## Created by Shiloh H.

Warmup 1 / (\# of lives a cat has)

$$
\begin{gathered}
\text { PLEASE BRING YOUR } \\
\text { TEXTBOOK TODAY!!!!!! }
\end{gathered}
$$

Evaluate: (means "find the value of")

1) $7^{3}$
2) $(-5)^{4}$
3) $\left(\frac{11}{9}\right)^{2}$

## BAND STUDENTS:

- Please turn in your warmups now!


## REMEMBER:

- The corrections/extension assignment is due Monday. (Band students - don't forget this!)
- Do a good job on this! Write specific explanations, not vague ones.
- Also 30 min ALEKS


## A simple question...

- If you fold a piece of paper in half 7 times, how many layers are there?
- Try it!!!

We're starting a NEW table of
contents...

- You should keep your old TOC/old notes. But you could move them to the back section of your binder. These new notes should be in front.


## Table of Contents ( $2^{\text {nd }}$ Semester) <br> Exponent Basics (1.2)

p. 1

## Exponent Basics

## Objective:

-Review how exponents work
-Look at powers of negative numbers

## Remember...

- Anything in RED is something you MUST write down.
- Anything else is up to you. You should know your learning style best. Write down what you feel will be helpful to you.
- Please do NOT work on the homework during the lesson.


## Vocab



## What is the number "out in front"

 called?Coefficient

## "Expanding"

- Expand = write out all the factors
- Expanding will be VERY VERY VERY helpful later when we are learning more complicated rules.

Expand and simplify if possible:

- $10^{4}$
- $a^{3}$
- $7 x^{5}$


## IMPORTANT

## Expanding $7 X^{5}$

- RIGHT: $7 \cdot x \cdot x \cdot x \cdot x \cdot x$
- WRONG: $7 x \cdot 7 x \cdot 7 x \cdot 7 x \cdot 7 x$
- (The coefficient is NOT connected to the exponent!)


## Example: Write using powers

 $8 \cdot \mathrm{k} \cdot \mathrm{m} \cdot \mathrm{k} \cdot \mathrm{k} \cdot 8 \cdot 8 \cdot \mathrm{k} \cdot \mathrm{k}$"Write using powers" = leave it with an exponent "Evaluate" = actually work it out

Powers of 2

- $2^{1}=2$
- $2^{2}=4$
- $2^{3}=8$
- $2^{4}=16$
- $2^{5}=32$
- $2^{6}=64$
- $2^{7}=128$
- $2^{8}=256$
- $2^{9}=512$
- $2^{10}=1024$
- $2^{11}=2048$
- $2^{12}=4096$
- $2^{13}=8192$
- $2^{14}=16384$
- $2^{15}=32768$

Powers of 3

- $3^{1}=3$
- $3^{2}=9$
- $3^{3}=27$
- $3^{4}=81$
- $3^{5}=243$
- $3^{6}=729$
- $3^{7}=2187$
- PoWer $4^{1}=4$
- $4^{2}=16$
- $4^{3}=64$
- $4^{4}=256$
- $4^{5}=1024$
- $4^{6}=4096$

Powers of 5

- $5^{1}=5$
- $5^{2}=25$
- $5^{3}=125$
- $5^{4}=625$
- $5^{5}=3125$


## Negative bases

Powers of -2...
$(-2)^{1}=-2$
$(-2)^{2}=4$
$(-2)^{3}=-8$
$(-2)^{4}=16$
$(-2)^{5}=-32$
$(-2)^{6}=64$
A negative number to an odd power is negative. A negative number to an even power is positive.
***This is the reason that you can do the cube root of a negative but you can't do a square roots of a negative!***

## Do we really need the parentheses?



> IF THERE ARE NO PARENTHESES, YOU EVALUATE THE POWER FIRST AND THEN MAKE IT NEGATIVE, BECAUSE THE NEGATIVE SIGN IS NOT CONNECTED TO THE EXPONENT.

## OR BECAUSE: A NEGATIVE SIGN IS LIKE MULTIPLYING BY -1. AND EXPONENTS COME BEFORE MULTIPLICATION!

## IMPORTANT:

$(-3)^{2}$ is 9
$-3^{2} \quad$ is the same as $-\left(3^{2}\right)$
which is -9

Negative sign is NOT connected to the exponent here

## Practice

1. Simplify: $(-10)^{4}=(-10) \cdot(-10) \cdot(-10) \cdot(-10)=\mathbf{1 0}, 000$
2. Simplify: $-5^{2}$

$$
\begin{gathered}
=-(5 \cdot 5)=\mathbf{- 2 5} \\
=\left(\frac{3}{2}\right)\left(\frac{3}{2}\right)\left(\frac{3}{2}\right)=\frac{3 \cdot 3 \cdot 3}{2 \cdot 2 \cdot 2}=\frac{\mathbf{2 7}}{\mathbf{8}} \\
=9 \cdot 4^{2}=9 \cdot 16=\mathbf{1 4 4}
\end{gathered}
$$

3. Simplify: $\left(\frac{3}{2}\right)^{3}$
4. Evaluate $9 x^{2}$ when $\mathrm{x}=4$.
5. Evaluate $-a^{6}$ when $a=2$. $=-(2)^{6}=\mathbf{- 6 4}$
6. Evaluate $c^{2}$ when $\mathrm{c}=-31$. $=(-31)^{2}=961$
7. Is the value of $(-84)^{63}$ positive or negative? Explain how you know. Negative; any negative number to an odd power is negative.

## Homework

-p. 19 (1-5, 7, 9-12)
-NO CALCULATOR!

- (9-12 are challenging: be careful!!!)


## Today during SEL/PLT:

- Panorama survey - must complete this before doing anything else
- surveys.panoramaed.com/nashville
- Your "access code" is your student ID number (190.......)

