Name: _____ Date: Jan 24 Hour: 6th

Unit 5 Day 3: The Product Rule of Exponents

*Focus Question: How do I **multiply** bases with different exponents?*

A. Exponential Form using variables
Exponential Form and Expanded Form also work when variables are used in place of numbers.

Write each of the following in expanded form.

1. $4a^5$ 4·a·a·a·a·a
2. $7x^3$ 7·x·x·x
3. $15m^8$ 15·m·m·m·m·m·m·m·m

Write each of the following in exponential form.

4. $3 \cdot j \cdot j \cdot j \cdot j$ $3j^4$
5. $24 \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b$ $24b^8$
6. $10 \cdot d \cdot d$ $10d^2$

B. The Product Rule of Exponents

1. Write each of the following in expanded form. Then write the answer in exponential form.

Problem	*Expanded Form*	*Exponential Form*
$2^2 \cdot 2^4$	2·2·2·2·2·2	2^6
a) $3^4 \cdot 3^3$	3·3·3·3·3·3·3	3^7
b) $6^5 \cdot 6^4$		6^9
c) $x^3 \cdot x^7$	x·x·x·x·x·x·x·x·x·x	x^{10}
d) $y^2 \cdot y^1$	y·y·y	y^3
e) $a^4 \cdot a^6$		a^{10}

add exponent

2. Finish the following equation to express **The Product Rule** of exponents. $a^m \cdot a^n = a^{m+n}$

3. Explain **when** you can use the product rule.

the same base is being multiplied

4. Let's practice without writing expanded form. BUT STILL SHOW WORK

Problem	*Work*	*Exponential form*
$4^2 \cdot 4^3$	4^{2+3}	4^5
$10^7 \cdot 10^{-4}$	10^{7+-4}	10^3
$x^8 \cdot x^7$	x^{8+7}	x^{15}
$y^{13} \cdot y^{-5}$	y^{13+-5}	y^8

If you ever forget the short cut…use expanded form!

5. Either simplify each expression or fill in the boxes to make the equation true.
(Some problems are almost algebra 1 level: Hint, re-write the problem using the commutative property so that the same bases are next to each other.)

a. $3^5 \cdot 3^2 = 3^{5+2} = 3^7$

b. $m^{\boxed{2}} \cdot m^{\boxed{8}} = m^{10}$

c. $g^3 \cdot g^2 \cdot g^8$ $g^{3+2+8} = g^{13}$

d. $5^{\boxed{4}} \cdot 5^{\boxed{5}} \cdot 5^3 = 5^{12}$

e. $4x^2 \cdot 3x^4$ $4 \cdot 3 \cdot x^2 \cdot x^4 = 12x^{2+4} = 12x^6$

f. $-3m^2 \cdot 5m^7$ $-3 \cdot 5 \cdot m^2 \cdot m^7 = -15m^{2+7} = -15m^9$

g. $2n^{\boxed{3}} \cdot 8n^{\boxed{5}} = 16n^8$

h. $8k^4 \cdot k^1 = 8k^{4+1} = 8k^5$

i. $6y^3 \cdot 4y^5$ $6 \cdot 4y^{3+5} = 24y^8$

j. $10^{\boxed{4}} \cdot 10^{\boxed{1}} = 10^{\boxed{5}}$