## Created by Mr. Lischwe <br> Warmup $1 /\left(3^{2}+2^{1}\right)$ <br> YOU ARE NOT ALLOWED TO USE A CALCULATOR FOR THIS WARMUP!!!

1) Guess: what do you think $22^{3}$ is?
2) Guess: what do you think $3^{22}$ is?
3) Guess: what do you think $2^{0}$ is?
4) Guess: what do you think $4^{-2}$ is?
5) (Super Crazy Example from yesterday)

Simplify: $\frac{-2 a^{6} \cdot 6 b^{3} \cdot a \cdot 4 b^{5}}{18 b^{4} \cdot a^{5} \cdot 3 b^{2}}$ $\rangle$
2) $5^{9}$
4) $h^{36}$
6) $5^{8}$
8) $1331 \mathrm{c}^{12}$
10) $64 m^{30} n^{66}$
20) $x=5$
21) $x=3$
22) To simplify $\left(2 a^{3}\right)\left(4 a^{6}\right)$, multiply 2 times 4 , keep the $a$, and add $3+6$. To simplify $\left(2 a^{3}\right)^{6}$, do 2 to the $6^{\text {th }}$ power, and multiply $3 \times 6$.

$$
\begin{array}{lc}
x^{5} \cdot x^{3} & (x \cdot x \cdot x \cdot x \cdot x) \cdot(x \cdot x \cdot x)=x^{8} \\
5 x^{5} \cdot 3 x^{3} & (5 \cdot x \cdot x \cdot x \cdot x \cdot x) \cdot(3 \cdot x \cdot x \cdot x)=15 x^{8}
\end{array}
$$

$$
\frac{y^{8}}{y^{2}} \quad \frac{y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y}{y \cdot y} \quad=y^{6}
$$

$\frac{8 y^{8}}{2 y^{2}}$
$\frac{8 \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y}{2 \cdot y \cdot y}=4 y^{6}$
$\left(x^{4}\right)^{3}$
$x^{4} \cdot x^{4} \cdot x^{4}$
$=x^{12}$
$\left(4 x^{4}\right)^{3}$
$4 x^{4} \cdot 4 x^{4} \cdot 4 x^{4}$
Let's Review:

## Zero \& Negative Exponents

Objective:
Discover how zero \& negative exponents work
"With your group, talk about this problem. How many different ways can you figure out how to solve it?


I will come around and ask each group what they talked about.


## Zero Exponents:

" Anything to the zero power is $\mathbf{1 !}$

Examples

1) $9^{\circ}$
2) $k^{0}$
3) $\left(\frac{8 x^{3} y^{2}}{0.27 a b c}+12.5 q\right)^{0}$
4) $\frac{a^{6}}{a^{6}}$
Zero Exponents ,
" Find a pattern and use it to complete the table:

```
" Any time you expand a power, there is really an
    "invisible 1 " being multiplied by everything.
\(5^{6}=\cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5\)
\(5^{0}=\frac{1}{2}\)
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For $5^{0}$, there are no $5^{\prime}$ 's, but the invisible 1 is still there!!!

The coinvisible ic ${ }^{100}$,
"With your group, talk about this problem. How many different ways can you figure out how to solve it?


I will come around and ask each group what they talked about.


| $4^{-2}$ | $\frac{1}{16}$ |
| :--- | :--- |
| $2^{-3}$ | $\frac{1}{8}$ |
| $10^{-3}$ | $\frac{1}{1000}$ |
| $2^{-4}$ | $\frac{1}{16}$ |
| $7^{-1}$ | $\frac{1}{7}$ |
| Exampples - Tryy these in your headug |  |

Negative Exponents:
Rule: $x^{-n}=\frac{1}{x^{n}}$
» Negative exponent:
> 1 over the same power with a positive exponent

Negative Exponents >
» POSITIVE EXPONENTS:
$>$ Are 1 TIMES the base that many times
$>2^{4}=1 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

》 NEGATIVE EXPONENTS:
> Are 1 DIVIDED BY the base that many times
$>2^{-4}=1 \div 2 \div 2 \div 2 \div 2$

$$
=\frac{1}{2 \cdot 2 \cdot 2 \cdot 2}
$$

$$
=\frac{1}{2^{4}}
$$

》 ZERO EXPONENTS:
$>$ Are the 1 not multiplied or divided by anything $\geqslant$
$>2^{0}=1$

## Examples

1) $3^{-2}$
2) $b^{-7}$
3) $x^{3} \cdot x^{-5}$
4) $\frac{g^{4}}{g^{10}}$

Negative Exponents >

## Methemeticiens sey:

Never leave your a zero or negative exponent in
your answer.
"p. $26(1-4)$
>p. $34(2,4,6)$
"p. $49(31-35)$
" *You can do them all on a separate sheet of paper if you don't feel like tearing 3 pages out of your book.

Homework >

