

LESSON PLAN 10

TEACHER'S NAME :

SUBJECT: MATHEMATICS

CLASS: 8

UNIT : EXPONENTS AND POWERS

No.of Periods: 7+8=15

PERIOD ALLOTMENT

NAME OF THE UNIT	SUB-TOPICS	NO OF PERIODS REQUIRED			Time line for teaching	
		Teaching	Practice	TOTAL	From	To
EXPONENTS AND POWERS	10.1 PRE-REQUISITES & INTRODUCTION	1	1	2		
	10.2 POWERS WITH NEGATIVE EXPONENTS 10.3 LAWS OF EXPONENTS	3	4	7		
	10.4 USE OF EXPONENTS TO EXPRESS SMALL NUMBERS IN STANDARD FORM 10.4.1 COMPARING VERY LARGE AND VERY SMALL NUMBERS	3	3	6		
	TOTAL	7	8	15		

PRE-REQUISITES OF THE LESSON

Every Pupil is expected to have basic knowledge in

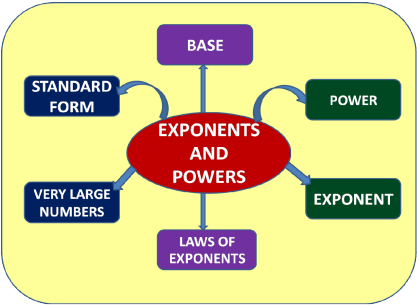
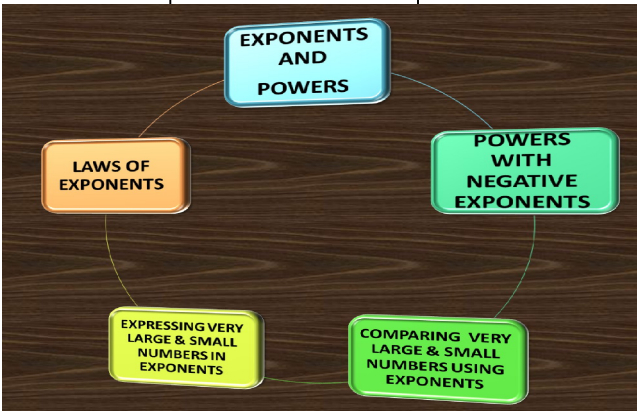
- # terminology related to powers & exponents (non negative integers)
- # expressing larger numbers in powers of 10
- # four basic operations +, -, ×, ÷
- # laws of exponents for positive numbers.
- # converting larger positive numbers into standard form and vice versa

LEARNING OUTCOMES

After Completion of this lesson every student will be able to

- # express negative numbers also in powers
- # convert very large and very small numbers into standard form
- # Compare two very large or very small numbers by converting them into standard form
- # Utilize the concept of exponents & Powers in real life sums
- # appreciate the utility of "Exponents & Powers" in real life situations

TEACHING PERIOD : 1 (PRE - REQUISITES & INTRODUCTION)

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
PRE REQUISITES	Brain storming session involving children with pre-requisites vocabulary and concepts related to previous knowledge. Introduction of new vocabulary and key words associated with the concept through questioning #Base # Power # Exponent # Laws of Exponents (Natural numbers) # Very large numbers # standard form	* Students read the pre-requisites and answer the questions to the teacher (whole class activity)	Every Pupil will read and write the key words in their note books
MIND MAPPING	Teacher writes the key word " EXPONENTS & POWERS " on the black board and will elicit its other related words through questioning 	Heterogeneous groups are created. One group will read the words and other will explain the meaning	Pupils individually read the keywords associated with the lesson
RELEVANCE OF THE LESSON	Teacher conducts a discussion on the importance of the lesson through questioning ex. 1.How can we express the distance of moon from earth in easily readable form? 2. What is an exponent? 3. Can you express some examples of very large numbers? 4.Which laws of exponents are known to you?	Students participate in the discussion and ask questions	Pupils individually write their responses to the questions asked
CONCEPT MAP	Teacher displays the concept map depicting various concepts that pupil are going to learn in this lesson 	Whole class read the concept map	
ASSESSMENT	Teacher poses some questions to test their knowledge on prerequisites like laws of exponents and sums based on them.	every group will do the task by discussion among each other	every individual solves the task on their own

PRACTICE PERIOD: 1

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books #Base # Power # Exponent #Laws of Exponents (natural numbers) # Very large numbers # standard form	Students read these key words in groups and will try to give examples to each key word	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher writes some examples on laws of exponents (powered with natural numbers) and deduces the law from them and asks children to deduct remaining laws in the similar way by watching similar lines	Each group will observe the similar lines and will frame some more by discussion	Every Individual will frame some more using similar lines
SUMMARY/ SYNOPSIS	Teacher writes synopsis on the board along with laws of exponents and asks children to read, note down and practice.	pupils will note down and read the summary in groups	every individual spells and reads the summary and notes it down
WRITING/ EDITING	Teacher conducts a dictation on key words ,pre-requisites and similar lines and asks children to exchange books for editing after writing is finished.	One group will check the writings of the other and vice versa	Slow learners are focused and teacher will ascertain that every individual learns the

TEACHING PERIODS : 2 to 4	POWERS WITH NEGATIVE EXPONENTS LAWS OF EXPONENTS																		
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)																
KEY WORDS	Brain storming session involving children with key words # Negative Exponents # Laws of exponents(powered with integers)	* Students read the keywords answer the questions to the teacher (whole class)	Every Pupil will read and write the key words in their note books																
CONCEPTUAL UNDERSTANDING	Teacher demonstrates the process of expressing powers with negative exponents and conducts an activity involving groups of children where each group is provided with some negative exponents and are asked to test the various of laws of exponents as they have done in the case of positive exponents in class VII. Here teacher	Each group will understand the concepts by participation in the activity	every child learns the concept through the learning activity																
LEARNING ACTIVITY	guides each group and makes them apprehend that all the laws of exponents that they have learnt in previous class holds good for negative exponents too.	<table border="1"> <tbody> <tr> <td>Product Rule</td> <td>$a^m \times a^n = a^{m+n}$</td> </tr> <tr> <td>Quotient Rule</td> <td>$a^m \div a^n = a^{m-n}$</td> </tr> <tr> <td>Power of a Power Rule</td> <td>$(a^m)^n = a^{mn}$</td> </tr> <tr> <td>Power of a Product Rule</td> <td>$(ab)^m = a^m b^m$</td> </tr> <tr> <td>Power of a Quotient Rule</td> <td>$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$</td> </tr> <tr> <td>Zero Exponent Rule</td> <td>$a^0 = 1$</td> </tr> <tr> <td>Negative Exponent Rule</td> <td>$a^{-m} = \frac{1}{a^m}$</td> </tr> <tr> <td>Fractional Exponent Rule</td> <td>$a^{\frac{m}{n}} = \sqrt[n]{a^m}$</td> </tr> </tbody> </table>		Product Rule	$a^m \times a^n = a^{m+n}$	Quotient Rule	$a^m \div a^n = a^{m-n}$	Power of a Power Rule	$(a^m)^n = a^{mn}$	Power of a Product Rule	$(ab)^m = a^m b^m$	Power of a Quotient Rule	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$	Zero Exponent Rule	$a^0 = 1$	Negative Exponent Rule	$a^{-m} = \frac{1}{a^m}$	Fractional Exponent Rule	$a^{\frac{m}{n}} = \sqrt[n]{a^m}$
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SUMMARY	Teacher once again writes important key words and procedures and asks children to note down and adopt.	Pupils will note down and read the summary in groups	Every individual reads the summary and notes it down and adopts the procedure																
ASSESSMENT	Teacher gives some questions from Try These sections as well as some examples and asks children to solve those sums	Every group will do the sums by discussion among each other	Every individual solves the sums on their own																

PRACTICE PERIODS : 2 to 5			
POWERS WITH NEGATIVE EXPONENTS LAWS OF EXPONENTS			
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books # Negative Exponents # Laws of exponents(powered with integers)	Whole class activity : one child comes to the board and reads the key words loudly and the remaining class follows.	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher will express some numbers with negative exponents and also solves some exemplary sums involving laws of exponents and asks children to read the lines and frame some more by watching similar lines	Each group will read the similar lines and will frame some more by discussion	Every Individual will do a few more by watcing similar lines
<div style="background-color: #003366; color: white; padding: 10px;"> $1256.249 = 1000 + 200 + 50 + 6 + 0.2 + 0.04 + 0.009$ $= 1 \times 1000 + 2 \times 100 + 5 \times 10 + 6 \times 1 + 2/10 + 4/100 + 9/1000$ $= 1 \times 10^3 + 2 \times 10^2 + 5 \times 10^1 + 6 \times 10^0 + 2 \times 10^{-1} + 4 \times 10^{-2} + 9 \times 10^{-3}$ </div>		<div style="border: 2px solid red; border-radius: 15px; padding: 10px; text-align: center;"> $\frac{-18x^3y^{-9}}{3x^2y^2} = \frac{-18}{3} \cdot \frac{x^3}{x^2} \cdot \frac{y^{-9}}{y^2}$ $= -6xy^{-9-2}$ $= -6xy^{-11}$ $= \frac{-6x}{y^{11}}$ </div>	
SUMMARY/ SYNOPSIS	Teacher once again writes important key words and definitions and asks children to note down and adopt.	Pupil groups will read and adopt the procedure	Teacher focuses on every individual so that every child is able to learn the concept in successive upcoming practice sessions
WRITING/ EDITING	Teacher gives some questions from Exercise 10.1 and asks children to solve those sums and teacher checks the writings of children	One group will check the writings of the other and vice versa	

TEACHING PERIODS : 6 to 9					
USE OF EXPONENTS TO EXPRESS SMALL NUMBERS IN STANDARD FORM					
COMPARING VERY LARGE AND VERY SMALL NUMBERS					
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)		
KEY WORDS	Brain storming session involving children with key words # Very large numbers in Standard form # Very Small numbers in standard form # Comparing large/small numbers	* Students read the keywords answer the questions to the teacher (whole class activity)	Every Pupil will read and write the key words in their note books		
CONCEPTUAL UNDERSTANDING	Teacher conducts an activity involving heterogeneous groups where each group will be given some very large and small numerics are given and are asked to express them in standard form. As children are well aware of expressing large numbers in exponential form in their previous class they can easily express the given very large numbers in standard form. Each group will be guided by the teacher in expressing both very large and very small numbers in standard form. Later teacher expresses some exemplary numbers in standard form both large numbers in positive exponents and small numbers in negative exponents. Later demonstrates the procedure of comparing two very large	Each group will understand the concepts by participation in the activity	every child learns the concept through the learning activity and observation of TLM		
LEARNING ACTIVITY	small numbers by expressing them in their standard forms	<div style="border: 2px solid red; padding: 10px;"> <p style="text-align: center;">COMPARING VERY LARGE NUMBERS AND SMALL NUMBERS BY EXPRESSING THEM IN STANDARD FORM</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> <p style="color: red; font-weight: bold;">Compare the following two large numbers using standard form</p> <p style="color: red; font-weight: bold;">288560000000000,536000000000000</p> <p>Ans:</p> <p>First we write the two numbers in standard form</p> $288560000000000 = 2.8856 \times 10^{15}$ $536000000000000 = 5.36 \times 10^{14}$ <p>To compare, both the numbers shall be expressed in exponents of equal power.</p> <p>Therefore the two numbers will be 2.8856×10^{15} and 0.536×10^{15}</p> <p>Now as since both are of equal power the number with higher coefficient part will be the bigger number. Hence</p> $2.8856 \times 10^{15} > 0.536 \times 10^{15}$ </td> <td style="width: 50%; padding: 5px;"> <p style="color: red; font-weight: bold;">Compare the following two small numbers using standard form</p> <p style="color: red; font-weight: bold;">0.000000000000083,0.000000000000302</p> <p>Ans:</p> <p>First we write the two numbers in standard form</p> $0.000000000000083 = 8.3 \times 10^{-15}$ $0.000000000000302 = 3.02 \times 10^{-13}$ <p>To compare, both the numbers shall be expressed in exponents of equal power.</p> <p>Therefore the two numbers will be 8.3×10^{-15} and 302×10^{-15}</p> <p>Now as since both are of equal power the number with higher coefficient part will be the bigger number. Hence</p> $8.3 \times 10^{-15} < 302 \times 10^{-15}$ </td> </tr> </table> </div>		<p style="color: red; font-weight: bold;">Compare the following two large numbers using standard form</p> <p style="color: red; font-weight: bold;">288560000000000,536000000000000</p> <p>Ans:</p> <p>First we write the two numbers in standard form</p> $288560000000000 = 2.8856 \times 10^{15}$ $536000000000000 = 5.36 \times 10^{14}$ <p>To compare, both the numbers shall be expressed in exponents of equal power.</p> <p>Therefore the two numbers will be 2.8856×10^{15} and 0.536×10^{15}</p> <p>Now as since both are of equal power the number with higher coefficient part will be the bigger number. Hence</p> $2.8856 \times 10^{15} > 0.536 \times 10^{15}$	<p style="color: red; font-weight: bold;">Compare the following two small numbers using standard form</p> <p style="color: red; font-weight: bold;">0.000000000000083,0.000000000000302</p> <p>Ans:</p> <p>First we write the two numbers in standard form</p> $0.000000000000083 = 8.3 \times 10^{-15}$ $0.000000000000302 = 3.02 \times 10^{-13}$ <p>To compare, both the numbers shall be expressed in exponents of equal power.</p> <p>Therefore the two numbers will be 8.3×10^{-15} and 302×10^{-15}</p> <p>Now as since both are of equal power the number with higher coefficient part will be the bigger number. Hence</p> $8.3 \times 10^{-15} < 302 \times 10^{-15}$
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ASSESSMENT	Teacher gives some questions from Try These sections as well as some examples and asks children to solve those sums	Every group will do the sums by discussion among each other	Every individual solves the sums on their own		

COMPARING VERY LARGE AND VERY SMALL NUMBERS

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)																														
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SIMILAR LINES READING	Teacher expresses some large and small numbers in Standard form and asks children to express some more given in the work sheet by observing similar lines	Each group will read the similar lines and will frame some more by discussion	Every Individual will do a few more by watching similar lines																														
<div style="display: flex; justify-content: space-between;"> <div style="border: 2px solid blue; border-radius: 20px; padding: 10px; width: 48%;"> <p>Express the number appearing in the following statements in standard form.</p> <p>(a) The distance between Earth and Moon is 384,000,000 m.</p> <p>384,000,000</p> <p>= 384×10^6 m</p> <p>= $(3.84 \times 10^2) \times 10^6$</p> <p>= $3.84 \times 10^2 \times 10^6$</p> <p>= $3.84 \times 10^{2+6}$ (Using $a^m \times a^n = a^{m+n}$)</p> <p>= 3.84×10^8</p> <p>Answer is 3.84×10^8 m</p> </div> <div style="border: 2px solid red; border-radius: 20px; padding: 10px; width: 48%;"> <p>Express the number appearing in the following statements in standard form.</p> <p>(iv) Size of a plant cell is 0.00001275 m</p> <p>0.00001275 m</p> <p>= $\frac{1275}{1000000000}$</p> <p>= $\frac{1275}{10^8}$</p> <p>= 1275×10^{-8}</p> <p>= $(1.275 \times 10^3) \times 10^{-8}$</p> <p>= $1.275 \times (10^3 \times 10^{-8})$</p> <p>= $1.275 \times 10^{3+(-8)}$ (Using $a^m \times a^n = a^{m+n}$)</p> <p>= 1.275×10^{-5} m</p> </div> </div>																																	
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