**Math 9 Lesson 2-4 Exponent Laws (Part 1)**

Today we’re going to work through the exponent rules. The most important thing to remember while we work through these patterns is what an exponent means: repeated multiplication!

Example: 25 means 2 x 2 x 2 x 2 x 2

Complete the table using by writing out the expression in expanded form, and then simplify it into power form in the last column.

|  |  |  |  |
| --- | --- | --- | --- |
| **Expression to be simplified** | **Work it out (expanded form)** | **End result (power form)** | **Standard Form** |
| 23 x 24 | (2 x 2 x 2) (2 x 2 x 2 x 2) | 27 |  |
| 34 x 31 |  |  |  |
| 54 x 55 |  |  |  |
| 72 x 76 |  |  |  |
| (-2)3 x (-2)7 |  |  |  |

What is the pattern you see for **multiplying** powers that have the **same base?**

**Exponent law for a Product of Powers**

**To multiply powers with the same base:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**am x an = am+n**

**Where the variable *a* is any integer, except 0.**

**The variables *m* and *n* are any whole numbers.**

Does this rule work for 43 x 52? If so, what do you get as the end result?

Does this rule work for 42 +46? If so, what do you get as the end result?

**Exponent law for Quotient of Powers**

Now let’s have a look what happens when we are dividing powers with the same base. The key to remember here is that any number divided by itself equals one…

Example: $\frac{2}{2}=1$

Complete the table using by writing out the expression in expanded form, and then simplify it into power form in the last column.

|  |  |  |  |
| --- | --- | --- | --- |
| **Expression to be simplified** | **Work it out (expanded form)** | **End result (power form)** | **Standard Form** |
| $$\frac{4^{7}}{4^{2}}$$ |  |  |  |
| $$\frac{6^{10}}{6^{5}}$$ |  |  |  |
| $$\frac{3^{2}}{3^{1}}$$ |  |  |  |
| $$\frac{8^{4}}{8^{1}}$$ |  |  |  |
| $$\frac{(-5)^{11}}{(-5)^{3}}$$ |  |  |  |

What is the pattern you see for **dividing** powers that have the **same base?**

**Exponent Law for a Quotient of Powers**

**To divide powers with the same base,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

$$a^{m}÷a^{n}=a^{m-n} m\geq n$$

***a* is any integer, except 0; *m* and *n* are any whole numbers.**

**Does this rule work for** $\frac{3^{2}}{3^{2}}$? **Explain. If so, what do you get as the end result?**

**Does this rule work for** $\frac{0^{2}}{0^{1}}$**? Explain. If so, what do you get as the end result?**

Eg simplify each to have only one power

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Pg 76 #4 and 5 (a,c,e,g) 6-8, 10\*\* Use BEDMAS to evaluate (a,c,e,g,i)