

LESSON PLAN 11

TEACHER'S NAME :

SUBJECT: MATHEMATICS

CLASS: 7

UNIT : EXPONENTS AND POWERS

No.of Periods: 8+9=17

PERIOD ALLOTMENT

NAME OF THE UNIT	SUB-TOPICS	NO OF PERIODS REQUIRED			Time line for teaching	
		Teaching	Practice	TOTAL	From	To
EXPONENTS AND POWERS	11.1 11.2 PRE-REQUISITES & INTRODUCTION EXPONENTS	1	1	2		
	11.3 11.3.1 11.3.2 11.3.3 11.3.4 11.3.5 11.4 LAWS OF EXPONENTS MULTIPLYING POWERS WITH THE SAME BASE DIVIDING POWERS WITH THE SAME BASE TAKING POWER OF A POWER MULTIPLYING POWERS WITH SAME EXPONENTS DIVIDING POWERS WITH THE SAME EXPONENTS MISCELLANEOUS EXAMPLES USING THE LAWS OF EXPONENTS	5	6	11		
	11.5 11.6 DECIMAL NUMBER SYSTEM EXPRESSING LARGE NUMBERS IN THE STANDARD FORM	2	2	4		
	TOTAL	8	9	17		

PRE-REQUISITES OF THE LESSON

Every Pupil is expected to have basic knowledge in

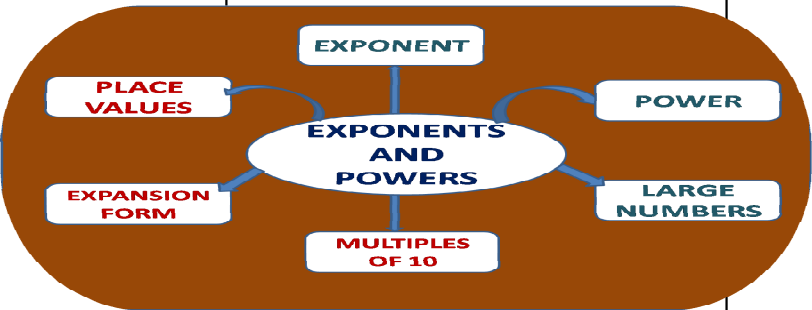
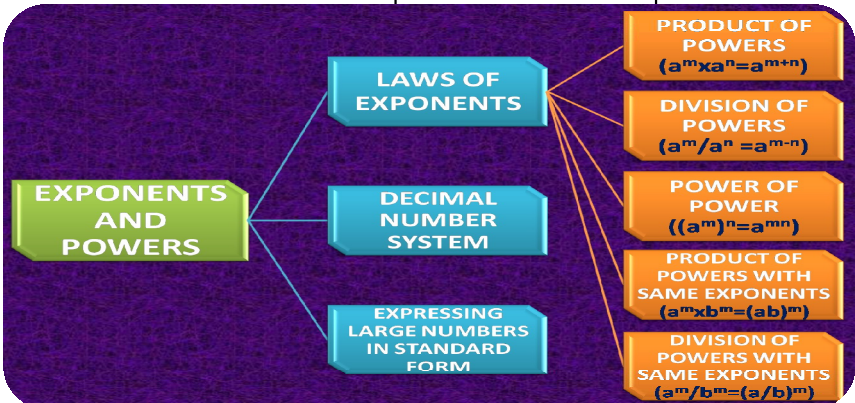
- # dealing with large numbers
- # expressing large numbers in expansion form with place values in multiples of 10
- # four basic operations +, -, ×, ÷
- # finding squares and cubes
- # converting larger numbers into expansion form and vice versa

LEARNING OUTCOMES

After Completion of this lesson every student will be able to

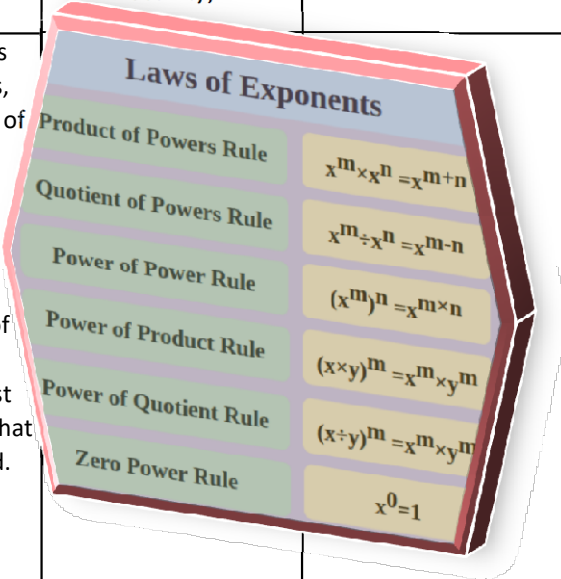
- # express numbers in the form of exponents
- # utilize various laws of exponents in solving sums
- # Express decimals in the form of exponents
- # convert very large numbers into standard form
- # compare very large numbers or small numbers by expressing them in standard form
- # appreciate the utility of "Exponents & Powers" in real life situations

TEACHING PERIOD : 1 (PRE - REQUISITES & INTRODUCTION, EXPONENTS)

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 # large numbers # expansion form # expression #Base # Power # Exponent	* 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 	Hetrogeneous 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. Can you express 5004236 in expansion form? 3. Can you express some examples of very large numbers? 4. What is the multiple of a number by itself is called?	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 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 # large numbers # expansion form # expression #Base # Power # Exponent	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 large numbers and expresses them in expansion form and writes them in the form of power of 10 and explains the basic terminology like exponent, base, coefficient, power etc., related with exponents. Teacher will perform some exemplary transformations into exponential form by taking some sums.	Each group will observe the similar lines and will frame some more by discussion	Every Individual will frame some more using similar lines
<div style="border: 2px solid purple; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;"> base → 10³ ← exponent </p> <p style="text-align: center;">Ten to the 3rd power</p> <p style="text-align: center;">10³ = 10 × 10 × 10 = 1000</p> </div>			
<p style="text-align: center; margin: 0;">EXPRESSING LARGE NUMBERS IN EXPANSION FORM</p> <p style="text-align: center; margin: 5px 0 0 0;">92,35,874 = 9 × 10,00,000 + 2 × 1,00,000 + 3 × 10,000 + 5 × 1,000 + 8 × 100 + 7 × 10 + 4 × 1</p> <p style="text-align: center; margin: 5px 0 0 0;">= 9 × 10⁶ + 2 × 10⁵ + 3 × 10⁴ + 5 × 10³ + 8 × 10² + 7 × 10¹ + 4 × 10⁰</p>			
SUMMARY/ SYNOPSIS	Teacher writes synopsis on the board and detailing about basic terminology 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 6 LAWS OF EXPONENTS, MULTIPLYING POWERS WITH THE SAME BASE, DIVIDING POWERS WITH THE SAME BASE, TAKING POWER OF A POWER, MULTIPLYING POWERS WITH SAME EXPONENTS, DIVIDING POWERS WITH THE SAME EXPONENTS, MISCELLANEOUS EXAMPLES USING THE 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 # Laws of Exponents # product of powers # quotient of powers # Power of Power # power of product # power of quotient # zero power rule	* 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 explains various laws of exponents like product of powers, quotient of powers, power of power, power of product, power of quotient, zero power rule etc., through inductive-deductive manner. Later teacher conducts an activity by dividing pupils into heterogeneous groups. In this activity each group is provided with a set of exponents and are instructed to apply the laws of exponents they have learnt and test the authenticity of these laws. The group that that first does the activity will be rewarded.		Every child learns the concept through the learning activity
LEARNING ACTIVITY	<div style="border: 2px solid blue; padding: 10px; margin: 10px;"> <p>(i) $3^4 \times 3^2 = \underbrace{(3 \times 3 \times 3 \times 3)}_{\substack{\text{4 times multiplication} \\ \text{of 3 by itself}}} \times \underbrace{(3 \times 3)}_{\substack{\text{2 times multiplication} \\ \text{of 3 by themselves}}}$</p> <p>$= \underbrace{3 \times 3 \times 3 \times 3 \times 3 \times 3}_{\substack{\text{6 times multiplication} \\ \text{of 3 by themselves}}} = 3^6 = 3^{4+2}$</p> <p>Thus, $3^4 \times 3^2 = 3^{4+2}$</p> </div>		
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 Exercise 11.1 & 11.2 , 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 7 LAWS OF EXPONENTS, MULTIPLYING POWERS WITH THE SAME BASE, DIVIDING POWERS WITH THE SAME BASE, TAKING POWER OF A POWER, MULTIPLYING POWERS WITH SAME EXPONENTS, DIVIDING POWERS WITH THE SAME EXPONENTS, MISCELLANEOUS EXAMPLES USING THE LAWS OF EXPONENTS																															
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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 # Laws of Exponents # product of powers # quotient of powers # Power of Power # power of product # power of quotient # zero power rule	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 make use of some laws of exponents in solving some exemplary sums and asks children to solve some more by watching similar lines in the worksheet provided to them.	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: 15px; padding: 10px; width: 45%;"> <p style="text-align: center; color: blue;">Exponents and Multiplication</p> <p>Simplify. Your answer should contain only positive exponents.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1) $8 \cdot 8^5$ 8^6</td> <td style="width: 50%;">8) $(\frac{4}{5})^6 \cdot (\frac{4}{5})^2 \cdot (\frac{4}{5})^5$ $(\frac{4}{5})^{13}$</td> </tr> <tr> <td>2) $7r \cdot 9r^3$ $63r^4$</td> <td>9) $c^5 \cdot c^6$ c^{11}</td> </tr> <tr> <td>3) $5^5 \cdot 5^4$ 5^9</td> <td>10) $9c^6s^5 \cdot 7cs^4$ $63c^7s^9$</td> </tr> <tr> <td>4) $6z^5 \cdot 8z^5 \cdot 2z^3$ $96z^{14}$</td> <td>11) $2n^3d^5 \cdot 6n^2d^4$ $12n^5d^9$</td> </tr> <tr> <td>5) $8c^2 \cdot 9c^3y^5$ $72c^5y^5$</td> <td>12) $(\frac{3}{7})^2 \cdot (\frac{3}{7})^4$ $(\frac{3}{7})^6$</td> </tr> <tr> <td>6) $(\frac{1}{8})^6 \cdot (\frac{1}{8})^2$ $(\frac{1}{8})^8$</td> <td>13) $6y \cdot 4y^4$ $24y^5$</td> </tr> <tr> <td>7) $7b^3 \cdot 5b^4$ $35b^7$</td> <td>14) $k \cdot k^3$ k^4</td> </tr> </table> </div> <div style="border: 2px solid red; border-radius: 15px; padding: 10px; width: 45%;"> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1) $9^4 \cdot 9^3$</td> <td style="width: 50%;">8) $(\frac{1}{k})^3 \cdot (\frac{1}{k})^4 \cdot (\frac{1}{k})^5$</td> </tr> <tr> <td>2) $(\frac{1}{w})^5 \cdot (\frac{1}{w})^2$</td> <td>9) $5z^5 \cdot 6z^{-3} \cdot 3z^6$</td> </tr> <tr> <td>3) $r^3s^{-2} \cdot 8r^{-3}s^4 \cdot 4rs^5$</td> <td>10) $9 \cdot 9^{-6}$</td> </tr> <tr> <td>4) $7y \cdot 2y^2$</td> <td>11) $9b \cdot 6b^3$</td> </tr> <tr> <td>5) $(\frac{1}{5})^4 \cdot (\frac{1}{5})^3 \cdot (\frac{1}{5})^2$</td> <td>12) $9s^4 \cdot 7s^{-2}$</td> </tr> <tr> <td>6) $5a^3n^6 \cdot 4dn^4$</td> <td>13) $2a^3c^6 \cdot 8d^6c^{-2}$</td> </tr> <tr> <td>7) $8nr^{-4} \cdot 9n^{-6}r^3$</td> <td>14) $s^2 \cdot s^6$</td> </tr> </table> </div> </div>				1) $8 \cdot 8^5$ 8^6	8) $(\frac{4}{5})^6 \cdot (\frac{4}{5})^2 \cdot (\frac{4}{5})^5$ $(\frac{4}{5})^{13}$	2) $7r \cdot 9r^3$ $63r^4$	9) $c^5 \cdot c^6$ c^{11}	3) $5^5 \cdot 5^4$ 5^9	10) $9c^6s^5 \cdot 7cs^4$ $63c^7s^9$	4) $6z^5 \cdot 8z^5 \cdot 2z^3$ $96z^{14}$	11) $2n^3d^5 \cdot 6n^2d^4$ $12n^5d^9$	5) $8c^2 \cdot 9c^3y^5$ $72c^5y^5$	12) $(\frac{3}{7})^2 \cdot (\frac{3}{7})^4$ $(\frac{3}{7})^6$	6) $(\frac{1}{8})^6 \cdot (\frac{1}{8})^2$ $(\frac{1}{8})^8$	13) $6y \cdot 4y^4$ $24y^5$	7) $7b^3 \cdot 5b^4$ $35b^7$	14) $k \cdot k^3$ k^4	1) $9^4 \cdot 9^3$	8) $(\frac{1}{k})^3 \cdot (\frac{1}{k})^4 \cdot (\frac{1}{k})^5$	2) $(\frac{1}{w})^5 \cdot (\frac{1}{w})^2$	9) $5z^5 \cdot 6z^{-3} \cdot 3z^6$	3) $r^3s^{-2} \cdot 8r^{-3}s^4 \cdot 4rs^5$	10) $9 \cdot 9^{-6}$	4) $7y \cdot 2y^2$	11) $9b \cdot 6b^3$	5) $(\frac{1}{5})^4 \cdot (\frac{1}{5})^3 \cdot (\frac{1}{5})^2$	12) $9s^4 \cdot 7s^{-2}$	6) $5a^3n^6 \cdot 4dn^4$	13) $2a^3c^6 \cdot 8d^6c^{-2}$	7) $8nr^{-4} \cdot 9n^{-6}r^3$	14) $s^2 \cdot s^6$
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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 11.2 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 : 7 TO 8	DECIMAL NUMBER SYSTEM EXPRESSING LARGE NUMBERS IN THE STANDARD FORM
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CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS	Brain storming session involving children with key words # Decimal number system # Very large 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 demonstrates the procedure of expressing large numbers in standard form using powers of 10. Here teacher gives an exemplary illustration of expressing large numbers in standard form through some exemplary sums. Later conducts an activity involving heterogeneous groups where each group will be given some large numerics and are asked to express them in standard form.	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	<div style="border: 2px solid purple; padding: 10px; background-color: #fff9c4; margin: 10px auto; width: 80%;"> <p>Express 431 000 in standard form</p> <p>Express the number as a product of A ($1 \leq A < 10$) and a power of 10</p> <p style="text-align: center;"> A Power of 10 </p> <p style="text-align: center;"> $431\ 000 = 4.31 \times 100\ 000$ $= 4.31 \times 10^5$ </p> <p style="text-align: center;"> $431\ 000 = 4\ 310\ 000$ $= 4.31 \times 10^5$ </p> <p style="text-align: center; font-size: small;">5 is the number of places, the decimal point is moved to the left</p> </div>		
<p>EXPRESSING LARGE NUMBERS IN EXPANSION FORM OF EXPONENTS</p> <p>$4035000000 = 4035 \times 10000000$</p> <p>$= 4035 \times 10^7$</p> <p>$= 4.035 \times 10^3 \times 10^7$</p> <p>$= 4.035 \times 10^{10} \quad (a^m \times a^n = a^{m+n})$</p>			
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
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 : 8 to 9 **DECIMAL NUMBER SYSTEM**
EXPRESSING LARGE NUMBERS IN THE STANDARD FORM

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 # Decimal number system # Very large numbers in Standard form # Comparing large/small numbers	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 expresses some large numbers in Standard form and asks children to express some more given in the work sheets 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

EXPRESSING LARGE NUMBERS IN EXPANSION FORM OF EXPONENTS

3800000000 = 38 x 100000000

= 38 x 10⁸

= 3.8 x 10¹ x 10⁸

= 3.8 x 10⁹ (a^m x aⁿ = a^{m+n})

WORK SHEET ON EXPRESSING LARGE NUMBERS IN STANDARD FORM OF EXPONENTS

EXPRESS THE FOLLOWING IN THEIR EXPONENT FORM

1) 32040000000000000000=.....

2) 2850000000000000000000=.....

3) 90000000000000=.....

4) 2345600000000=.....

5) 807033000=.....

Planet	Distance from Sun (km)	Distance from Sun (km) Standard Notation
Earth	149,600,000	1.496 X 10 ⁸
Jupiter	778,300,000	
Mars	227,900,000	
Mercury	57,900,000	
Neptune	4,497,000,000	
Pluto	5,900,000,000	
Saturn	1,427,000,000	
Uranus	2,870,000,000	
Venus	108,200,000	

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 11.3 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	