Unit 6 Day 3 Zero and Negative Exponents

Key

Fill in the following tables starting from right moving left. *You may use your calculator where necessary.*
(Remember: to enter 2^{-3} into your calculator : Plug in: 2^-3, Hit ENTER, then MATH , ENTER)

2^{-4}	2^{-3}	2^{-2}	2^{-1}	2^{0}	2^{1}	2^{2}	2^{3}	2^{4}
1/16	1/8	1/4	1/2	1	2	4	8	16

3^{-4}	3^{-3}	3^{2}	3^{-1}	3^{0}	3^{1}	3^{2}	3^{3}	3^{4}
1/81	1/27	1/9	1/3	1	3	9	27	81

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

4^{-4}	4^{-3}	4^{-2}	4^{-1}	4^{0}	4^{1}	4^{2}	4^{3}	4^{4}
1/256	1/64	1/16	1/4	1	4	16	64	256

Use the tables about to determine the following two definitions:

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

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

Notice: when we **"crossed the line, we changed the sign"**.
What would you predict the following definition would be?

$$\frac{1}{a^{-n}} = \frac{a^n}{1} = a^n$$

Try it out! * cannot leave negative exponents in our answer

1) $1000^0 = \boxed{1}$

2) $\frac{1}{4^0} = \frac{1}{1} = \boxed{1}$

3) $6^0 \cdot 6 =$ $1 \cdot 6 = \boxed{6}$

4) $3^{-2} = \frac{1}{3^2} = \boxed{\frac{1}{9}}$

5) $55^{-1} = \frac{1}{55^1} = \boxed{\frac{1}{55}}$

6) $9^{-x} = \boxed{\frac{1}{9^x}}$

7) $\frac{1}{8^{-2}} = \frac{1 \cdot 8^2}{1} = \boxed{64}$

8) $\frac{1}{x^{-7}} = \boxed{x^7}$

11) $\frac{x}{x^{-2}y^{-4}} = \frac{x \cdot x^2 \cdot y^4}{1} = \boxed{x^3y^4}$

12) $\frac{y^{-5}}{x^{-3}y} = \frac{x^3}{y^5 \cdot y} = \boxed{\frac{x^3}{y^6}}$

13) $\frac{3a^{-5}b}{24b^{-2}} = \frac{3 \cdot b \cdot b^2}{24a^5} = \frac{1b^3}{8a^5} = \boxed{\frac{b^3}{8a^5}}$

Turn it up a notch!!

1) $\frac{x^2}{x^5} = x^{-3} = \boxed{\frac{1}{x^3}}$

2) $\frac{a^1}{a^7} = \boxed{\frac{1}{a^6}}$

3) $\frac{\cancel{2}^{1}x^7y^{10}}{\cancel{12}_{6}x^5y^{13}} = \frac{1x^2}{6y^3} = \boxed{\frac{x^2}{6y^3}}$

4) $\frac{2^{-2}a^4b^5}{3^2a^8b} = \frac{a^4b^5}{2^2\cdot 3^2\cdot a^8\cdot b} = \boxed{\frac{b^4}{36a^4}}$

$\frac{x^2}{x^5} = \frac{\cancel{x}\cdot\cancel{x}}{\cancel{x}\cdot\cancel{x}\cdot x\cdot x\cdot x} = \frac{1}{x^3}$

$\frac{x^2}{x^5} = \frac{1}{x^3}$

Take it up a notch!
Rewrite each of the following expressions with positive exponents.

1) $\frac{6^{-1}x^0}{y^{-4}y^8} = \frac{x^0y^4}{6^1y^8} = \boxed{\frac{1}{6y^4}}$

2) $\frac{xy}{2^{-1}y^2z^{-3}} = \frac{2^1\cdot x\cdot y\cdot z^3}{y^2} = \boxed{\frac{2xz^3}{y}}$

3) $\frac{8^{-2}x^{-3}y^2}{4^{-1}y^5} = \frac{4^1y^2}{8^2x^3y^5} = \frac{\cancel{4}^{1}y^2}{\cancel{64}_{16}x^3y^5} = \boxed{\frac{1}{16x^3y^3}}$

4) $\frac{4^{-1}x^5y}{2x^0x^7y^{-4}} = \frac{x^5y\cdot y^4}{4^1\cdot 2\cdot 1\cdot x^7} = \boxed{\frac{y^5}{8x^2}}$

Exit Slip!!! Your ticket out the door!
simplify all problems using <u>POSITIVE</u> exponents only

$$\frac{5^{-2}x^{3}y^{-6}}{2^{-3}xy^{2}}$$

$$\frac{4^{-2}x^{3}y^{-5}}{2x^{6}x^{-3}y^{2}}$$

Exit Slip!!! Your ticket out the door!
simplify all problems using <u>POSITIVE</u> exponents only

$$\frac{5^{-2}x^{3}y^{-6}}{2^{-3}xy^{2}} =$$

$$\frac{4^{-2}x^{3}y^{-5}}{2x^{6}x^{-3}y^{2}} =$$