1. (Musser and Burger, *Mathematics for Elementary Teachers*, Wiley 1996) A very large school has a row of 1000 lockers. 1000 students line up and student 1 closes all the lockers. Student 2 opens every second locker. Student 3 changes the state of every 3rd locker. Student 4 changes the state of every 4th locker, and so on.

   (a) What lockers are closed at the end? Why?

   (b) Which lockers have been switched the most often?

   (c) How many lockers, and which ones, were switched exactly 5 times?

2. How could we systematically figure out the sum of all even numbers up to a specified limit?

3. Examine the following sequence:

$$1, 3, 9, 27, 81, 243 \ldots$$

   (a) What is the rule for forming the next number each time?

   (b) What is the units digit of the 89th element of the sequence?