Lesson 7: Practice with Rational Bases

Let's practice with exponents.

7.1: Which One Doesn't Belong: Exponents

Which expression doesn't belong?

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

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

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

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

7.2: Exponent Rule Practice

1. Choose 6 of the equations to write using a single exponent:
   - $7^5 \cdot 7^6$
   - $3^{-3} \cdot 3^8$
   - $2^{-4} \cdot 2^{-3}$
   - $\left(\frac{5}{6}\right)^4 \left(\frac{5}{6}\right)^5$
   - $\frac{3^5}{3^{28}}$
   - $\frac{2^{-5}}{2^4}$
   - $\frac{6^5}{6^{-8}}$
   - $\frac{10^{-12}}{10^{-20}}$
   - $\left(7^2\right)^3$
   - $\left(4^3\right)^{-3}$
   - $\left(2^{-8}\right)^{-4}$
   - $\left(6^{-3}\right)^5$

2. Which problems did you want to skip in the previous question? Explain your thinking.

3. Choose 3 of the following to write using a single, *positive* exponent:
   - 2^{-7}
   - 4^{-9}
   - 3^{-23}
   - 2^{-32}
   - 11^{-8}
   - 8^{-3}

4. Choose 3 of the following to evaluate:
   - $\frac{10^5}{10^5}$
   - $\left(\frac{5}{4}\right)^2$
   - $\left(\frac{2}{3}\right)^3$
   - $\left(3^4\right)^0$
   - $2^8 \cdot 2^{-8}$
   - $\left(\frac{7}{2}\right)^2$

7.3: 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. $3^2 \cdot 5^3 = 15^5$

3. $5^4 + 5^5 = 5^9$

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

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

Are you ready for more?

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

Lesson 7 Summary

In the past few lessons, we found rules to more easily keep track of repeated factors when using exponents. We also extended these rules to make sense of negative exponents as repeated factors of the **reciprocal** of the base, as well as defining a number to the power of 0 to have a value of 1. These rules can be written symbolically as:

$$x^n \cdot x^m = x^{n+m},$$

$$(x^n)^m = x^{n \cdot m},$$

$$\frac{x^n}{x^m} = x^{n-m},$$

$$x^{-n} = \frac{1}{x^n},$$

and

$$x^0 = 1,$$

where the base x can be any positive number. In this lesson, we practiced using these exponent rules for different bases and exponents.