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


power
exponent
8
3
base

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

-2^5

Base: 2

Exponent: 5

$(-1)^{10247} = -1$ $(-1)^{29584} = 1$

Evaluating powers when the base is negative...

If the exponent is **even** the answer will be **positive**.

If the exponent is **odd** the answer will be **negative**.

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:

10^4	10^3	10^2	10^1	10^0
5	3	6	0	4

Exponent Laws

1) Zero Rule

-Anything raised to the exponent of zero is 1

$(-5)^0 = 1$ or $(x)^0 = 1$

2) Product of Powers Rule

When you multiply like bases you add the exponents

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

3) Quotient Rule

When you divide like bases you Subtract the exponents

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

4) Power to a Power Rule

With a power to a power we multiply exponents

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

5) Power of Product Rule

With a power of products we multiply exponents

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

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

6) Power of Quotient Rule

With a power of quotient we multiply exponents

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

7) Negative Exponent rule

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

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

$= 32\, x^{10}y^5$

2) $\dfrac{15x^3y^4}{5\,xy}$ $= 3\, x^2y^3$

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

$= \dfrac{729\, x^{14}y^8}{16}$

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

$$= \frac{6x^8y}{2^3x^6y^9}$$

$$\frac{6x^8y^{-8}}{8}$$

$$= \frac{3x^8}{4y^8}$$

Simplify using laws of exponents:

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

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

$4^{10} - 5^4$

$(4^4 \times 4^6) - (5^8 \div 5^4)$

$4^{10} - 5^4$

17. Simplify, then evaluate each expression.

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

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

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

$= 1024 - (9)$

$= 1015$

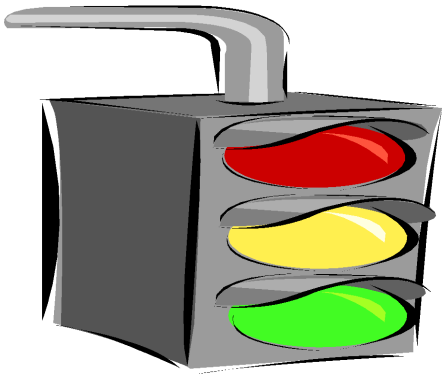
b) $[(-2)^3 \div (-2)^2]^2 - [(-3)^3 \times (-3)^2]^2$

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

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

$= 4 - (59049)$

$= -59045$



REQUIRED

Test Review
WORKSHEETS
All Questions