



EXPONENTS AND POWERS

PREPARED

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Exponential form of a number



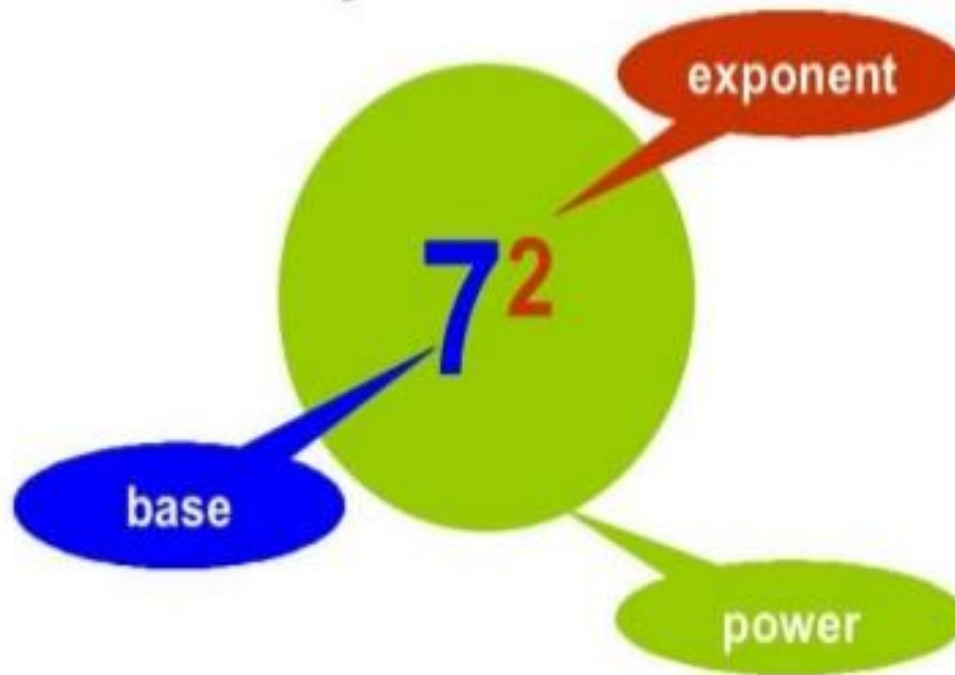
$$81 = 3 \times 3 \times 3 \times 3 = 3^4$$

3^4 IS EXPONENTIAL FORM OF 81

EXPONENT AND BASE

Lesson 1: Laws of Exponents

Vocabulary



BASE AND EXPONENT



3⁴

3 IS CALLED BASE AND

4 IS CALLED EXPONENT / POWER /
INDEX

READING OF EXPONENTIAL FORM



$$8^{10}$$

WE READ AS 8 RAISED TO POWER 10

OR

10TH POWER OF 8

OBSERVE THE PATTERN



WHEN WE DIVIDE EACH BY 5 WE GET

$$5^3 = 5 \times 5 \times 5 = 125$$

$$5^2 = 5 \times 5 = 25 \quad (125 \text{ is dividing by } 5)$$

$$5^1 = 5 \quad (25 \text{ is dividing by } 5)$$

$$5^0 = 1 \quad (5 \text{ is dividing by } 5)$$

$$5^{-1} = \frac{1}{5} \quad (1 \text{ is dividing by } 5)$$

$$5^{-2} = \frac{1}{5^2} \quad \left(\frac{1}{5} \text{ is dividing by } 5\right)$$

$$5^{-3} = \frac{1}{5^3} \quad \left(\frac{1}{5^2} \text{ is dividing by } 5\right)$$

ZERO POWER RULE

$a^0 = 1$ (any term to the zero power is one)

Examples:

1) $(m^5 n^7)^0 = 1$

2) $(4m^8 n^2)(-2mn^4)^0 = (4m^8 n^2)(1) = 4m^8 n^2$

$$x^0 = 1$$

$$\left\{\frac{1}{5}\right\}^{-1} = 5$$

Reciprocal and multiplicative inverse are same

Powers with Negative exponent

1. To change the negative power to positive, we write the reciprocal of base and positive power vice versa



- Multiplicative inverse
- The product of a number and its multiplicative inverse is 1
- $\frac{4}{5}$ Reciprocal is $\frac{5}{4}$
- Product = $\frac{4}{5} \times \frac{5}{4} = 1$

NEGATIVE POWER OF EXPONENT (Reciprocal)

$$1. \left\{\frac{1}{5}\right\}^{-1} = 5$$

$$2. \left\{\frac{1}{5}\right\}^{-2} = 5^2$$

$$3. \left\{\frac{3}{4}\right\}^{-10} = \left\{\frac{4}{3}\right\}^{10}$$

4. If $a \neq 0$ Then Reciprocal of a is $\frac{1}{a}$

5. Reciprocal of $\frac{7}{4}$ is $\frac{4}{7}$

NEGATIVE EXPONENT

When there is a negative exponent, reciprocate the exponent, and the exponent will be in the denominator

Example:

$$a^{-3} = \frac{1}{a^3}$$

$$6^{-2} = \frac{1}{6^2} = \frac{1}{36}$$

EXPANDED FORM OF NUMBERS USING EXPONENTS

NUMBERS /PLACE VALUES	THOUSANDS	HUNDREDS	TENS	ONES	TENTHS	HUNDREDTHS	THOUSANDTHS
EXPONENTS FOR P.V	10^3	10^2	10^1	$10^0=1$	$10^{-1}=1/10$	$10^{-2}=1/100$	$10^{-3}=1/1000$
1) 6235	6	2	3	5			
EXPANDED FORM OF 6235	$6 \times 10^3 + 2 \times 10^2 + 3 \times 10^1 + 5 \times 10^0 = 6000 + 200 + 30 + 5$						
2) 9872.65	9	8	7	2	6	5	
EXPANDED FORM OF 9872.65	$9 \times 10^3 + 8 \times 10^2 + 7 \times 10^1 + 2 \times 10^0 + 6 \times 10^{-1} + 5 \times 10^{-2} = 9000 + 800 + 70 + 2 + 6/10 + 5/100$						

“Thank You”

