Concept: The Meaning of Exponents

Name:

- **You should have completed Exponents – Section 1 Part A: The Meaning of Exponents before beginning this handout.**

Warm Up

Complete the following. Show all your steps.

(a) $2 \times 2 =$

(b) $3 \times 3 \times 3 =$

(c) $4 \times 4 \times 4 \times 4 =$

(d) $5 \times 5 \times 5 \times 5 \times 5 \times 5 =$

(e) $6 \times 6 \times 6 \times 6 \times 6 \times 6 =$

f) $7 \times 7 \times 7 \times 7 \times 7 \times 7 \times 7 =$

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Exponents > **The Meaning of Exponents**

NOTE: *Use the **Menu** button in order to get to the lesson where you left off.*

Work through all Sub Lessons of the following Lessons **in order**:

- *Exponents, Powers, Bases*
- *Powerful Explosions*
- *Introductory Examples*
- *Examples – Substitution*
- *Examples – Order of Operations*

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

NOTES:
Fill in the following blanks:

- Exponents are used to write _____ expressions that have repeated _____.

$$2^4$$

- The base is ___ Use the base as the _____.
- The exponent is ____. The exponent indicates how many _____ to use the base as a _____.
- The entire _____ is called a _____.

$$2^{10}$$

- is read as "_____ to the _____ of _____."
- is read as "_____ to the _____."

It means that you use _____ as a factor _____ times.

Fill in the chart.

Power	Base	Exponent	Factor	Standard Form
	2	1	2	2
	2	2	2 × 2	4
	2	3	2 × 2 × 2	
	2	4	2 × 2 × 2 × 2	
	2	5		
	2	6		
	2	7		

	2			
	2			
	2			
	2			
Power	**Base**	**Exponent**	**Factor**	**Standard Form**
	3			
	3			
	3			
	3			
	3			
Power	**Base**	**Exponent**	**Factor**	**Standard Form**
	4			
	4			
	4			
	4			
Power	**Base**	**Exponent**	**Factor**	**Standard Form**
	5			

	5			
	5			
	5			
Power	**Base**	**Exponent**	**Factor**	**Standard Form**
	6			
	6			
	6			
Power	**Base**	**Exponent**	**Factor**	**Standard Form**
	10			
	10			
	10			
	10			
	10			
	10			
	10			

Interesting Fact: ***Descartes invented the exponent notation.***

http://books.google.ca/books?id=7juWmvQSTvwC&pg=PA346&lpg=PA346&dq=exponents+Descartes&source=web&ots=KWflCmK8Ss&sig=eTUkAqRdrQlDf8PUXpqlZCiRCOU&hl=en&sa=X&oi=book_result&resnum=8&ct=result

S^6

- **"___" is _____ by itself _____ times.**

Remember:

- *A power with a negative base is **positive** when _____ is _____ .*
- *A power with a negative base is **negative** when _____ is _____ .*

Practice:

Fill in the chart.

Power	Expanded Form	Standard Form
10^2		
3^3		
$\left(\frac{2}{3}\right)^2$		
$(-7)^3$		
$(-7)^4$		
$(-1)^{23}$		
$(-1)^{44}$		
4^3		
3^4		
$(-2)^4$		
$-(2)^4$		

Interesting fact:

Computer Memory

A byte is a unit of storage capable of storing one letter of the alphabet. For example, the word "math" requires four bytes to store in a computer.

Bytes of computer memory are often manufactured in amounts equal to powers of 2.

1 kilobyte (1K) = 2^{10} = _____ bytes

1 megabyte (1 MB) = 2^{20} =_____ bytes

1 gigabyte (1 GB) = 2^{30} =_____ bytes

http://www.webopedia.com/TERM/b/byte.html

OFF COMPUTER EXERCISES

1. Complete the chart.

Power	Expand the Power	Answer
2^4	(2) (2) (2) (2)	16
$(-2)^{16}$		
-4^4		
$(-4)^4$		
$(-1)^{33}$		
$(0.75)^3$		
$(-3)^5$		
$(-1)^{22}$		
$(-2)^3$		

2. Find the number that makes each expression true.

(a) $2^{(\ )} = 32$

(b) $(-4)^{(\ )} = -64$

(c) $(\ \ )^{3} = -27$

(d) $(0.5)^{(\ )} = 0.25$

(e) $(\ \ )^{(\ )} = 10\,000$

(f) $1^{3} + 2^{3} + 3^{3} + 4^{3} = (\ \ )^{(\ )}$

3. For each of the following substitute, the given value and then evaluate the expression. (*Use good form.*)

Example: $x^2 + 2y^3$ when $x = 2$ and $y = -1$

$$x^2 + 2y^3 = (\underline{\ 2\ })^2 + 2(\underline{\ -1\ })^3$$
$$= 4 + 2(-1)$$
$$= 4 + (-2)$$
$$= 2$$

(a) $2x^3$ when $x = -2$

(b) $-3x^3 - y^3$ when $x = -1$ and $y = 2$

(c) $2x^3 - 3y$ when $x = -3$ and $y = -4$

(d) $-4x^2y^3$ when $x = -3$ and $y = -2$

4. Evaluate. *Remember to use* ***Order of Operations*** *rules.*

(a) $33 - 3^3 =$

(b) $21 + 2^3 =$

(c) $3^4 + 2(-17) =$

(d) $2^5 - (5)(5) =$

(e) $(2 + 3)^2 =$

(f) $(2)^3 + (3)^2 =$

(g) $(-4)^2 + (-1)^3 =$

(h) $(3)^4 + (4)^3 =$

5. Fill in the blanks.

   In an expression $(-5)^3$, 3 is the _____, -5 is the _____ and

   $(-5)^3$ is the _____.

6. Is it possible for a person's age to be expressed as an exponent? *Explain your answer*.

7. On my first birthday, my parents gave me a dollar. On each birthday after that, they tripled my previous amount.

   (a) How much money did I receive on my 13^{th} birthday?

   (b) If I saved my birthday money, how much money in total will I have on my 13^{th} birthday?