

# Geodesic Domes

## Objectives

Participants will construct 12 pentagons to build a dodecahedron as a model of a geodesic dome.

## Activity Description

In this activity participants make a model of a geodesic dome by connecting straws to make twelve regular pentagons and then taping the pentagons together to form a geodesic dome or *dodecahedron*. The activity should be done in cooperative groups because after participants work individually to make the pentagons, they work in small groups to put the geodesic dome together.

The geodesic dome was designed by architect R. Buckminster Fuller. Geodesic domes consist of a pattern of self-bracing triangles that create a maximum structural advantage. Unlike a conventional building, geodesic domes get lighter, cheaper and stronger per unit of volume as they get larger. There are more than 300,000 geodesic domes around the world (Pitzer, 2007).

Probably one of the best known geodesic dome structures is at Epcot Center in Walt Disney World, Florida.

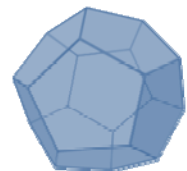


## Materials (per group)

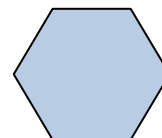
- 60 flexible straws
- transparent tape

## Vocabulary

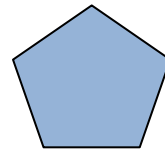
**Dodecahedron** - a dodecahedron is any polyhedron with twelve faces, but usually a regular dodecahedron is meant: a Platonic solid composed of twelve regular pentagonal faces, with three meeting at each vertex. It has twenty (20) vertices and thirty (30) edges.



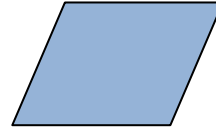
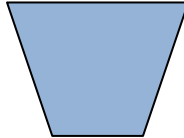
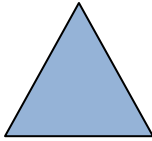
**Hexagon** – a polygon with six sides and six angles



**Pentagon** – a polygon with five sides and five angles



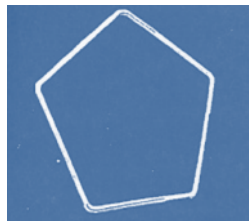
**Polyhedron** – any solid whose surface is made up of polygons. Triangles, quadrilaterals, and pentagons make up the faces of common polyhedrons.



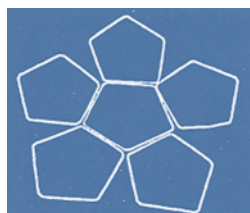
### **Procedure**

Activity adapted from Kessler, J.H. & Bennett, A. 1997. An unusual home...a geodesic dome. *The Best of Wonder Science*. Albany, NY: Delmar.

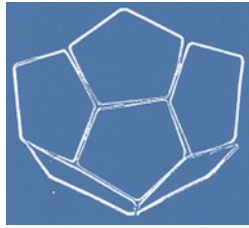
1. Make a pentagon by connecting five straws together. When connecting the straws, the end of the straw should be folded in to make it small enough to go into the other straw. Insert the short end of one straw into the long end of the other straw. Push the straw in as far as possible. Keep a regular pattern (short into long or long into short) when connecting the straws.



2. The teacher should reinforce the concept that a regular pentagon is a geometric shape that consists of five sides and five angles. Students should discuss this with a partner to reinforce their understanding.
3. Repeat this with the remaining 55 straws to make 11 more pentagons. Make sure that all of the pentagons are the same size. The size of the pentagons can be adjusted by changing how far the straws are pushed in to each other.
4. Place one pentagon on the table and tape five pentagons around it.

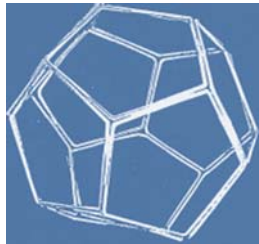


5. Lift the five outside pentagons so that the sides closest to each other touch. Tape together the sides of the pentagons that are touching. This is one half of the geodesic dome.



6. Repeat steps 3 and 4 with the rest of the pentagons to build the other half of the geodesic dome.

7. Tape the two halves together to form the complete geodesic dome.



## References

- Kessler, J. H. & Bennett, A. 1997. An unusual home...a geodesic dome. *The Best of Wonder Science*. Albany, NY: Delmar.
- Pitzer, W. June 12, 2007. *The Charlotte Observer*.