

C_{60} and C_{70} Buckminsterfullerenes (whole atoms)

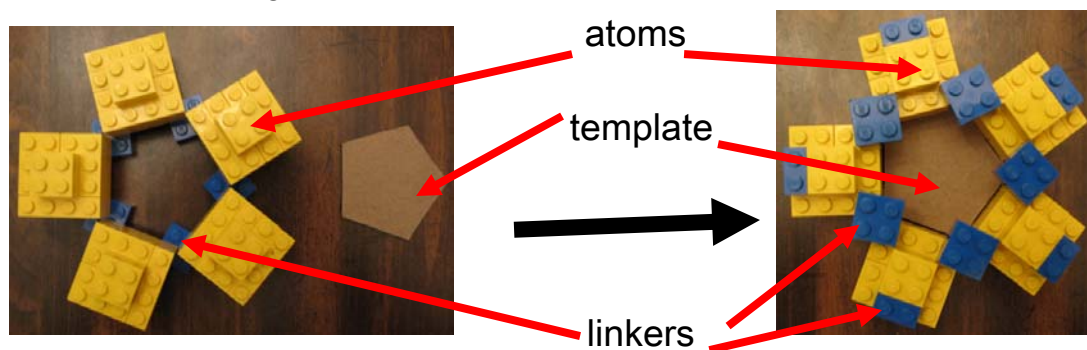
These are the most challenging (and rewarding) builds that I have attempted, and the resulting models have the same atom connectivity as C_{60} and C_{70} molecules. I recommend using fresh bricks with snug tolerances, a careful eye for symmetry, and a good dose of patience. This structure uses both support posts (which one might be able to carefully remove after the fullerene structure is complete and maybe even glued) and small bricks (2x2 and 1x2) to link the atoms together. Enjoy! -DJC-

LEGO unit representing
atoms in this structure:



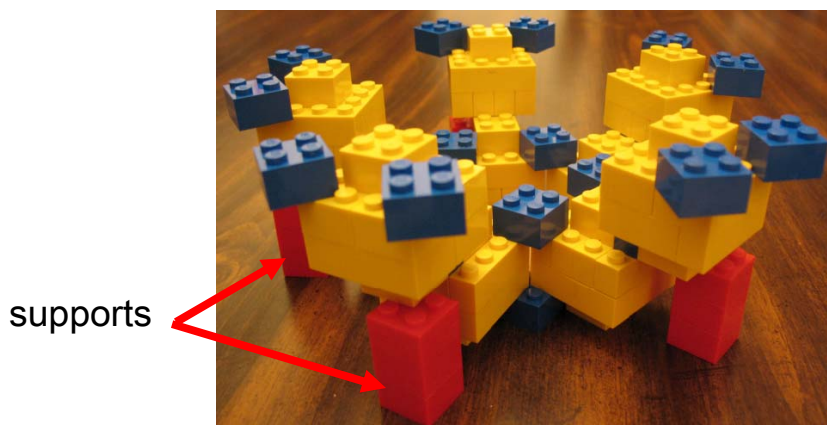
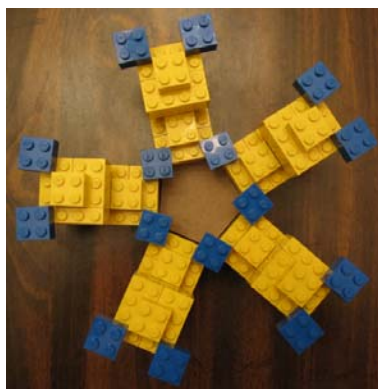
Level 1: 5 atoms, 10 2x2 linkers, 5 1x2 linkers

NOTE: Since this is the foundation level, it is helpful to build as perfect of a pentagon of the five atoms as possible. To accomplish this, made a cardboard pentagon template with about 31 mm edges to fit inside the ring of bricks.



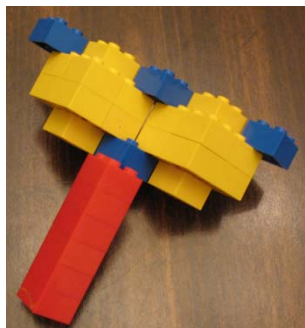
Level 2 added: 5 atoms, 10 2x2 linkers, 5 supports (3 bricks high)

NOTE: Using 2x2 bricks for the supports, and connecting them to the atoms by only one peg, is a trade off between model stability and ease of support removal later on.

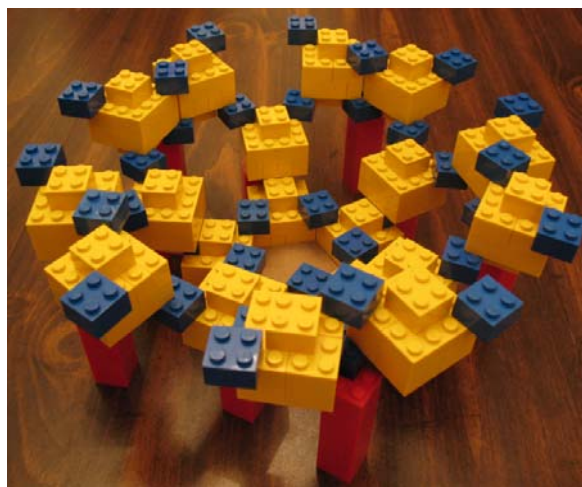
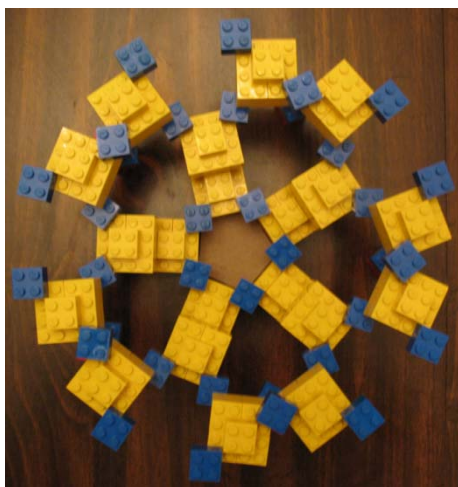


Level 3 added: 10 atoms, 20 2x2 linkers, 5 supports (6 bricks high)

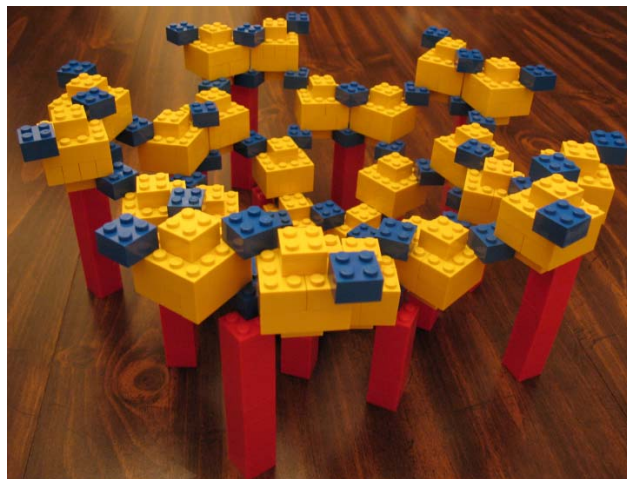
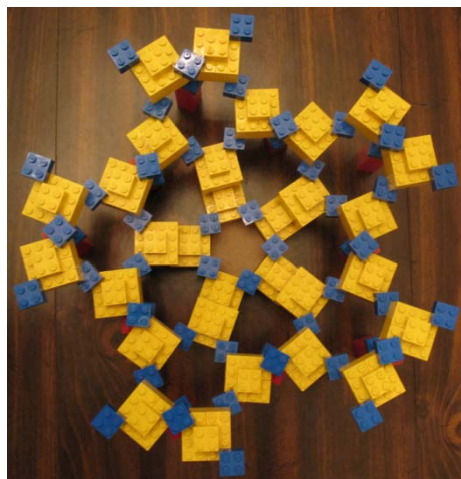
NOTE: The 2x2 linkers must be turned to connect the atoms together. It helps to add atoms in linked pairs.



Linked pair
and support



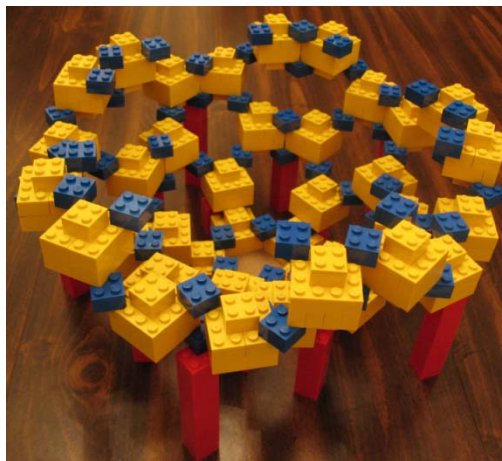
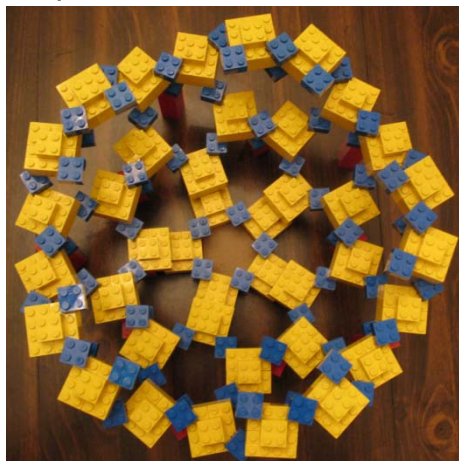
Level 4 added: 10 atoms, 20 2x2 linkers, 5 supports (9 bricks high)



Level 5 added: 10 atoms, 20 2x2 linkers

NOTE: The pattern of atoms in Level 5 is similar to that of Level 4, only rotated by 36°.

Levels 4 and 5 contain the "equator" of the structure and should make as uniform of a ring together as possible.

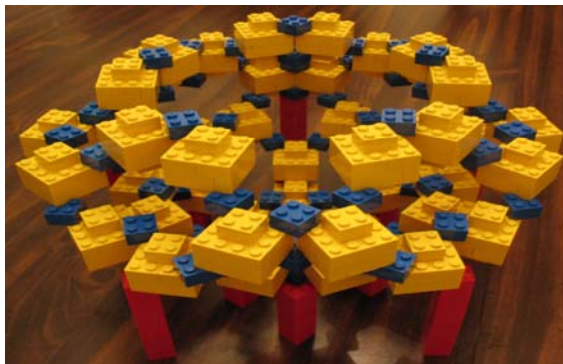
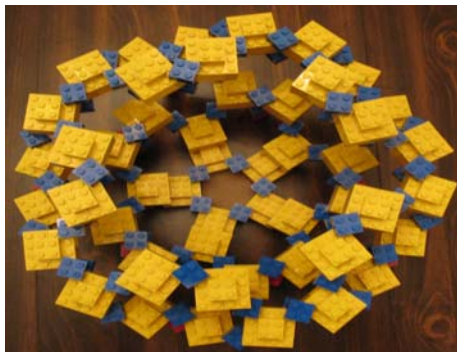


Levels 4 and 5
together make a ring

Modifications to make C_{70} are described on the last page.

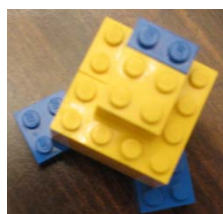
Level 6 added: 10 atoms, 10 2x2 linkers

NOTE: The pattern of atoms in Level 6 is similar to that of Level 3, only rotated by 36°.



Level 7 added: 5 atoms, 10 2x2 linkers, 5 1x2 linkers

NOTE: It helps to add atoms as the units shown. The pattern of atoms in Level 7 is similar to that of Level 2, only rotated by 36°.

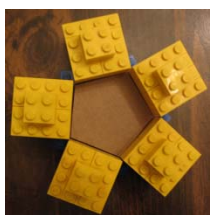


One atom
and 3 linkers

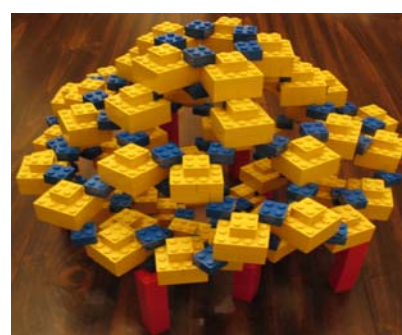


Level 8 added: 5 atoms, 10 2x2 linkers

NOTE: It helps to add this level by building a 5-atom ring and then adding the entire level at once. The level should just be able to rest in place, but fastening this level down to Level 7 makes for a stronger and better-looking structure. The pattern of atoms in Level 8 is similar to that of Level 1, only rotated by 36°.



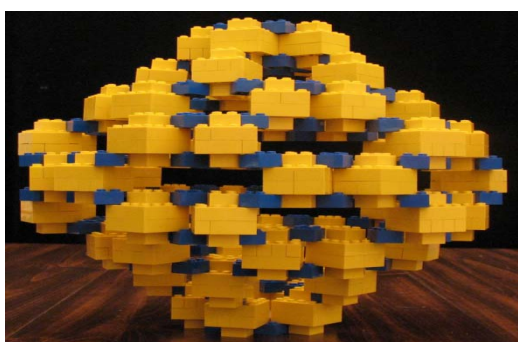
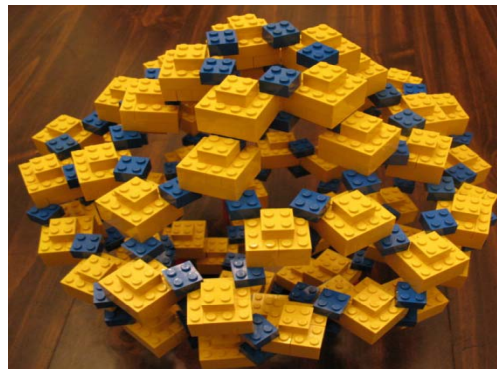
A template
can help
build the
pentagon



This model (C_{60}) requires:

- 240 yellow 2x4 bricks
- 120 yellow 2x2 bricks
- 90 red 2x2 bricks
- 110 blue 2x2 bricks
- 10 blue 1x2 bricks

To make C_{70} , add a Level "5 and a half": 10 atoms, 20 2x2 linkers
 This level would look like Level 4. If this extra level is used, Levels 6, 7, and 8 would not be rotated by 36° from Levels 3, 2, and 1.



Remember that these structures are fragile.



This model (C_{70}) requires:

280 yellow 2x4 bricks

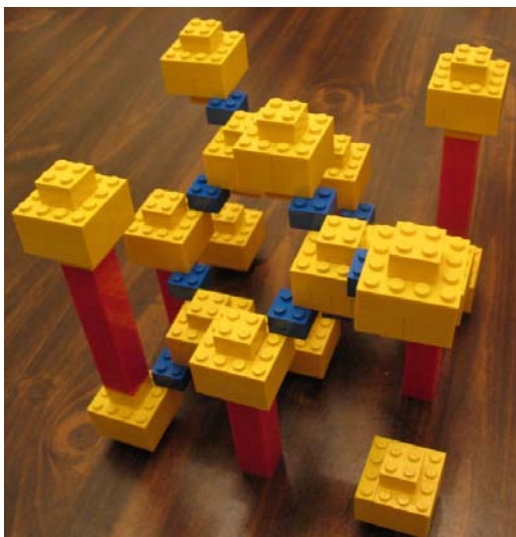
130 blue 2x2 bricks

140 yellow 2x2 bricks

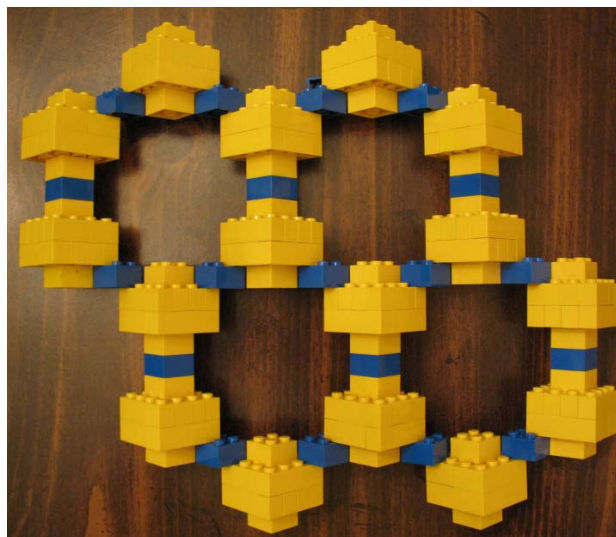
10 blue 1x2 bricks

90 red 2x2 bricks

Diamond and graphite models with linking bricks between the atoms can also be made for comparison to the fullerenes.



Diamond



Graphite