Unit 7, Lesson 6

Practice with Rational Bases

Let's practice with exponents.

6.1 Which Three Go Together: Exponents

Which three go together? Why do they go together?

A

$$\frac{2^8}{2^5}$$

B

$$(4^{-5})^8$$

C

$$\left(\frac{3}{4}\right)^{-5} \cdot \left(\frac{3}{4}\right)^8$$

D

$$\frac{10^{-8}}{5^5}$$

6.2 Exponent Rule Practice

For each expression, write at least 3 different equivalent expressions.

1. $(6^2)^4$

2. $\frac{4^5}{4^{-8}}$

3. 3^{-12}

6.3 Inconsistent Bases

Mark each equation as true or false. What could you change about the false equations to make them true?

1. $\left(\frac{1}{3}\right)^2 \cdot \left(\frac{1}{3}\right)^4 = \left(\frac{1}{3}\right)^6$

2. $5^4 + 5^5 = 5^9$

3. $\left(\frac{1}{2}\right)^4 \cdot 10^3 = 5^7$

4. $3^2 \cdot 5^2 = 15^2$

Are you ready for more?

Solve this equation: $3^{x-5} = 9^{x+4}$. Explain or show your reasoning.

Lesson 6 Summary

We can keep track of repeated factors using exponent rules. These exponent rules work with other bases in exactly the same way as they did with a base of 10. For example,

$$7^5 \cdot 7^3 = 7^{5+3}$$
$$(2^4)^3 = 2^{4 \cdot 3}$$
$$\frac{\left(\frac{1}{3}\right)^4}{\left(\frac{1}{3}\right)^2} = \left(\frac{1}{3}\right)^{4-2}$$

The exponent rules also work with negative exponents. For example, to write 5^{-6} with a single positive exponent, we can write $\frac{1}{5^6}$.

These rules do not work when the bases are not the same. For example $\frac{6^5}{3^2} \neq 2^3$. We can check this by expanding the factors: $\frac{6^5}{3^2} = \frac{6 \cdot 6 \cdot 6 \cdot 6 \cdot 6}{3 \cdot 3}$, which is not equal to 3 factors that are 2.