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

Write an equation in slope-intercept form that gives the height of the plant (y) after "x" weeks.

1) A cactus plant is originally 2 cm tall, and grows ½ cm per week.

$y=\frac{1}{2}x+2$

2) A fern grows 3 cm per week, and is 14 cm tall after 2 weeks.

$$\begin{array}{r} 14 \\ -6 \\ \hline 8 \end{array}$$

8 cm originally

$y=3x+8$

3) A jade plant was originally 10 cm tall, and was 20 cm tall after 4 weeks.

grew 10 cm in 4 weeks

$\frac{10}{4}=2.5$

$y=2.5x+10$

Who can explain the date problem???

- **1/**$\left(\frac{\mathbf{15^{47}}}{\mathbf{15^{46}}}\right)$ $= 15^1 = 15$

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

$2^{30} \cdot 2 = 2^{31}$

p. 27 (1-6, 8, 14-20)

1) $(-6)^7$
2) $-24a^{10}$
3) $-35a^5b^5c^5$
4) 8^2 (or 64)
5) $2t^3$
6) x^2y^5
8) $4^1 \cdot 5^1 \cdot 6^1$ or 120

14) 2
15) 9
16) 4
17) 6
18) 5
19) 7
20) Answers vary. Example: $5^{10} \cdot 5^3$

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!*****

Table of Contents (2^{nd} Semester)

Power to a Power

Objective:

Simplify expressions like $(x^5)^3$

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?

$$\left(x^3\right)^4 \qquad \left(a^5\right)^2$$

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

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 $(a^5)^2$)

- Keep the base, multiply the exponents

What if there's a coefficient?

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

Predictions?

$= 3y^4 \cdot 3y^4$

$= 3 \cdot y \cdot y \cdot y \cdot y \cdot 3 \cdot y \cdot y \cdot y \cdot y$

$= 9y^8$

What did we learn?

The coefficient goes to the power outside the parentheses, just like any normal number.

Taking a Power to a Power

- Keep the base, multiply the exponents

*****TREAT COEFFICIENTS AS A NORMAL NUMBERS. TAKE THEM TO THE POWER OF THE EXPONENT!!!*****

(The “pretend the variables aren’t there” strategy)

- $5p^4$ This coefficient is NOT connected to the 4 exponent

- $(5q^2)^4$ This coefficient IS connected to the 4 exponent

  But the 5 is NOT connected to the 2 exponent

Examples

1. $\left(x^2\right)^5$ $= \left(x^2\right)\cdot\left(x^2\right)\cdot\left(x^2\right)\cdot\left(x^2\right)\cdot\left(x^2\right)$ $= x^{10}$

2. $\left(a^4 b\right)^2$ $= \left(a^4 b\right)\cdot\left(a^4 b\right)$ $= a^8 b^2$

3. $\left(2m^3\right)^4$ $= \left(2m^3\right)\cdot\left(2m^3\right)\cdot\left(2m^3\right)\cdot\left(2m^3\right)$
$= (2\cdot m\cdot m\cdot m)\cdot(2\cdot m\cdot m\cdot m)\cdot(2\cdot m\cdot m\cdot m)\cdot(2\cdot m\cdot m\cdot m)$
$= 16m^{12}$

4. $\left(\frac{5g^{50}}{6h^{30}}\right)^2$ $\left(\frac{5g^{50}}{6h^{30}}\right)^2$ $= \frac{25g^{100}}{36h^{60}}$

Once again…

- **WHEN IN DOUBT, EXPAND IT OUT!!!**

EXIT TICKET

- **Do these on a notecard. You may not get help from me, your classmates, or your notes.**

1) $\mathbf{8x^4 \cdot 4x^8}$
2) $\mathbf{\dfrac{16y^7}{8y}}$
3) $\mathbf{\left(3z^5\right)^3}$

Homework

Textbook p. 35 (2-10 even, 14, 20, 21, 22)