

## Engineering: Geodesic Dome!

**Ages: 9 - 13**

Hello everyone. This is Bill from the Okanagan Regional Library System. Welcome to the fun and inventive world of making STEAM projects in your own home. Each week, I will share a fun and interesting project that you can make using materials commonly found in your own home.

Even though we can't be together right now, we can still learn how to make exciting projects each week!

This week's project: How to Make your own Geodesic Dome.

### Geodesic Dome



This amazing structure is known as a geodesic dome. It's easy to make your own, and though it will look quite light and fragile, it will be actually extremely sturdy because of its shape. Once you have made your dome, you can cover it with clear plastic wrap to make a small green house.

Your geodesic dome will be made of 65 struts of two different lengths, joined together by connectors made from pipe cleaners. We will use two different kinds of straws to distinguish the long struts from the short ones. We will also use two different kinds of pipe cleaners, one for the feet connectors at the base of the dome, and one for the regular connectors.

## Materials Needed:

- Plastic wrap
- Clear sticky tape
- Pencil
- Ruler
- Scissors
- 30 straws of one colour
- 35 straws of another colour
- 5 pipe cleaners of one colour
- 10 pipe cleaners of another colour
- Coloured Tape



**Time:** 60 minutes

## Steps:

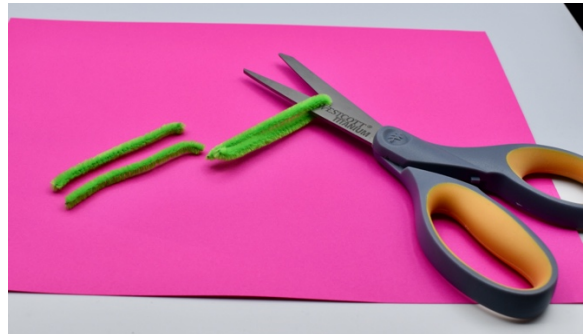
1. First, make the 35 long struts from straws. They should be 12 cm long. For each one, draw a line first, then cut the straw at the line.



2. Now make 30 short struts from the other straws. These should be 11 cm long.



3. Gather together 5 pipe cleaners of one colour and 10 of the other colour. Fold each one in half and cut. Then, cut each half in half again.



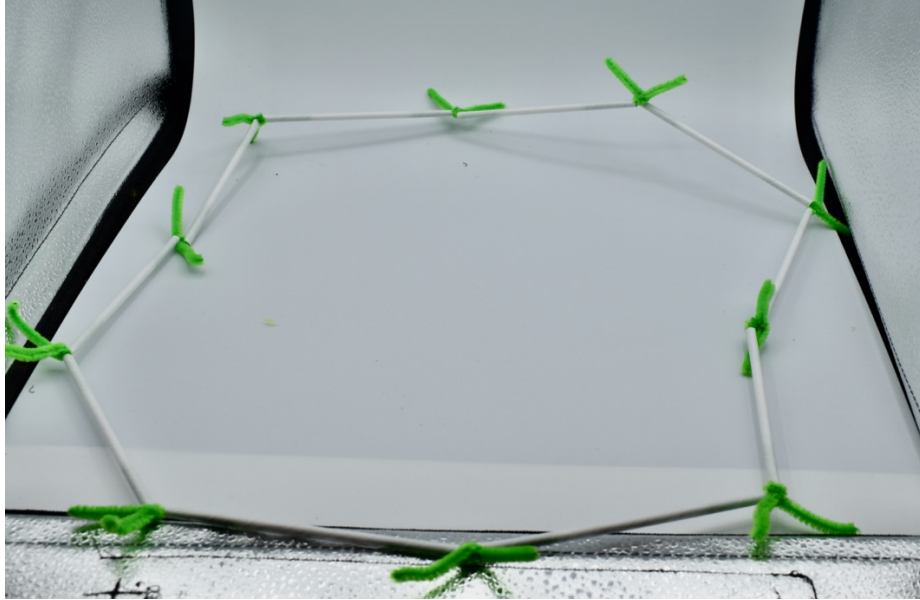
4. Twist together pairs of pipe cleaners from the pile of 20, to make 10 “feet” for your dome.



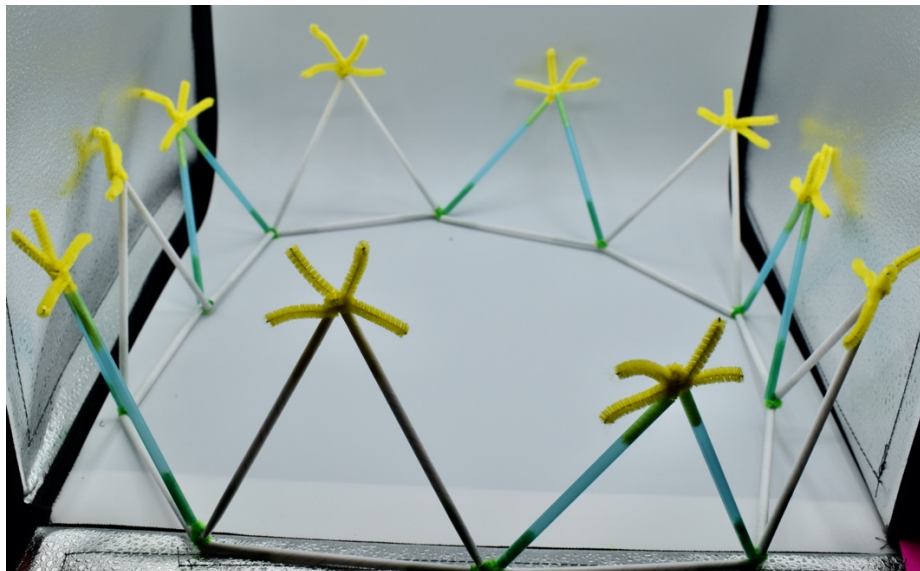
5. To make the other connectors for the dome, twist together 3 lengths of the other pipe cleaner. You will need 12 of these connectors altogether.



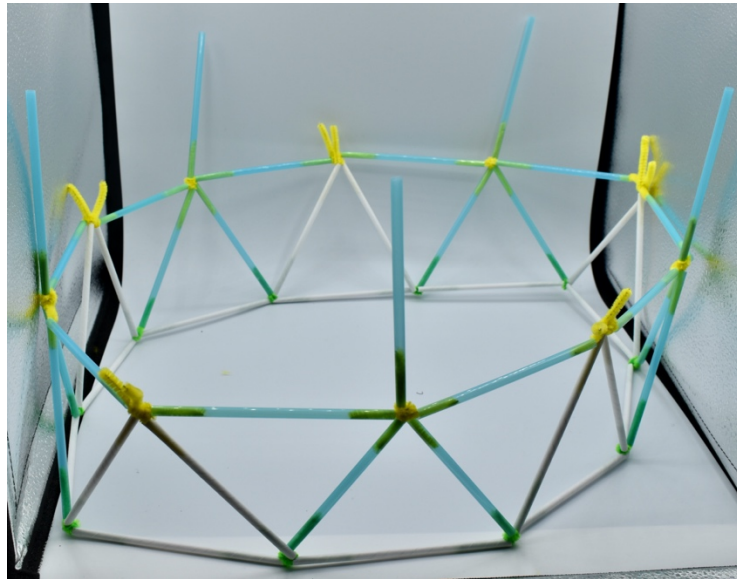
6. Connect 10 of the long struts by using the pipe cleaner feet. You'll end up with a 10-sided shape. Tape the connections as needed, using the coloured tape.



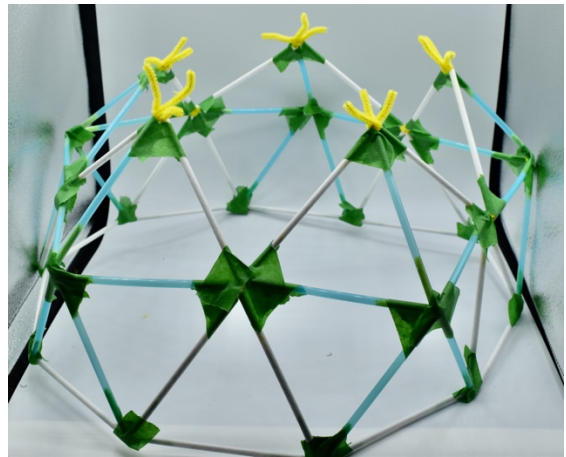
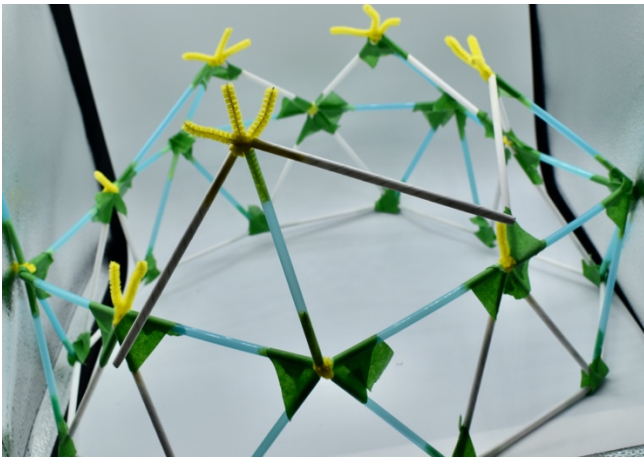
7. Use the connectors to begin building up the sides of the dome, forming the bottom layer of triangles. Alternate the long and short struts as shown. Again, tape the connections as needed.



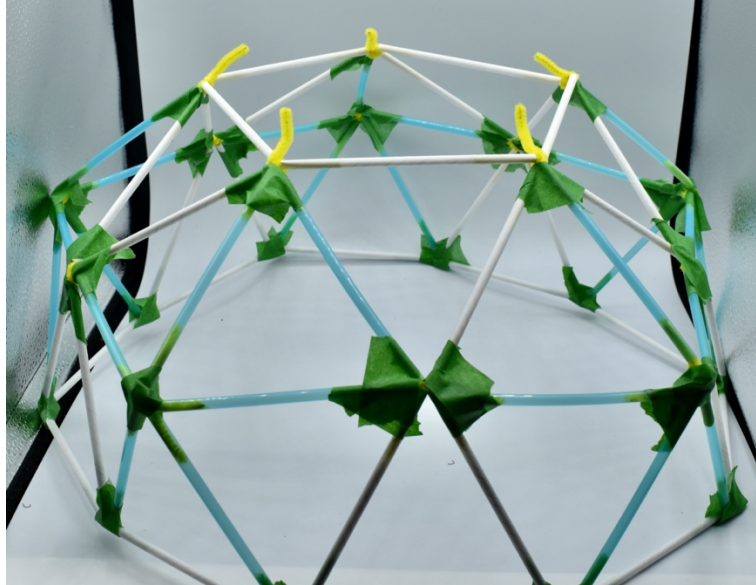
3. Add short struts around the top of the first layer, then wherever four short struts meet, add another short strut. Again, tape the connections as needed.



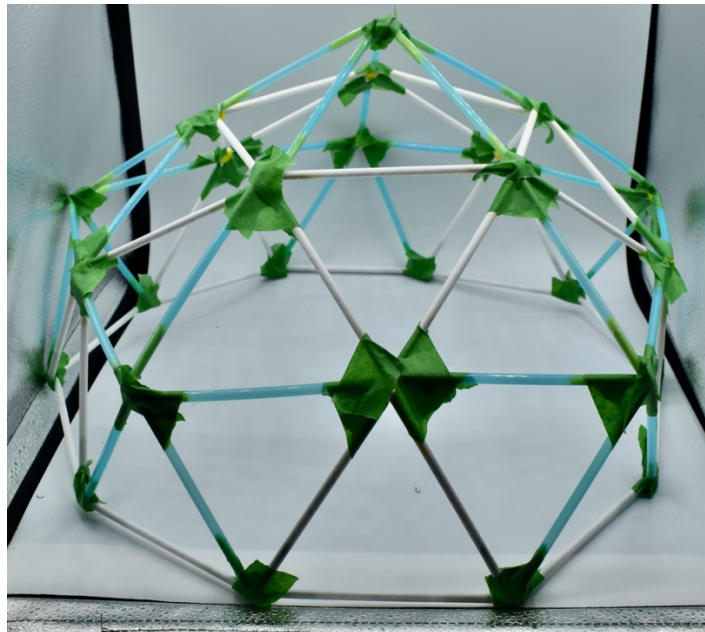
8. Around each near-vertical short strut, use a connector to add two long struts, as shown. Again, tape the connections as needed.



4. Connect five more of the long struts around the top of the middle layer. These will form a pentagon on top of the dome.



9. To complete the top of the dome, join 5 short struts with a connector. Tuck the sixth leg of the connector into one of the struts. Join the 5 remaining short struts to the spare connectors at the top of the dome. Again, tape the connections as needed.



3. Now cover your dome in plastic wrap and secure the pieces in place using the clear tape. Your geodesic dome is now complete!



## The Science behind your Geodesic Dome

The geodesic dome design is very sturdy, because it has the stability of the triangle shape as its building block. Triangles are strong because they don't distort when put under pressure. If pressure is put on one corner of a triangle, the other two corners distribute the force evenly. In your geodesic dome, the triangles are repeated, so any force on the building divides repeatedly at each intersection and spread efficiently through the structure.

## STEAM

This activity includes everything you need for a comprehensive STEAM project.

**Science:** Understanding how force and pressure can be dissipated.

**Technology:** Understanding how geometric shapes can affect the strength of a structure.

**Engineering and Art:** Construction of the geodesic dome.

**Math:** Measuring and cutting out the parts needed to construct your geodesic dome.