Activity 1: Tower of Hanoi

As the legend goes, there is a monastery in Hanoi with a great hall containing 3 tall pillars. Resting on the first pillar are 64 giant disks (or washers) - all different sizes, stacked from largest to smallest. The monks are charged with the following task: they must move the entire stack of disks to the third pillar. However, due to the size of the disks, the monks cannot move more than one at a time. Each disk must be placed on one of the pillars before the next disk is moved. And because the disks are so heavy and fragile, the monks may never place a larger disk on top of a smaller disk.

When the monks finally complete their task, the world shall come to an end. Your task: figure out how long before we need to start worrying about the end of the world.

1. First, let's find the minimum number of moves required for a smaller number of disks. Collect some data. Make a table.

2. Conjecture a formula for the minimum number of moves required to move n disks. Test your conjecture. How do you know your formula is correct?

3. If the monks were able to move one disk every second without ever stopping, how long before the world ends?

Activity 2: Counting Strips

The goal: You have a large collection of 1×1 squares and 1×2 dominoes. You want to arrange these to make a 1×15 strip. How many ways can you do this?

1. Again, start by collecting data: How many length 1×1 strips can you make? How many 1×2 strips? How many 1×3 strips? And so on.

2. How are the 1×3 and 1×4 strips related to the 1×5 strips?

3. How many 1×15 strips can you make?

4. What if I asked you to find the number of 1×1000 strips? Would the method you used to calculate the number fo 1×15 strips be helpful?