**Instructional Days**: 7-9

**Topic Description**:

This lesson reinforces the four main phases in the problem-solving process.

**Objectives**: The students will be able to:

* Solve a problem by applying the problem-solving process.
* Express a solution using standard design tools.
* Determine if a given solution successfully solves a stated problem.

**Student Activities**:

* Work individually to learn the history and rules of the Towers of Hanoi puzzle.
* Discuss how long this puzzle might take to complete for different sizes
* Work with elbow partner to complete the activity.
* Discuss solutions.

**Teaching/Learning Strategies**:

* History of Towers of Hanoi
  + Students read the history and rules
  + Play the game using 3 discs
* Discussion of Towers of Hanoi
  + How long did it take to solve the problem for 3 discs? How long do you expect it take for 6 or 12 discs?
    - Lead them to the idea that the solution time might grow differently from the size of the problem (e.g. 6 discs might be more than twice as long as the solution for 3 discs.)
* Students partner up and complete worksheet using tower of Hanoi puzzles.
* Go over the questions on the worksheet
  + Question 2: ask the students if there was a specific strategy that always completed the puzzle in the minimum number of moves. The minimum number of moves is 2^n-1
  + Question 5: (They might need a heavy duty calculator for this!) Approximately 585,000,000,000 years! (five hundred and eighty-five billion years)
* Task them to try and come up with an algorithm that always solves the problem in the minimum number of steps possible.
  + Along the way, help guide them by explaining how the problem is recursive.
  + The problem ultimately consists of moving the bottom layer of one stack to the top of another stack over and over again.

**Resources**:

* PBS Teachers Tower of Hanoi <http://www.pbs.org/teachers/mathline/concepts/historyandmathematics/activity3.shtm>