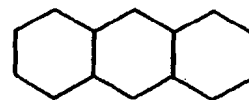
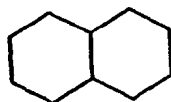
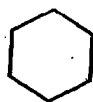


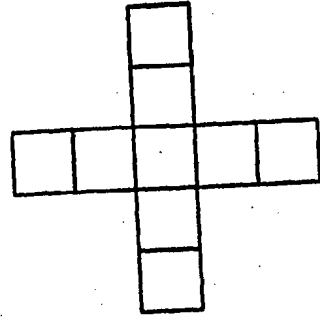
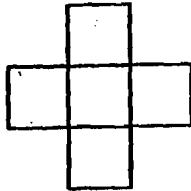
We are now going to start using algebra to actually answer questions. When doing these problems, please make sure you can explain each step you made.

1. Consider the following patterns of hexagons. Assume each edge has a length of 1 unit.



- (a) What is the perimeter at the first stage? Second? Third? Fourth?
- (b) Let a_n be the perimeter at the n th stage of the design. What is the relationship with a_n and a_{n+1} ?
- (c) What is a_5 ? a_6 ? a_{55} ? a_{100} ? Come up with a formula for a_n . Do **not** simplify your formula, but leave it in the first form you thought of.
- (d) Let b_1 be the perimeter in the second stage, b_2 be the perimeter in the third stage, and so on (that is, b_n is perimeter at stage $n + 1$). What is the relationship between b_n and b_{n+1} ?
- (e) Come up with a formula for b_n .
- (f) How are your answers to parts b) and d) reflected in your answers to parts c) and e)? In other words, if you were given the answers to parts c) and d), how could you recover your answers to b) and d)?

2. Consider the following patterns of squares.



- (a) What is the number of squares at the first stage? Second? Third? Fourth?
- (b) Let c_n be the number of squares at the n th stage of the design. What is the relationship with c_n and c_{n+1} ?
- (c) What is c_5 ? c_6 ? c_{38} ? a_{205} ? Come up with a formula for c_n . Do **not** simplify your formula, but leave it in the first form you thought of.
- (d) Let d_1 be the perimeter in the second stage, d_2 be the perimeter in the third stage, and so on (that is, d_n is perimeter at stage $n + 1$). What is the relationship between d_n and d_{n+1} ?
- (e) Come up with a formula for d_n .
- (f) How are your answers to parts b) and d) reflected in your answers to parts c) and e)? In other words, if you were given the answers to parts c) and d), how could you recover your answers to b) and d)?