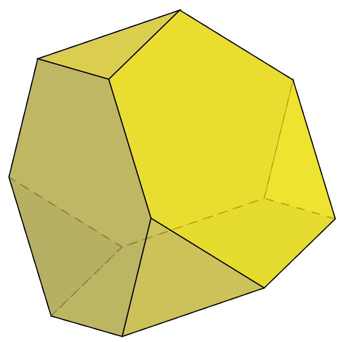
Archimedean solids

Quick facts

- A *polygon* is a two-dimensional shape with straight edges, for example a triangle is a polygon, and so is a square, a rectangle, a rhombus, a parallelogram.
- A *regular polygon* is a polygon whose side lengths and interior angles are all equal, for example a square or an equilateral triangle.
- A *polyhedron* is a three-dimensional shape with flat faces, where each face is a polygon. For example a cuboid is a polyhedron, its faces are rectangles. The edges are where two polygonal faces meet and the vertices (or corners) are where three or more polygonal faces meet.
- A *semi-regular polyhedron* is a polyhedron whose faces are regular polygons, not all the same AND the arrangements of the faces around each vertex (corner) is the same. This means each vertex looks the same as every other vertex. An example of a semi-regular polyhedron is the truncated tetrahedron, shown below.

  The truncated tetrahedron has four regular hexagonal faces and three faces that are equilateral triangles. Each corner is the meeting of two hexagonal faces and one triangular face.
- The semi-regular polyhedra, excluding prisms and anti-prisms, are called the *Archimedean solids*. If we discount the two infinite families of prism and anti-prism there are thirteen examples (some people say fourteen) of Archimedean solids.

Activities

On the following pages you will find the nets for some of the Archimedean solids. A net is a two-dimensional diagram that can be cut, folded and glued to create a three-dimensional shape.

- Can you assemble each one of the nets into the corresponding Archimedean solid?

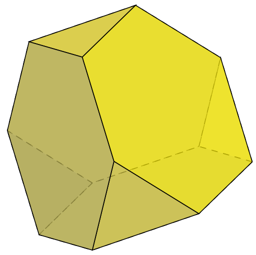
  You should print each net. Then cut along the solid lines and fold along the dashed lines. Then glue the ears (shaded in grey) to the faces to assemble the three-dimensional shape.

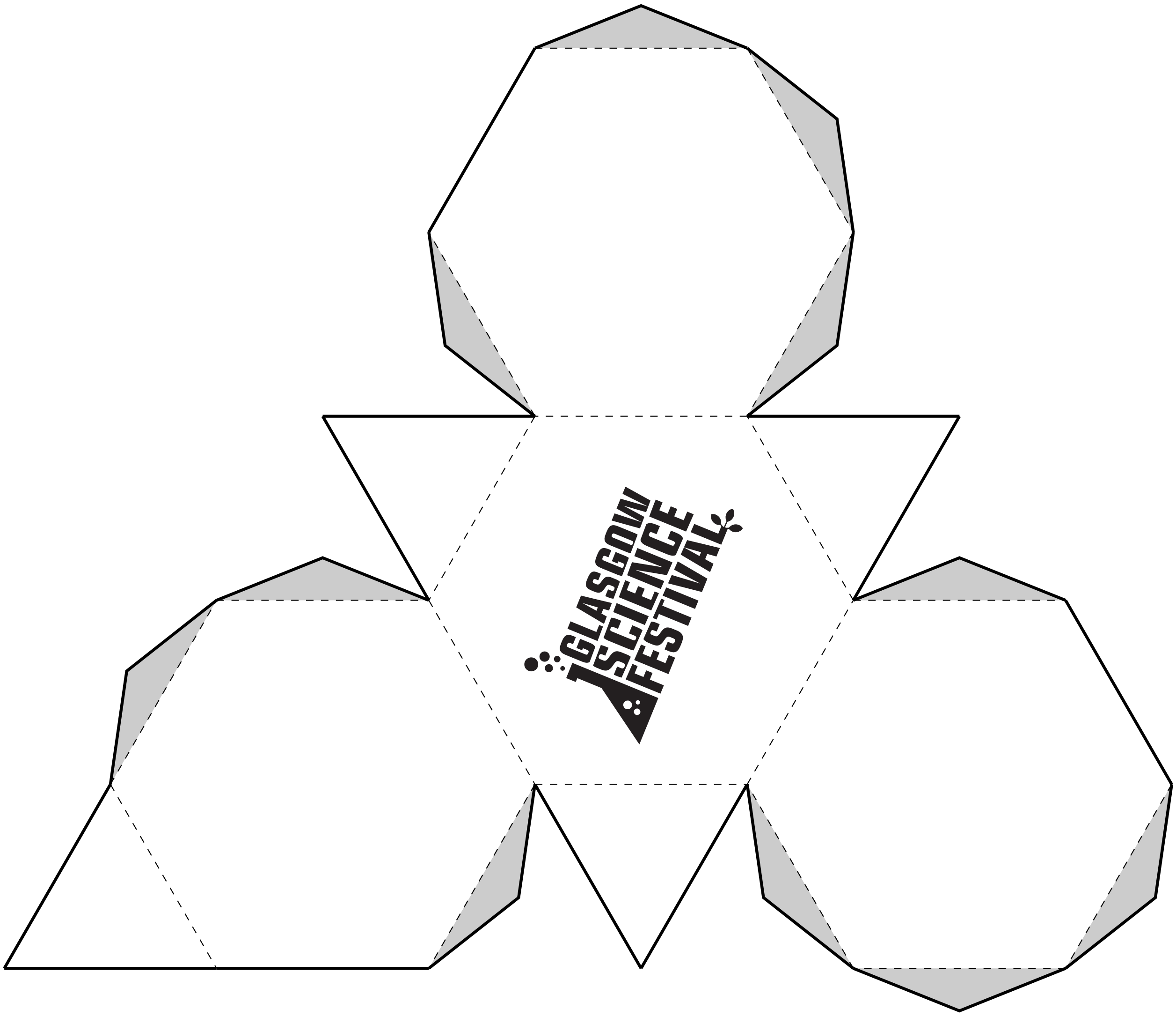
  Some of the shapes are quite intricate and so the bigger you can print the better. The shapes are also sometimes easier to make using card if available.

- One of the Archimedean solids is called the *truncated octahedron*. It has the interesting property that you can tessellate space using it by placing truncated octahedra so that their faces match. This has interesting connections to *Lord Kelvin's* foam problem.

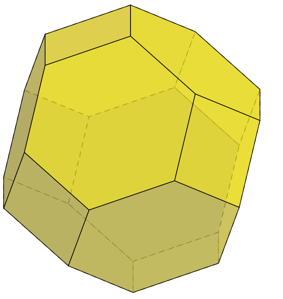
  Can you make (or find others that have made) multiple copies of the truncated octahedron and check that they do indeed fit together?

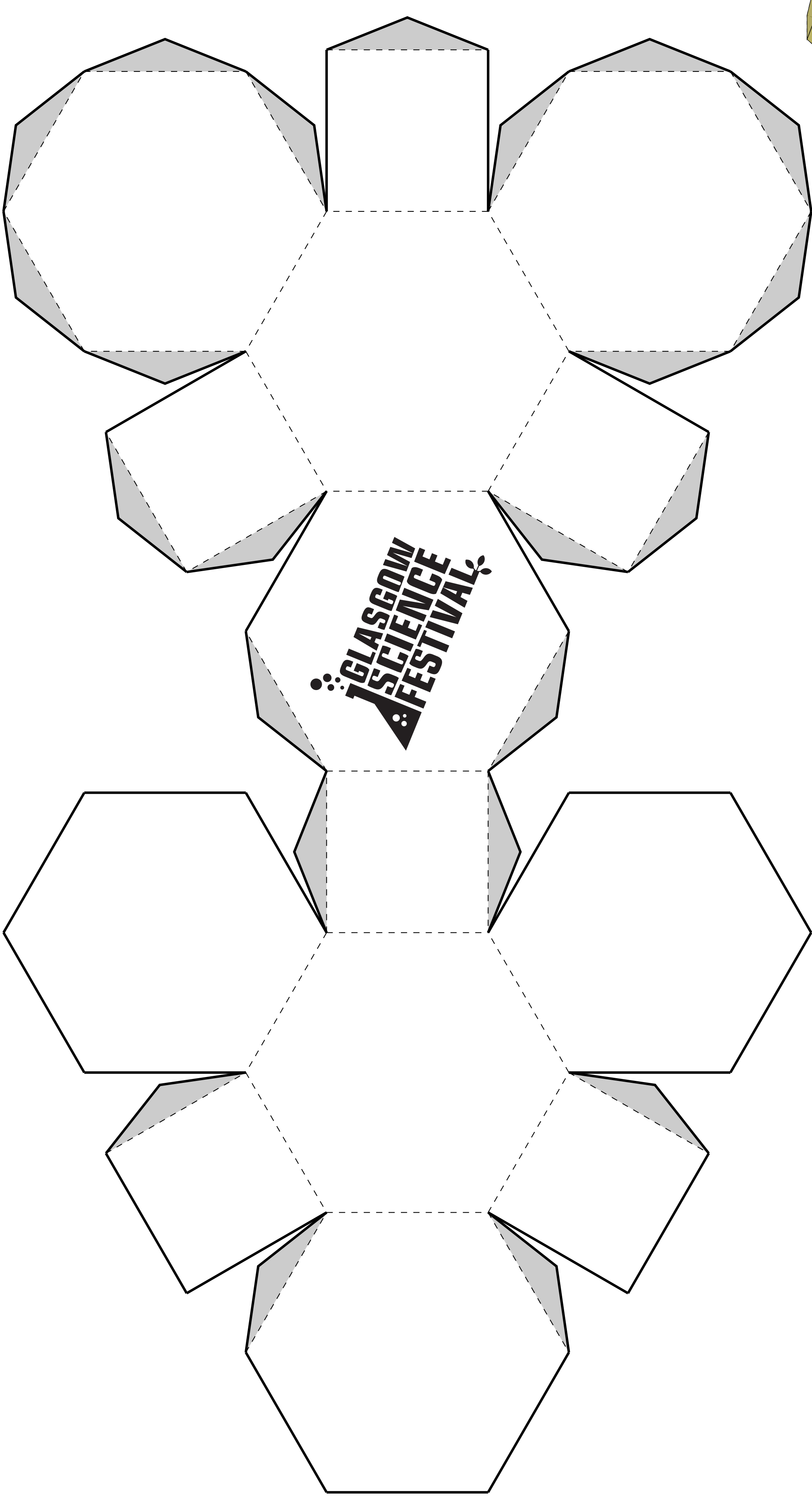
Truncated tetrahedron



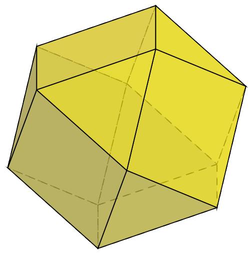


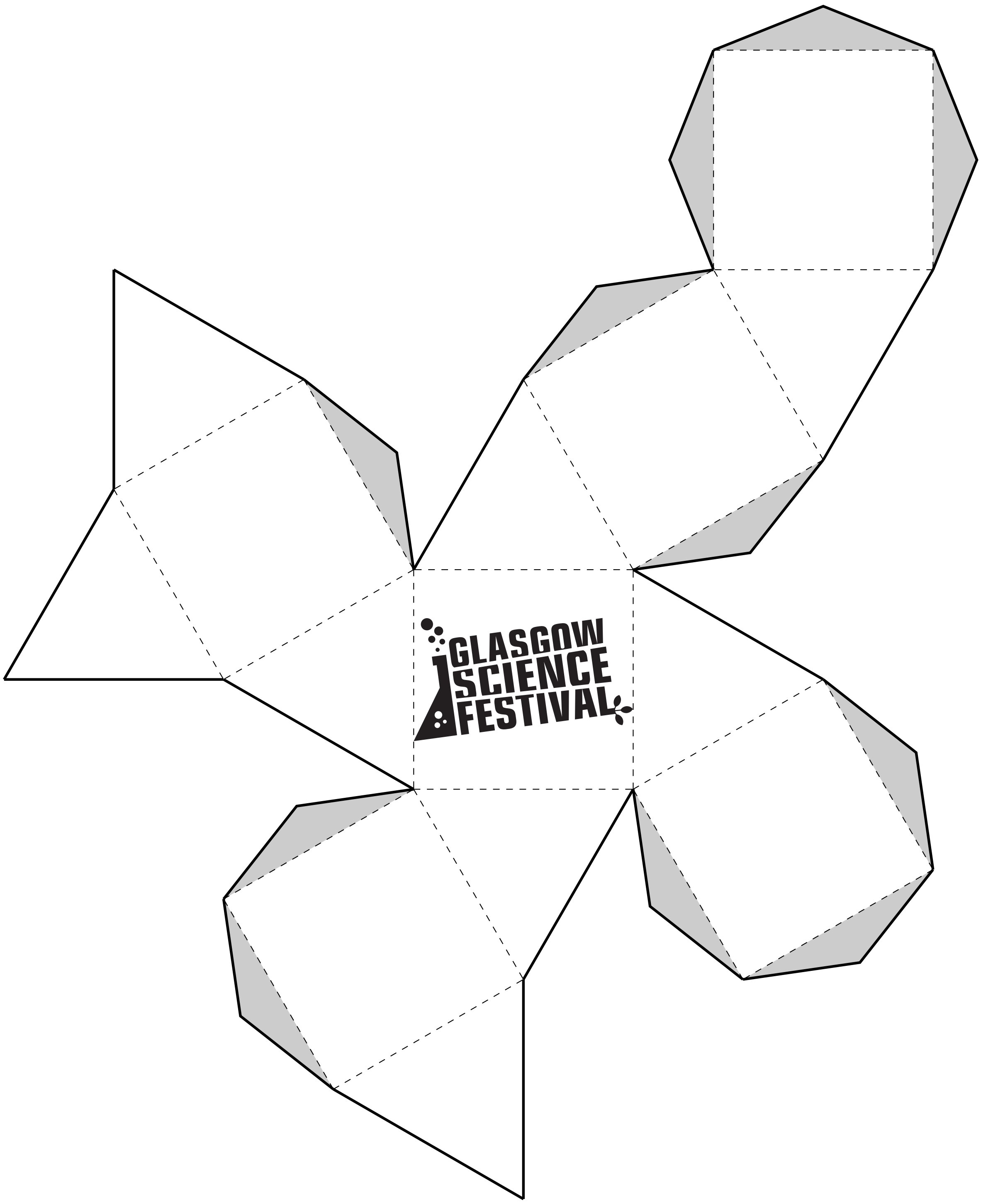
Truncated octahedron



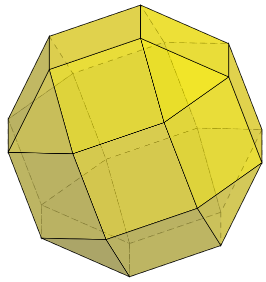


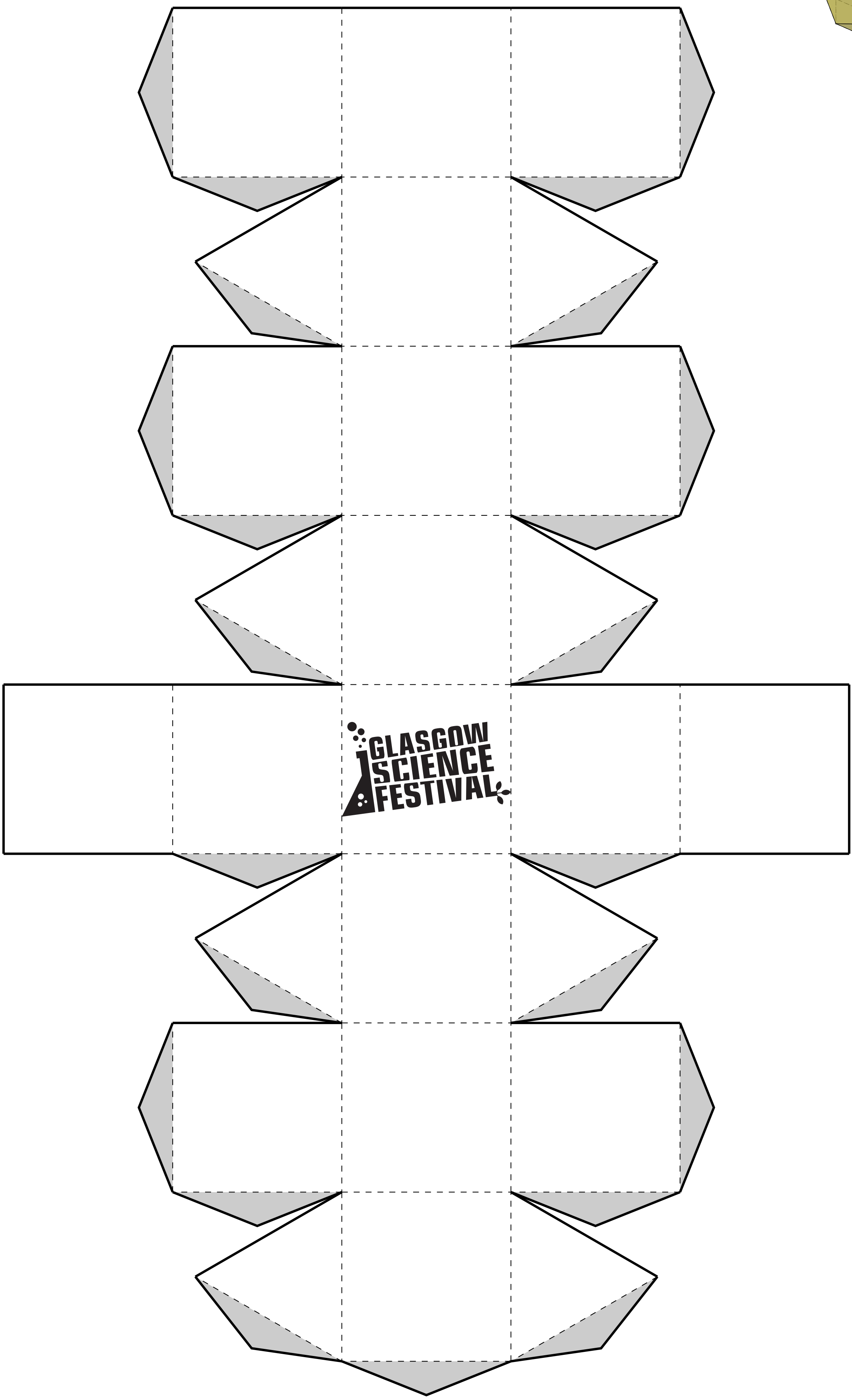
Cuboctahedron



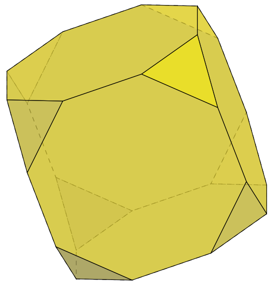


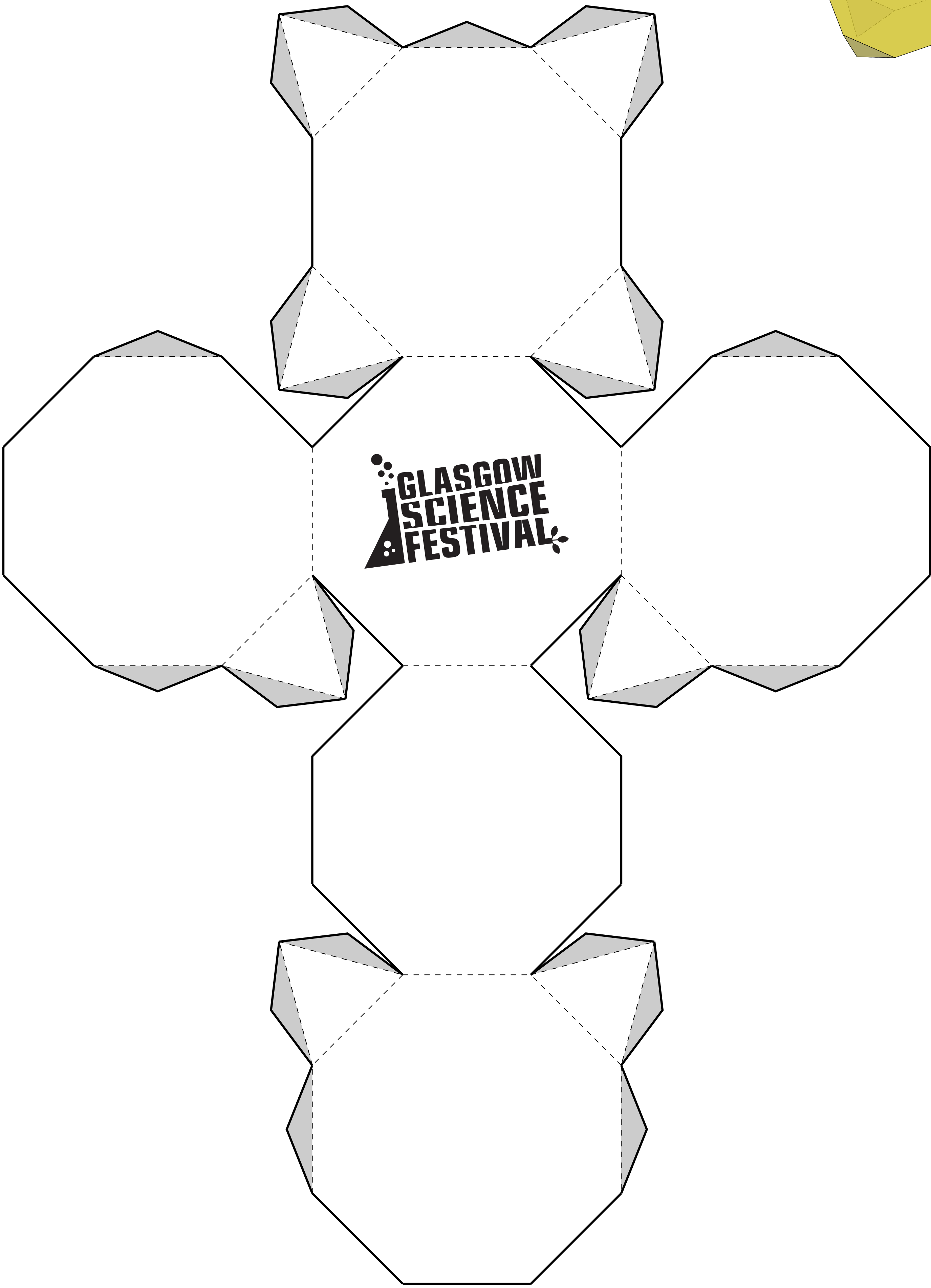
Rhombicuboctahedron



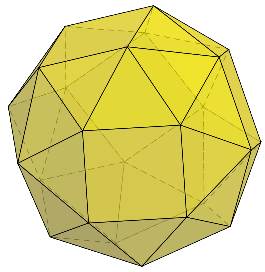


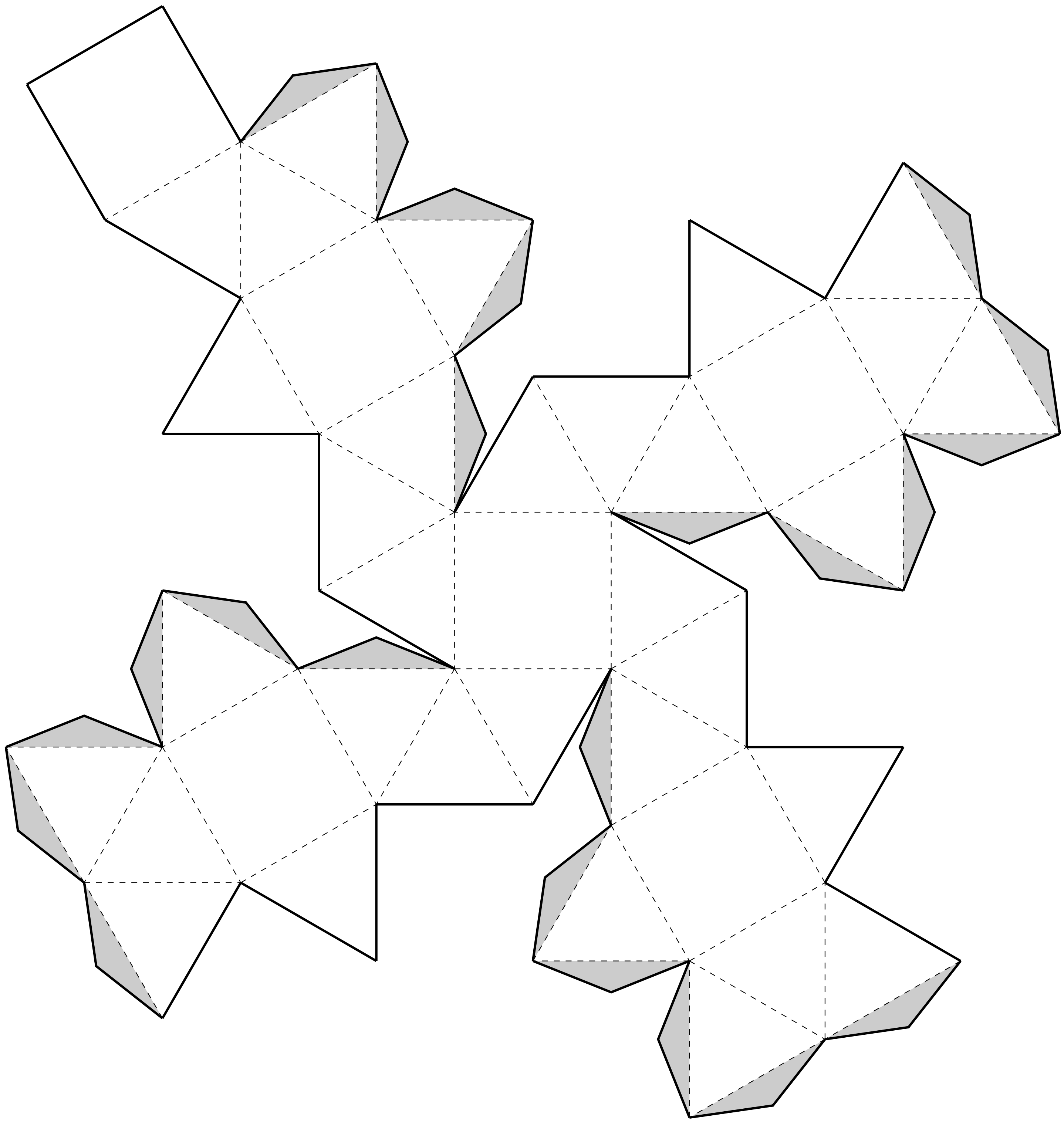
Truncated cube





Snub cube





Icosidodecahedron