The Sears Tower is How High? NAMES:

Problem: Take a piece of paper and cut it in half. Stack pieces on top of each other and cut in half again. After each cut, record the information in the table. The column for thickness is blanked out for the first four rows because it is hard to measure. If you want, use calipers to measure even the smallest thicknesses. Repeat until you see a pattern and can generalize for the bottom line of the table.

Number of cuts	**Number of pieces of paper**	**Thickness (inches)**
0		--
1		--
2		--
3		--
4		
5		
6		
7		
8		
9		
10		
…	…	…
c		

1. The Sears Tower (now called Willis Tower), the tallest building in the U.S., is 1454 feet (or 17,448 inches) tall. (Information Please Almanac, 1996) Can you, do you think, make enough cuts to make a paper tower that tall? How many cuts would it take? Let's examine this together. (HINT: Find the relationship between the number of cuts and the height of the stack. We will do this together.)

2. You should see a pattern in the second column of the table even though you will not be physically able to complete the table with your cut paper. Use this pattern to complete the entire second column including the bottom entry. Notice the bottom entry tells us how the number of pieces of paper is related to the number of cuts, *c*.

3a. Let's move on to the thickness of the stack. What is the thickness of the stack after 4 cuts?

3b. What is the thickness of the stack after 5 cuts?

3c. What is the thickness of the stack after 6 cuts?

3d. Complete the rest of column 3 by using this pattern.

3e. Work backwards up the table and fill in the thicknesses for 3, 2, 1, and 0 cuts.

4. Come up with an expression for the thickness of the stack (in inches) after c cuts. That would be the bottom entry in the third column of the table.

5a. How many cuts would you guess would it take to make a stack of paper as high as the Sears Tower? Do no arithmetic and just take a guess.

5b. Use your formula from question 4 to check your guess.

6. Use guess and check to find the number of cuts required to make a stack that rivals the Sears Tower.