



3Doodler<sup>®</sup> EDU

Design Challenge

# How Strong Is Your Geometry?

**Participant's Guide**

## 🚩 The Challenge

Test the strength of volumes—both with and without cross bracing—using only the 3Doodler pen and plastic strands.



## Challenge Organization

Notes

### Challenge Documentation

Take photos & videos of your process using a camera. Document what to do and what not to do. Share your experience with the online community using #3DoodlerEDU!

Challenges are organized into 50-minute periods so they can fit into a traditional classroom structure, or be combined into a single workshop with breaks in between activities. This Challenge is designed to have participants work in short sprints to quickly explore the concepts.

## Class 1: Build, Test & Reflect

Total Time: 50 min.

### Build (35 min.)

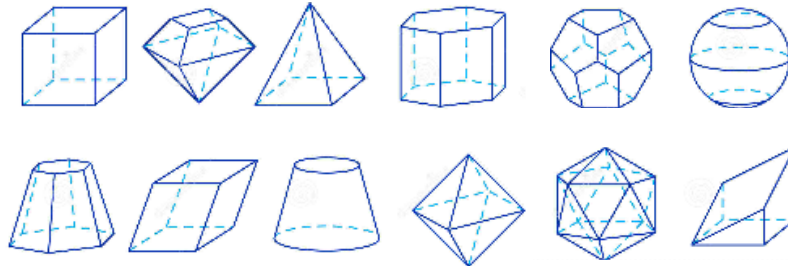


Fig. 3

### Remember to Snip Those Ends

We recommend pliers or scissors for snipping plastic ends. Make sure to keep your plastic ends clean to prevent clogs and jams. Snip plastic after removing it from the 3Doodler pen to make sure it's clean for the next time.

**Step 1:** Select a volume to 3Doodle and make it no larger than three inches in any direction. You will make three versions of the same shape with the same dimensions.

**Step 2:** On graph paper, draw a measured pattern of all of the sides of the shape you will create. Make two copies of your pattern to repeat.

**Step 3:** Make all three of the same shape with only the most basic construction and **no cross bracing**.

**Step 4:** Set one shape aside. With the second one, add only one piece of cross bracing on each face of the shape. On the third one, add two pieces of cross bracing on each face of the volume.

### Test & Reflect (15 min.)

**Step 1:** Gather around a display table and test your shape by placing increasingly heavy objects on it. Time how long it takes for each shape to collapse.

**Step 2:** Consider and discuss how the structures differ and what makes one stronger than another.

## 🔗 More Information:

For further information and inspiration about cross bracing, visit:

- <https://www.youtube.com/watch?v=wkOlz6XI9ic>
- <http://www.wisegeek.com/what-is-cross-bracing.htm>
- <http://goo.gl/JP8Kam>

### 🖼 Images:

Cover Page: [https://upload.wikimedia.org/wikipedia/commons/4/4d/John\\_Hancock\\_Center\\_2.jpg](https://upload.wikimedia.org/wikipedia/commons/4/4d/John_Hancock_Center_2.jpg)

Fig.1: <https://goo.gl/Dz0IKP>

Fig. 2: <https://goo.gl/33wzN>

Fig. 3: <http://tccl.rit.albany.edu/knilt/images/3/34/Graphic2.png>