

Body-Scale Icosahedron



The purpose of this activity is for educators to playfully engage in spatial thinking and use geometry to build a three-dimensional shape. In this activity, educators will collaboratively construct a larger-than-body icosahedron (pronounced: eye-koh-suh-hee-druhn). An icosahedron is a three-dimensional shape composed of 20 equilateral triangular faces, 12 vertices, and 30 edges. You might observe the video, "<u>Building the Body-Scale Icosahedron</u> (Activity for Adults)" to learn more about how to build the icosahedron.

Key Concepts

- Learn about shapes and spatial thinking through an active, hands-on experience.
- Explore three-dimensional shapes from different perspectives.
- Build and problem-solve to create a larger-than-body icosahedron model.

Materials

- 30 or more wooden dowels (48 inches long, at least 7/16 inch wide)
- 60 or more eye hooks (trade size #14 in zinc-plated steel)
- 15 or more spring O-rings (1-inch inner diameter, 1¼-inch outer diameter)

Setup Instructions

- 1. Drill pilot holes into both ends of each dowel. For the #14 eye hooks, use a 1/16-inch drill bit to a depth of ¼ to ½ inch.
- 2. Insert eye hooks into the pilot holes.

Activity instructions begin on the next page.







Small groups



Large open space

In-person professional learning



Activity Instructions

To complete this activity, you will connect the dowels together by inserting an O-ring through the eye hooks (see Figure 1).

You can construct any larger-than-body three-dimensional shape. The materials you need may vary depending on the shape you select.



Figure 1. Insert the O-ring through the eye hooks to connect the dowels.

Follow the steps below to build a larger-than-body icosahedron:

1. Connect five dowels to one O-ring, creating a five-spoked star.



3. Connect two dowels to each corner of the pentagon (10 dowels total), creating triangular "teeth."



 Create another 5-spoked star using five dowels and one O-ring (as was done in step 1). Connect the ends of the star to the corners of the pentagon rim on the bottom of the shape. 2. Connect the ends of the star using five dowels, creating a raised pentagon.



 Connect the points of the triangular "teeth" with five dowels, creating a pentagonshaped rim on the bottom of the shape.









Reflect and Discuss

Reflect on and discuss the following questions with a partner or in a small group.

- 1. Discuss how you used each of the following components of spatial thinking while building the body-scale icosahedron:
 - a. Spatial orientation
 - b. Spatial navigation
 - c. Spatial vocabulary
 - d. Mental rotation
- 2. How did the active nature of this experience help you use and understand the different components of spatial thinking?
- 3. What personal connections might you make to the experience of building the icosahedron? Consider your individual interests, languages, cultures, and lived experiences.

Activities for Children

For activities that support children's learning about spatial thinking, explore these books and related activities.

- 0 to 3 years: The Birthday Box (Mi caja de cumpleanos in Spanish) by Leslie Patricelli and the activity It Fits! (¡Cabe! in Spanish)
- 3 to 5 years: Jack the Builder (Jacobo, el constructor in Spanish) by Stuart J. Murphy and the activity Tallest Tower (La torre más alta in Spanish)
- 6 to 8 years: The Napping House (La casa adormecida in Spanish) by Audrey Wood and the activity **Build a Bed** (Construye una cama! in Spanish)

Acknoweldgments

Credit for the original design of this activity:

Abrahamson, D., & Rosenbaum, L. F. Embodied Icosahedron: Participatory Activity Designed for the Embodied Mathematics, Imagination, and Cognition Working Group (EMIC). The 38th annual meeting of the North American chapter of the International Group for the Psychology of Mathematics Education (PME-NA), Tucson, AZ: 2016, November 3.

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