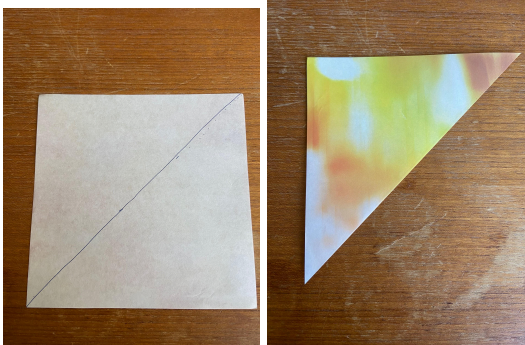
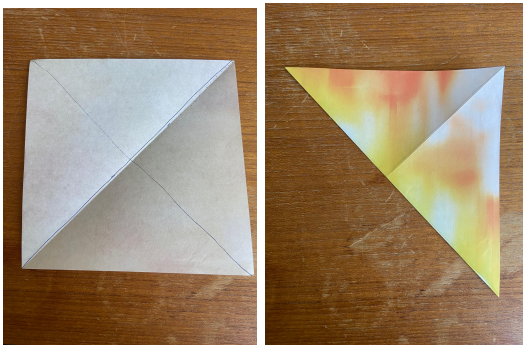


Family Art Studio

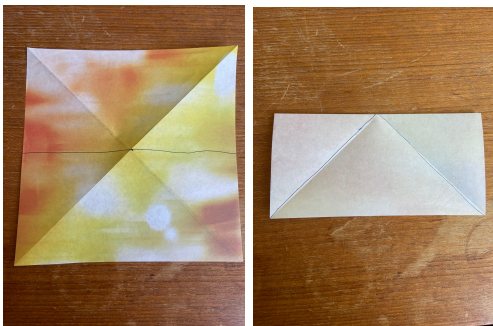
Make a Butterfly



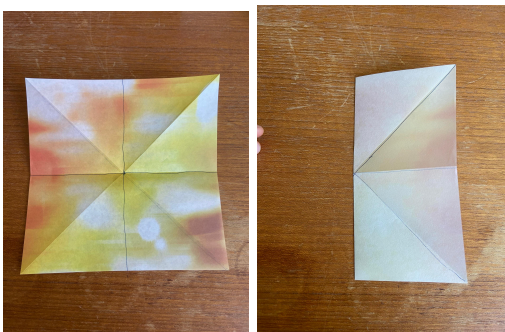
1. Start with a square of paper face down in front of you. Fold it diagonally.



2. Unfold and fold along the other diagonal.



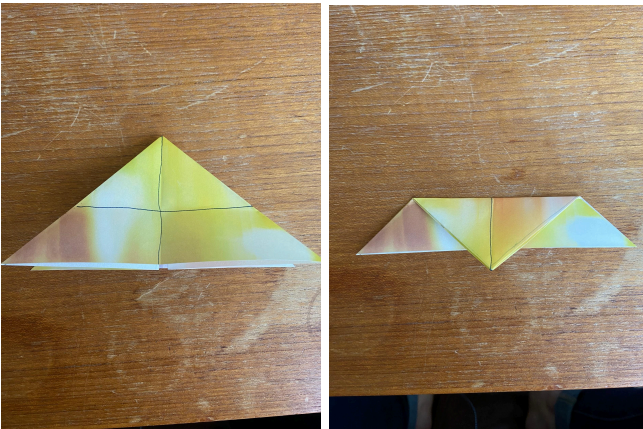
3. Unfold and flip over. Fold in half "hamburger style".



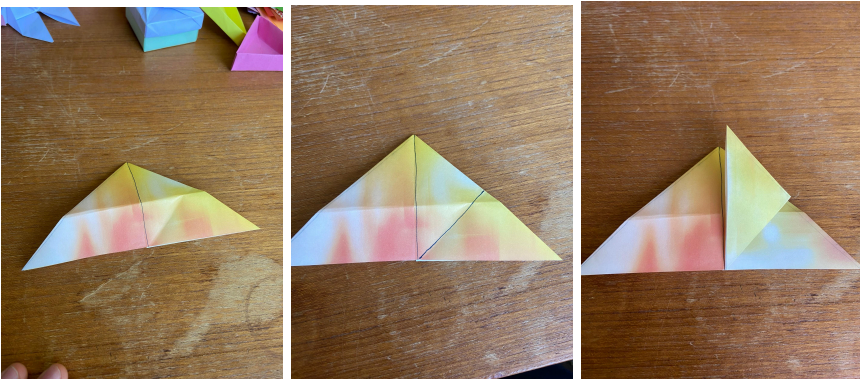
4. Unfold and fold in half "hotdog style".



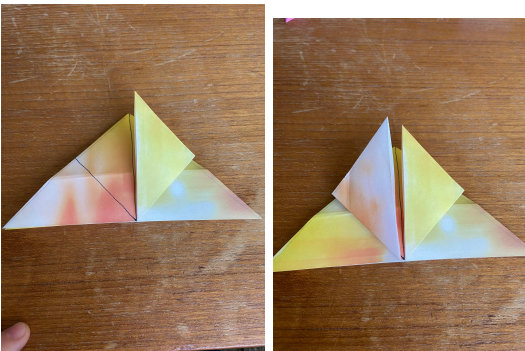
5. Unfold and flip over. You will notice that it “pops up” towards you. Push down in the middle to “pop” it so it pops down toward the table. There will be four folds that still “pop up”. Gather these together to make four flaps. Gently flatten so there are two flaps on each side and you have a triangle.



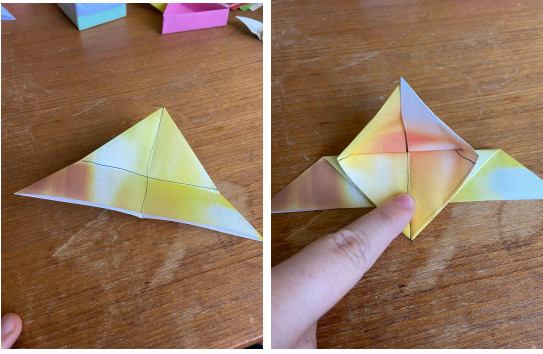
6. Fold the point of the triangle down a little more than halfway.



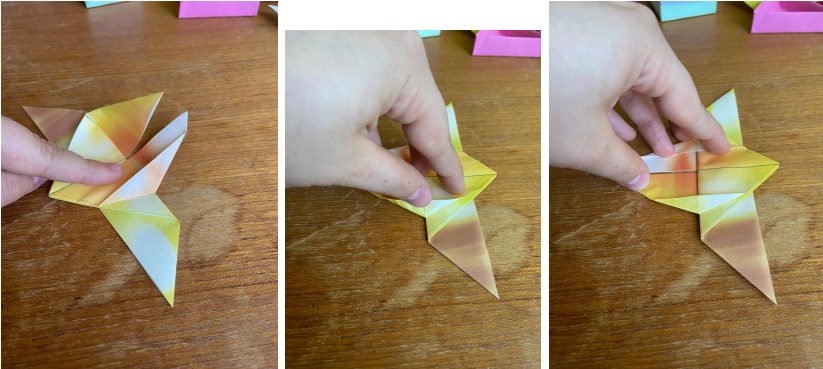
7. Unfold and flip over. Fold the top flap on the right side up so it meets the point of the triangle.



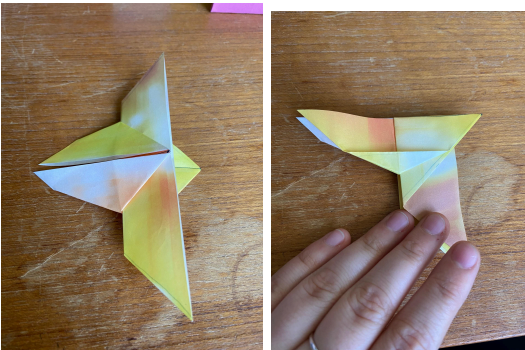
8. Fold the top flap on the left side up so it meets the point of the triangle.



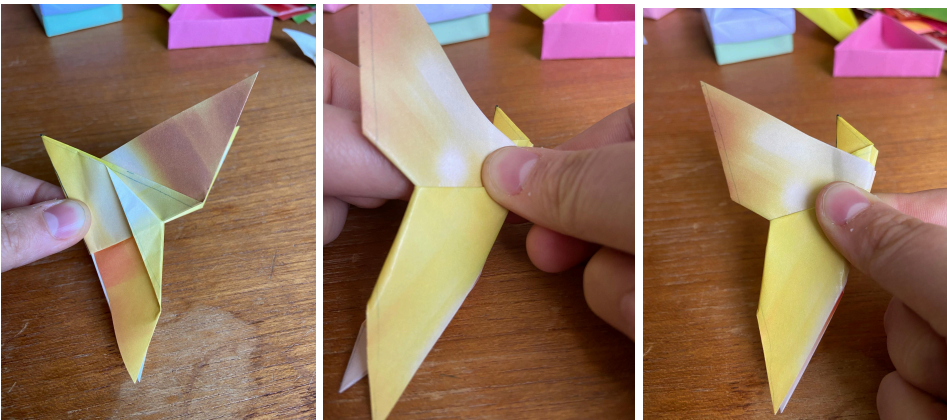
9. Flip over and fold the point down along the crease you made earlier. The two flaps will flap up.



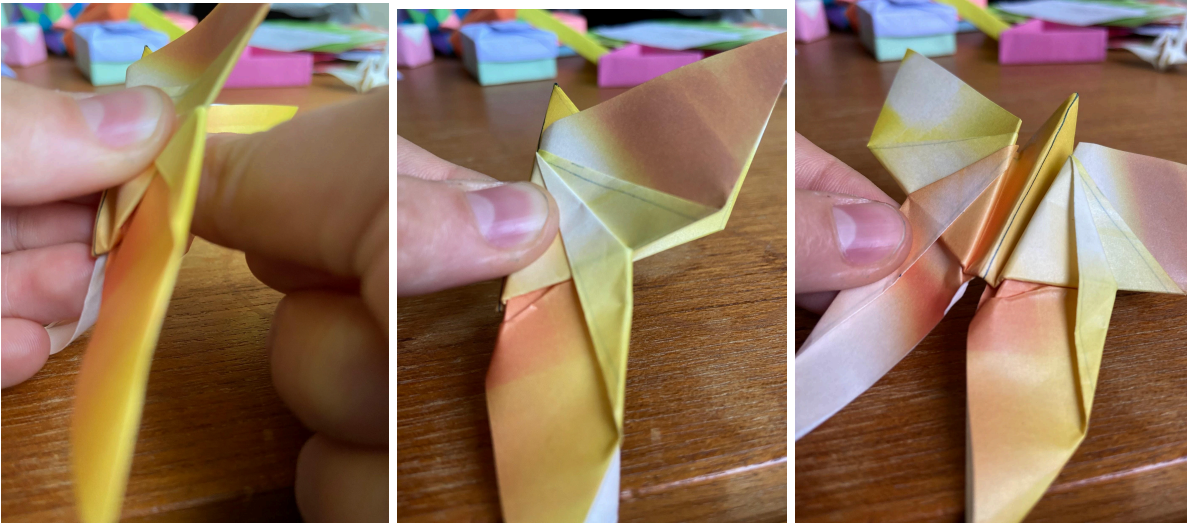
10. Gently squish the two flaps back towards the table, pressing inward along the sides.



11. Flip over the butterfly and fold in half.



12. Gently pinch in the middle of the body. Open and fold the wings back, keeping the body pinched together.



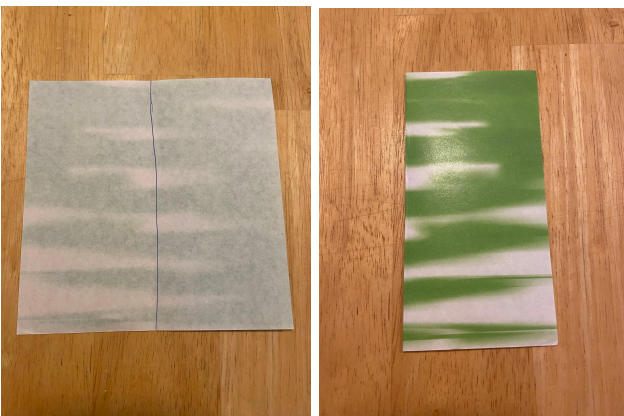
13. With the body pinched, open fold the wings forward, keeping the body pinched. Gently let go of the body and you are done!

Take it Further!

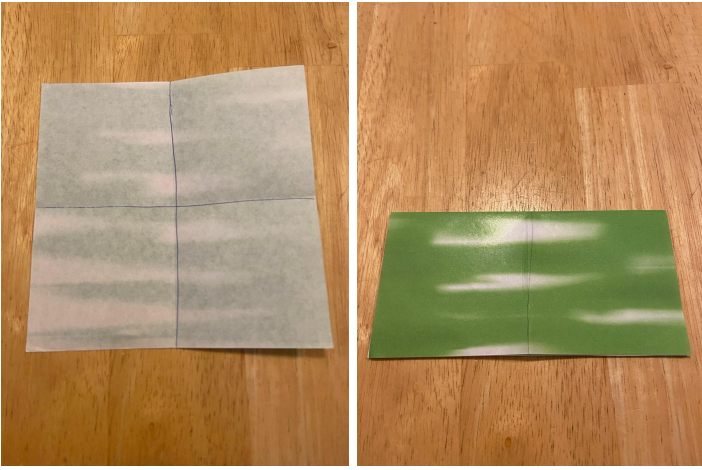
Make a Mobile! This is one of my favorite ways to display pieces like butterflies, birds, or boats! Tie a small bead onto the end of a thread. Thread the other end to a needle and gently pierce the body of the butterfly from the bottom. Slide the butterfly until it rests on the bead. Repeat with more butterflies and pieces of thread. Tie butterflies to an embroidery hoop or wire hoop, adjusting lengths so butterflies are at various heights. Use ribbon or string to hang the hoop parallel to the floor.

Use your butterflies to add dimension! Use a little hot glue or liquid school glue to decorate boxes or artwork with your butterflies

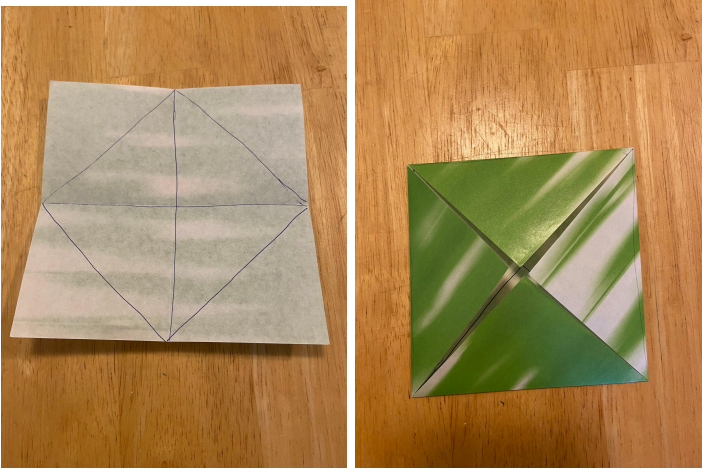
Make a Masu Box



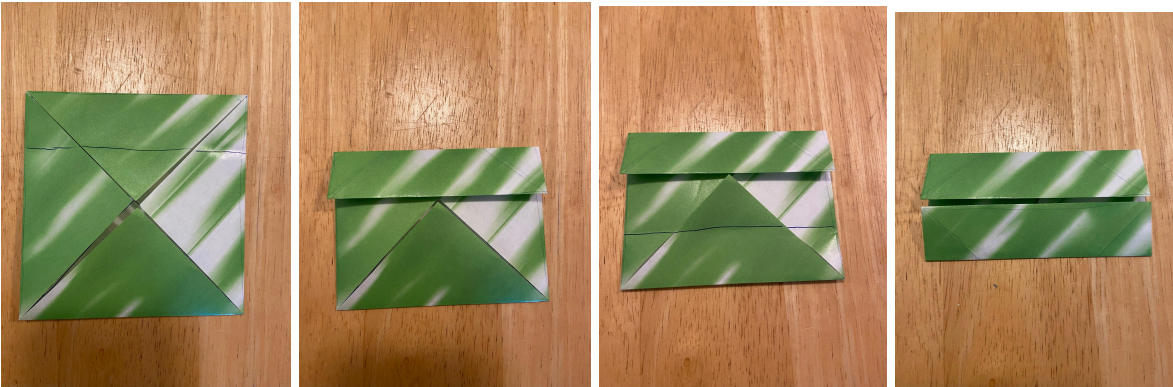
1. Start with your paper face down. Fold in half “hotdog style”.



2. Unfold and fold in half “hamburger style”.



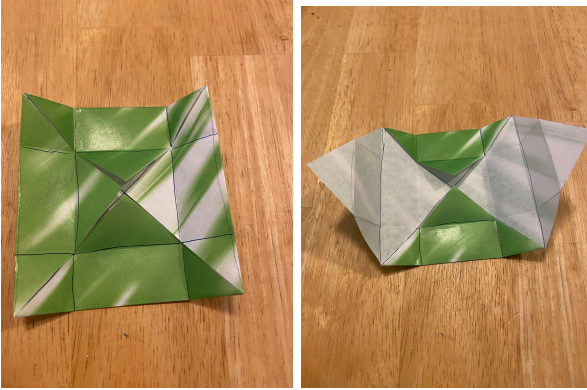
3. Unfold. Fold each corner in until it meets in the middle of the page (marked by where the folds intersect).



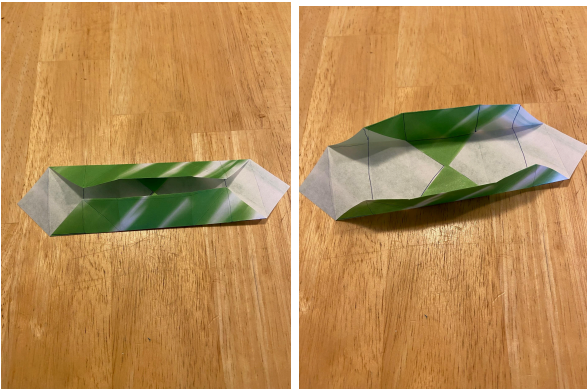
4. Fold the top edge until it touches the middle. Repeat with the bottom edge.



5. Unfold. Fold the right edge until it touches the middle. Repeat with the left edge.



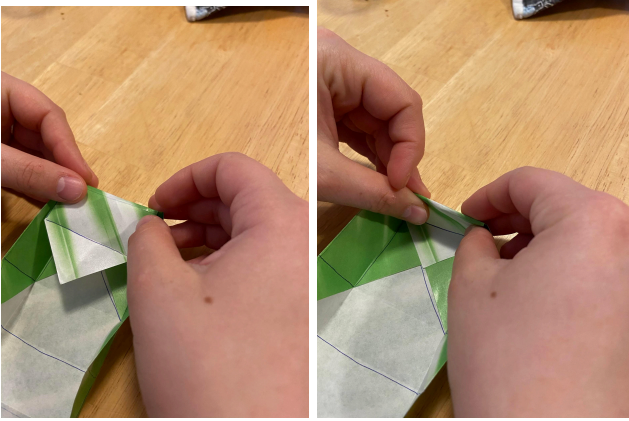
6. Unfold. Unfold the left and right flaps.



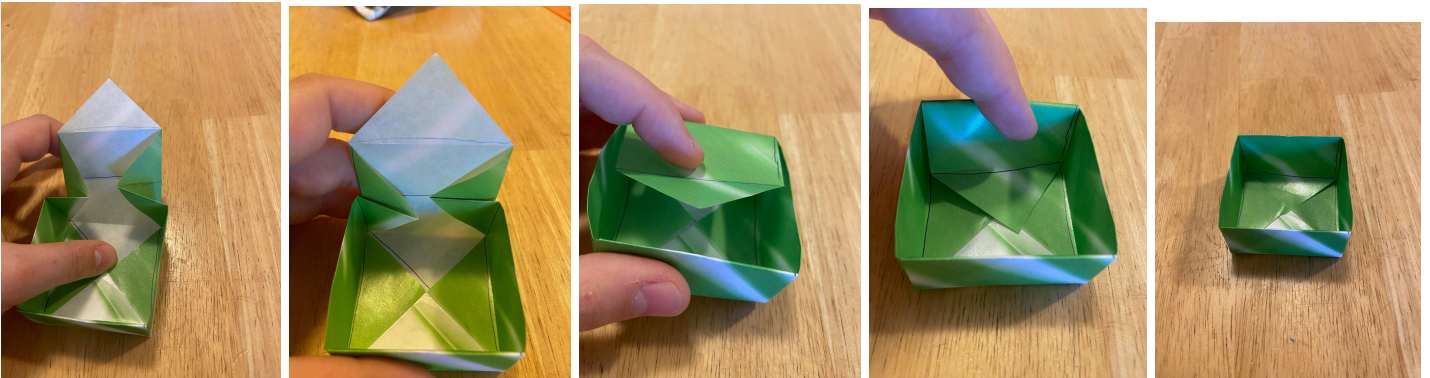
7. Refold the top and bottom edges. Let them stand up.



8. Gently placing one hand between the standing edges from the left, take your right hand and lift the right flap until it is pointing straight up. It should accordion-fold two little flaps on the inside.



9. Bring the flap over the top of the box, and, using the flaps as a guide, wrap the flap over the side of the box, placing the point of the flap in the center of the bottom of the box. Crease the paper well to secure the wall of the box.



10. Repeat steps 8 and 9 with the other flap. It may be useful to place a hand carefully in the bottom of the box, but be careful not to squish the walls of the box. You are done!

Take it Further!

Experiment with depth! In steps 4 and 5, by folding the edges until they met in the middle, we made a box that is half as tall as it is wide! By folding the edges towards the middle so they overlap, we can make a taller box with a smaller base. Similarly, by not folding the edges completely toward the middle, we can make a shallower box with a wider base!

Math Connection: This can be a great way to explore surface area and volume! Using one size of paper, you can make boxes with different surface areas and volumes -- how might you find them? Is there a "biggest" box you can make with one size of paper?*

Make a lid! By folding a second box that is just a little bit shallower than the first box, you can use the second box as a lid!

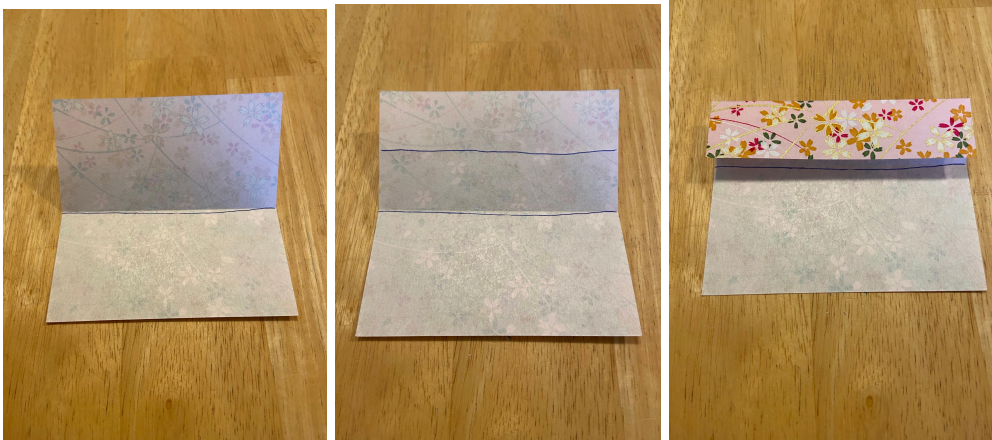
Make fancy lids! Experiment with folding designs into the paper -- make sure it is still square! The designs I shared are based on designs from the book *Unfolding Mathematics with Origami Boxes*, by Crystal Mills and Arnold Tubis. You can also decorate lids using small objects -- like the butterflies we folded earlier!

Make it triangular! By starting with hexagonal paper, you can fold a triangular box! Find out how to make hexagonal paper [here](#)! The triangular box is also described in *Unfolding Mathematics with Origami Boxes*, by Crystal Mills and Arnold Tubis, but it can also be figured out with a little tinkering -- the secret is to fold each corner individually, carefully tucking the last one in without unfolding the previous two. I've made a video [here](#). Note: the video moves quickly -- I recommend pausing frequently or watching the video on 0.5x speed.

Make a Sonobe Unit



1. Start with paper face down. Fold in half “hamburger style”.



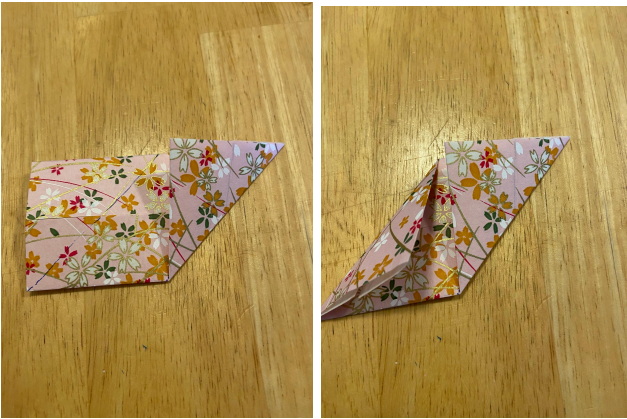
2. Unfold. Fold the top edge down to the middle.



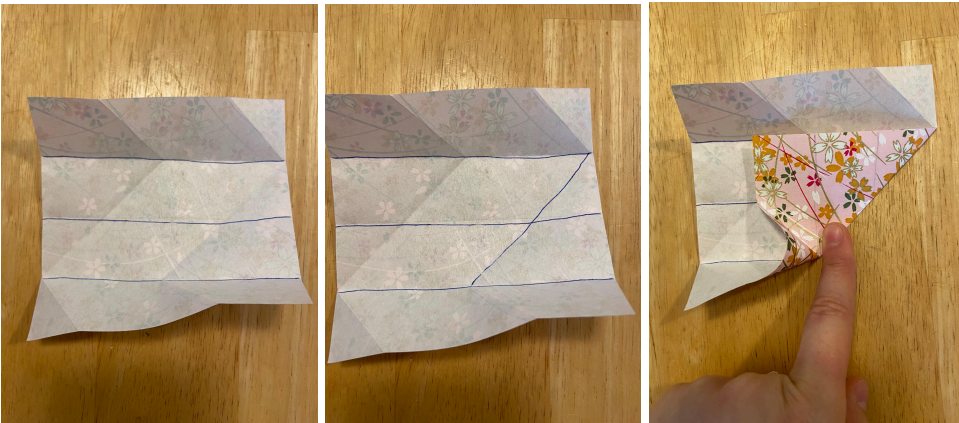
3. Fold the bottom edge up to the middle.



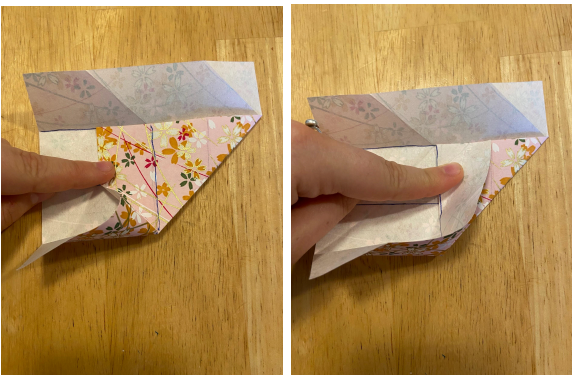
4. Fold the bottom right corner diagonally to the top edge.



5. Fold the upper left corner diagonally to the bottom edge.



6. Unfold completely. Refold along the middle section's rightmost diagonal crease.



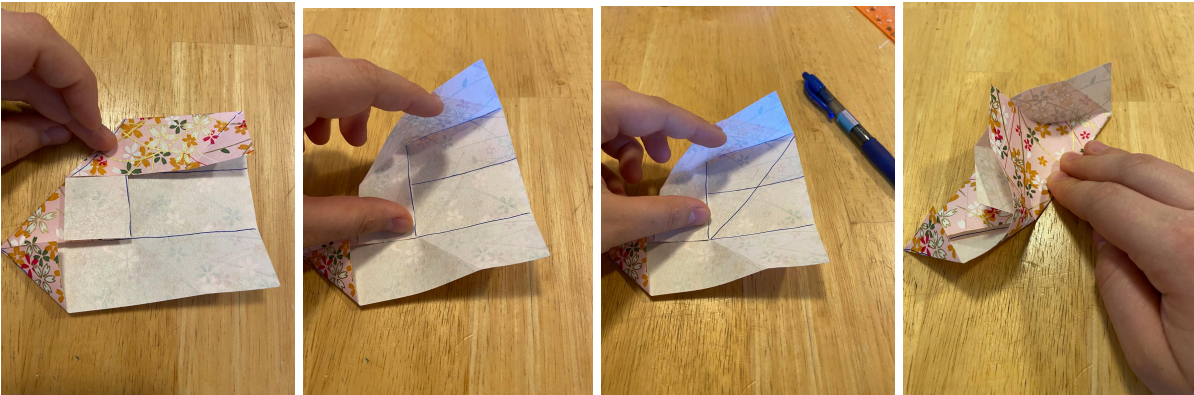
7. Fold back the edge of the paper, using the vertical crease present as a guide.



8. Bring up the bottom edge of the paper, refolding and gently squishing the paper flat, using the diagonal crease as a guide.



9. Fold the top right corner down toward you, along the diagonal crease. You will fold it in the opposite direction from the crease.



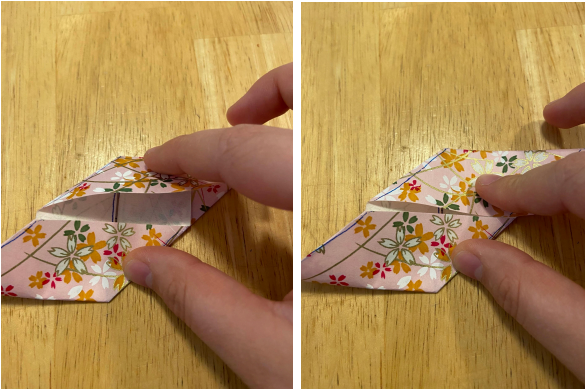
10. Rotate the figure 180 degrees. Carefully open the top flap and fold along the new rightmost diagonal crease. The figure will not lie flat yet.



11. Fold back the left edge of the part you just folded, using the vertical crease as a guide.



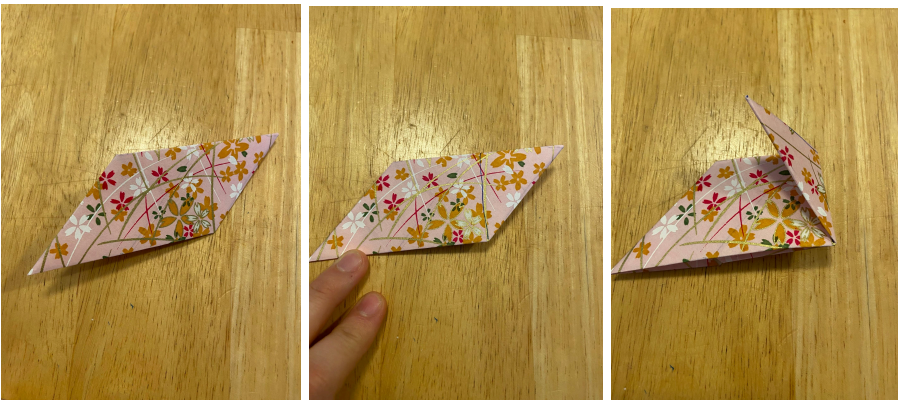
12. Fold the bottom edge up and gently flatten the figure along the diagonal.



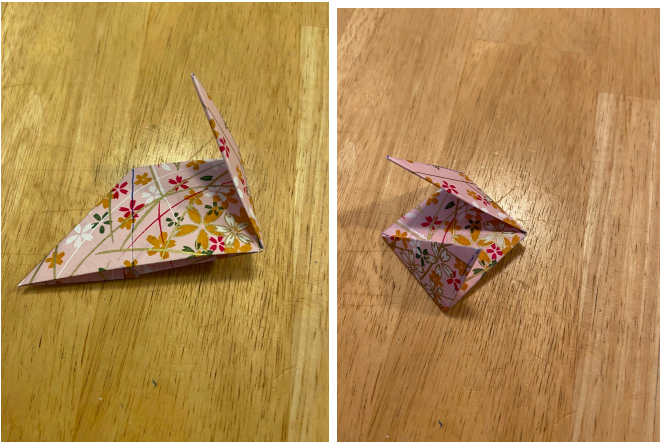
13. Refold the top edge down, over the part you just folded.



14. Flip the figure over. Notice the little corner of paper that sticks out. Fold the corner down, tucking it into the flap.



15. Rotate the figure 90 degrees. Fold the right triangular flap over and across, so the top of the flap is aligned with the top of the figure. It may not lie flat due to the thickness of the paper



16. Fold the left triangular flap over and across so the bottom of the flap lines up with the bottom of the figure. It should now have a square base with two flaps that stick up a little.

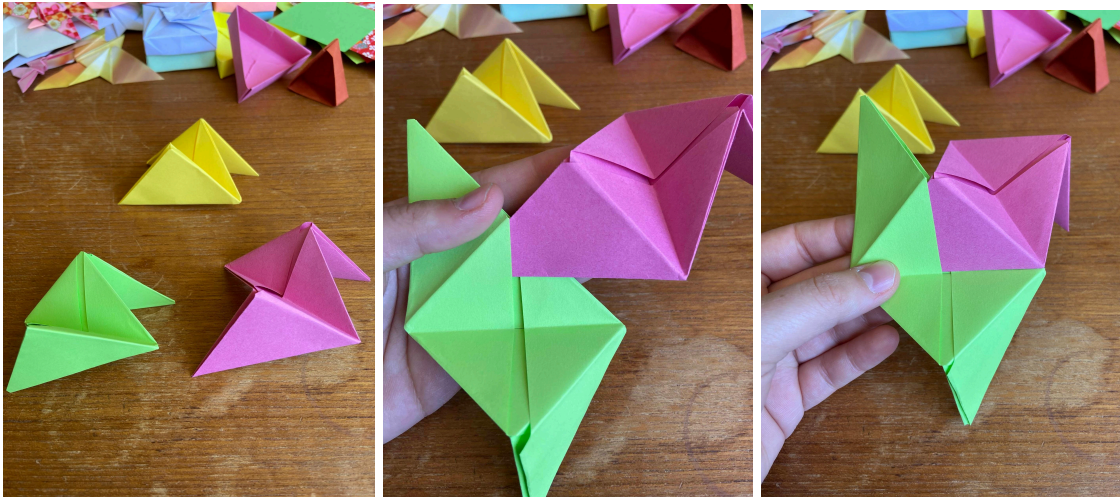


17. Flip over the figure so the two diagonal edges run from upper left to bottom right. Fold the whole piece diagonally along the diagonal running from the lower left to upper right.

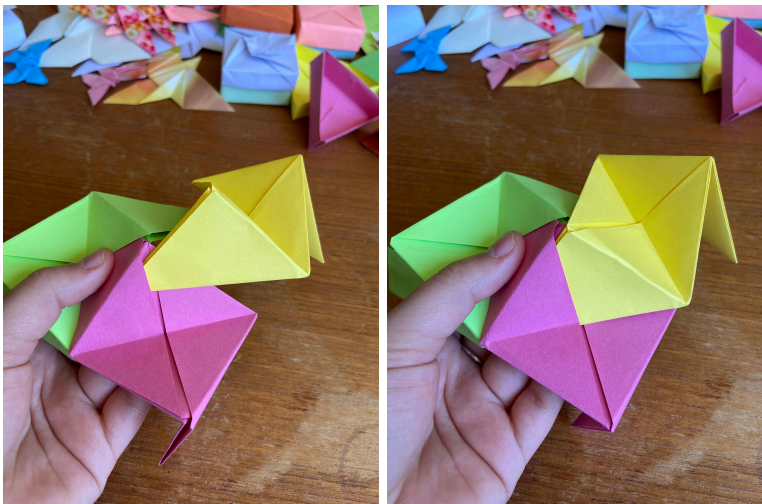


18. When you set the piece down, it will unfold a little. This is the finished Sonobe unit.

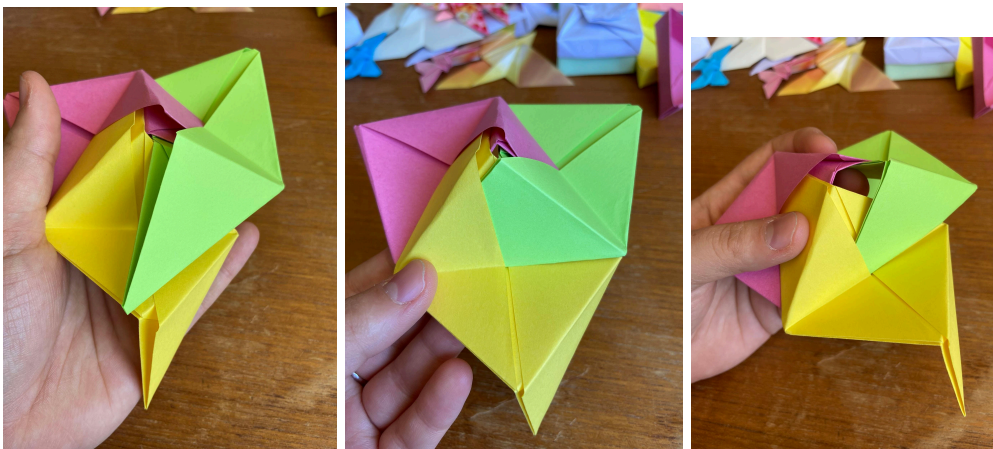
Putting Sonobe Units Together



1. Start with 3 Sonobe units. Pick up two and slide an end flap from the first into a pocket on the second.

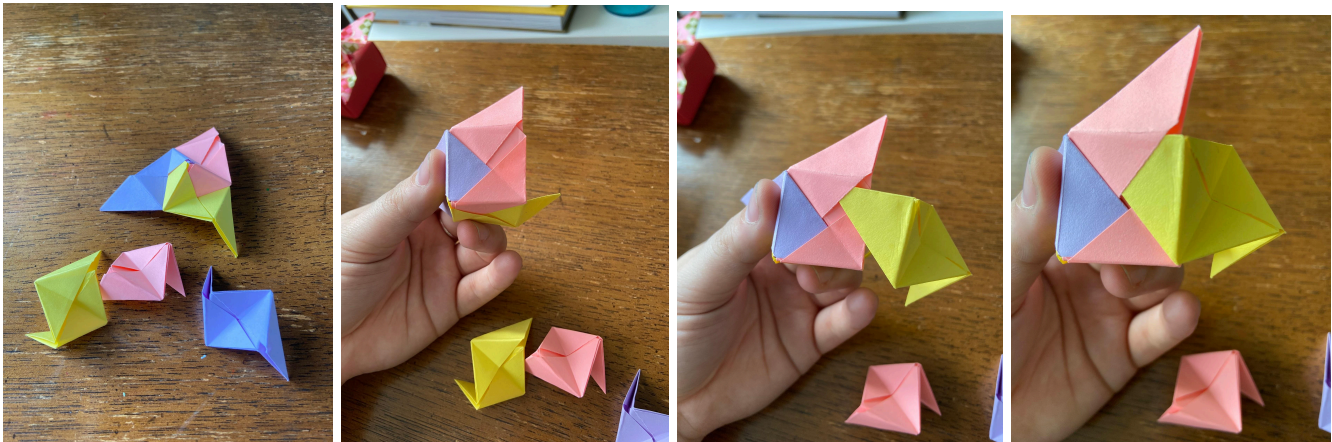


2. Rotate. Pick up the third unit and slide an end flap into a pocket on the first.

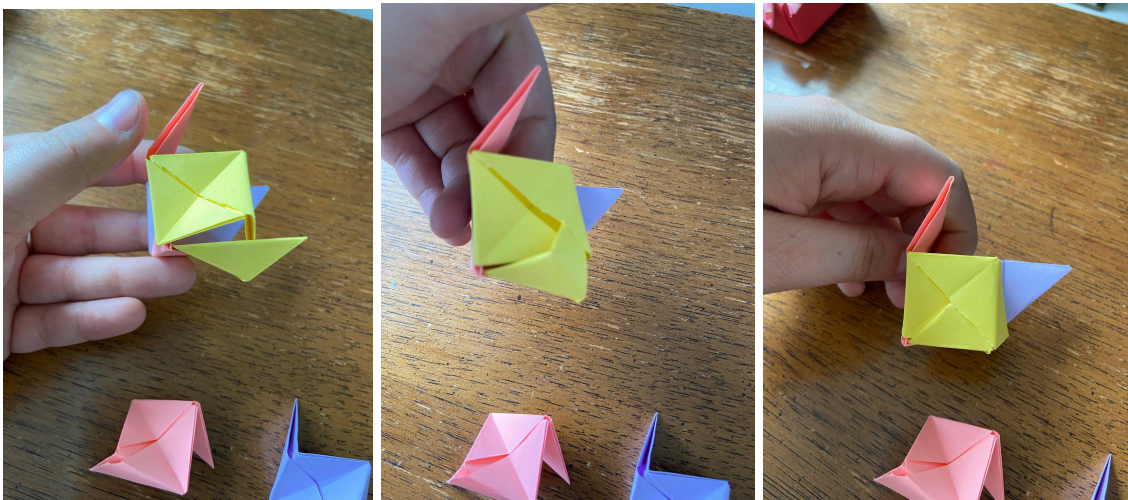


3. Rotate. Take the flap from the second unit and bring it over the top of the pockets on the third unit. Carefully tuck the flap into a pocket on the third unit. You may need to loosen the whole structure first. Gently compress so that all flaps are snugly in their respective pockets. You are done!

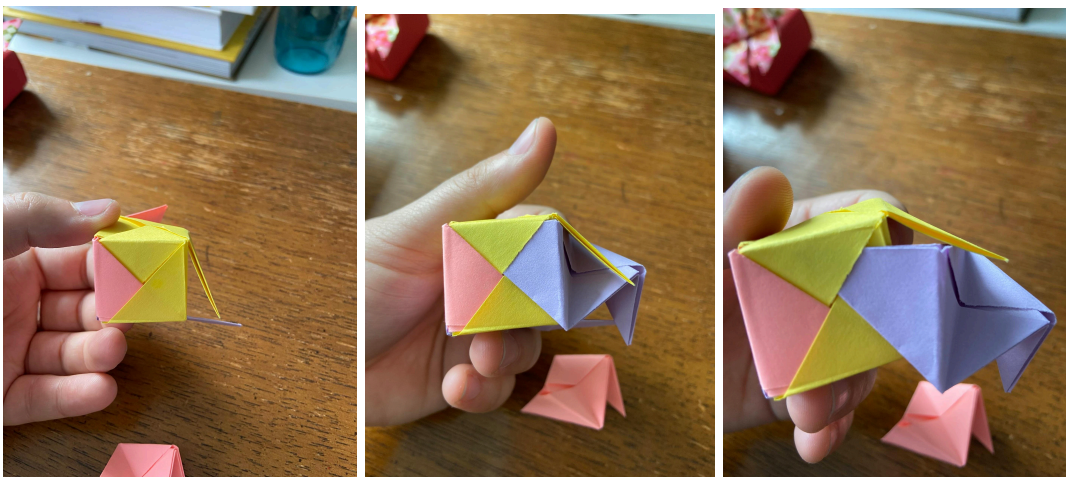
Make a Cube



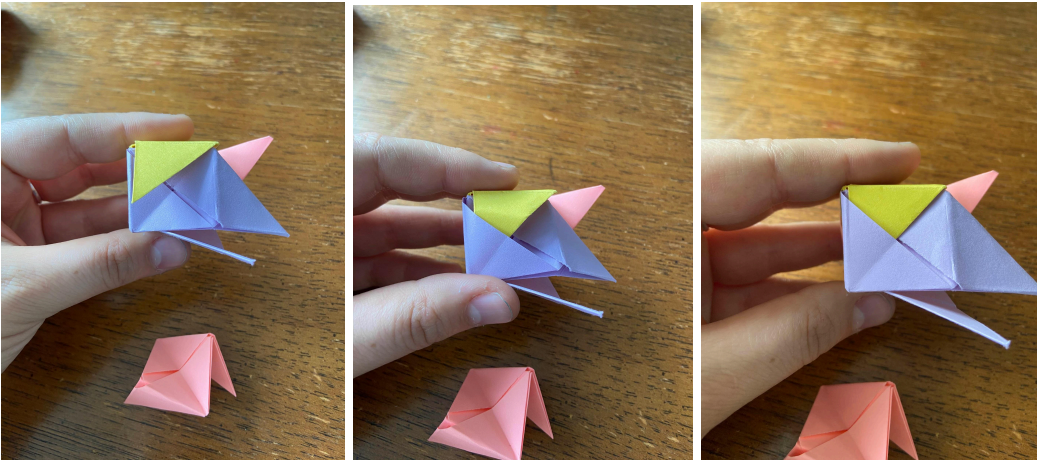
1. Start with 3 connected and 3 unconnected Sonobe units. Pick up one of the unconnected units and connect it to one of the flaps on the connected units.



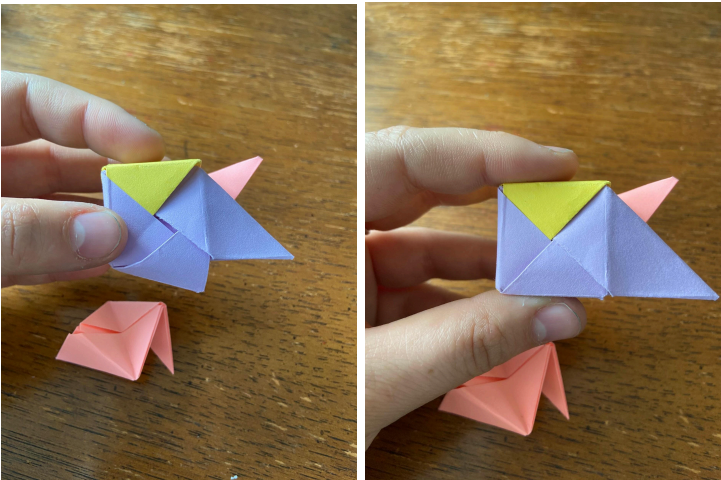
2. Rotate so that the new unit is facing you. Connect the flap on the adjacent unit to the pocket on the new unit.



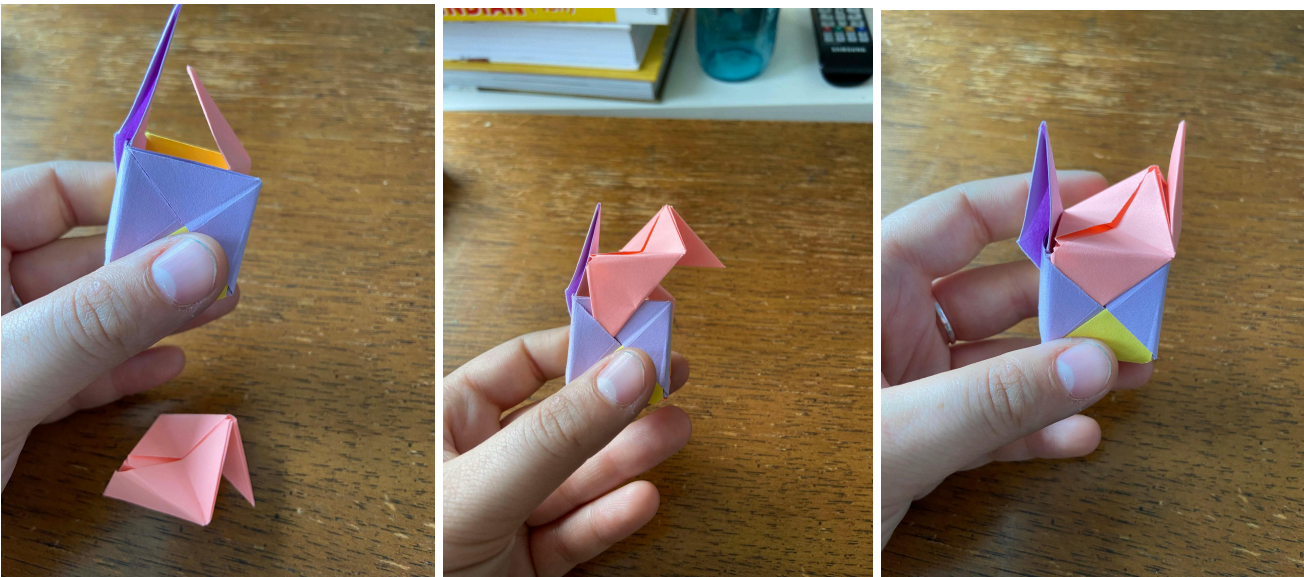
3. Rotate so that the adjacent unit that you just connected is facing you. Pick up a new unit and connect it.



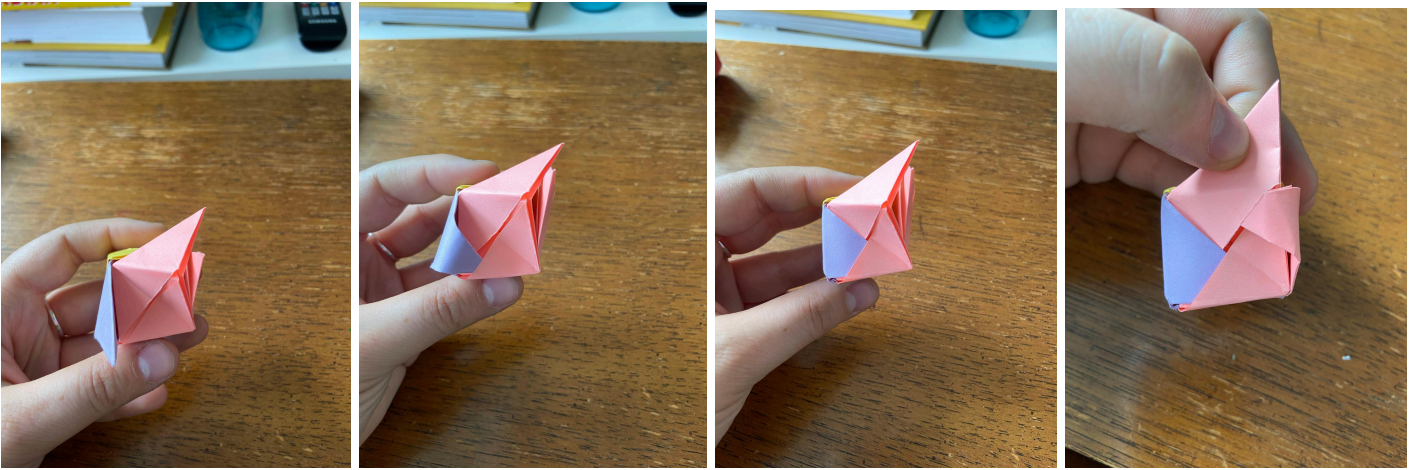
4. Rotate so that the unit you just connected is facing you. Connect the top flap.



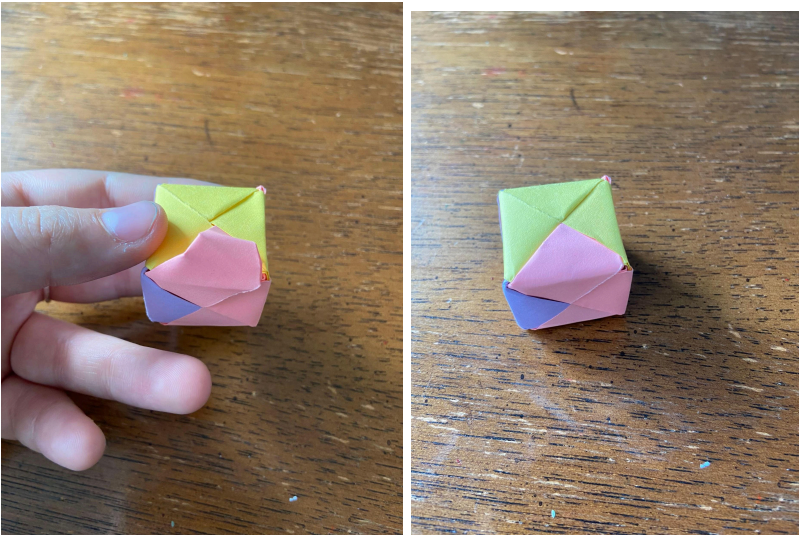
5. Connect the bottom flap



6. Rotate so that the side with no unit is pointed up with the flaps on the left and right. Pick up the last unit. Connect it to the side facing you.



7. Rotate so the unit you just attached is facing you. Attach the left and right flaps.



8. Rotate so you can see the last flap. Tuck it in to the appropriate pocket and you are done!

Take it Further!

Making larger figures! By connecting different numbers of Sonobe units, you can make larger figures. To make a cube, you needed 6 Sonobe units. To make a stellated octahedron, you need 12 units. For a stellated icosahedron, you'll need 30 units! You might also try connecting them to build asymmetric figures!