NOTES: Section 8.2 - Zero and Negative Exponents

Goals: #1 - I can apply exponent properties involving quotients.







#2 - I can evaluate powers that have zero or negative exponents.

Homework: Section 8.2 Worksheet

Warm Up:

Simplify the expression. Write your answer using exponents.

2.
$$(y^4)^3$$

 $y^4 \cdot 3$
 y^{12}

Simplify the expression.

2.
$$(3b^3)^2 \cdot b$$

 $3^2 b^{3 \cdot 2} \cdot b$
 $9 b^6 \cdot b$
 $19 b^7$

Exploration #1: Work with a partner and answer the following questions

1. Evaluate the following exponents:

a.
$$10^1 = 10^1$$

b.
$$10^2 = 100$$

a.
$$10^1 = 10$$
 b. $10^2 = 100$ c. $10^3 = 1000$ d. $10^0 = 100$

d.
$$10^0 =$$

2. Use your calculator to evaluate the following exponents and write your answer as

FRACTIONS:
$$a. 10^{-1} = \sqrt{0}$$

b.
$$10^{-2} = \frac{1}{100}$$

c.
$$10^{-3} = \frac{1}{1000}$$

- d. Can you write your answer in letters a c using EXPONENTS?
- 3. What do you notice?



Notes:

Example:
$$5^{\circ} = 1$$
 to the power of $\frac{700}{100000}$ is $\frac{000}{100000}$.

When numbers have a <u>NIJUTIVE</u> exponent, it is also their <u>reciprocal</u> $\frac{1}{3^{-2}} = \frac{3^2}{1} = 3^2$

Example #1: Evaluate the expression.

1.
$$7^{-2}$$

$$\frac{1}{7^2}$$

3.
$$(-5)^{-5}$$

$$\frac{1}{(-5)^3}$$

$$\frac{1}{-125}$$

4.
$$(\frac{2}{3})^{-2}$$

$$\frac{2^{-2}}{3^{-7}}$$

$$\frac{3^{2}}{2^{2}}$$

$$\frac{9}{4}$$

You practice: Evaluate the expression.

1.
$$(-7)^{-1}$$

$$\frac{1}{(-1)}$$

$$-\frac{1}{7}$$

2.
$$(\frac{1}{5})^{-3}$$

$$\frac{1^{-3}}{5^{-3}}$$

$$\frac{5^{3}}{1^{3}}$$
125

Example #2: Simplify the expression. Write your answer using only positive exponents.

$$\begin{bmatrix}
2x^2y^{-3} \\
2x^2
\end{bmatrix}$$

2.
$$(5a)^{-2}$$

$$5^{-2}a^{-2}$$

$$\frac{1}{5^{2}a^{2}}\left[\frac{1}{25a^{2}}\right]$$

$$3. \frac{c^{-2}}{d^{-3}}$$

$$\boxed{\frac{d^3}{C^2}}$$

You practice: Simplify the expression. Write your answer using only positive exponents.

1.
$$(5b)^{-3}$$

$$5^{-3}b^{-3}$$

$$\frac{1}{5^{3}b^{3}} \boxed{\frac{1}{125b^{3}}}$$

$$\begin{array}{c|c}
2. & 2x^{-3}y^3 \\
\hline
2 & y^3 \\
\hline
\chi^3
\end{array}$$

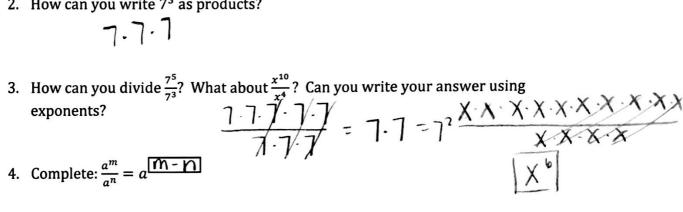
$$3. \frac{3}{x^{-2}}$$

Exploration #2: Work with a partner and answer the following questions.

1. How can you write 75 as products?

7.7.7.7

2. How can you write 7³ as products?



Notes:

powers that have the <u>SUM</u> base, we <u>SUV</u> the exponents.

Example:

Example #3: Simplify the expression.

1.
$$\frac{x^9}{x^2}$$

$$X$$

$$X$$

$$X$$

2.
$$\frac{(-4)^7}{(-4)^5}$$

 $(-4)^7$

3.
$$\frac{p^8 \cdot p^{10}}{p^{18}}$$

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You practice: Simplify the expression.

$$\begin{array}{c}
2. \frac{3^{10}}{3^7} \\
3^{10-7} \\
\hline
3^3
\end{array}$$

2.
$$\frac{y^{100}}{y^{99}}$$

$$y^{100-99}$$

$$\frac{\frac{m^{2}}{m^{2} \cdot m}}{M^{2} \cdot m}$$

$$\frac{M^{7}}{M^{2} \cdot 1}$$

$$\frac{M^{7}}{M^{3}}$$

$$100, 7^{-3}$$

$$100$$