NAME _____

Lesson 5.1 Using Exponents

A **power** of a number represents repeated multiplication of the number by itself.
$10^3 = 10 \times 10 \times 10$ and is read 10 to the third power.

In **exponential** numbers, the **base** is the number that is multiplied, and the **exponent** represents the number of times the base is used as a factor. In 2^5, 2 is the base and 5 is the exponent.

2^5 means 2 is used as a factor 5 times.
$2 \times 2 \times 2 \times 2 \times 2 = 32 \quad 2^5 = 32$

Scientific notation for a number is expressed by writing the number as the product of a number between one and ten, and a power of ten.

3,000 can be written as $3 \times 1{,}000$ or 3×10^3.
3×10^3 is scientific notation for 3,000.

Some powers of 10 are shown in the table at right.

10^1	10	10
10^2	10×10	100
10^3	$10 \times 10 \times 10$	1,000
10^4	$10 \times 10 \times 10 \times 10$	10,000
10^5	$10 \times 10 \times 10 \times 10 \times 10$	100,000

Use the table above to write each number in scientific notation.

	a	b	c
1.	30 _____	4,000 _____	50,000 _____
2.	600,000 _____	700 _____	90 _____
3.	40,000 _____	100,000 _____	400 _____

Write each power as the product of factors.

4.	3^3 _____	5^5 _____	1^6 _____
5.	12^2 _____	8^3 _____	6^3 _____
6.	7^4 _____	4^4 _____	11^4 _____

Use exponents to rewrite each expression.

7.	$3 \times 3 \times 3$ _____	8×8 _____	$7 \times 7 \times 7 \times 7 \times 7$ _____
8.	24×24 _____	$4 \times 4 \times 4$ _____	$6 \times 6 \times 6 \times 6 \times 6 \times 6$ _____
9.	$2 \times 2 \times 2 \times 2$ _____	$38 \times 38 \times 38$ _____	$5 \times 5 \times 5 \times 5 \times 5$ _____

Evaluate each expression.

10.	a^4 if $a = 2$ _____	x^3 if $x = 4$ _____	n^7 if $n = 1$ _____
11.	n^2 if $n = 8$ _____	b^4 if $b = 3$ _____	x^3 if $x = 5$ _____
12.	a^5 if $a = 3$ _____	x^3 if $x = 6$ _____	n^2 if $n = 11$ _____