



Exponents shorten writing out long strings of repeated multiplication.  
For example,  $3 \times 2 \times 2 \times 3 \times 3 \times 2 \times 2 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 2^4 3^3$ .

In the expression  $a^n$ , we are saying that **a** is being multiplied by itself **n** number of times. We call **a** the base, and **n** is the exponent. The expression  $a^n$  is called a **power**, and is read as, "**a** raised to the power of **n**" or "**a** to the **n**th power." In my above example of  $2^{10}$ , 2 is the base, 10 is the exponent (the number of times 2 is multiplied by itself), and we read it as "2 raised to the 10th power". Some powers are special because they come up quite frequently like  $a^2$  can also be read as "a-squared," and  $a^3$  as "a-cubed."

### **SUBTOPICS**

- 1) Powers with positive exponents
- 2) Powers with negative exponent
- 3) Expansion of decimal numbers
- 4) Laws of exponents

### **IMPORTANT POINTS WITH THEIR LINKS FOR REFERENCE**

- 1) Introduction  
<https://www.examfear.com/free-video-lesson/Class-8/Maths/Exponents-and-Powers/part-1.htm>
- 2) What are exponents  
[https://www.youtube.com/watch?v=4qHe68w4Nul&feature=emb\\_rel\\_end](https://www.youtube.com/watch?v=4qHe68w4Nul&feature=emb_rel_end)
- 3) Negative exponent  
<https://www.youtube.com/watch?v=rwFqnRss-do>
- 4) Expansion of large numbers  
<https://www.youtube.com/watch?v=yvSyObj59Pk>
- 5) laws of exponents  
<https://www.youtube.com/watch?v=bLCtYNI dw4E>
- 6) some examples for reference  
<https://www.youtube.com/watch?v=S4BbEDuMnAU>

### **POINTS TO REMEMBER**

- 1)  $x^1 = x$  . Any number raised to the power of "1" equals itself.
- 2)  $x^0 = 1$ . Any non-zero number raised to the power 0 equal to 1.
- 3)  $x^{-1} = 1/x$  . Any non-zero number raised to a negative power equals its reciprocal raised to the same but positive power .
- 4)  $x^m x^n = x^{m+n}$  . When multiplying 2 powers that have the same base, you can add the exponents.

- 5)  $x^m/x^n = x^{m-n}$ . Divide 2 powers with the same base by subtracting the exponents .
- 6)  $((x)^m)^n = (x)^{mn}$ . Multiply the powers when the power is raised by another power.
- 7)  $(x y)^m = x^m * y^m$
- $$\frac{x^m}{y^m} = \left(\frac{x}{y}\right)^m$$

### Some important points to remember

- Follow the order of operations .
- Remember that exponents are repeated multiplication.  $2^3$  is not the same as  $2 \times 3$ ! It means  $2 \times 2 \times 2$ .
- Be careful evaluating exponents with negative bases. Use parenthesis when necessary to help you remember.
- Negative exponents are the same as repeated division of one by a number.
- Negative exponents don't make a number negative ie  $.2^{-3} = 1/2^3 = 1/8 = 0.125$ , not  $-8$ .

### ASSIGNMENT

- 1). From NCERT textbook the following questions are to be done in Mathematics notebook:

#### Exercise 12.1

- { Q1 .(I) (II)  
Q2(I) (II) (IV)  
Q3 (I) (II) (IV)  
Q6 (I) and Q7. (II) }

- 2) Practice assignment on Exponents and Powers (for online practice only ).

1 [https://www.khanacademy.org/math/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-exp-powers/xa9e4cdc50bd97244:in-in-8th-exp-negative-exponents/e/exponents\\_2?modal=1](https://www.khanacademy.org/math/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-exp-powers/xa9e4cdc50bd97244:in-in-8th-exp-negative-exponents/e/exponents_2?modal=1)

2 [https://www.khanacademy.org/math/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-exp-powers/xa9e4cdc50bd97244:in-in-8th-exp-negative-exponents/e/exponent\\_rules?modal=1](https://www.khanacademy.org/math/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-exp-powers/xa9e4cdc50bd97244:in-in-8th-exp-negative-exponents/e/exponent_rules?modal=1)

3 <https://www.khanacademy.org/math/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-exp-powers/xa9e4cdc50bd97244:in-in-8th-exp-negative-exponents/e/powers-of-powers-int-exp?modal=1>

4 <https://www.khanacademy.org/math/in-in-class-8th-math-cbse/xa9e4cdc50bd97244:in-in-8th-exp-powers/xa9e4cdc50bd97244:in-in-8th-exp-negative-exponents/e/properties-of-integer-exponents?modal=1>

3) **Objective type questions** ( to be done in a separate Mathematics practice notebook)

- Q1. What is the value of  $2^{-5}$  ?
- Q2. Multiplicative inverse of  $2^{-7}$  is  
A)  $2^{-7}$       B)  $7^2$       C)  $2^7$       D)  $7^{-2}$
- Q3. In  $2^n$ , n is known as  
A) base                      B) constant  
C) exponent                D) none of the above
- Q4. The value of  $3^5/3^{-6}$  is  
A)  $3^5$       B)  $3^{-6}$       C)  $3^{11}$       D)  $3^{-1}$
- Q5. If y be any non zero integer, the  $y^0$  is equal to  
A) 1      B) 0      C) -1      D) not defined
- Q6.  $[2^{-1} + 3^{-1} + 4^{-1}]^0 =$  \_\_\_\_\_
- Q7. What is the value of  $4^0 - 3^3$  ?
- Q8. What is the value of  $(-3)^4$
- Q9. On dividing  $8^5$  by \_\_\_\_\_ we get 8.
- Q10. The value for  $(-7)^6/7^6$  is \_\_\_\_\_.
- Q11. True/False:  
A)  $(-2)^0 = 2$   
B)  $(-7)^{-4} \times (-7)^2 = (-7)^{-2}$   
C)  $a^2 = \frac{1}{(a)^{-2}}$   
D) The expression of  $4^{-3}$  as a power with base 2 is  $2^6$ .

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