POLYDRON™

Home Learning Pack

The minimum number of pieces required to
complete all these workcards is:

32 equilateral triangles
5 isosceles triangles
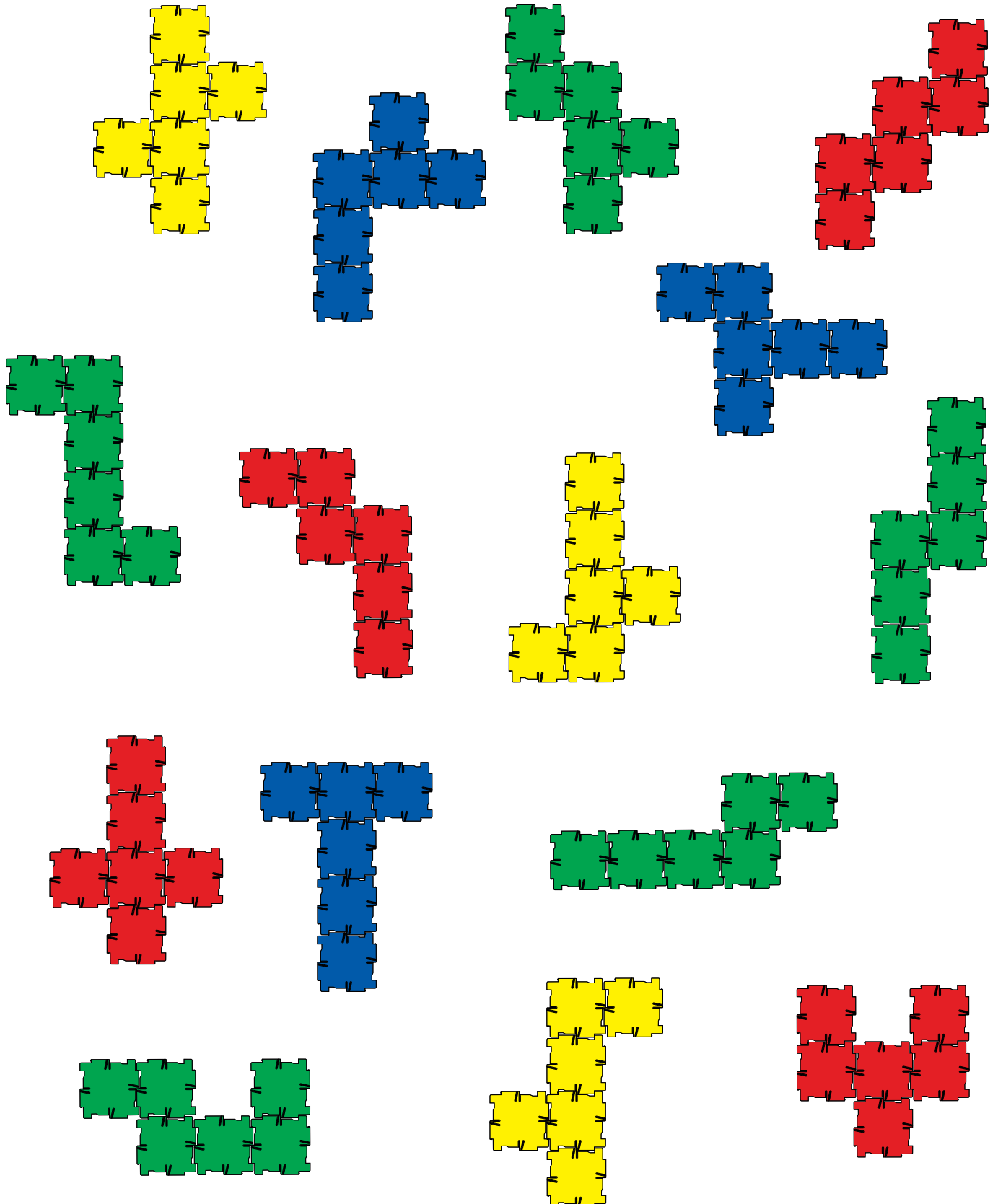**24 squares**
8 rectangles
12 pentagons

Nets of a cube puzzle

▶ A cube is made from 6 squares. Below are 15 nets – 11 make a cube.

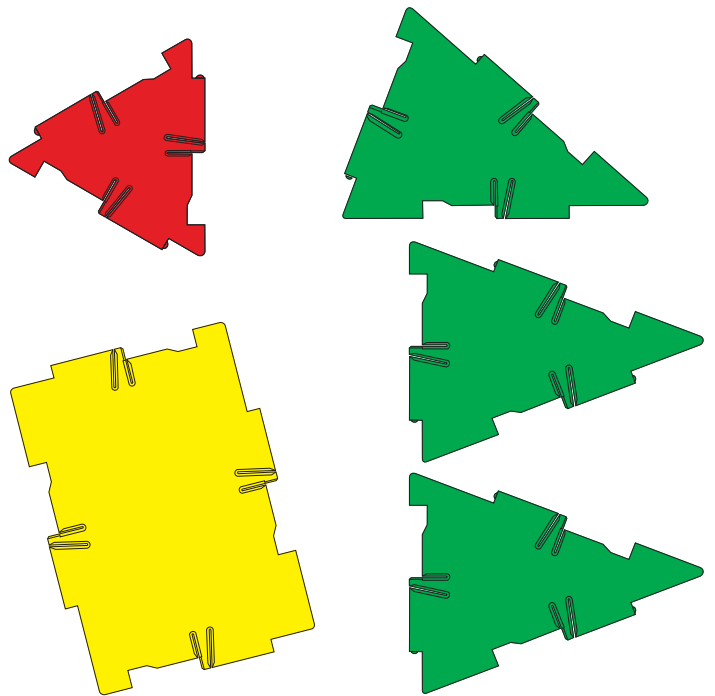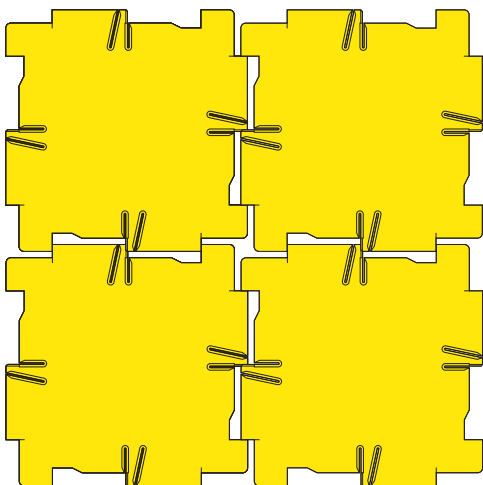▶ Can you identify the 4 which cannot be folded to make a cube?

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Pyramids

▶ Here is a square-based pyramid.

▶ A pyramid can have any polygon for the base and any triangles for the sloping faces.

▶ Make a pentagonal-based pyramid.

▶ Make an unusual pyramid with the shapes on the right.

▶ Make a different pyramid with a rectangle for the base.

More Ideas

▶ Make an enlargement of the pyramid at the top of the page.

▶ You will need four squares for the base and lots of equilateral triangles.

▶ Try to work out how many triangles you need before you start.

▶ Make a very large pyramid with nine squares for the base.

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The Tetrahedron

- A tetrahedron is a special pyramid made from four triangles.

- Make a tetrahedron with the four triangles on the right.

- Make a different tetrahedron with the four triangles below.

- Make a tetrahedron with three isosceles triangles and one equilateral triangle.
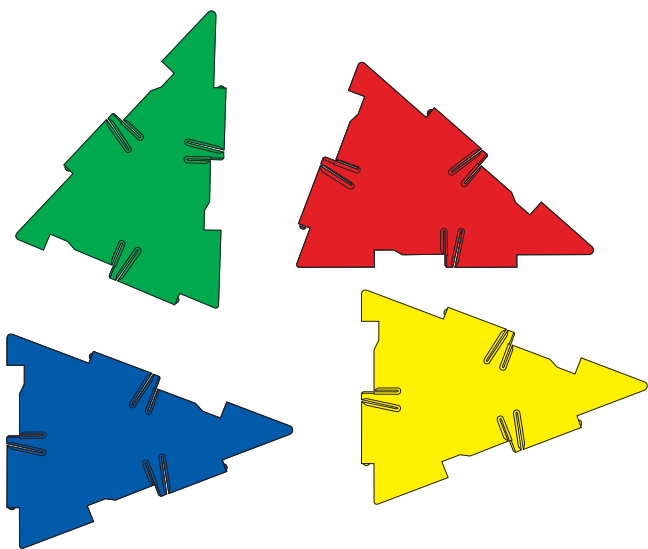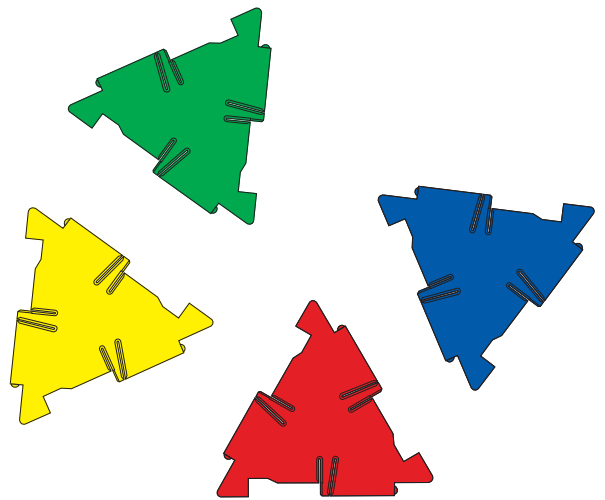
- Make a larger tetrahedron (pyramid) having 4 equilateral triangles of the same colour on each side.

Tetrahedron Puzzle

- Make two copies of this net using any colours.

- Fold up each of your nets to make a solid.

- Place the two solids together to make a large tetrahedron.

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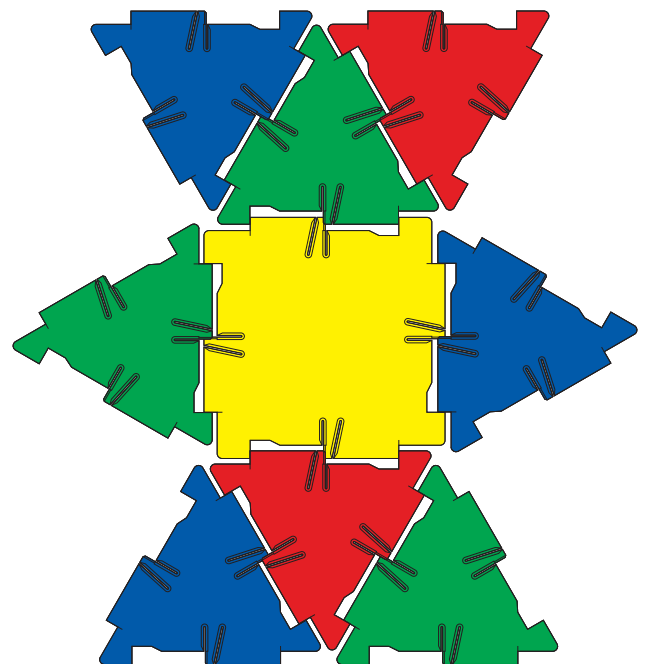
Star Challenge

- For this challenge, you will need 24 triangles – 6 of each colour.

- Try and construct the shape to the right.
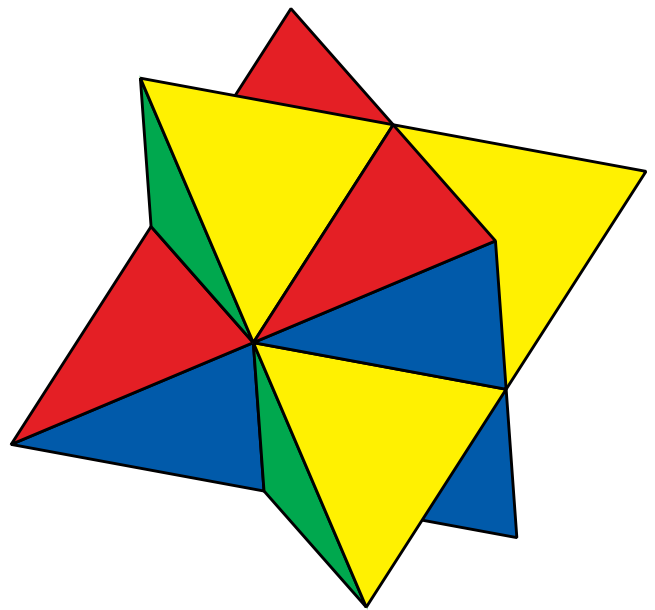
- Each point in the shape is made up of 3 triangles of different colours.

- There are 8 pyramids (tetrahedrons) joined together.

- The shape gives the illusion of 2 large pyramids (tetrahedrons) pushed together. Below are 2 other angles of the shape to help you with the construction:
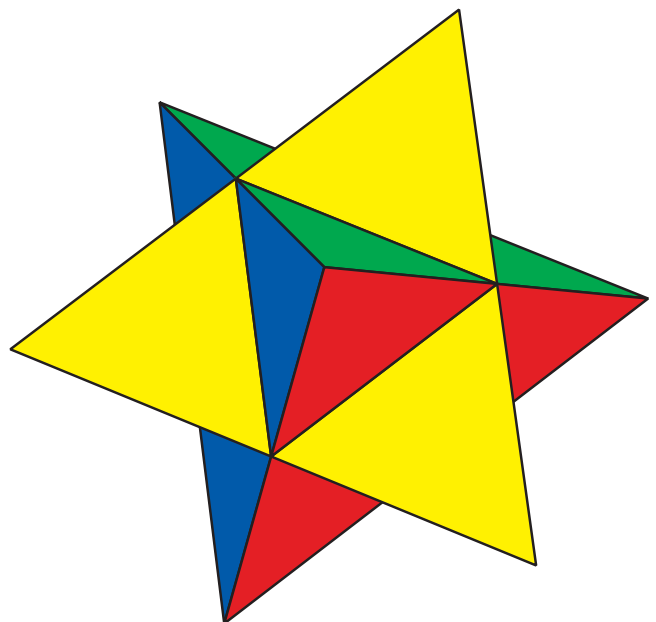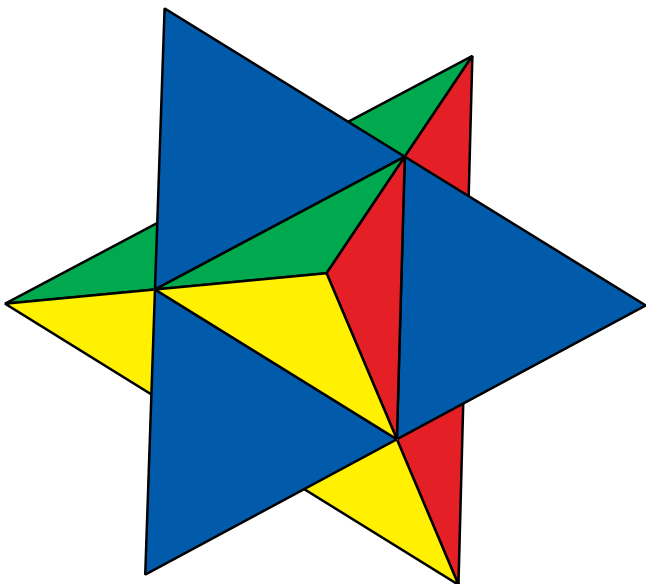
- This shape is called a stellated octahedron.

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Two Views

▶ Each activity shows you two different views of the same solid. Use the clues to make each one.

▶ This cube is made from four red squares.
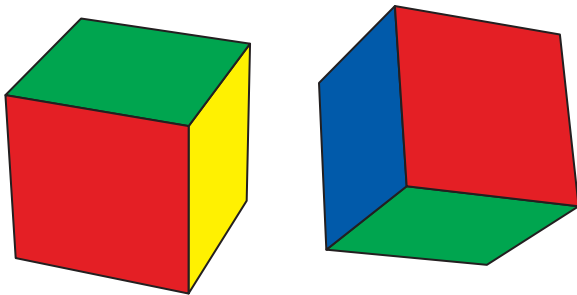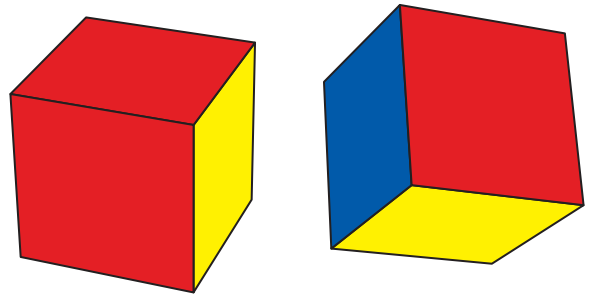
▶ This cube is made from two red squares, two green squares, one blue square and one yellow square.

▶ This octahedron is made from eight triangles.

▶ Two of them are blue, two are yellow, two are red and two are green.
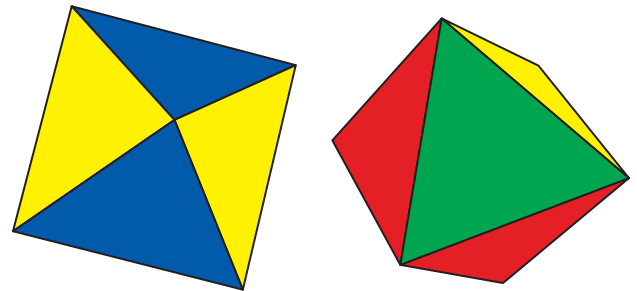
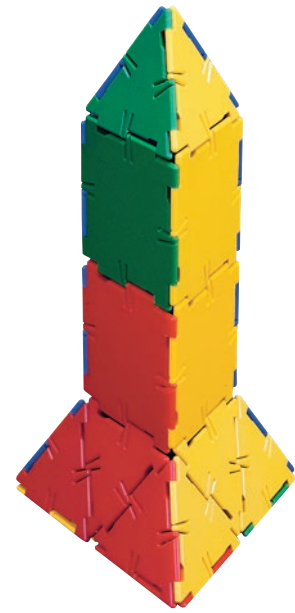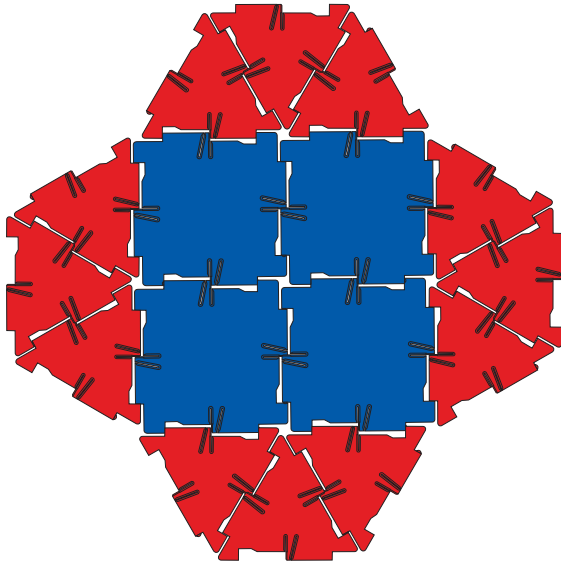▶ This solid is called a cuboctahedron. It has three red squares, three green squares, four yellow triangles and four blue triangles.
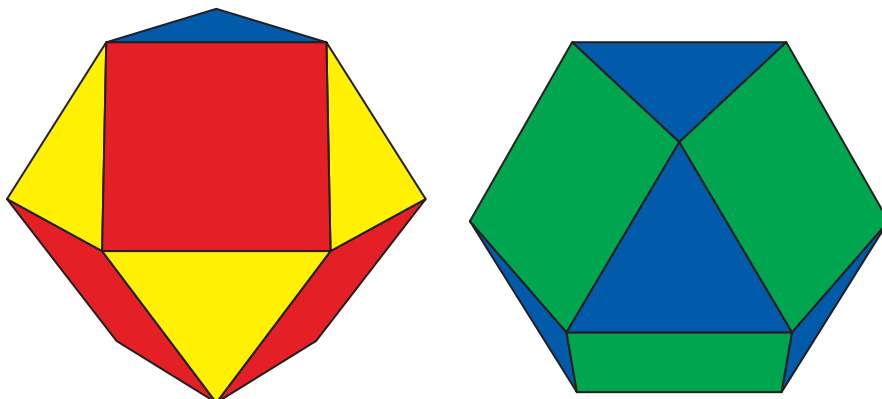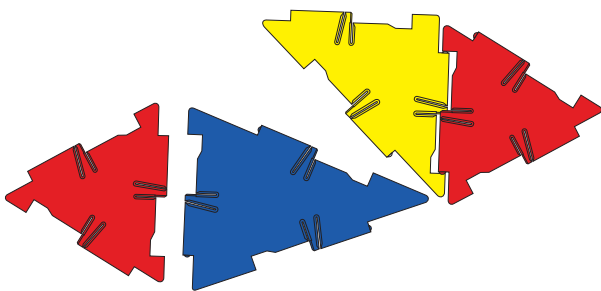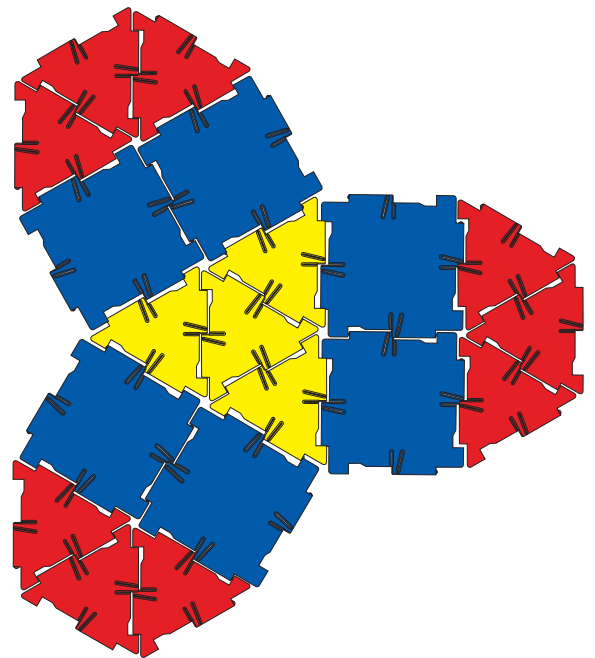
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Rockets

▶ Here is a Polydron rocket.

▶ Use the net below to make the base of the rocket.

▶ Make your rocket taller with a prism of rectangles.

▶ Complete your rocket with a pyramid on the top.

More Ideas

▶ Use the net on the right as a base for a new rocket.

▶ Make your rocket longer with squares and rectangles.

▶ Try adding some fins along the side of your rocket.

▶ Use different triangles to produce your own base.

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Faces, Vertices & Edges

▶ This cube has 6 faces, 8 vertices or corners and 12 edges. Make one and check.

▶ Make a collection of solids like the ones below.

▶ Make a larger copy of the table below.

▶ For each solid, record the the number of faces (F), the number of vertices (V) and the number of edges (E).

Name of Solid	Faces (F)	Vertices (V)	Edges (E)	F+V
Cube	6	8	12	14

▶ In the final column record the sum F + V.

▶ Try to find a relationship between the number of faces (F), vertices (V) and edges (E), for each of your solids.

▶ This relationship is sometimes called Euler's formula, named after the 18th century Swiss mathematician, Leonhard Euler.
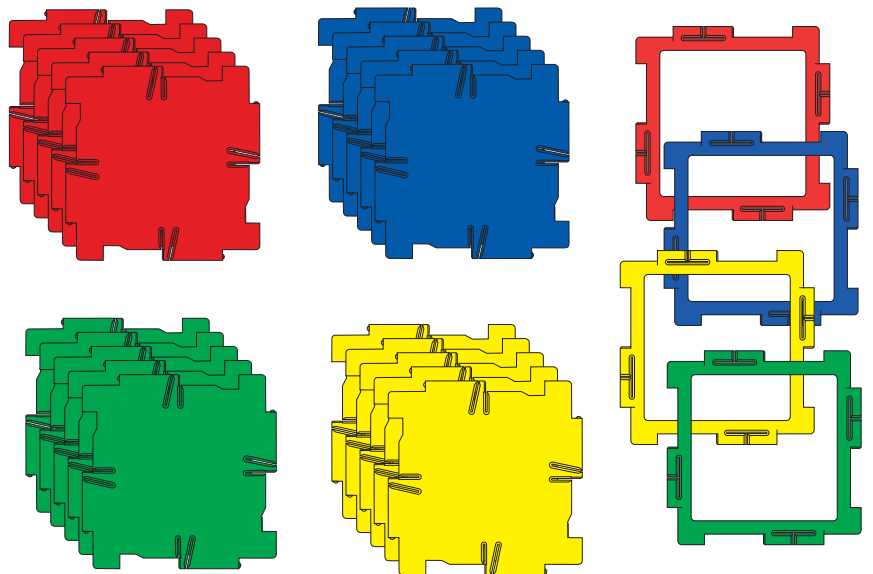
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Cubes

- ▶ Take six red squares.

- ▶ Make a red cube.

- ▶ Make a blue cube, a yellow cube and a green cube.
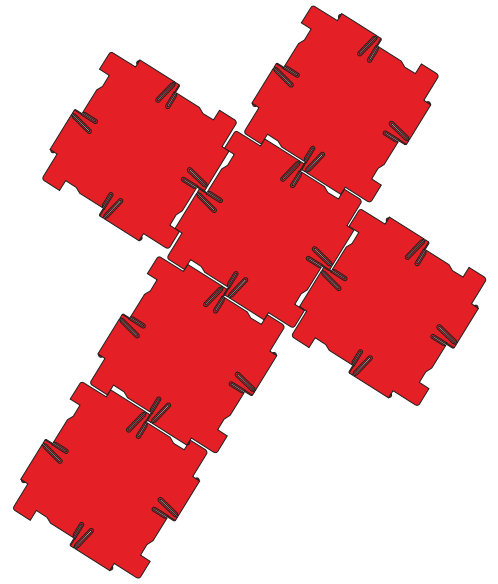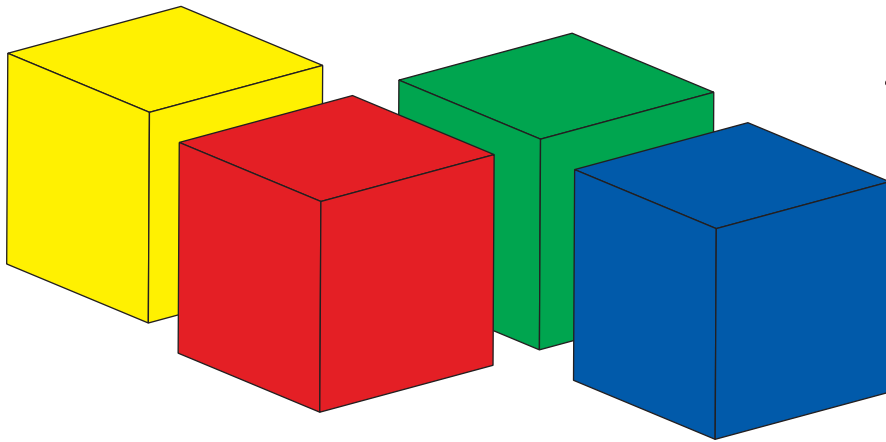
- ▶ Make some more cubes and arrange them in a pattern.

- ▶ Join your cubes together.

More Ideas

- ▶ Make a big cube with 24 squares.

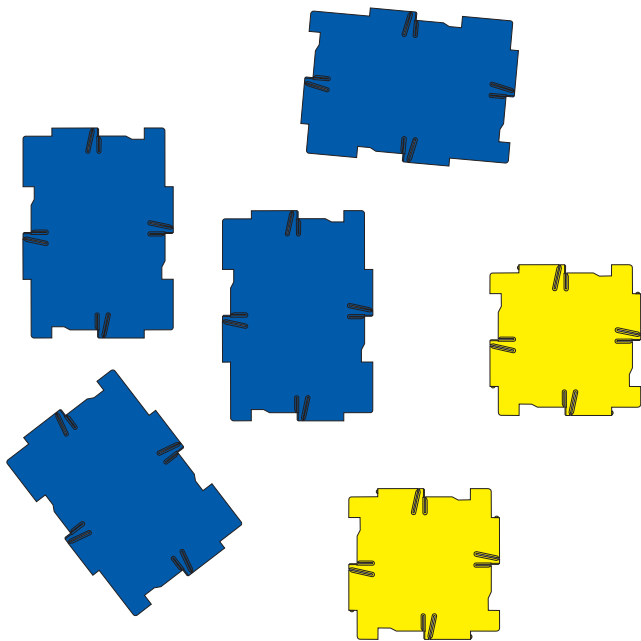- ▶ Open the top of your big cube and fit some small cubes inside.
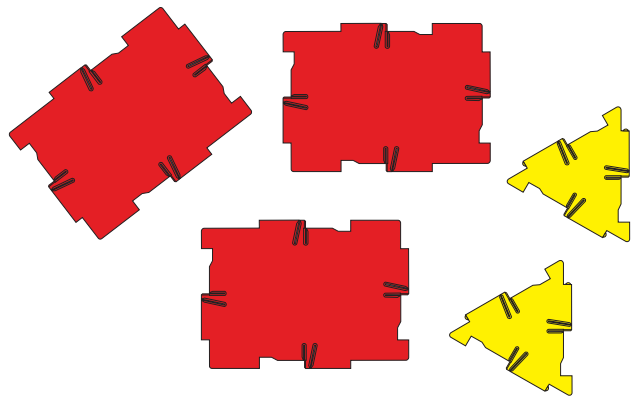
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Prisms

▶ This solid is called a prism.

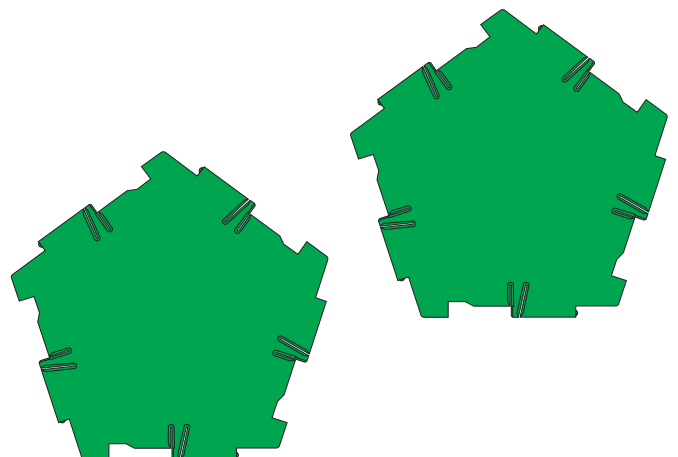▶ A prism has the same shape at each end and a belt made from squares or rectangles.

▶ Use these shapes to make a prism of your own.

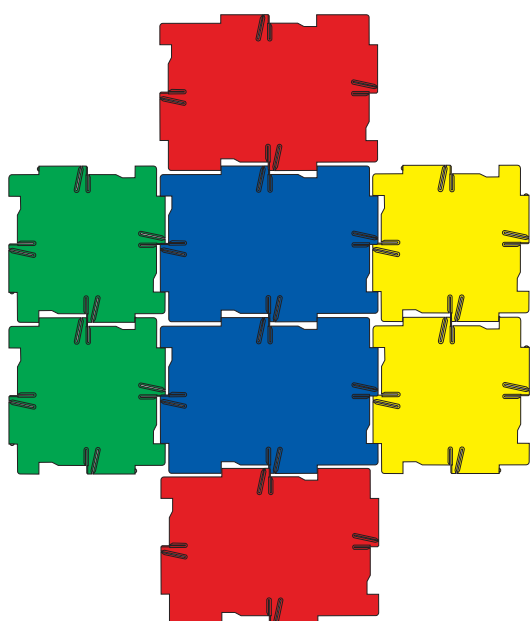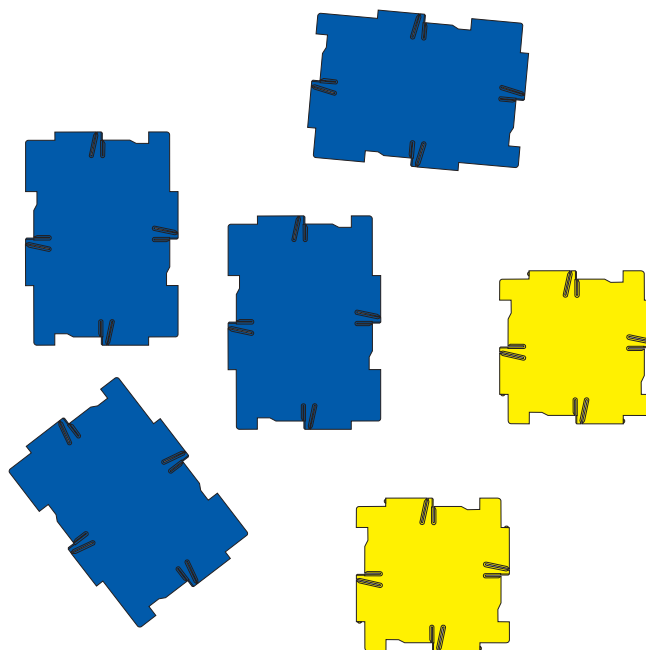▶ Make a prism with these squares and rectangles.

▶ This prism is also a cuboid.

More Ideas

▶ Make a prism with a pentagon at each end.

▶ Make an unusual prism with two triangles at each end.

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Cuboids

- A cuboid is a solid made only from rectangles and squares.

- Make a cuboid with these rectangles and squares.

- Make your cuboid longer by adding more rectangles.

- Make this flat shape.

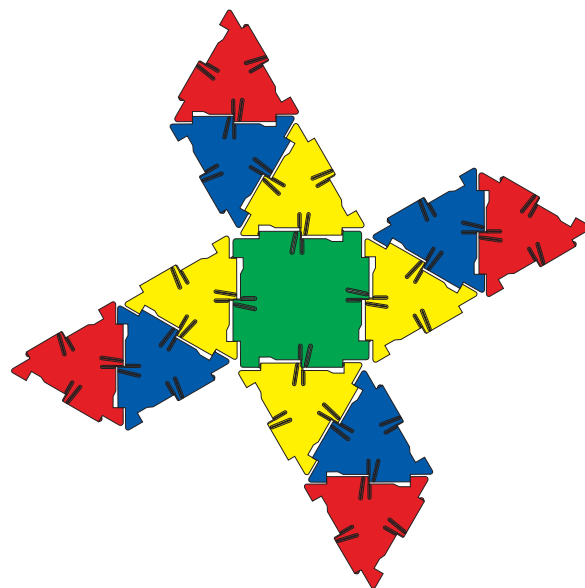- Fold up your shape to make an open box.

- Put a lid on it.

More Ideas

- Use these pieces to make a large cuboid.
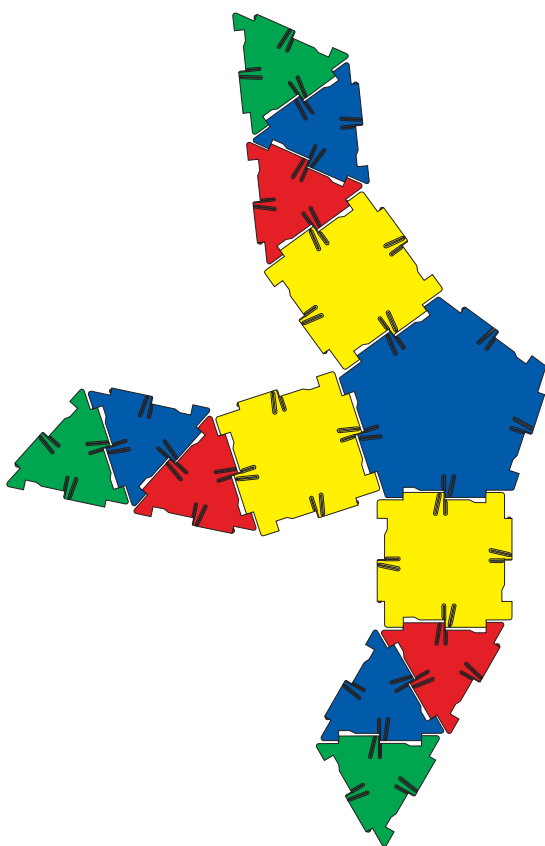
- Make a large cuboid of your own.
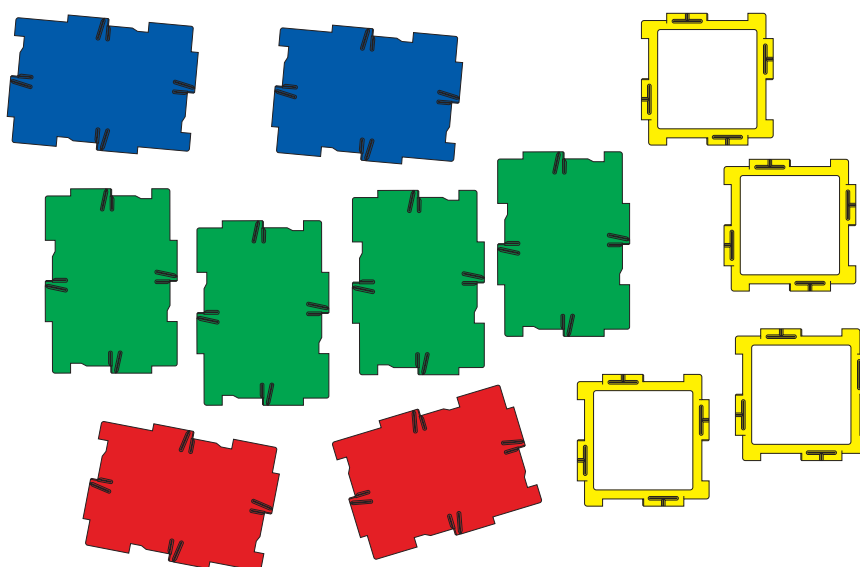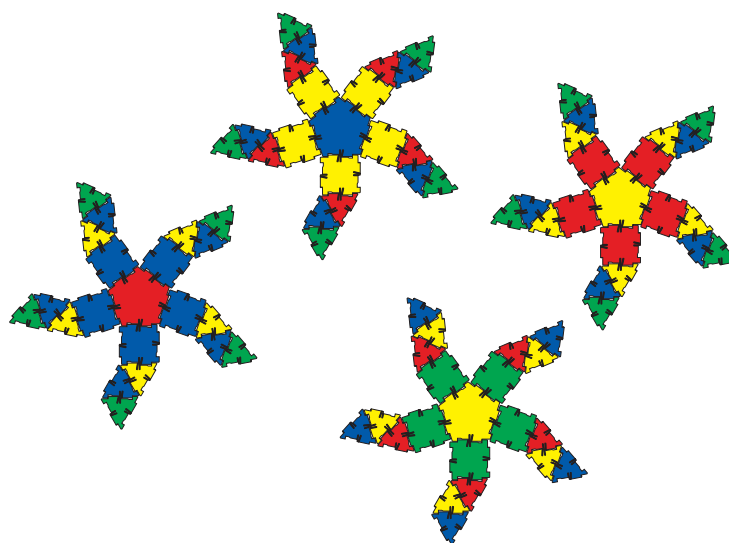
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Spidrons

- ▶ Spidrons are Polydron Spiders.

- ▶ Make this spidron with four legs.

- ▶ Make each leg longer.

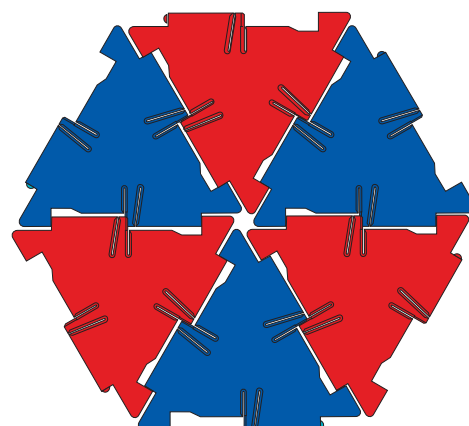- ▶ Make this spidron. It has five legs but two of them are missing.

- ▶ Make a colourful group of spidrons like this.

- ▶ Make each one different.

More Ideas

- ▶ Join six triangles like this to make a hexagon.

- ▶ Add a spidron leg to each triangle.

- ▶ Can you make each leg the same?

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Challenging 3D Nets

▶ Polydron is ideal for creating 3D shapes which are more complex.

▶ Below are 3 nets for 3 different shapes.

▶ For each one can you first of all guess what shape can be made from the net, and then secondly you need to build the shape and check the answer on the next page.
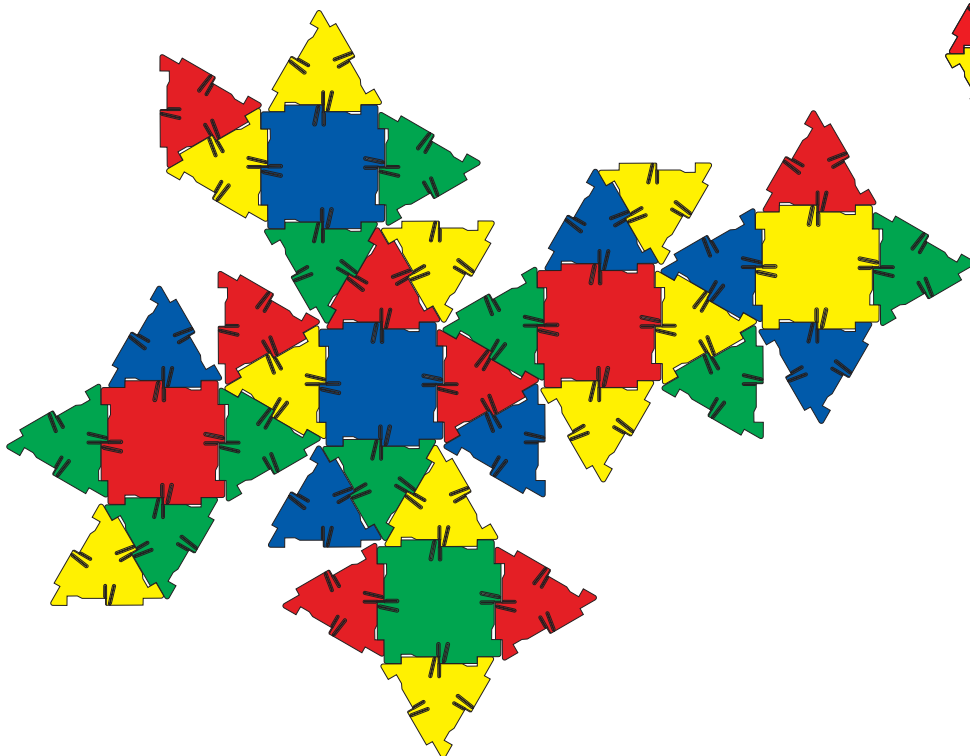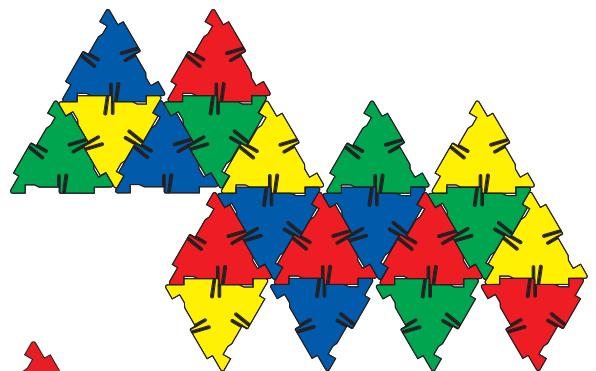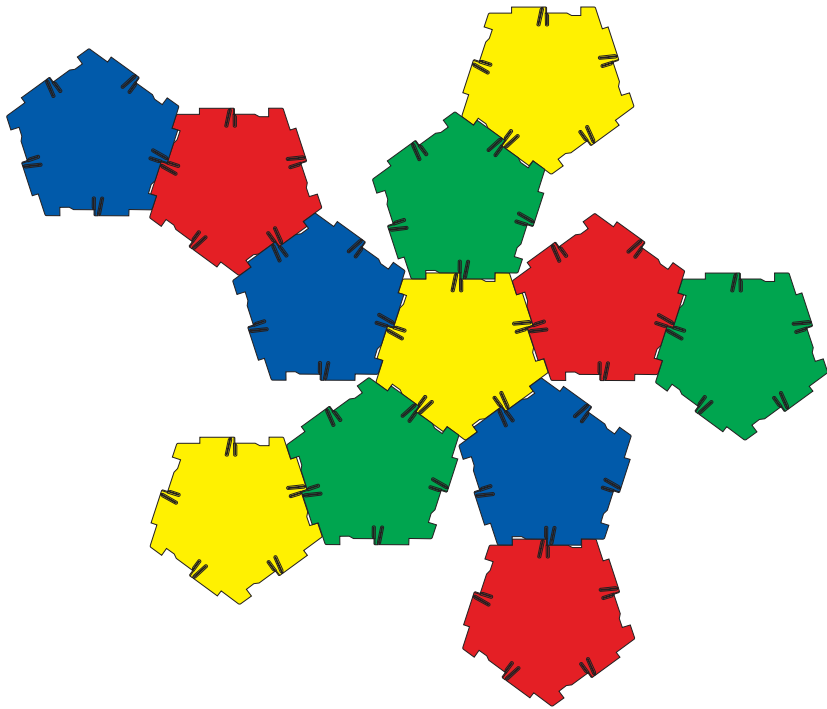
Challenging 3D Net Answers

Regular Dodecahedron

Icosahedron

Snub Cube