



Practical Round

Task:

Using the Sonobe unit you are to make as many Toshie's Jewels, Cubes, Octahedrons and Icosahedrons as possible in the time given.

You can choose to make any of the constructions but should note that the more complicated ones are worth more points!



Toshie's Jewel – 5 points



Cube – 10 points



Octahedron – 25 points



Icosahedron – 50 points



Practical Round

How to Make a Sonobe Unit

Take a square piece of paper.

If you are using coloured origami paper, flip it so it is coloured side down:

Fold in half horizontally:



Unfold. You should have a horizontal crease in the middle:



Now you are going to fold the paper in four equal parts.

Start by folding the top down to meet the crease in the middle:





Practical Round



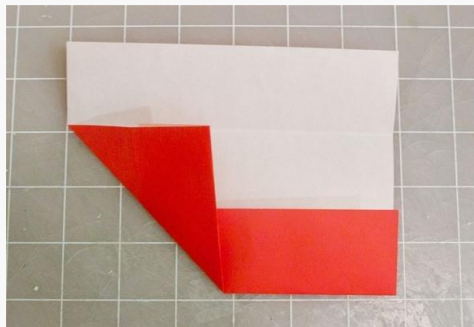
Fold the bottom up to meet the crease in the middle:



Unfold the top:



Fold the bottom corner up to meet the upper crease:



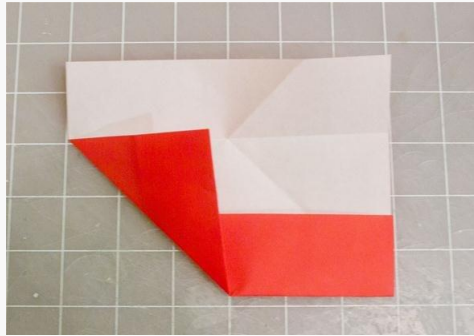
Unfold. Rotate 180 degrees. Fold the bottom flap up to meet the middle crease:



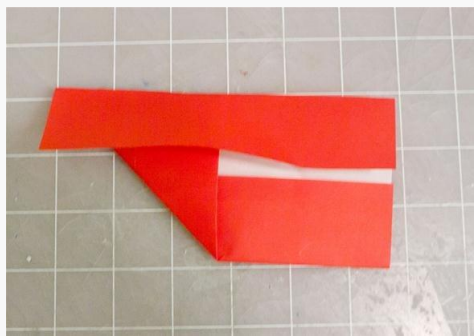


Practical Round

Fold the bottom corner up to meet the upper crease:



Fold the top down:



Refold the top corner down along the previously formed crease.

Tuck it into the bottom flap:

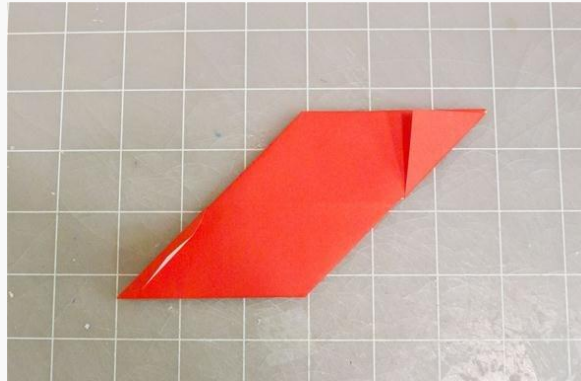


Flip the paper over:



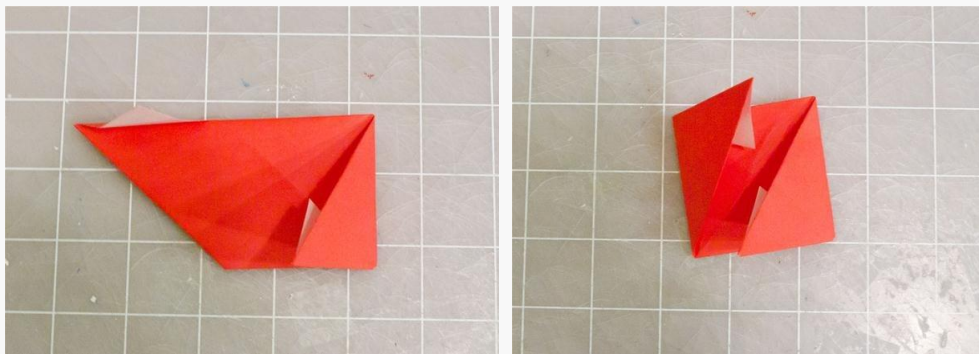
Practical Round

Fold the corners over:



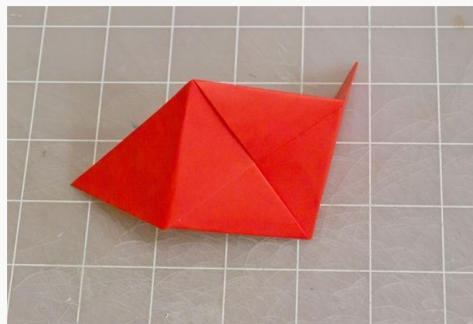
Rotate 45 degrees clockwise and fold the corners in to form a square.

First one corner..... Then the other corner:

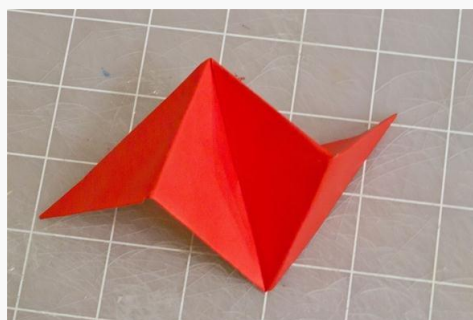


Flip the unit over. It is complete.

There should be two triangular pockets that you can use to insert other units into.



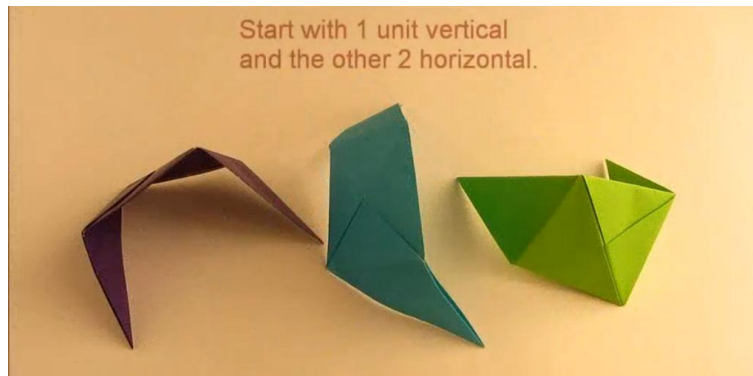
When making the octahedron or icosahedron you will need to make an additional diagonal fold across the square part of the unit.



Practical Round

How to make Toshie's Jewel from 3 Sonobe Units

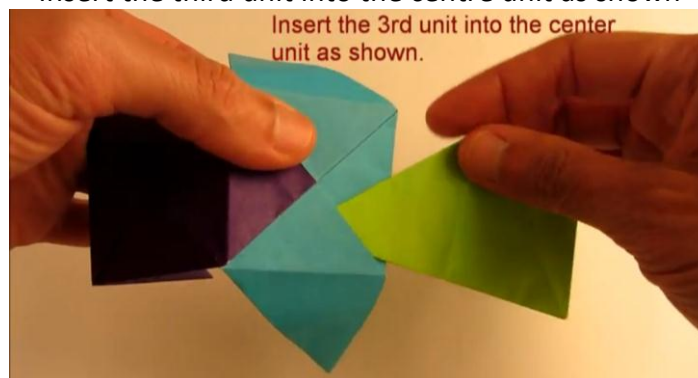
Start with one unit vertical and the other two horizontal



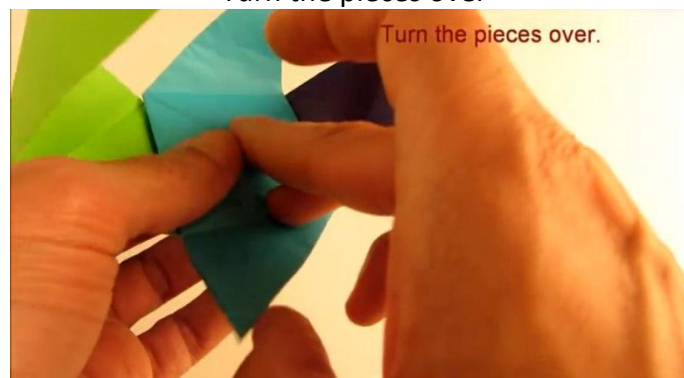
Insert the tip of 1 unit into the pocket of the centre unit as shown.



Insert the third unit into the centre unit as shown

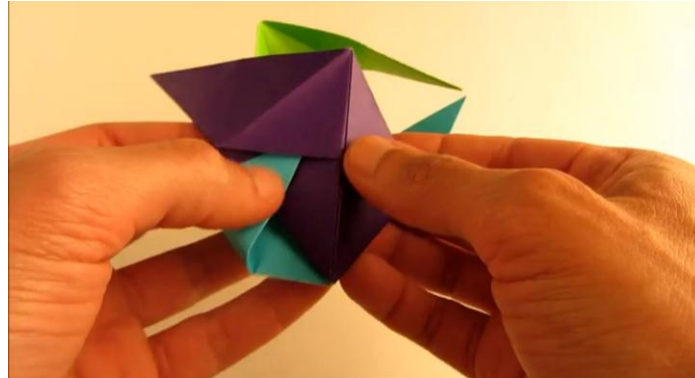


Turn the pieces over



Practical Round

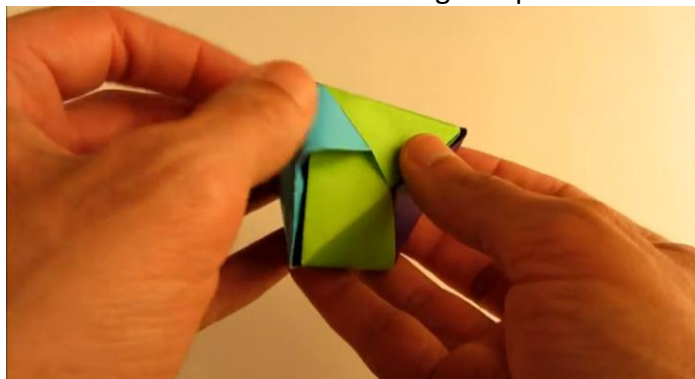
Insert a tip into its pocket



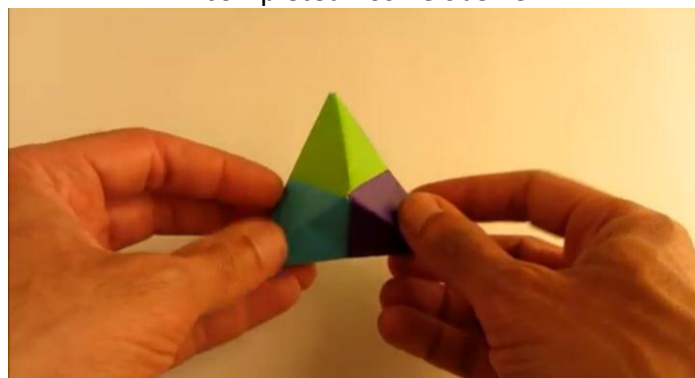
The tip of the first unit goes into the pocket of the next unit.



Continue for the remaining two pockets



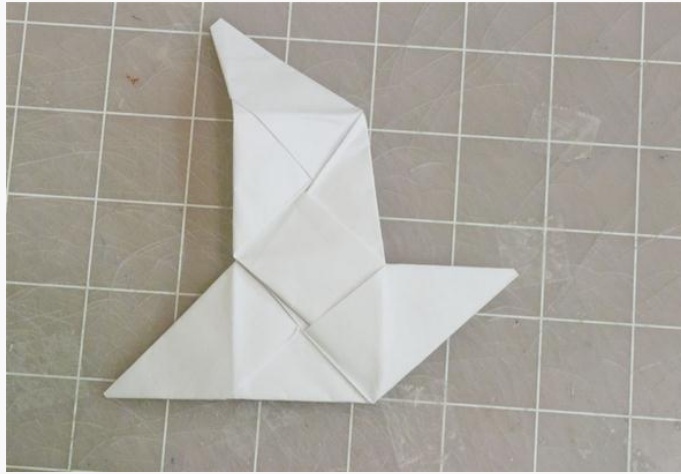
A completed Toshie's Jewel



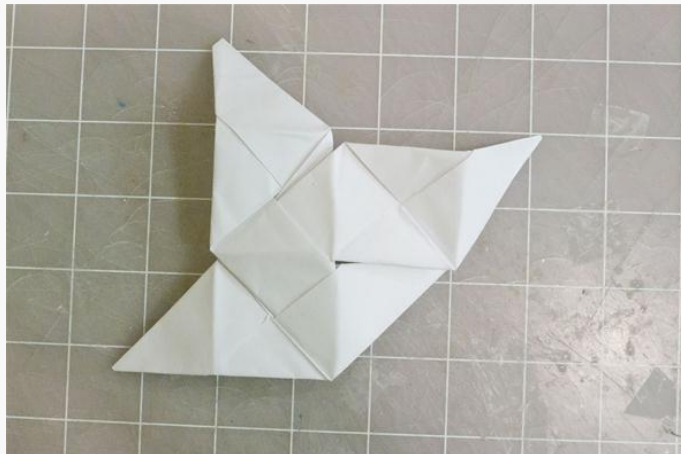
Practical Round

How to Make a Cube from 6 Sonobe Units

Insert one Sonobe unit into the pockets of another unit:



Insert another Sonobe unit into the pocket of the last unit:



Fold the squares together to form right angles and connect the units.

You should have 3 faces of the cube and one corner.



Practical Round

Add more Sonobe units by tucking each one into the pocket of the last.

Continue forming the cube. It should look like this before inserting the sixth unit:



Finished cube



Coloured version:



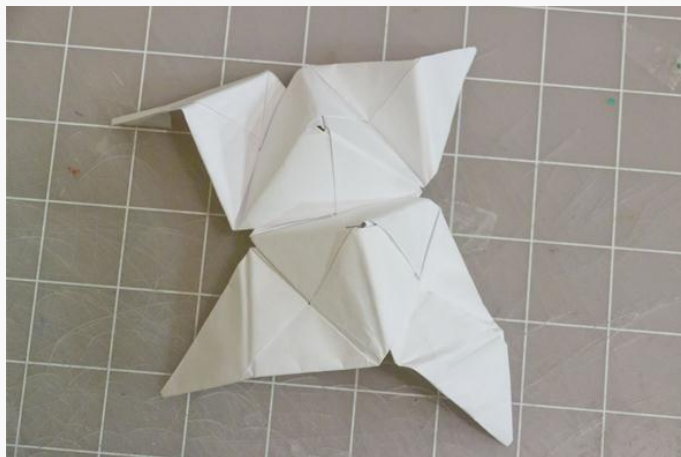
How to Make an Octahedron Out of 12 Sonobe Units

You must use the units that have an additional fold down the middle of the square.

Fit three units together to form a triangular pyramid.



By adding two more units, build another pyramid connected to the first:



Use a further two units to add a third pyramid:

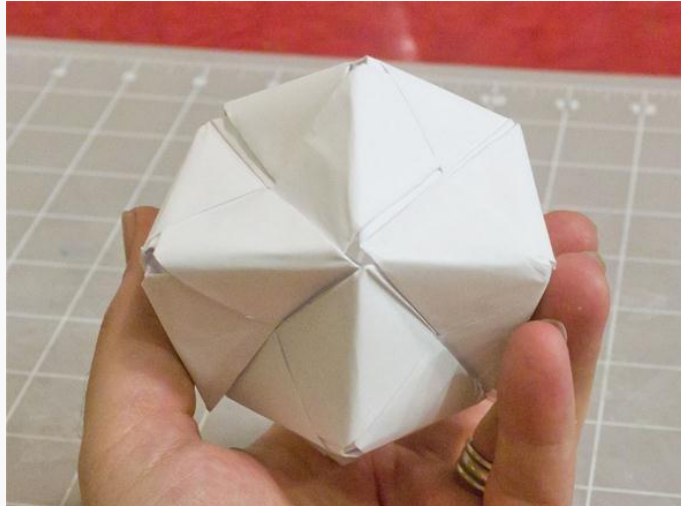


Practical Round

For an octahedron, there should always be cycles of four pyramids around a point.

Use one more Sonobe unit to connect the three pyramids, forming a fourth.

The whole object will now bend into the third dimension.



To finish the octahedron, you have to keep attaching units, always forming triangular pyramids in cycles of 4.



Here is a coloured version. Note that if you look at it one way you can see triangles.



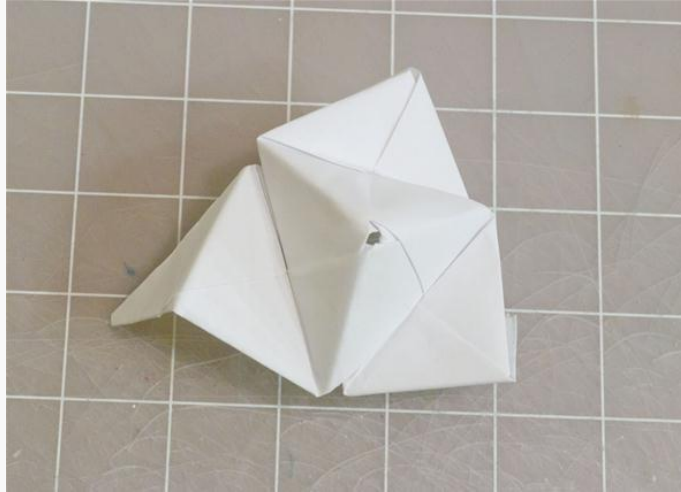
But if you look at it to other way, you see squares.

This is because 4 triangles meet at each vertex in an octahedron.

How to Make an Icosahedron from 30 Sonobe Units

You must use the units that have an additional fold down the middle of the square.

Place three units together to form a triangular pyramid.



Keep forming pyramids connected to each other until you have a cycle of five of them connected around a point.



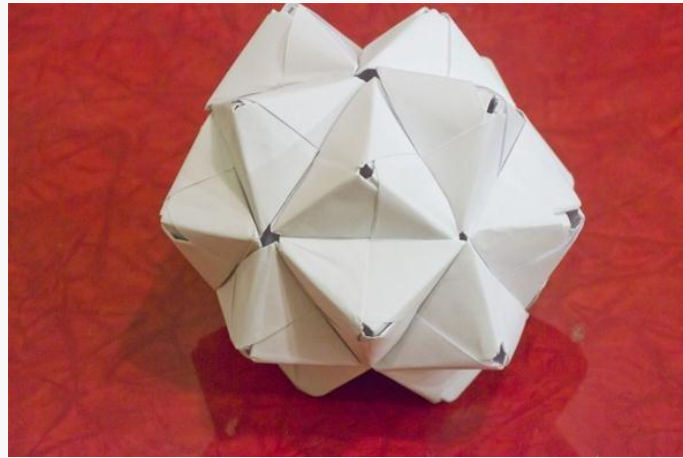
Keep connecting pyramids together in cycles of 5. It will begin to curve into a ball:



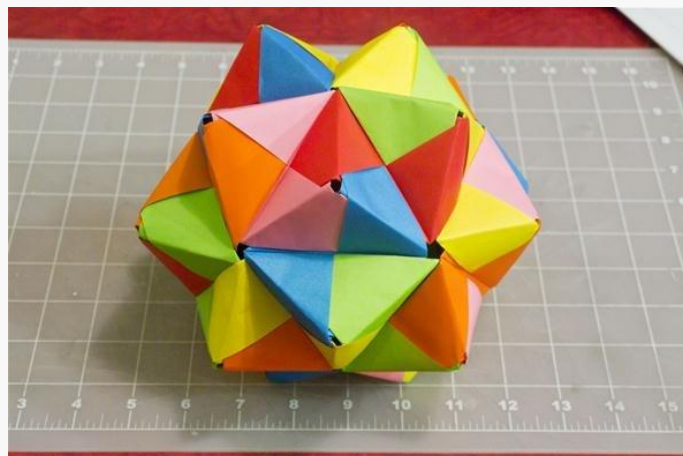
Practical Round

Connecting up the last couple can be a little challenging!

Here's the completed model:



The coloured version, notice the triangular figures.



From this angle, notice how you can see pentagons and pentagrams.

This is because on an icosahedron, 5 triangles meet at each vertex.

