Unit 2: Powers and Exponent Laws Name: _____

2.4 Exponent Laws I

Product of Powers	Product as Repeated Multiplication	Product as a Power
$5^4 \times 5^2$	$(5\times5\times5\times5)\times(5\times5)$	5^6
$3^2 \times 3^5$	$(3\times3)\times(3\times3\times3\times3\times3)$	3^7
$2^3 \times 2$	$(2\times2\times2)\times2$	2^4
$6^3 \times 6^4$	$(6\times6\times6)\times(6\times6\times6\times6)$	6^7
$7^2 \times 7^3$	$(7\times7)\times(7\times7\times7)$	7^5

Exponent Law for Product of Powers

To multiply powers with the same base add the exponents.

$$a^m \times a^n = a^{m+n}$$

Quotient of Powers	Quotient as Repeated Multiplication	Quotient as a Power
$5^4 \div 5^2 = \frac{5^4}{5^2}$	$\frac{(5 \times 5 \times 5 \times 5)}{5 \times 5}$	5^2
$3^5 \div 3^4$	$\frac{3 \times 3 \times 3 \times 3 \times 3}{3 \times 3 \times 3 \times 3}$	3^1
$2^7 \div 2^3$	$\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}{2 \times 2 \times 2}$	2^4
$6^4 \div 6$	$\frac{6 \times 6 \times 6 \times 6}{6}$	6^3
$-5^3 \div 5^2$	$-\left[\frac{5 \times 5 \times 5}{5 \times 5}\right]$	-5^1

the negative is NOT a part of the base

Exponent Law for Quotient of Powers

To divide powers with the same base subtract the exponents.

$$a^m \div a^n = a^{m-n}$$

Example (1): Simplify Products and Quotients with the Same Base

Write each expression as a power.

a) $6^2 \times 6^4$

$= 6^{2+4}$

$= 6^6$

b) $(-9)^7 \div (-9)^6$

$= (-9)^{7-6}$

$= (-9)^1$

$= (-9)$

Example (2): Evaluating Expressions Using Exponent Laws

Evaluate.

a) $(-2)^3 \times (-2)^5$

$= (-2)^8$

$= 258$

b) $3^4 \times 3^5 \div 3^3$

$= 3^9 \div 3^3$

$= 3^6$

$= 729$

Example (3): Using Exponent Laws and the Order of Operations

Evaluate.

a) $6^3 + 6^2 \times 6^5$

$= 6^3 + 6^7$

$= 216 + 279\,936$

$= 280\,152$

b) $(-10)^3[(-10)^5 \div (-10)^2] - 10^7$

$= (-10)^3 [(-10)^3] - 10^7$

$= (-10)^6 - 10^7$

$= 1\,000\,000 - 10\,000\,000$

$= -9\,000\,000$