

Cubes in all Dimensions

Zometool model of a four-dimensional Cube

Materials:

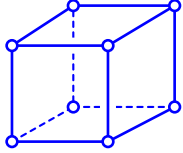
16 Zometool balls (zomes), 8 each of Yellow, Red, Blue, and Green struts.

Directions:

- First familiarize yourself with the Zometool parts. Note that their ends are different shapes, and that they fit into the balls.
- Some rules to keep in mind. These are precision tools; If you do the assembly right, there is one and only one way to attach the parts together. In particular, the struts should not be bent or stressed in any way. If a strut does not point at the hole on the ball you want it to insert it into, it, or your model, needs to be adjusted through partial reassembly. (This is particularly true for the green struts.)
- Never pull apart with two hands. (This tends to break things, particularly the yellow struts.) Use one hand and pinch the ball to gently move it off a strut.
- Attach zomes on all yellow struts, making 8 one-dimensional cubes (dimers).
- Put a red strut on each ball of one dimer so that the struts are parallel.
- Attach one parallel yellow dimer on the ends of the red struts, making a parallelogon.
- Make an identical yellow-red parallelogon. (Reserve the remaining 1/2 of yellow dimers and red struts.)
- On one parallelogon, place a four parallel blue struts, one on each ball. Try to not have three colors of struts lying too close to the same plane.
- On the blue struts, attach the other parallelogon, making a parallelepiped.
- On this parallelepiped, attach 8 parallel green struts. Be careful to insert these parallel to each other—even selecting the right hole, there are five orientations of the green strut.
- Finally, on the ends of the green struts, build a parallelepiped identical to the first one.

You may need help.

Cubes Worksheet

d	d -Cube	v	e	f_2	f_3	f_4	f_5	Sum
0	◦							
1	—							
2	□							
3								
4	[Your Model]							
5	[Your Mind]							
n	[Your Mind]							
d	d -Cube	v	e	f_2	f_3	f_4	f_5	Sum

What is the sum of the face numbers of a d -cube?

What about its face numbers? [The second question is hard.](#)

This is a picture of the Schlegel diagram of the four-dimensional cube. It is different from the model you just made.

