

1.10: Powers with Rational Bases

Warm-Up

Evaluate:

1) $(-7)^4$

2) 6^5

3) -2^5

4) -2^6

5) 1^{99}

6) -1^{98}

7) $(-1)^{100}$

8) $(-1)^{101}$

Powers with Rational Bases

Think/Pair/Share

THINK: Evaluate $\left(\frac{3}{4}\right)^3$ and $\left(\frac{-2}{3}\right)^2$, leaving your answers as fractions.

PAIR: Discuss with the person next to you.
Can you agree on the same answer for each?

SHARE: Share your answers with the class.

Answers:

$$\left(\frac{3}{4}\right)^3 =$$

$$\left(\frac{-2}{3}\right)^2 =$$

Complete the Table:

Expression	Expanded Form	Value	Observations
$\left(\frac{5}{4}\right)^3$			
$\left(\frac{-5}{4}\right)^3$			
$\left(\frac{5}{-4}\right)^3$			
$\frac{-5^3}{4}$			
$\frac{5}{(-4)^3}$			

Exponent Law #1:

When a power has a rational base (a fraction), the power is distributed to the

numerator **and** the denominator: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$.

Examples

1) Evaluate, leaving your answers as fractions in lowest terms. Show the step that applies the law:

a) $\left(\frac{2}{3}\right)^2$

b) $\left(\frac{3}{2}\right)^5$

c) $\left(\frac{6}{-3}\right)^2$

d) $\left(\frac{-1}{-4}\right)^3$

e) $\left(\frac{1}{-3}\right)^3$

f) $\frac{3}{-4^2}$

2) A sample of radioactive material decays according to the expression

$$M = 1000\left(\frac{1}{2}\right)^t,$$

where M is the mass of the sample at time t . Mass is measured in grams and time is measured in years.

a) What is the initial mass of the material?

b) What is the half-life of this material?

c) How much material will remain after 1 year? 4 years? 15 years?

Homework: p.223,224 #3abfg ,4abc , p.219 #12f,14ac, W/S BB-8