Equal-edge Square Antiprism

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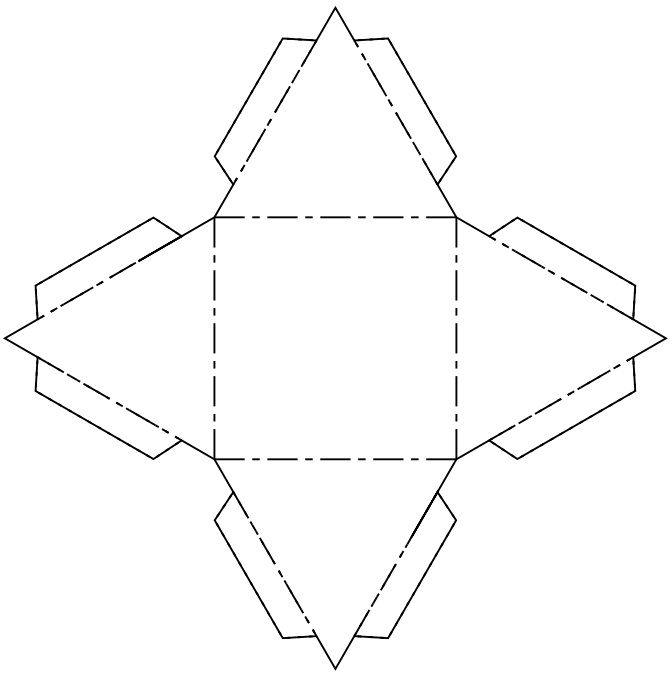
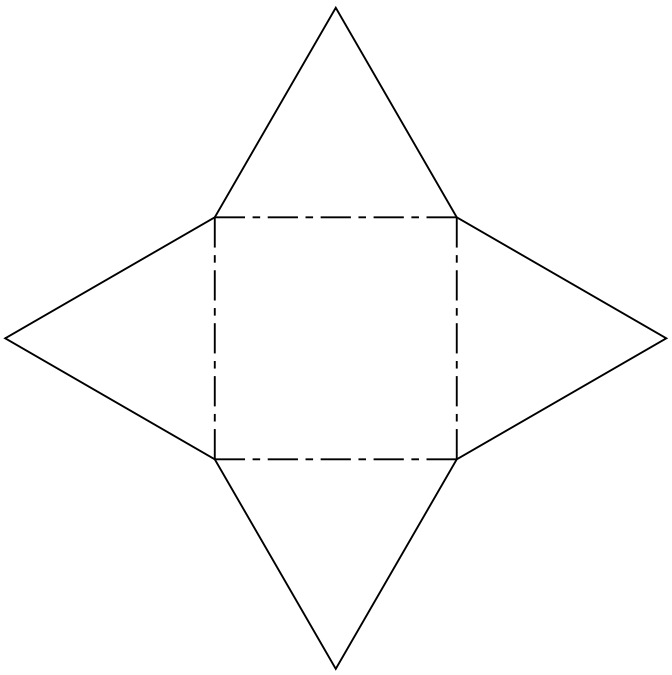
L | cut 1
87.43 x 87.43 mm



U | cut 1
87.43 x 87.43 mm



Solid: cut | Dashed: valley | Dash-dot: mountain | Dotted: glue

50 mm calibration

Print at 100% / Actual size. Do not fit to page. Original paper craft template.

Equal-edge Square Antiprism

square-antiprism / 1.0.0 / A4 / Assembly instructions

Finished size: 45.25 x 45.25 x 26.91 mm

Materials: 160-180 gsm paper; Scissors or craft knife; Ruler and blunt scoring tool; PVA glue; Tweezers

Original exact piecewise-rigid construction. 2 cut pieces; 10 structural faces; 8 integral tapered glue tabs. All 16 structural edges measure 32 mm.

Circumradius = 32/sqrt(2) mm; height = 32/2^(1/4) = 26.90869 mm. Upper square is rotated 45 degrees relative to lower square.

Square/triangle folds turn 76.164 degrees from flat (inside dihedral 103.836); triangle/triangle seams turn 52.448 degrees (inside dihedral 127.552). Mountain means printed exterior convex.

Each tab is 4 mm deep, starts 5 mm from either edge end and tapers another 2 mm at its outer corners. Tabs lie against the inside of U, never outside the shell. Receiver overlaps are congruent 4 mm strips of U along the matching sloping edges.

Index convention: B0..B3 and T0..T3 run counterclockwise viewed from above. Lower triangle Li = Bi,B(i+1),Ti; upper Ui = Ti,T(i+1),B(i+1), with indices modulo 4. User instructions number triangles 1..4 instead.

Ideal zero-thickness paper: glue contact is coplanar with the receiving face; paper thickness, glue thickness and springback are not simulated. No stretching or extra cuts are required by the mathematical net.

Generation only. Screen review and physical printing, cutting, folding and closure trials are deferred; physical validation pending.

Part inventory (cut each instance once):

L: Lower crown - 8 tabs

U: Upper crown - no tabs

1. Print, mark and cut two crowns [L, U]: Print at 100% and use the 50 mm ruler. Cut L and U along their solid outer contours, keeping all eight tabs on L. On the inside, number the four triangles of each crown 1-4 in cyclic order (counterclockwise when each finished crown is viewed from above). Keep these marks inside; U has no tabs.

2. Score and form the crowns [L, U]: Score the four square edges on each crown and the eight short tab hinges on L. With printed sides outside, mountain-fold square edges 76.16 degrees from flat; the interior angle is 103.84 degrees. L triangles rise around its bottom square; U triangles descend from its top square. Do not crease through triangle interiors.

3. Pre-fold the eight seam tabs [L]: Mountain-fold each L tab 52.45 degrees from its triangle plane. The tab will lie flat under a U triangle, giving an interior side-face dihedral of 127.55 degrees. Use the complete 4 mm tab depth for overlap, keeping glue clear of the 5 mm corner setbacks.

4. Register the rotated top and anchor one seam [L, U]: Dry-fit U above L with its square rotated 45 degrees. Each U square corner meets the apex of an L triangle; each L square corner meets an apex of U. Label U triangle 1 as the triangle between the tips of L1 and L2, then continue cyclically. L1 joins U4 and U1; L2 joins U1 and U2; L3 joins U2 and U3; L4 joins U3 and U4. Glue only the L1-to-U1 tab under U1 first, matching the full 32 mm face edges with no face overlap. Let this anchor set.

5. Close the first two upper triangles [L, U]: Leave the far half open for finger or tweezer access. Glue L2-to-U1, then L2-to-U2 and L3-to-U2. Apply a thin film on the printed face of each tab, press it to the unprinted inside of U, and let each seam grab before the next. The 4 mm tab overlap belongs inside U; structural triangle edges meet edge-to-edge.

6. Close the third sector [L, U]: Glue L3-to-U3 then L4-to-U3. Keep both seams bordering U4 open. Support the seams with tweezers through this last opening; do not flatten the square ends or force the equilateral triangles out of shape. Allow these six completed seams to set.

7. Finish the last accessible opening [L, U]: Dry-seat U4 over the L4 and L1 tabs. Apply a small amount of glue to both tabs through the remaining opening. Seat the L4-to-U4 edge first, leaving the L1-to-U4 edge slightly open for tweezer support, then withdraw the tweezers and seat that final edge. Press externally along both edges until tack holds. Let dry standing on the bottom square. Both squares remain flat, rotated 45 degrees, with eight triangular sides. Physical closure and paper-thickness fit remain pending a real build.