## BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI - 110034

## SUBJECT:- MATHEMATICS

## CHAPTER:-6

## TOPIC:- Exponents and Powers(Part1)

## GUIDELINES

Dear students, kindly refer to the following notes/video links for the Chapter"EXPONENT AND POWERS " and thereafter attempt the questions in Mathematics notebook.

NOTE- Students can download the NCERT book using the following link:
http://ncert.nic.in/textbook/textbook.htm?hemh1=0-16

## INTRODUCTION

We know how to calculate the expression $5 \times 5$. This expression can be written in a shorter way using something called exponents.

$$
5 \times 5=5^{2}
$$

An expression that represents repeated multiplication of the same factor is called a power. The number 5 is called the base, and the number 2 is called the exponent.


| $3^{1} 3$ to the power 1 | 3 |
| :--- | :--- | :--- |
| $4^{2} 4$ to the power 2 | $4 \times 4$ |
| $5^{3} 5$ to the power 3 | $5 \times 5 \times 5$ |
| $2^{6} 2$ to the power 6 | $2 \times 2 \times 2 \times 2 \times 2 \times 2$ |

In mathematics, we use superscripts to represent the number of times the number is multiplied by itself. These superscripts are the exponents.
$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2=2^{10}=1,024$
$a \times a \times a \times a \times a \times a \times a \times a \times a \times a=a^{10}$

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 $\mathrm{a}^{\mathrm{n}}$, we are saying that $\mathbf{a}$ is being multiplied by itself $\mathbf{n}$ number of times. We call a the base, and $\mathbf{n}$ is the exponent. The expression $\mathrm{a}^{\mathrm{n}}$ is called a power, and is read as, "a raised to the power of $\mathbf{n}$ " or "a to the nth 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 $\mathrm{a}^{2}$ can also be read as "asquared," and $\mathrm{a}^{3}$ 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
3) Negative exponent
https://www.youtube.com/watch?v=rwFgnRss-do
4) Expansion of large numbers
https://www.youtube.com/watch?v=yvSyObj59Pk
5) laws of exponents
https://www.youtube.com/watch?v=bLCtYNIdw4E
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) $\quad x^{m} / x^{n}=x^{m-n}$. Divide 2 powers with the same base by subtracting the exponents.
6) $\quad\left((x)^{m}\right)^{n}=(x)^{m n}$. Multiply the powers when the power is raised by another power.
7) $\quad(x y)^{m}=x^{m} y^{m}$

$$
\frac{x^{m}}{y^{m}}=\left(\frac{x}{y}\right)^{m}
$$

## 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
2https://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

3https://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
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. $\quad \ln 2^{n}, n$ 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 $\mathrm{y}^{0}$ is equal to
A) 1
B) 0
C) -1
D) not defined

Q6. $\left[2^{-1}+3^{-1}+4^{-1}\right]^{0}=$ $\qquad$
Q7. What is the value of $4^{0}--3^{3}$ ?
Q8. What is the value of $(-3)^{4}$
Q9. On dividing $8^{5}$ by $\qquad$ we get 8 .
Q10. The value for $(-7)^{6} / 7^{6}$ is $\qquad$ .
Q11. True/False:
A) $(-2)^{0}=2$
B) $\quad(-7)^{-4} \times(-7)^{2}=(-7)^{-2}$
C) $\quad a^{2}=\frac{1}{(a)-2}$
D) The expression of $4^{-3}$ as a power with base 2 is $2^{6}$.

