

Name: _____

Date: _____

Integer Exponents Notes

$5^4 = 625$	$5^3 = 125$	$5^2 = 25$	$5^1 = 5$	$5^0 = 1$	$5^{-1} = \frac{1}{5}$	$5^{-2} = \frac{1}{5^2} \text{ or } \frac{1}{25}$
$4^4 = 256$	$4^3 = 64$	$4^2 = 16$	$4^1 = 4$	$4^0 = 1$	$4^{-1} = \frac{1}{4}$	$4^{-2} = \frac{1}{4^2} \text{ or } \frac{1}{16}$
$3^4 = 81$	$3^3 = 27$	$3^2 = 9$	$3^1 = 3$	$3^0 = 1$	$3^{-1} = \frac{1}{3}$	$3^{-2} = \frac{1}{3^2} \text{ or } \frac{1}{9}$

A. What pattern do you see in the powers of 5? As the power decreases so does the value of the number

B. What pattern do you see in the powers of 4? _____

C. What pattern do you see in the powers of 3? _____

D. Complete the table for the values of $5^0, 5^{-1}, 5^{-2}$

E. Complete the table for the values of $4^0, 4^{-1}, 4^{-2}$

F. Complete the table for the values of $3^0, 3^{-1}, 3^{-2}$

Reflect:

1. Make a conjecture: write a general rule for the value of a^0 $= 1$

2. Make a conjecture: write a general rule for the value of a^{-2} $= \frac{1}{a^2}$

Practice:

A. $2^{-5} = \frac{1}{2^5} \text{ or } \frac{1}{32}$ _____

B. $5^{-4} = \frac{1}{5^4} \text{ or } \frac{1}{625}$ _____

C. $10^{-3} = \frac{1}{10^3} \text{ or } \frac{1}{1000}$ _____

D. $-2^{-5} = \frac{1}{-2^5} \text{ or } \frac{1}{-32}$ _____

E. $2 - (2^{-3}) = 2 - \frac{1}{2^3} \text{ or } 1\frac{7}{8}$ _____

F. $4 + 3(4 - 9^0) + 5^{-3} = 4 + 3(3) + \frac{1}{5^3}$
 $= 13 + \frac{1}{125}$
 $13\frac{1}{125}$

Exploring Properties of Integer Exponents

Date: _____

A. Complete the following equations:

$$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^{\boxed{5}}$$

$$(3 \cdot 3 \cdot 3 \cdot 3) \cdot 3 = 3^{\boxed{5}}$$

$$(3 \cdot 3 \cdot 3) \cdot (3 \cdot 3) = 3^{\boxed{5}}$$

What pattern do you see when **multiplying** two powers with the same base? _____

You add the powers

Use your pattern to complete this equation: $5^2 \cdot 5^5 = 5^{\boxed{7}}$

B. Complete the following equation:

$$\frac{4^5}{4^3} = \frac{4 \cdot 4 \cdot 4 \cdot 4 \cdot 4}{4 \cdot 4 \cdot 4} = \frac{\cancel{4} \cdot \cancel{4} \cdot \cancel{4} \cdot 4 \cdot 4}{\cancel{4} \cdot \cancel{4} \cdot \cancel{4}} = 4 \cdot 4 = 4^{\boxed{2}}$$

What pattern do you see when **dividing** two powers with the same base? _____

You subtract the powers

Use your pattern to complete this equation: $\frac{6^8}{6^3} = 6^{\boxed{5}}$

Complete the following equations:

$$(5^3)^2 = (5 \cdot 5 \cdot 5)^{\boxed{2}} = (5 \cdot 5 \cdot 5) \cdot (5 \cdot 5 \cdot 5) = 5^{\boxed{6}}$$

What pattern do you see when raising a power to a power? _____

You multiply the powers

Reflect: (Let m and n be integers)

3. Make a conjecture: write a general rule for the value of $a^m \cdot a^n$ a^{m+n} _____

4. Make a conjecture: write a general rule for the value of $\frac{a^m}{a^n}, a \neq 0$ a^{m-n} _____

5. Make a conjecture: write a general rule for the value of $(a^m)^n$ $a^{m \cdot n}$ _____