

Main Idea/Tips

Learning
Outcomes

- Explain and apply the exponent laws:
 - Product Rule
 - Quotient Rule
 - Power Rule

Product Rule

When multiplying powers with the _____ base, _____ the exponents.

General Case:

Where x is the base and a and b are powers

$$a^x \times a^y = a^{(x+y)}$$

Example 1:

Write the following as repeated multiplication, then using the product rule.

Write in standard form (evaluate)

$$(-2)^4 \times (-2)^2$$

- Repeated multiplication:
- Product rule

Numbers in standard form means to evaluate to a single number

Notes

Try it Yourself

Solve the following using repeated multiplication and using the product rule.

a. $(4)^2 \times (4)^5$

b. $(-3)^3 \times (-3)^3$

c. $(\frac{1}{2})^4 \times (\frac{1}{2})^2$

d. $-2^5 \times 2^3$

Quotient Rule

When dividing powers with the _____ base, _____ the exponents

General case:

Where x is the base and a and b are powers.

$$x^a \div x^b = x^{(a-b)}$$

Write the following as repeated multiplication, then use the quotient rule to write in standard form

$$(-2)^5 \div (-2)^2$$

Notes/Examples

Evaluate using the quotient rule

$$\frac{x^7}{x^2}$$

Try it Yourself

Evaluate the following using the quotient rule

a. $4^7 \div 4^2$

b. $(-5.1)^6 \div (-5.1)^3$

c. $\frac{y^9}{y}$

Any number to the power of 1 equals itself

$$x^1 = x$$

Notes

Power Rule

When a _____ is raised to an exponent, _____ the exponents.

General Case:

Where x is the base and a and b are exponents

$$(x^a)^b = x^{ab}$$

Write the following as repeated multiplication and evaluate.

1. $(2^3)^2$

a. Repeated multiplication:

b. Power rule

2. $((-6)^4)^2$

a. Repeated multiplication:

b. Power rule

Notes

Try it Yourself

Use the power rule for the following to write as a single power:

1. $(3^2)^5$

2. $((-10)^3)^5$

3. $(y^m)^n$

4. $(4.2^5)^3$

Expand Your Knowledge

Apply the product rule, quotient rule or power rule to solve for the missing exponent.

1. $7^2 \times 7^x = 7^{18}$

2. $5^x \div 5^2 = 5^5$

3. $(2^4)^x = 2^{20}$

Homework:

p3. #15-38

Worksheet to be handed in