

The Plato Bead—A Bead Dodecahedron

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Abstract

Creating polyhedra with beads is another way to learn the properties of regular and semi-regular solids. The instructions given below are for the dodecahedron (The Plato Bead). In a bead polyhedron each face becomes open space; each edge becomes one bead; each vertex becomes a thread void. The structure is light and open. The size of the overall bead changes with the size of beads used.

One of the five Platonic solids, the dodecahedron consists of 12 equilateral pentagon faces, 30 edges, and 20 vertices. Considered the Platonic symbol for the universe, this twelve-sided form may also represent time with each face being a month of the year or one of the twelve signs of the zodiac. In the bead polyhedron a bead stands in for each of the 30 edges. The 12 faces of the form become open spaces. Each of the vertices becomes a void surrounded by three beads and thread. Because our support medium is thread, each polygon face of the polyhedron becomes a softer shape, approximating a circle. The bead polyhedron more closely resembles a sphere than the geometrically angular dodecahedron but still retains many properties of the dodecahedron.

Beaded beads based on regular and semi-regular polyhedrons have been part of the largely undocumented bead lexicon in China for several hundred years. According to Valerie Hector's research, Chinese beadworkers call the dodecahedron *mei* or "plum blossoms". The Chinese often use a two strand thread path. The Plato Bead uses a one strand thread path.

This pattern uses two colors of beads "A" (white) and "B" (blue) to create the impression of alternating rows of color. (Two colors make it easier for the new beader to work and follow the pattern.) The text lists Row, Step, Bead # and Colors (A, B). Each circle or loop of beads completed in each step will contain a total of 5 beads (five edges of each pentagon face). Each bead will be shared by another circle. Three beads will surround each thread void. Take care to pull the monofilament through completely as it can kink inside a bead hole and release later, weakening the integrity of the piece. The bead polyhedron's stability depends on the bead holes being as full of thread as possible and reasonably tight tension.

Variations

Other transformations of the dodecahedral shape happen when more than one size of bead is used within one structure. Examples and patterns will be available in class. These transformations are not the traditional ones achieved with paper models.



Figure 1:
The Plato Bead.

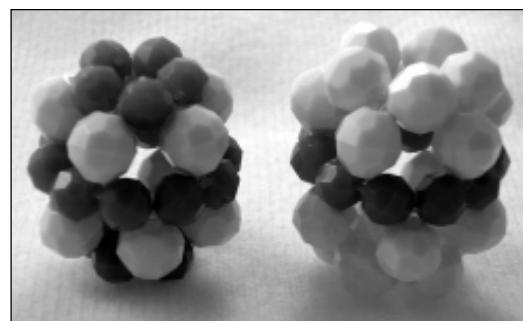


Figure 2:
*Dodecahedron Variations,
bead size and color.*

The Plato Bead

Row 1

Step 1: String 5 beads AAAAA. (Beads 1, 2, 3, 4, 5). Go through Bead 1 forming a circle. Leave at least a six-inch tail. The tail will be useful later to help hold onto the bead as it forms.

(Tip: Form a circle not a teardrop, the thread must be coming out the opposite side of Bead 1 from the tail.)

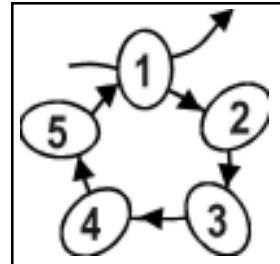


Figure 3:

Row 1 completed. Note the star shape.

Row 2

Step 2: String 4 beads BAAB.(Beads 6, 7, 8, 9). Go through Bead 1 (Row 1). Thread is in a void. Continue through Bead 2 (Row 1).

(Tip: A tendency of students is stop after going through Bead 1 and then add beads. Understanding where each forming void is, helps tremendously. TIIAV=Thread is in a void.)

Step 3: String 3 beads BAA. (Beads 10, 11, 12).Go through Bead 6 (mystery/ Elijah bead, Row 2) and Bead 2 (Row 1). TIIAV. Continue through Bead 3 (Row 1).

(Tip: When first learning this technique, students tend to forget to include the beads I call “mystery” or “Elijah” beads. At Passover it is custom to lay a place at the table for the prophet Elijah, the unexpected guest. MEB=mystery/Elijah bead.)

Step 4: String 3 beads BAA. (Beads 13, 14, 15). Go through Bead 10 (MEB, Row 2) and Bead 3 (Row 1). TIIAV. Continue through Bead 4 (Row 1).

Step 5: String 3 beads BAA. (Beads 16, 17, 18). Go through Bead 13 (MEB, Row 3) and Bead 4 (Row 1). TIIAV. Continue through Bead 5 (Row 1) and Bead 9 (Row 1).

Step 6: String 2 beads AA. (Beads 19, 20). Go through Bead 16 (MEB, Row 2), Bead 5 (Row 1), and Bead 9 (Row 2). TIIAV. Continue through Bead 8 (Row 2).

(Tip: at the end of end completed Row the partially completed bead will have a five-pointed shape.)

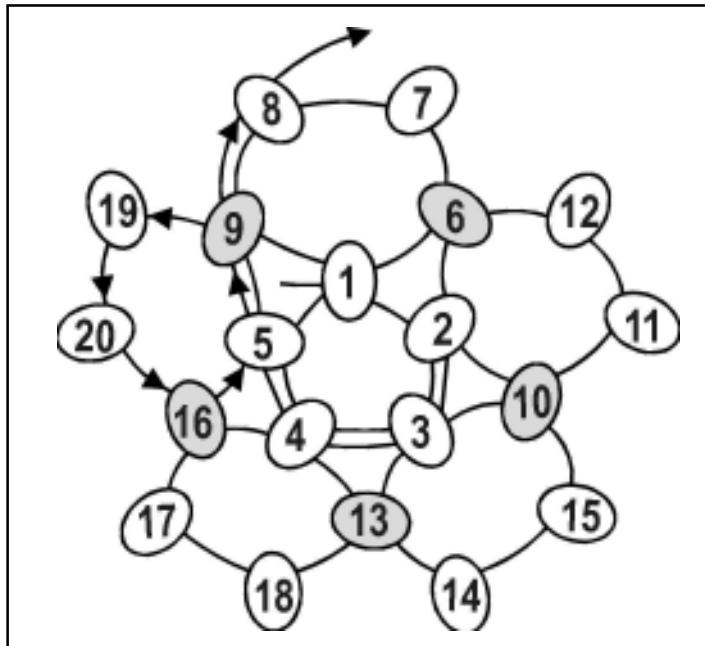


Figure 4: Rows 1 & 2 completed.
The star shape continues to repeat.

Row 3

Step 7: String 3 beads BAB. (Beads 21, 22, 23). Go through Bead 19 (MEB, Row 2) and Bead 8 (Row 2). TIIAV. Continue through Bead 7 (Row 2) and Bead 12 (Row 2).

Step 8: String 2 beads BA. (Beads 24, 25). Go through Bead 21 (MEB, Row 3), Bead 7 (Row 2) and Bead 12 (Row 2). TIIAV. Continue through Bead 11 (Row 2) and Bead 15 (Row 2).

Step 9: String 2 beads BA. (Beads 26, 27). Go through Bead 24 (MEB, Row 3), Bead 11 (Row 2) and Bead 15 (Row 2). TIIAV. Continue through Bead 14 (Row 2) and Bead 18 (Row 2).

Step 10: String 2 beads BA. (Beads 28, 29). Go through Bead 26 (MEB, Row 3), Bead 14 (Row 2) and Bead 18 (Row 2). TIIAV. Continue through Bead 17 (Row 2) and Bead 20 (Row 2) and Bead 23 (Row 3).

Step 11: String 1 bead A (Bead 30, the final bead). Go through Bead 28 (MEB, Row 3), Bead 17 (Row 2), Bead 20 (Row 2) and Bead 23 (Row 3). TIIAV.

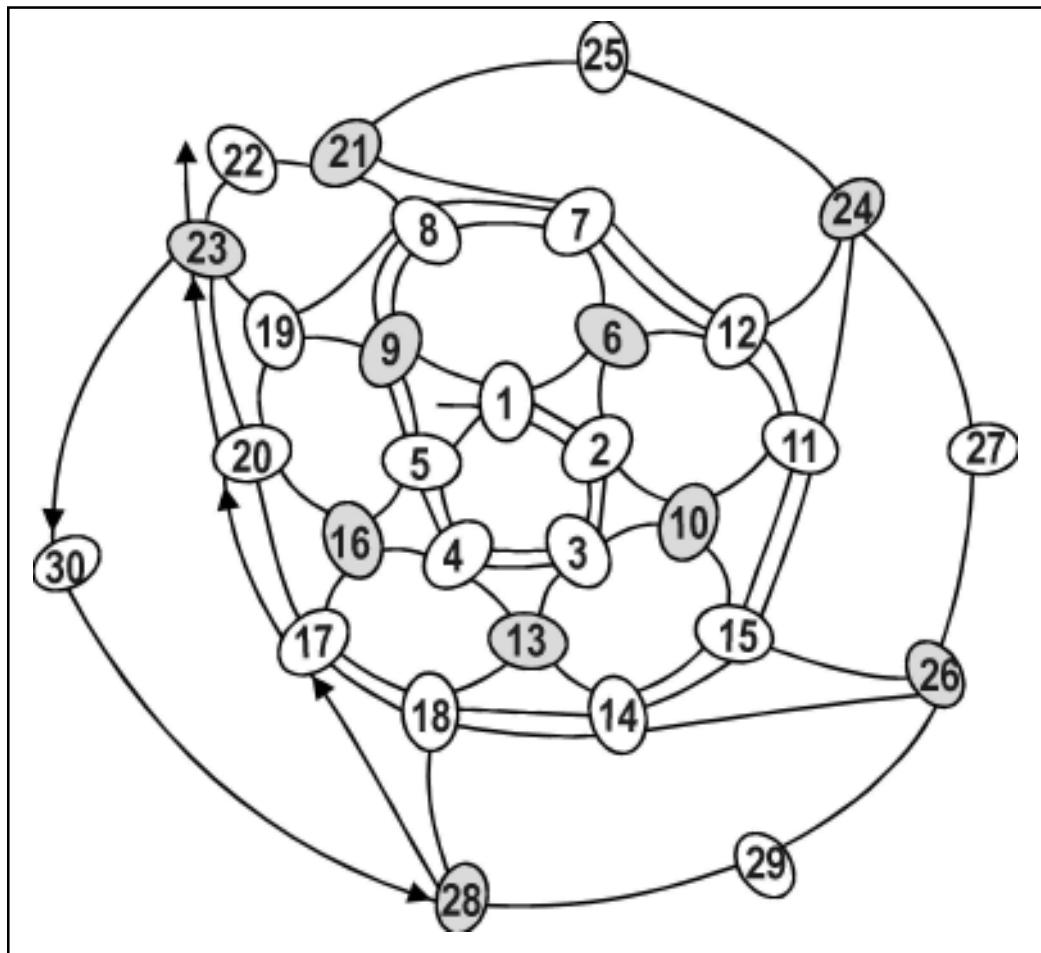


Figure 5: Rows 1 & 2 & 3 completed.

Row 4

Step 12: There are five remaining beads to connect. They should all be “A” beads. Continue through Beads 22, 25, 27, 29, and 30. Secure the thread by passing back through several circles, being careful not to cross any voids. Bury the beginning tail in the same way. The thread will lock itself if it passes through enough circles. Optional: knotting or gluing to secure the thread.

Secure the thread by passing back through several circles being careful not to cross a void.

Optional: additional knotting or gluing to secure thread.

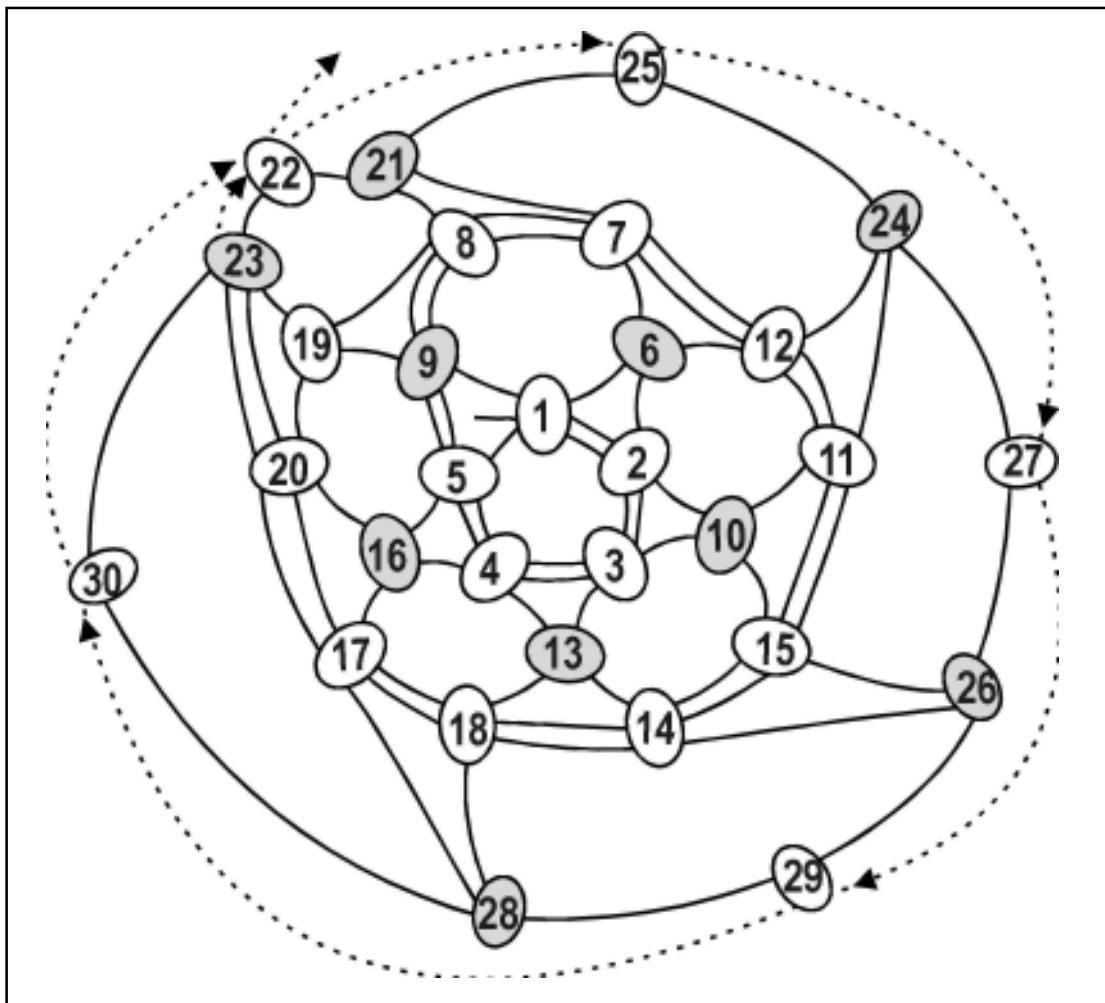


Figure 6: The finished bead dodecahedron.

Materials

This pattern for BTTB requires 30 faceted plastic beads (8 mm) and 2 yards of 15# test monofilament. In a class room situation or at home the beader will also need a small dish for the beads, scissors and sharp-pointed tweezers. Contact me at the above email for information about other bead/ thread combinations.