Laws of Exponents Study Guide

Rules:

- To multiply powers with the same base, keep the base and add the exponents
- To divide powers with the same base, keep the base and subtract the exponents
- To complete a power to a power, keep the base and multiply the exponents
- Any base with an exponent of zero is equal to 1
- A base with a negative integer exponent should be turned into its reciprocal.

Tips:

- **Simplify** means to rewrite the expression in exponential form by following the exponent rules above for powers with common bases.
- **Evaluate** or “What is the value of…?” questions mean that you need to rewrite the power in standard form. For example, the value of $3^2$ is 9.
- If a base does not have an exponent written next to it, then the exponent is 1. It is just not written because any base with an exponent of 1 is equivalent to itself.
- If you are still struggling with adding, subtracting, and multiplying negative numbers, please make sure that you practice that before this test! Try to prevent those silly mistakes by practicing those skills too!

Notebook Pages: pgs 25-28, especially 26

FrontRow:

- Sign in with code pjdzy3 at student.frontrowed.com
- Choose math
- Choose expressions and equations
- Take the diagnostic if you haven’t already
- Choose “assigned”
- Choose lesson 17

Links/practice (these are case sensitive):

- [https://goo.gl/FsPDvN](https://goo.gl/FsPDvN) Positive and negative exponents practice on Khan Academy
- [https://goo.gl/ahcllo](https://goo.gl/ahcllo) Properties of exponents practice on Khan Academy
- [https://goo.gl/AD3EGs](https://goo.gl/AD3EGs) Evaluating expressions using exponents on Khan
- [http://goo.gl/kEvC3f](http://goo.gl/kEvC3f) Regents Test Prep laws of exponents practice
- [https://goo.gl/1VPb7R](https://goo.gl/1VPb7R) Practice worksheet with rules and answers
- [http://goo.gl/EOfMh5](http://goo.gl/EOfMh5) laws of exponents practice on Math Warehouse
- [http://goo.gl/mTZSsA](http://goo.gl/mTZSsA) Learn Alberta--dig for dinosaurs and solve exponent problems (this is actually really cool!!!!!!)
- [http://goo.gl/yrl0Kr](http://goo.gl/yrl0Kr) Laws of exponents game
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**Product Rule:**

example: \(5^2 \cdot 5^9 = 5^{2+9} = 5^{11}\)

\[5^2 \cdot 5^{-9} = 5^{2-9} = 5^{-7} = \frac{1}{5^7}\]

*Practice: Simplify each expression*

\[
9^{12} \cdot 9^{39} \quad (-13)^4 \cdot (-13)^3 \quad 1.8^5 \cdot 1.8
\]

\[
\frac{1}{3}^{10} \cdot \frac{1}{3}^9 \quad (-4)^4 \cdot (-4)^4 \quad 3^{-2} \cdot 3
\]

**Quotient Rule:**

example: \(\frac{8^3}{8^1} = 8^{3-2} = 8^1\)

\[
\frac{8^3}{8^4} = 8^{3-4} = 8^{-1} = \frac{1}{8}
\]

*Practice: Simplify each expression*

\[
\frac{9^{13}}{9^7} \quad \frac{12^2}{12^3} \quad (-7)^3 \quad (-2)^3 \quad \frac{21^{11}}{21^{13}}
\]

**Power to a Power Rule:**

example: \((3^2)^9 = 3^{2 \cdot 9} = 3^{18}\)

\[
(-6^{-2})^4 = (-6)^{-2 \cdot 4} = (-6)^{-8} = -\frac{1}{6^8}
\]

*Practice: Simplify each expression*

\[
(8^{12})^9 \quad (-17^8)^9 \quad (0.13^4)^0 \quad (15^3)^{-9} \quad (5^3)^{-9}
\]

**Multiple Exponent Laws:**

example: \(\frac{18^8 \cdot 18^5}{18^6} = \frac{18^{4+5}}{18^6} = 18^{9-6} = 18^3\)

*Practice: Simplify each expression*

\[
(-9)^3 \cdot (-9)^6 \quad (11^{-4})^3 \div (11^6)^{-5}
\]

\[
(17^6)^5 \cdot (17^4)^{-3} \cdot 17^{-8} \quad \frac{(-4)^8}{(-4)^{-9} \cdot (-4)^2}
\]