

Mathematics 9

Section 2.5 - Exponent Laws II

We looked at two of the basic power laws last class. Now we will look at the final 3 laws that we will cover this year.

Power of a Power

WE CAN RAISE A POWER TO A POWER
 $(4^3)^5$

WHICH MEANS...

$$(4^3) \times (4^3) \times (4^3) \times (4^3) \times (4^3)$$

$$4^{3+3+3+3+3}$$

$$4^{15}$$

WHEN WE DO THIS WE MULTIPLY THE EXPONENTS

Exponent Law for a Power of a Power

$$(x^m)^n = x^{m \cdot n} \text{ or } x^{mn}$$

Power of a Product

The base of a power can be a product. Depending on what the question is asking, we can proceed in two different ways:

Method 1 - Answer as a Power of a Product

$$(3 \times 5)^4$$

which means...

$$(3 \times 5) \times (3 \times 5) \times (3 \times 5) \times (3 \times 5)$$

look at like terms.

$$3^4 \times 5^4$$

Method 2 - Evaluate

$$(3 \times 5)^4$$

BEDMAS

$$(15)^4$$

$$50625$$

Exponent Law for a Power of a Product (Method 1)

$$(a \times b)^m = a^m \times b^m$$

Power of a Quotient

The base of a power may be a quotient.

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

WHICH MEANS...

$$\left(\frac{3}{4}\right) \times \left(\frac{3}{4}\right) \times \left(\frac{3}{4}\right) \times \left(\frac{3}{4}\right)$$

ITS

RECALL WHEN WE MULTIPLY FRACTIONS, AS TOP \times TOP, BOTTOM \times BOTTOM

$$\frac{3 \times 3 \times 3 \times 3}{4 \times 4 \times 4 \times 4}$$

$$\frac{3^4}{4^4}$$

Exponent Law for a Power of a Quotient

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

Complete the following table:

Power	Repeated Multiplication	Simplified	As a Product of Powers
$(3^2)^4$	$(3^2) \times (3^2) \times (3^2) \times (3^2)$	3^8	
$[(-4)^3]^2$	$(-4)^3 \times (-4)^3$	$(-4)^6$	
$\left(\frac{5}{6}\right)^3$	$\frac{5 \times 5 \times 5}{6 \times 6 \times 6}$	$\frac{5^3}{6^3}$	
$(2 \times 5)^2$	$(2 \times 5) \times (2 \times 5)$		$2^2 \times 5^2$
$(5 \times 3)^3$	$(5 \times 3) \times (5 \times 3) \times (5 \times 3)$		$5^3 \times 3^3$

p. 84 #4acf, 5acd, 6aef, 7, 11, 14abeh, 15, 16, 19

Homework: pg.