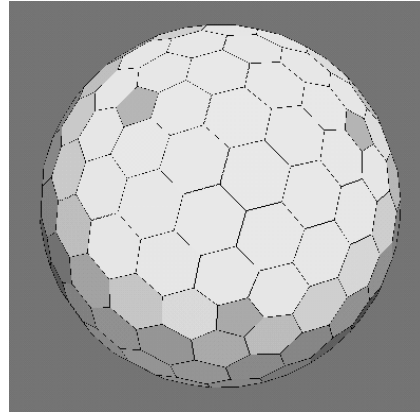


Large Sphere

This model is a large geodesic sphere, fifty inches in diameter. It can also be thought of as a model of a large "buckyball" type of carbon molecule consisting of 420 carbon atoms.

Materials: 420 metal Y-connectors,
240 **short** (87 mm) tubes,
390 **long** (100 mm) tubes.

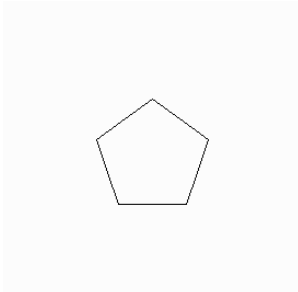


12 pentagons and 200 hexagons make a sphere.

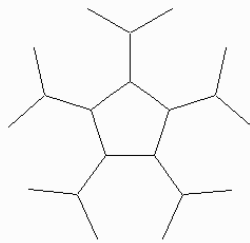
Twelve sub-units that we call "turtles" will be constructed and assembled together. Each turtle is almost flat. The curvature appears when they are connected together. Be careful about whether to use **short** or **long** tubes at each step.

To make one turtle:

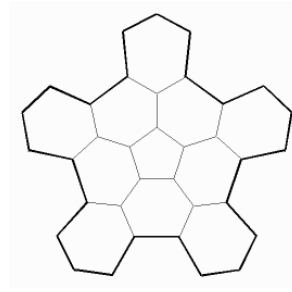
- A) Make a pentagon using 5 connectors and 5 **short** tubes. You bend the tubes slightly to close the pentagon.
- B) Using 3 **short** tubes, add a "Y" to each of the pentagon's corners.
- C) Using **long** tubes, make hexagons as shown in the figure. The thin lines in the figure are the short tubes of step B. The bold lines are the long tubes to add.



A. Pentagon of short tubes



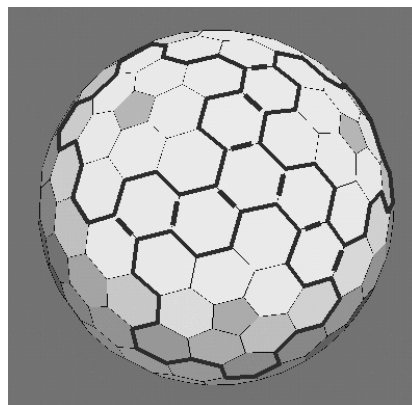
B. Pentagon with Y's added



C. One complete turtle

Once you have three turtles, start assembling them together with **long** tubes, as shown. Each is surrounded by five others.

The ball is not strong enough to hold its own weight without flattening. So after three units are assembled, hang it from three strings tied at three points—one string somewhere on each pentagon. (All the weight hanging on one point would distort it.) Then continue adding units to the sides and bottom. Twelve turtles are required for the complete sphere. Continue building turtles and adding them to the sphere in this manner until finished.



How to connect three turtles together