Powers of Ten

Reporting Category   Number and Number Sense

Topic   Describing the concept of negative exponents for powers of ten

Primary SOL   7.1a   The student will investigate and describe the concept of negative exponents for powers of ten.

Related SOL   7.1b, 7.1c

Materials
- Powers of Ten Chart (attached)
- Scientific calculators

Vocabulary

exponent, negative number (earlier grades)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Review powers and exponents. Then, guide a group discussion to complete the first six lines on the Powers of Ten chart. Ask students to look for a pattern.

2. Have students follow the pattern to complete the next line on the chart together. Have them write the answer both as a fraction and as a decimal.

3. Have students finish the remainder of the chart. When they have finished, conclude the discussion with a review of negative exponents for powers of ten.

4. At the conclusion of the lesson, demonstrate the use of the exponent button on the calculator.

Assessment
- **Questions**
  - What information do you know when the exponent is positive for a power of ten?
  - What information do you know when the exponent is negative for a power of ten?
- **Journal/Writing Prompts**
  - Explain patterns noticed with the powers of ten.
  - Explain what a negative exponent means when the base is ten.
  - Explain why 10^0 does not equal zero.

Extensions and Connections (for all students)
- Have students use the Internet or other reference material to locate examples of powers of ten with negative exponents.

Strategies for Differentiation
- Create a sort including powers of ten, expanded forms, and products. Have students complete the sort prior to filling in the Powers of Ten Chart.

Powers of Ten Chart

Name _____   **Date** _____

1. Complete the chart.

Power of Ten	Expanded Form	Product
10^5		
10^4		
10^3		
10^2		
10^1		
10^0		

What patterns do you see?

What would 10^6 be?
Predict what 10^9 would be.
Following the pattern in the chart, what is 10^0?
Based on this pattern, what do you predict that 10^{-1} would be?

2. Complete the chart

Power of Ten	Expanded Form	Product	
		Decimals	Fractions
10^0			
10^{-1}			
10^{-2}			
10^{-3}			
10^{-4}			
10^{-5}			

What patterns do you see?

What would 10^{-6} be?
Predict what 10^{-9} would be.