A Lesson Plan for
The First Day of Logarithms (in 9th grade)

(This 4 step sequence can be done in one 45 minute track class.)

1. *Subtraction as the Inverse of Addition*
   - Write on the board the three's addition table in the same way that the two's power table is written. The left column is labeled N and has the values 1,2,3, etc. The right column is labeled N+3 and has the values 4, 5, 6, etc.
   - We can view this table as the values of the left column posing the questions, and the right column giving the answers. The question from the 4th row is then:
         Question: What is 4 plus 3?
         Answer: 7
   - Alternatively, we can view this table as the values of the right column posing the questions, and the left column giving the answers. The question from the 4th row is then:
         Question for subtraction (posed in terms of addition): What plus 3 is 7?
         Answer: 4

2. *Division as the Inverse of Multiplication*
   - Write on the board the three's multiplication table, with the right column labeled N·3 and with the values 3, 6, 9, 12, etc.
   - We can view this table as the values of the left column posing the questions, and the right column giving the answers. The question from the 4th row is then:
         Question: What is 4 times 3?
         Answer: 12
   - Alternatively, we can view this table as the values of the right column posing the questions, and the left column giving the answers. The question from the 4th row is then:
         Question for division (posed in terms of multiplication): What times 3 is 12?
         Answer: 4

3. *Cube Rooting as the Inverse of Cubing*
   - Write on the board the cubing table, with the right column labeled N^3, with values 1, 8, 27, 64, etc.
   - We can view this table as the values of the left column posing the questions, and the right column giving the answers. The question from the 4th row is then:
         Question: What is 4 cubed?
         Answer: 64
   - Alternatively, we can view this table as the values of the right column posing the questions, and the left column giving the answers. The question from the 4th row is then:
         Question for cube rooting (posed in terms of cubing): What cubed is 64?
         Answer: 4

4. *Logarithms as the Inverse of an Exponential Function*
   - Write the three's power table, with the right column labeled 3^N, with values 3, 9, 27, 81, etc.
   - By this point, the students should be able to see what this is leading to.
         Simply ask them at this point "What's the question to be asked for logarithms?"
     Many of the students on their own should be able to come up with everything listed below.
   - We can view this table as the values of the left column posing the questions, and the right column giving the answers. The question from the 4th row is then:
         Question: What is 3 to the 4?
         Answer: 81
   - Alternatively, we can view this table as the values of the right column posing the questions, and the left column giving the answers. The question from the 4th row is then:
         Question for the logarithm (posed in terms of exponents**): Three to the what is 81?**
         Answer: 4   **Point out that we write this as: $\log_3 81$**