

Skills Worksheet

Math Skills**Map Scale and Exponents**

When dealing with large numbers, you will often find it useful to express these numbers using exponents. An exponent is a small raised number, or superscript, written to the right of another number. The exponent tells how many times a number is multiplied by itself. An exponent is also called the power to which the number is raised. For example, 43, or 4 to the power of 3, is the same as $4 \times 4 \times 4$. Any number raised to the power of 1 is equal to itself. For example, $4^1 = 4$. A map might have a scale of 1:100,000, where 1 centimeter on the map represents an actual distance 100,000 times the length of a centimeter, or 1 kilometer. Another way of expressing a number like 100,000 would be to use an exponent: $100,000 = 10^5$. Note that the exponent, 5, is the same as the number of zeros in 100,000.

The chart below shows rules for performing calculations with exponents.

EXPONENTS

	Rule	Example
Zero power	$x^0 = 1$	$7^0 = 1$
First power	$x^1 = x$	$6^1 = 6$
Multiplication	$(x^n)(x^m) = (x^{n+m})$	$(x^2)(x^4) = x^{(2+4)} = x^6$
Division	$\frac{x^n}{x^m} = x^{(n-m)}$	$\frac{x^8}{x^2} = x^{(8-2)} = x^6$
Exponents raised to a power	$(x^n)^m = x^{nm}$	$(5^2)^3 = 5^6 = 15,625$

SAMPLE PROBLEM

A map scale is 1:1,000,000. Use an exponent to express the number 1,000,000. Show your work.

SOLUTION

Step 1: $1,000,000 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

Step 2: In the number 1,000,000, 10 is multiplied by itself 6 times.

Step 3: $1,000,000 = 10^6$

PRACTICE

Using the sample problem as a guide, answer the following questions. Remember to show your work.

1. A map scale is 1:10,000,000. Use an exponent to express the number 10,000,000.
2. A map scale is 1:10,000. Use an exponent to express the number 10,000.
3. A map scale is 1:250,000. Use an exponent to express the number 250,000.
4. A map scale is 1:10. Use an exponent to express the number 10.

Use the chart on the previous page to help you perform the following calculations. Remember to show your work

5. $(5^4)(2^3) =$

6. $54^0 =$

7. $(20^2)^3$

8. 13^4

