1. Draw the graph of the function $y = \frac{-|x+a|}{|x+a|}$ for different values of $a$. What does this graph look like?

2. In the game "World of Goo" you build structures out of goo balls. If I make a tower like this:

And each layer is 1.3 meters tall, how tall can my tower be if I use 297 goos (say each goo contributes 1 edge, so there are 3 in the first picture, and 9 in the second.)

3. Laura takes her dog for a walk. Laura walks at 4 miles per hour, but her dog runs at 10 miles an hour. Walking along a path, the dog runs away from her to the end of the path, and back to her. How much farther does the dog run that Laura for a path of length $n$ miles?

4. A weird number is a number that is the product of two consecutive primes, such as $7 \times 11 = 77$. What is the least common multiple of the 6 smallest weird numbers?

5. Consider the following pattern:

$$\sqrt{1 + 1 \times 2 \times 3 \times 4} = 5$$
$$\sqrt{1 + 2 \times 3 \times 4 \times 5} = 11$$
$$\sqrt{1 + 3 \times 4 \times 5 \times 6} = 19$$
$$\sqrt{1 + 4 \times 5 \times 6 \times 7} = 29$$
$$\sqrt{1 + 5 \times 6 \times 7 \times 8} = 41$$

Determine $\sqrt{1 + 79 \times 80 \times 81 \times 82}$ using the pattern above. Why does this pattern hold?