

Curriculum Outcome

(N1) Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: representing repeated multiplication using powers; using patterns to show that a power with an exponent of zero is equal to one; solving problems involving powers.

(N2) Demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents.

**Student Friendly:
Chapter 2 Test Review**

Test Outline

Unit 2: Powers and the Exponent Laws



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Study Guide

Powers

- Base
- Exponent
- Repeated Multiplication
- The Zero Exponent
- Negative base rules
- Powers of ten to Standard form and vice versa

Order of Operations

BEDMAS

Exponent Laws

- Product of Powers
- Quotient of Powers
- Power of a Power
- Power of a Product
- Power of a Quotient





Can you see the difference?

$$(-4)^2$$

Expanded: $(-4)(-4)$

Evaluated: 16

Base: (-4)

Exponent: 2

$$-4^2$$

Expanded: $-(4)(4)$

Evaluated: -16

Base: 4

Exponent: 2

You Try!!!

$$-(-2)^3$$

Base: (-2)

Exponent: 3

$$\begin{aligned} & -(-2)^3 \\ & \downarrow \\ & -(-8) \\ & = 8 \end{aligned}$$

$$-2^5$$

Base: 2

Exponent: 5

$$\begin{aligned} & -2^5 \\ & = 32 \end{aligned}$$

$$(-1)^{10247} = -1$$

$$(-1)^{29584} = 1$$

~~THINK~~

Evaluating powers when the base is negative...

If the exponent is **even** the answer will be **(+)**

If the exponent is **odd** the answer will be **(-)**

7 605 404. Standard form

Write in powers of ten form:

$$(7 \times 10^6) + (6 \times 10^5) + (5 \times 10^3) + (4 \times 10^2) + (4 \times 10^0)$$

$$(5 \times 10^4) + (3 \times 10^3) + (6 \times 10^2) + (4 \times 10^0)$$

Write in standard form:

	4	3	2	1	0
	5	3	6	0	4

Exponent Laws

1) Zero Rule

-Anything raised to the exponent of zero is 1

$$(-5)^0 = 1 \quad \text{or} \quad (x)^0 = 1$$

2) Product of Powers Rule

When you multiply like bases you add the exponents

$$(2)^3 \times (2)^5 = (2)^8 \quad \text{or} \quad (a)^m \times (a)^n = (a)^{m+n}$$

3) Quotient Rule

When you divide like bases you Subtract the exponents

$$\frac{(-4)^7}{(-4)^5} = (-4)^2 \quad \text{or} \quad (a)^m \div (a)^n = (a)^{m-n}$$

4) Power to a Power Rule

With a power to a power we multiply exponents

$$(2^5)^3 = (2)^{15} \quad \text{or} \quad (a^m)^n = (a)^{mn}$$

5) Power of Product Rule

With a power of products we multiply exponents

$$[(5^5) \times (6^4)]^3 = 5^{15} \times 6^{12}$$

$$\text{or} \quad [(a^m) \times (b^n)]^p = (a)^{mp} \times (b)^{np}$$

6) Power of Quotient Rule

With a power of quotient we multiply exponents

$$\left[\frac{(-3)^6}{(5)^3} \right]^2 = \frac{(-3)^{12}}{(5)^6}$$

Negative exponent Rule

$$x^{-2} = \frac{1}{x^2}$$

example:

$$3x^5y^{-4} = \frac{3x^5}{y^4}$$

LET'S
TRY!

$$1) (2x^2y)^5 = 2^5 x^{10} y^5$$

$$2) \frac{15x^3y^4}{5x^1y^1} = 3x^2y^3$$

$$3) \frac{(3x^3y^2)^6}{(2xy)^4} = \frac{3^6 x^{18} y^{12}}{2^4 x^4 y^4}$$

$$\frac{729 x^{14} y^8}{16}$$

LET'S
TRY!

$$\frac{(4x^2y^3)^3 (2xy^2)^2}{(2x^2y^3)^3}$$

Top

$$\begin{aligned} & (4x^2y^3)^3 & (2xy^2)^2 \\ & (4^3x^6y^9) & (2^2x^2y^4) \\ & (64x^6y^9) \cdot (4x^2y^4) \end{aligned}$$

$$\boxed{256x^8y^{13}}$$

Bottom

$$\begin{aligned} & (2x^2y^3)^3 \\ & \boxed{2^3x^6y^9} \end{aligned}$$

$$\frac{256x^8y^{13}}{8x^6y^9} = 32x^2y^4$$

$$\frac{(2x^3) \cdot (3x^5y)}{(2x^2y^3)^2}$$

Simplify using laws of exponents:

$$(4^2 \times 4^3)^2 - (5^4 \div 5^2)^2$$

$$(4^5)^2 - (5^2)^2$$

$$4^{10} - 5^4$$

17. Simplify, then evaluate each expression.

a) $[(-2)^3 \times (-2)^2]^2 - [(-3)^3 \div (-3)^2]^2$

$$= [(-2)^5]^2 - [(-3)^1]^2$$

$$= (-2)^{10} - (-3)^2$$

$$= 1024 - (9)$$

$$= 1015$$

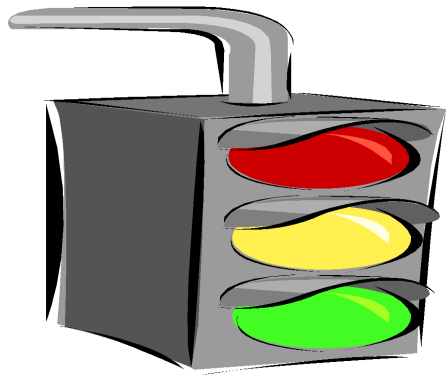
b) $[(-2)^3 \div (-2)^2]^2 - [(-3)^3 \times (-3)^2]^2$

$$= [(-2)^1]^2 - [(-3)^5]^2$$

$$= (-2)^2 - (-3)^{10}$$

$$= 4 - (59049)$$

$$= -59045$$



REQUIRED

Test Review
WORKSHEETS
All Questions