

## Fifth Grade Sample Lesson

# Math 4 Success

## USING FACTORS AND EXPONENTS

### LEVEL 13 Lesson 8

An exponent is a small numeral written above and to the right of another numeral e.g.  $3^4$ . The 4 is the exponent and indicates that 3 is used as a factor 4 times

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

$$3^4 = 81$$

The exponent names the number of places to the left of the ones' place when the base is ten.

Thousands	Hundreds	Tens	Ones
$10^3$	$10^2$	$10^1$	$10^0$

### 1. **CONCEPT:**

Number/Numeral: Using factors and exponents to express a product.

### 2. **BEHAVIORAL OBJECTIVE:**

The student given a set of repeated factors or a factor with an exponent would be able to write the one not given and its product.

### 3. **MATHEMATICAL IDEAS:**

- a) An exponent is a small numeral written above and to the right of another numeral.
- b) The exponent tells how many times the base number appears as a factor.
- c) An exponent names a power of a factor.
- d) The exponent names the number of places to the left of the ones' place when the base is ten.

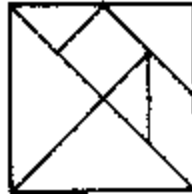
Thousands	Hundreds	Tens	Ones
$10^3$	$10^2$	$10^1$	$10^0$

**4. KEY WORDS:**

exponent power factor product

**5. ACTIVITIES:**

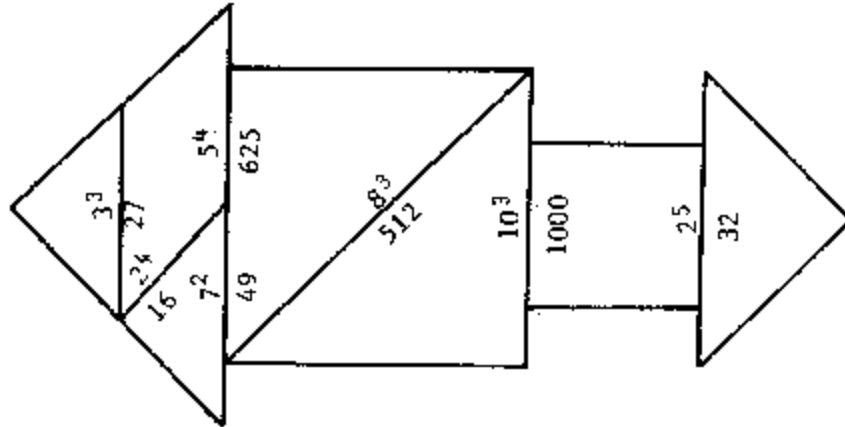
- a) Do repeated multiplication. Example:  $6 \times 6 \times 6$ . What is the factor? (6). How many times does it appear as a factor? (3). this could be repeated until the children have this pattern firmly in mind. Then, introduce the idea that the number of times a factor is repeated is the exponent and show how to write the exponent.
- b) "Exponents with Tangrams".  
A tangram is a puzzle that is made by cutting a square into seven pieces: five triangles, a square and a rhomboid.



The following procedure describes how to make a set of tangram pieces into a puzzle whose solution requires the use of exponential computations. Procedure for constructing puzzles:

1. Make a set of poster board or oak tag tangrams. The pieces may be cut out of a square piece of poster board that has been divided as indicated above.
2. Fit the pieces together to form some shape. Other patterns can be found in tangram books.
3. Write equivalent statements one of which involves an exponential expression on each pair of matching edges (or portions of edges) of puzzle pieces.

4. The puzzle pieces are mixed up and placed with instructions



in an envelope. Directions: (1) Form a shape by matching edges of puzzle pieces with equivalent expressions of which one is an exponential expression. (2) Make a sketch of the shape formed.

If the tangram pieces have been laminated and the numerals written with a felt-tip pen, the numerals may be changed to build other shapes.

- c) "Captain X". This activity is designed for 3 to 4 players.  
 Materials: fifty-two 3" x 5" cards with one exponential expression, such as:  $2^3$ ,  $3^4$ ,  $9^3$ ,  $7^2$ ,  $8^3$ , etc., written on each card. Rules: Shuffle the cards and deal out all of the cards to players. Each player stacks his cards face down in front of himself. One at a time, players turn over their top card. The player with the highest card takes all cards. When all cards have been turned up, the player with the most cards is declared the winner (Captain X).

## FACTORS AND EXPONENTS WORKSHEET

Name \_\_\_\_\_

### COMPLETE THE FOLLOWING CHART:

Numeral	Factors	Product
$2^5$	$2 \times 2 \times 2 \times 2 \times 2$	32
$4^2$		
	$6 \times 6 \times 6$	216
$9^2$		
	$12 \times 12$	
$8^3$		
$3^4$		
		128
$10^5$		
		36
$7^4$		

**USING FACTORS AND EXPONENTS TO EXPRESS  
A PRODUCT**  
**Answers to WORKSHEET**

**COMPLETE THE FOLLOWING CHART:**

Numeral	Factors	Product
$2^5$	$2 \times 2 \times 2 \times 2 \times 2$	32
$4^2$	$4 \times 4$	16
$6^3$	$6 \times 6 \times 6$	216
$9^2$	$9 \times 9$	81
$12^2$	$12 \times 12$	144
$8^3$	$8 \times 8 \times 8$	512
$3^4$	$3 \times 3 \times 3 \times 3$	81
$2^7$	$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$	128
$10^5$	$10 \times 10 \times 10 \times 10 \times 10$	100,000
$6^2$	$6 \times 6$	36
$7^4$	$7 \times 7 \times 7 \times 7$	2401

## FACTORS AND EXPONENTS CONCEPT TEST

Name \_\_\_\_\_

Score \_\_\_\_\_

Complete the chart. Write the missing answers in the answer spaces.

	Numeral	Factor	Product
1.	$9^4$		6,561
2.		$3 \times 3 \times 3$	27
3.	$5^6$		15,625
4.	$4^5$		
5.	$7^3$		

## FACTORS AND EXPONENTS

### Answers to CONCEPT TEST

Complete the chart. Write the missing answers in the answer spaces.

	Numeral	Factor	Product
1.	$9^4$	$9 \times 9 \times 9 \times 9$	6,561
2.	$3^3$	$3 \times 3 \times 3$	27
3.	$5^6$	$5 \times 5 \times 5 \times 5 \times 5 \times 5$	15,625
4.	$4^5$	$4 \times 4 \times 4 \times 4 \times 4$	1024
5.	$7^3$	$7 \times 7 \times 7$	343