:

18/24

49/84

52/208

Order the following fractions from least to greatest:

1/2, 3/10, 14/15, 4/5

What is 8 2/3 as an **improper fraction**?

What is 12

Evaluate

8^3
7^0
5^1
3^-3

Evaluate the following:

2.36 x 10^8

5.06 x 10^-7