Algebra 1

Lesson 8.1

Apply Exponent Properties Involving Products

Warm-Up

Evaluate each expression.

(a)
$$a^2$$
 when $a = -6$

$$(-6)^2 = 36$$

(b)
$$x^4$$
 when $x = 3$

$$(3)^4 = 81$$

(c)
$$m^3$$
 when $m = -2$

$$(-2)^3 = -8$$

Exponents

$$x^3 = x \cdot x \cdot x = x$$
 to the third power

Base is x Exponent (or power) is 3

Properties of Exponents

$$a^m \cdot a^n = a^{(m+n)}$$
 (Product of Powers)

$$(a^m)^n = a^{mn}$$
 (Power of a Power)

$$(ab)^m = a^m b^m$$
 (Power of a Product)

Example 1. Use the Product of Powers Property

Simplify the expression. You do not need to evaluate your answer like the Warm-Up, just write the answer using exponents.

(a)
$$4^7 \cdot 4^6$$

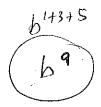


(b)
$$(-3)^3 \cdot (-3)$$

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

(c)
$$8^5 \cdot 8^1 \cdot 8^2$$

(d)
$$b^{\dagger} b^3 \cdot b^5$$



Example 2. Use the Power of a Power Property

Simplify the expression. You do not need to evaluate your answer like the Warm-Up, just write the answer using exponents.

(a)
$$(7^4)^2$$



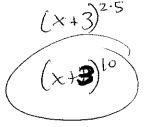
(b)
$$[(-3)^4]^2$$



(c)
$$(y^3)^2$$



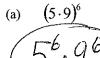
$$(d) \qquad \left[\left(x+3 \right)^2 \right]$$



$-1(5x)^2$

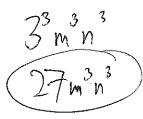
Example 3. Use the Power of a Product Property

Simplify the expression. You do not need to evaluate the variable part of the answer, just write the answer using exponents.

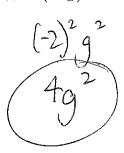




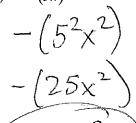
(b) $(3mn)^3$



(c) $\left(-2g\right)^2$

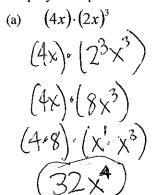


(d) $-(5x)^2$

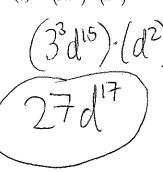


Example 4. Combining Properties (Order of Operations)

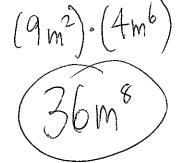
Simplify the expression. You do not need to evaluate the variable part of the answer, just write the answer using exponents.



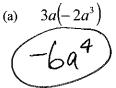
(b)
$$\left(3^{1}d^{5}\right)^{3}\cdot\left(d^{2}\right)$$

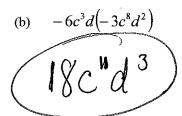


(c)
$$\left(-3m\right)^2 \cdot \left(2m^3\right)^2$$

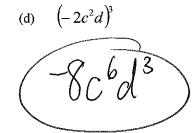


Try It! Simplify the expression.





$$\frac{(c) \left(-3b^4\right)^3}{-27b^{12}}$$



Assignment

New: Pg. 492 #4 - 38 (evens)

Review:

Solve by using the method of your choice (graphing, substitution, or elimination).

1.
$$y = 2x - 1$$

 $3y + 2x = 21$

$$2x + x = 7$$
$$3x - 4y = 1$$

3.
$$x + 3y = 2$$

 $3x = 9y + 15$