September 27 , 2017 continued

UNIT 2: POWERS AND EXPONENT LAWS

SECTION 2.1:
WHAT IS A POWER?

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MATH 9

WHAT'S THE POINT OF TODAY'S LESSON?

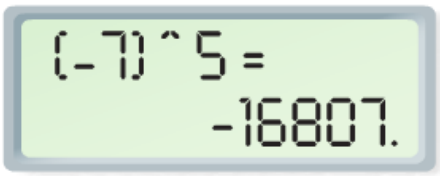
We will begin working on the Math 9 Specific Curriculum Outcome (SCO) "Numbers 1" OR "N1" which states:

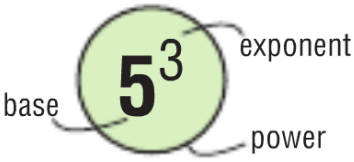
"Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: representing repeated multiplication using powers; using patterns to show that a power with an exponent of zero is equal to one; solving problems involving powers."

What does THAT mean???

SCO N1 means that we will learn about the two parts of a power (the base, or "the big number", and the exponent, or "the little number"). We will show what a power means when we write it out using multiplication (ex: $3^2 = 3 \times 3$), and we will use patterns to prove, for example, that $3^0 = 1$. Finally, we will use what we know about powers to solve problems.

UNIT 2: POWERS AND EXPONENT LAWS





exponent

5^3

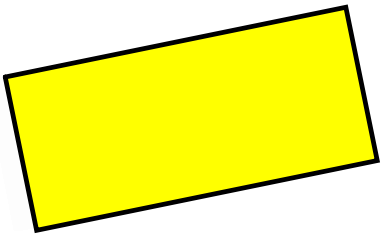
base

Power

UNIT 2: VOCABULARY

1. POWER: an expression in the form of a^n, where a is the base and n is the exponent; it represents a product of equal factors.

ex.: $4 \times 4 \times 4 = 4^3$



$15^{26} \rightarrow$ 26 15's

2. SQUARE NUMBER: a number that can be written as a power with an integer base and an exponent of 2.

ex.: $49 = 7^2$

(49 is a square number)

3. CUBE NUMBER: a number that can be written as a power with an integer base and an exponent of 3.

ex.: $8 = 2^3$

(8 is a cube number)

125 CAN BE WRITTEN SEVERAL WAYS:

1. **Standard Form:** 125
2. **As repeated multiplication:** 5 x 5 x 5
3. **As a POWER:** 5^3

(What kind of a number is 125? Think of definition #3...)

PLEASE TURN TO PAGE 53 IN *MMS9*.
LOOK AT EXAMPLE 1 - *WRITING POWERS*.

How would I write the following examples as POWERS?

1. 6 x 6 x 6 x 6 x 6 = 6^5

2. 8 x 8 x 8 x 8 x 8 x 8 x 8 = 8^7

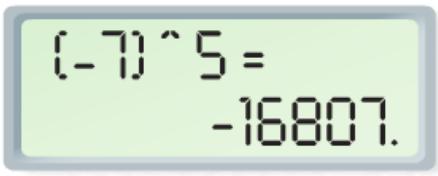
PLEASE TURN TO PAGE 54 IN *MMS9*.
LOOK AT EXAMPLE 2 - *EVALUATING POWERS*.

How would I write the following examples as repeated multiplication and in standard form?

1. 2^6 $= 2\times2\times2\times2\times2\times2$
$= 64$

2. 10^5 $= 10\times10\times10\times10\times10$
$= 100\,000$

Let's talk about the ways in which we can use our calculators to evaluate powers.



There are 4 possible ways that I know of. Please let me know if there are others.)

1. x^y 2. y^x 3. ^ 4. x■

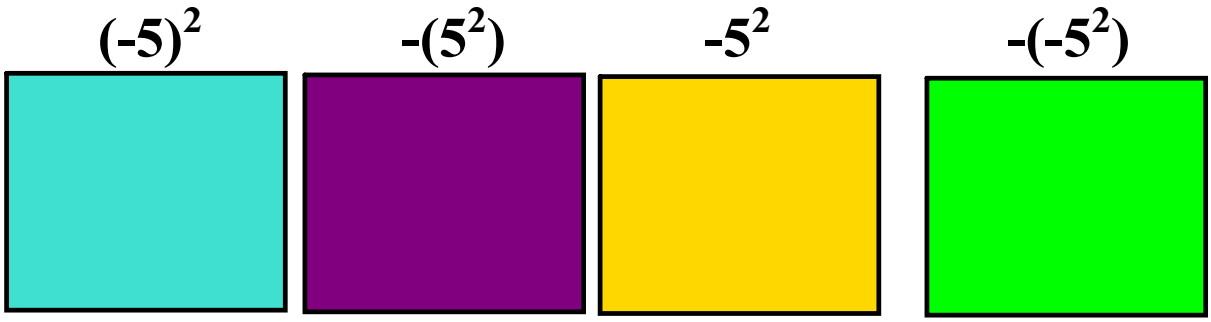
$13^4 = 28\,561$

Examples 1 and 2 on pages 53 and 54 showed powers with positive integer bases; however, a power can also be negative or have a base that is a negative integer.

$(-3)^6 = 729$ $(-3)(-3)(-3)(-3)(-3)(-3)$

$-3^6 = -729$ $-(3)(3)(3)(3)(3)(3)$

WHAT IS THE DIFFERENCE BETWEEN...



$(-5)(-5)$ $-(5)(5)$ $-(5)(5)$ $-(-(5)(5))$

25 -25 -25 25

DEALING WITH NEGATIVE BASES ON YOUR CALCULATOR:

Examples:

1. $(-2)^3 = -8$

   =

2. $(-2)^6 = 64$

   =

3. $(-4)^2$

   $= 16$

4. $(-4)^5$

   $= -1024$

PLEASE TURN TO PAGE 54 IN *MMS9*. LOOK AT EXAMPLE 3 - *EVALUATING EXPRESSIONS INVOLVING NEGATIVE SIGNS.*

Identify the base in each of these powers, then evaluate the power.

1. -5^4: **Base** $= 5$
   Repeated Multiplication $= -5 \times 5 \times 5 \times 5$
   Standard Form $= -625$

2. $-(-4^5)$: **Base** $= 4$
   Repeated Multiplication $= -(-4 \times 4 \times 4 \times 4 \times 4)$
   Standard Form $= 1024$

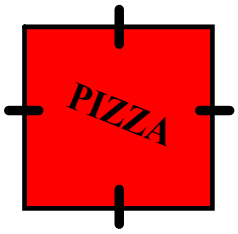
What is the square root of 9? 3

What ARE the square roots of 9? ± 3

What is $\sqrt{9}$? 3

" $\sqrt{\ }$ " : **PRINCIPAL SQUARE ROOT; this means the POSITIVE square root only.**

An example where ONLY the PRINCIPAL square root is appropriate:



The area of this pizza box is 144 cm^2 ; what is the length of each side of the pizza box?

CONCEPT REINFORCEMENT:

MMS9:

PAGE 55: #7, 8 and 9
PAGE 56: #11, 12, 13, 14 and 16
PAGE 57: #18, 19, 20 and 21a