Name:_____   Date:_____

Notes
Algebra Section 8.1
Pages 489-494

Goal: "Use properties of exponents involving products"

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1. $a^m \cdot a^n = a^{m+n}$

2. $(a^m)^n = a^{mn}$

3. $(ab)^m = a^m \cdot b^m$

Write the following expressions out as products:

$a^2 = a \cdot a$ $a^3 = a \cdot a \cdot a$

So then how would you multiply….?

$a^2 \cdot a^3 = a \cdot a \cdot a \cdot a \cdot a$

Can you come up with a rule to multiply expressions that have the same base and also have exponents?

Keep the base and add the exponents.

<u>Use the rule to multiply the following. Write your answer as an exponent:</u>

Ex: $7^3 \cdot 7^5$ **Ex:** $4^7 \cdot 4^6$ **Ex:** $9 \cdot 9^8 \cdot 9^2$

7^8 4^{13} 9^{11}

Ex: $8^5 \cdot 8 \cdot 8^2$ **Ex:** $(-5)(-5)^6$ **Ex:** $(-3)^3(-3)$

8^8 $(-5)^7$ $(-3)^4$

Ex: $x^7 \cdot x^3$ **Ex:** $b \cdot b^3 \cdot b^5 \cdot b^2$

x^{10} b^{11}

Write out the following expression as a product:

$$(a^2)^3 = (a{\cdot}a)^3 = (a{\cdot}a) \cdot (a{\cdot}a) \cdot (a{\cdot}a) = a^6$$

Can you come up with a rule to simplify an expression with an exponent raised to a power?

Keep the base and multiply the exponents.

Use the rule to simplify the following expressions. Write your answer as an exponent:

Ex: $(3^4)^2$

3^8

Ex: $(2^5)^3$

2^{15}

Ex: $[(-6)^5]^2$

$(-6)^{10}$

Ex: $[(y+2)^2]^6$

$(y+2)^{12}$

Ex: $(4^2)^7$

4^{14}

Ex: $(2^7)^4$

2^{28}

Ex: $(y^3)^3$

y^9

Ex: $[(n+8)^2]^9$

$(n+8)^{18}$

Write out the following expression a product:

$$(ab)^3 = (ab)(ab)(ab) = a{\cdot}a{\cdot}a{\cdot}b{\cdot}b{\cdot}b$$

Can you come up with a rule to simplify a product being raised to a power?

Each base is raised to the power.

Use your rule to simplify the following expressions. Write your answer as an exponent:

Ex: $(23{\cdot}17)^5$

$23^5{\cdot}17^5$

Ex: $(24{\cdot}13)^8$

$24^8{\cdot}13^8$

Ex: $(34{\cdot}9)^6$

$34^6{\cdot}9^6$

Simplify the following expressions:

Ex: $(9xy)^2$

$81x^2y^2$

Ex: $(-4z)^2$

$16z^2$

Ex: $-(4z)^2$

$-16z^2$

Ex: $(9m^3n^4)^2$

$81m^6n^8$

Ex: $(4mn)^3$

$64m^3n^3$

Ex: $(-2g)^4$

$16g^4$

Ex: $-(5x)^2$

$-25x^2$

Ex: $(2x^3)^2 \cdot x^4$

$4x^{10}$

Ex: $(3d^5)^2 \cdot d$

$9d^{11}$

Ex: $5 \cdot (5x^2)^4$

$3125x^8$