OCTOBER 1, 2018

UNIT 2: POWERS AND EXPONENT LAWS

SECTION 2.1:
WHAT IS A POWER?

K. Sears
MATH 9

WHAT'S THE POINT OF TODAY'S LESSON?

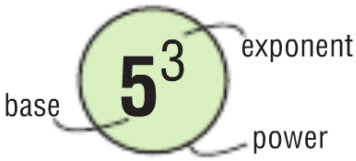
We will begin working on the Math 9 Specific Curriculum Outcome (SCO) "Numbers 1" OR "N1" which states:

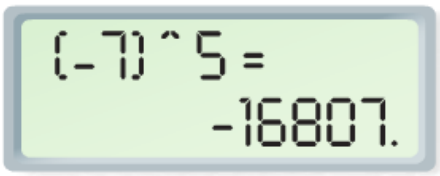
"Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: representing repeated multiplication using powers; using patterns to show that a power with an exponent of zero is equal to one; solving problems involving powers."

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





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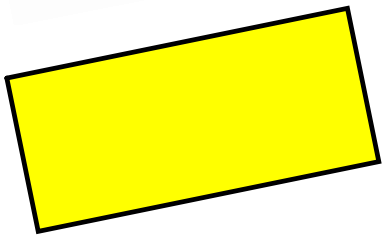
UNIT 2: VOCABULARY

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



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...) cube #

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

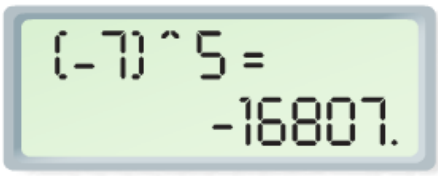
PLEASE TURN TO PAGE 54 IN *MMS9*.
LOOK AT EXAMPLE 2 - *EVALUATING POWERS*.

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

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

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

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■

$2^6 = 2 \wedge 6$
$= 64$

$7^5 = 16\,807$

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.

$(-3)^4$ -3^4 $-(-3^4)$

$= 81$ -81 81

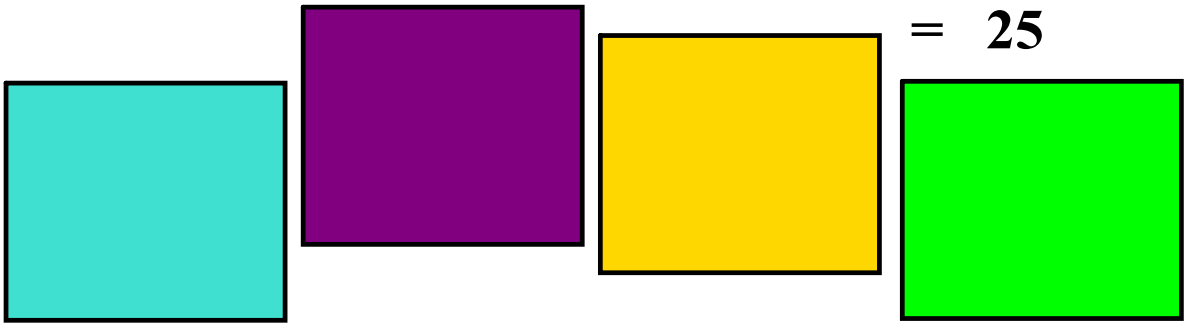
A quick review of "double signs"...

What do each of the following actually mean?

1. $+(+) = +$
2. $-(-) = +$
3. $+(-) = -$
4. $-(+) = -$

WHAT IS THE DIFFERENCE BETWEEN...

$(-5)^2$	$-(5^2)$	-5^2	$-(-5^2)$
$= (-5)(-5)$	$= -(5)(5)$	$= -(5)(5)$	$= -[-(5)(5)]$
$= 25$	$= -25$	$= -25$	$= -(-25)$
			$= 25$



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 = $-5\times5\times5\times5$
   Standard Form = -625

2. $-(-4^5)$: Base = 4
   Repeated Multiplication = $-(-4\times4\times4\times4\times4)$
   Standard Form = 1024

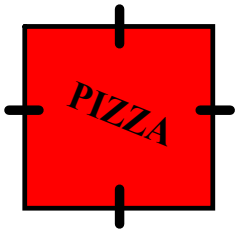
What is the square root of 9? 3

What ARE the square roots of 9? ±3

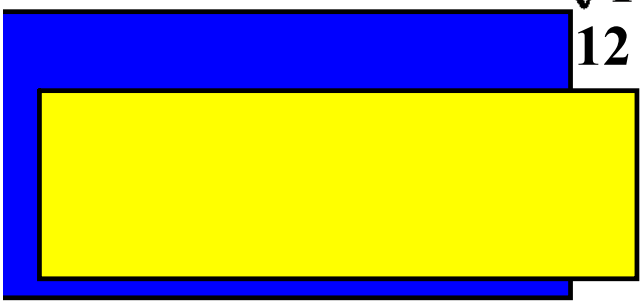
What is $\sqrt{9}$? 3

" $\sqrt{\ }$ " : **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?



$\sqrt{144}$

12 cm (not -12 cm)

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"Discuss the Ideas":

1.

2.

3.

CONCEPT REINFORCEMENT:

MMS9:

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