Text: CORD

Unit number and title: Unit 12 Scientific Notation

 Short Description: Students compile population data based on common last names in phone books then compute to scientific notation. They then practice basic math operations using scientific notation.

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Date: 6/24/2010

Lab Title

Phone Book Population

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**

  To use scientific notation and basic math operations to look at phone book populations.

- **Statement of pre-requisite skills needed** (i.e., vocabulary, measurement techniques, formulas, etc.)
  1.) Use mathematical calculation skills (+,-,x,÷) with signed numbers to solve problems.
  2.) Know how to use a scientific calculator.
  3.) Follow directions and work in a group.
  4.) Basic computation skills.

- **Vocabulary**

Base	the number that is used as a factor a given number of times
Exponent	the number above and to the right of the base, which tells how many times the base is used as a factor
Factors	the numbers multiplied together to form a product
Powers of Ten	the power which ten is raised to in a particular instance. 10 is the base
Scientific Notation	the number expressed as a product of a number between 1 and 10 and a power of 10

- **Materials List**

  Class Data Sheet

  Individual Student Data Sheet

  Phonebooks, one for each pair

- **State Standards addressed**

  Math:

  A1.1.E Solve problems that can be represented by exponential functions and equations. (Partial)

  A1.2.D Interpret and use integer exponents and square and cube roots, and apply the laws and properties of exponents to simplify and evaluate exponential expressions. (Partial)

A1.6.A Use and evaluate the accuracy of summary statistics to describe and compare data sets.(Partial)

Reading:
Understand and Use vocabulary (word meaning) strategies to comprehend text.
apply content/academic vocabulary critical to the meaning of the text, including vocabularies relevant to different contexts, cultures, and communities.

Writing:
Write for different purposes, such as telling stories, presenting analytical responses to literature, persuading, conveying technical information, completing a team project, and explaining concepts and procedures.

- **Leadership Skills**

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

2.1 The student will communicate, participate, and advocate effectively in pairs, small groups, teams, and large groups in order to reach common goals

- **SCAN Skills/Workplace Skills**

1.2 The student will demonstrate the ability to acquire and use **information** in a family, community, business and industry settings. This means that the
student can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.

1.3 The student will demonstrate an understanding of complex inter-relationships (**systems**). This means that the student understands social, organizational,
and technological systems; they can monitor and correct performance; and they can design or improve systems

- **Set-up information**

  Have enough student data sheets printed.
  Have one class data sheet.
  Have enough phone books, one for each pair.

- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**

  Pair students up.
  Have pairs get phone book and choose Last Name.
  Pairs count number of names which fall into Last Name chosen.
  One student reports population data found on class data sheet on document camera.
  Students then on their own complete data sheet and questions.

- **Teacher Assessment of student learning** (scoring guide, rubric)
  Student Data Sheet is turned into instructor

- **Summary of learning** (to be finished after student completes lab)
  -discuss real world application of learning from lab – what other populations could be studied in this manner.
  -ask students to explain how scientific notation would simply the data collection, tabulation and reporting process.
  -opportunity for students to share/present learning

- **Optional activities**
  Choose another population and use that to turn into scientific notation.
  Use calipers to measure thickness of phone books (similar to Lab Activity 1 in Unit 12)

- **Career Applications**

Lab technician, machinist or mechanic, computer programmer, physicist, astronomer, doctor, and accountant.

LAB TITLE: <u>Phone Book Population</u>
STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**
  Using scientific notation and basic math operations to complete population research.
- **Grouping instructions and roles**
  Pair up with a partner.
  Elect a partner to record data found on class data sheet on document camera.
  Pick up a student data sheet, one for each person.
  Pick up a phone book, one for each pair.
- **Procedures** – steps to follow/instructions
1. Using your pairs phone book, choose one of the 15 common last names (be sure it is different than anyone in the class.
2. Elected partner reports population number on class data sheet on document camera.
3. Once all numbers of all 15 last names are reported on class data sheet, students work individually.
   4. Complete questions and fill out personal data sheet following all directions.
- **Outcome instructions**
  Calculate numbers into scientific notation. Results of math operations using scientific notation will vary based on names chosen.
- **Assessment instructions** (peer-teacher)
  Turn in the data sheet once lab is completed and filled out. This is what will be graded.

Data Sheet for Phone Book Population Lab

Group Members: _____

Class period_____

Step 1: Fill in Data Sheet. First for partners, then copy down class data.

Last Name:	Population:	Scientific Notation Conversion:
Jones		
Brown		
Smith		
Wagner		
Clark		
Johnson		
Black		
Simpson		
Anderson		
Garcia		
Williams		
Sullivan		
Russell		
Green		
Nelson		

Step 2: On your own—

1.) Choose two Last Names and add the scientific notation conversions together. Tell which Last Names are chosen and show your work.

2.) Choose two Last Names and subtract the scientific notation conversions. Tell which Last Names are chosen and show your work.

3.) Choose two Last Names and multiply the scientific notation conversions. Tell which Last Names are chosen and show your work.

4.) Choose two Last Names and divide the scientific notation conversions. Tell which Last Names are chosen and show your work.

5.) Choose three Last names and add the scientific notation conversions. Tell which Last Names are chosen and show your work.

6.) Choose three Last Names and subtract the scientific notation conversions. Tell which Last Names are chosen and show your work.

7.) Choose four Last Names and add the scientific notation conversions. Tell which Last Names are chosen and show your work.

8.) Choose four Last Names and subtract the scientific notation conversions. Tell which Last Names are chosen and show your work.

9.) Choose four Last Names and multiply the scientific notation conversions. Tell which Last Names are chosen and show your work.

Class Data Sheet

Last Name:	Population:
Jones	
Brown	
Smith	
Wagner	
Clark	
Johnson	
Black	
Simpson	
Anderson	
Garcia	
Williams	
Sullivan	
Russell	
Green	
Nelson	

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