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Warmup $1/\left(\frac{15^{47}}{15^{46}}\right)$

1) Make up four different exponent problems that would simplify to x^{30}.

2) Copy the date problem and show work to verify that it is correct.

3) If I take 2^{30} and **double** it, what do I get? Write your answer as a power.

FYI:

- If you are still missing your Midterm Corrections/Extension assignment by tomorrow, you will be working on it during lunch tomorrow.

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Let's review…

- **Why is $2^7 \cdot 2^3$ NOT equal to 2^{21} even though this is a multiplication problem?**

- **Why is $\frac{2^{12}}{2^4}$ NOT equal to 2^3 even though this is a division problem?**

- *****If you understand WHY a rule works, you are <u>WAY</u> more likely to remember it better!*****

Examples: Dividing

1. $\frac{a^{45}}{a^{22}}$ a^{23}

2. $\frac{6^5}{6^3}$ 6^2

3. $\frac{x^3y^5}{xy^2}$ $x^2 \bullet y^3$

4. $\frac{12j^5}{3j^2}$ $\frac{12 \cdot j \cdot j \cdot j \cdot j \cdot j}{3 \cdot j \cdot j}$

$= 4j^3$

WHEN YOU HAVE COEFFICIENTS, MULTIPLY OR DIVIDE THEM JUST LIKE NORMAL NUMBERS!!!

Careful…

- $\dfrac{7x^5}{7x^3}$

Here the 7's are coefficients. There is 1 of each. The 7's would "divide away."

- $\dfrac{7^5}{7^3}$

Here the 7's are the actual base. There are five 7's in the numerator and three 7's in the denominator. There would be two 2's remaining in the denominator.

THESE 7'S DO NOT CANCEL OUT!!!

A little harder…

TIP:
Go step by step. Do the coefficients, then one variable, then the other.

1. $4a^2b^3 \cdot 7a \cdot 2b^5$

$= 4 \cdot a \cdot a \cdot b \cdot b \cdot b \cdot 7 \cdot a \cdot 2 \cdot b \cdot b \cdot b \cdot b \cdot b$

$$\boxed{= 56a^3b^8}$$

2. $\dfrac{6c^5 \cdot 3d^7}{9cd^4}$

$$= \frac{6 \cdot c \cdot c \cdot c \cdot c \cdot \overset{1}{\cancel{c}} \cdot 3 \cdot \overset{1}{\cancel{d}} \cdot \overset{1}{\cancel{d}} \cdot \overset{1}{\cancel{d}} \cdot \overset{1}{\cancel{d}} \cdot d \cdot d \cdot d \cdot d}{9 \cdot \cancel{c} \cdot \cancel{d} \cdot \cancel{d} \cdot \cancel{d} \cdot \cancel{d}}$$

$$= \frac{18 \cdot c^4 \cdot d^3}{9}$$

$$\boxed{= 2c^4d^3}$$

Helpful Hint

WHEN IN DOUBT, EXPAND IT OUT!!!

Super-Crazy Example

Simplify:

$$\frac{-2a^6 \cdot 6b^3 \cdot a \cdot 4b^5}{18b^4 \cdot a^5 \cdot 3b^2}$$

DUE TOMORROW:

- **Textbook p. 27 (1-6, 8, 14-18)**

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Power to a Power

Objective:

Simplify expressions like $\left(x^5\right)^3$

CHALLENGE

- We are going to learn a new exponent rule today.
- Once again, I am not going to tell you the rule right away. I want to see if you can figure it out.
- I am going to display a bunch of problems on the board. Try to figure out how to do these problems. Then use them to figure out the rule for taking a power to a power.

Can you figure out how these would work?

$$\left(x^3\right)^4$$

$$\left(a^5\right)^2$$

$$\left(3y^4\right)^2$$

$$\left(\frac{b^2}{c^3}\right)^4$$

After you solve these, come up with some **rules** that you discover about how to take a power to a power.

2 ways to show $(a^5)^2$

Way 1

$$(a^5)^2$$
$$= (a^5)(a^5)$$
$$= a^{10}$$

Way 2

$$(a^5)^2$$
$$= (a \cdot a \cdot a \cdot a \cdot a)^2$$
$$= (a \cdot a \cdot a \cdot a \cdot a)(a \cdot a \cdot a \cdot a \cdot a)$$
$$= a^{10}$$

Taking a Power to a Power (Problems like $\left(a^5\right)^2$)

- Keep the base, multiply the exponents