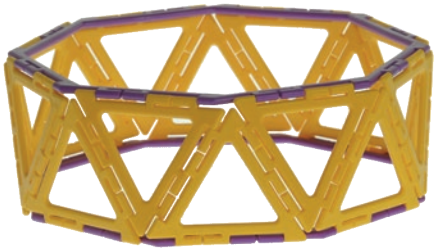
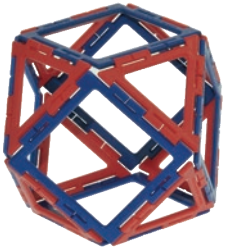
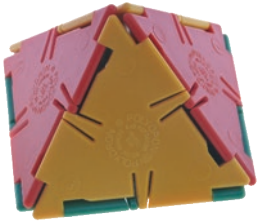
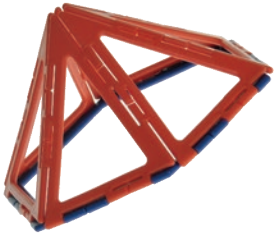
POLYDRON

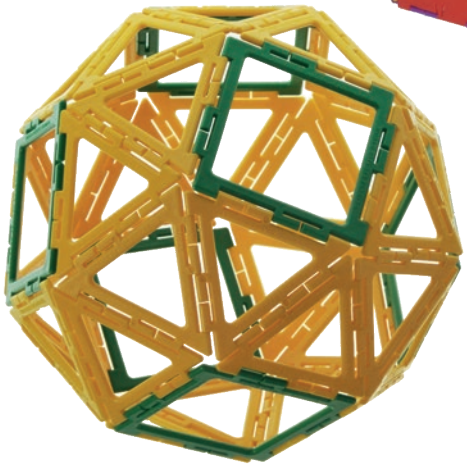
Exploring Polydron and Polydron Frameworks

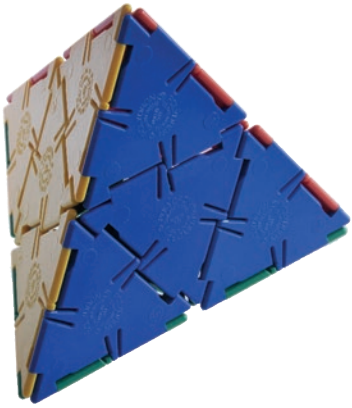












Written by Bob Ansell

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This publication is designed to show what can be achieved with Polydron and Polydron Frameworks.

Polydron materials have been widely used in education and in the home for over 30 years and have enriched the experiences of many thousands of children.

Indeed, for many children Polydron and Polydron Frameworks have given them access to the wonderful world of 3-D geometry and construction.

Bob Ansell

Bob Ansell is a Senior Lecturer in Mathematics Education at the University of Northampton. He has written and produced many publications that support teachers, students and parents to explore the potential of Polydron and Polydron Frameworks.

Just Four Triangles

- Polydron has four different shaped triangles.

- Select four small equilateral triangles to make a tetrahedron.

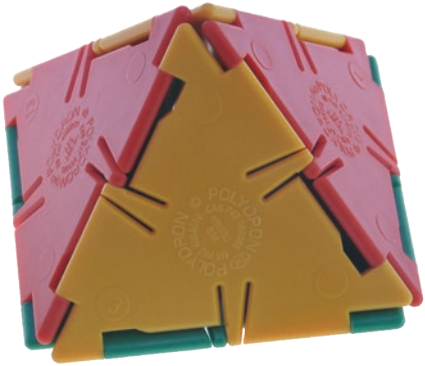
- Here is a different tetrahedron you can make.

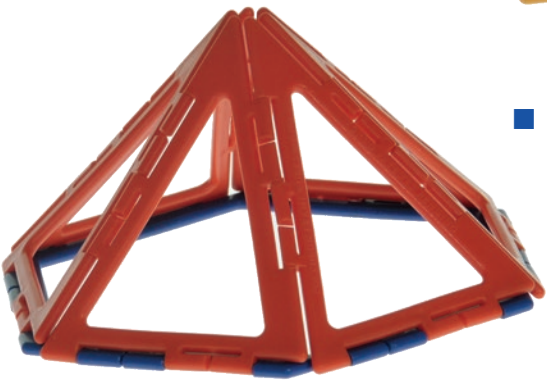
- Make an unusual tetrahedron with these four triangles.

- Make a collection of as many different tetrahedrons (tetrahedra) as you can.

Pyramids

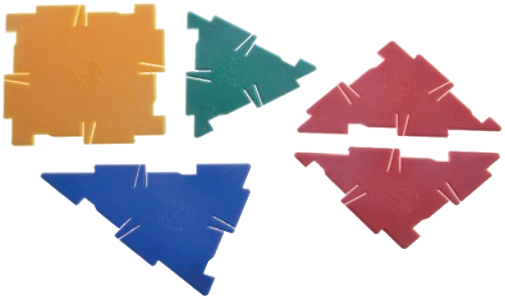
- Make this square-based pyramid. It has small equilateral triangles for the sloping faces.

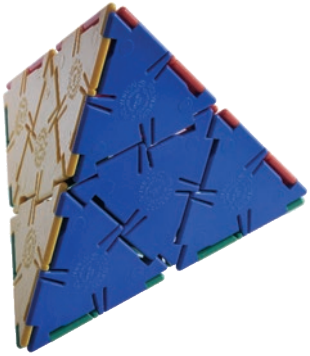




- This is a hexagonal based pyramid with isosceles triangles for the sloping sides.

- Make an unusual square-based pyramid with these pieces.

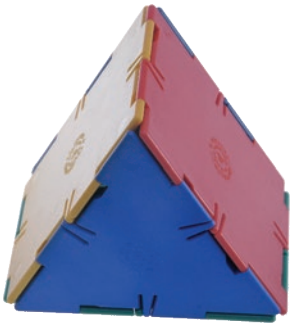


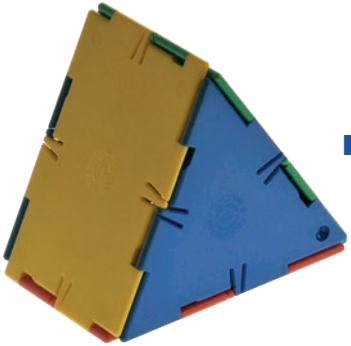


- A triangular-based pyramid is also called a tetrahedron. Here is an enlarged one made from four triangles of each colour.

Prisms

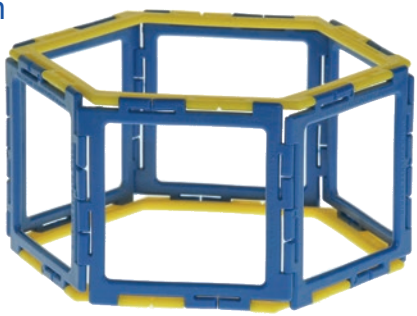
- This prism has small equilateral triangles for the end faces.

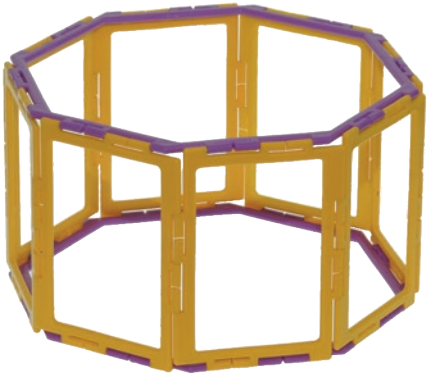




- This prism looks similar to the one above but has large equilateral triangles for the end faces.

- Prisms may have any polygon for the end faces and a belt of squares or rectangles.

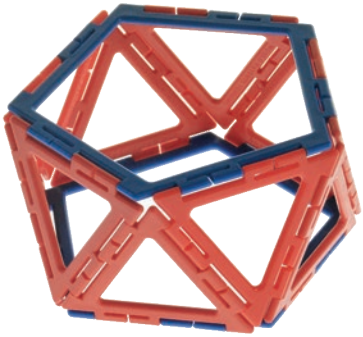


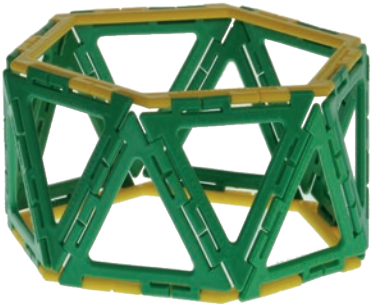


- This cube is a special prism.

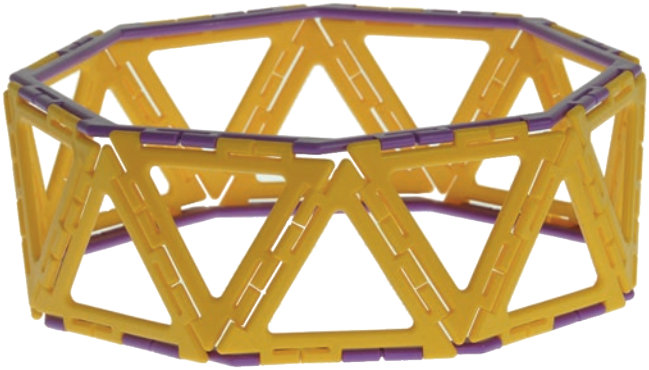
Antiprisms

- Antiprisms are wonderful solids that have a polygon for the top and bottom and a belt of triangles.

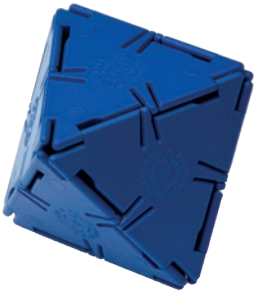




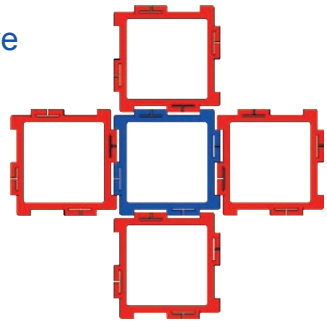
- Unlike a prism, an antiprism has no plane of symmetry parallel to its end faces.



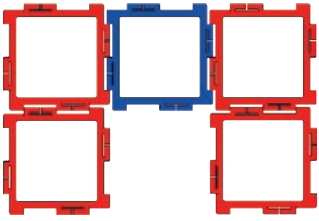
- Can you see why this octahedron is a special antiprism?

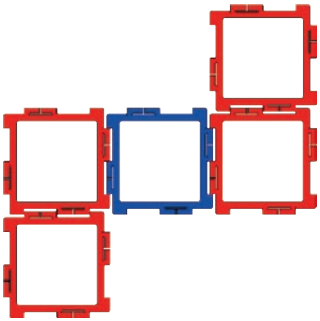


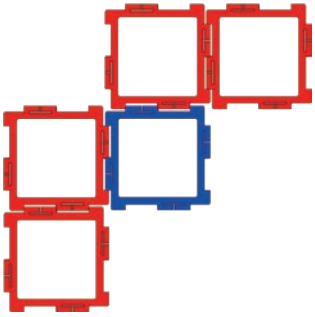
Pentominoes

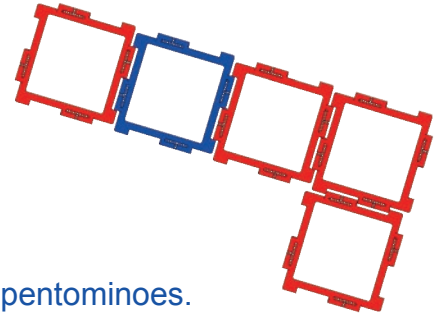


- Pentominoes are arrangements of five squares.
- Find as many pentominoes as you can.
- Some pentominoes can be folded to make an open box.
- Decide which of the pentominoes below will make an open box and have a blue square for the base.





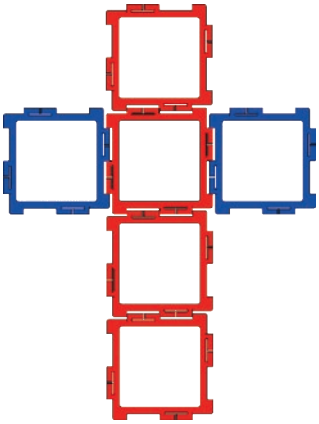




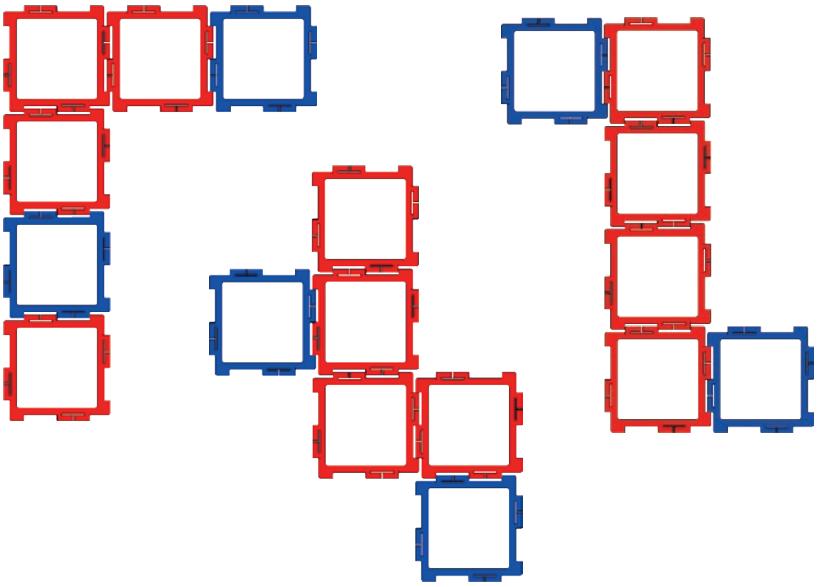
- There are twelve different pentominoes. Can you find them all?

Nets of a Cube

- Take six squares and make a cube.
- Check that the the two blue squares are on opposite faces of the cube.



- Which of these three arrangements are nets of a cube?

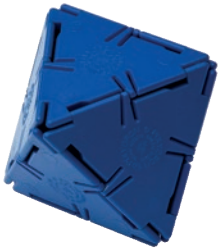


- Can you find all eleven nets of a cube?

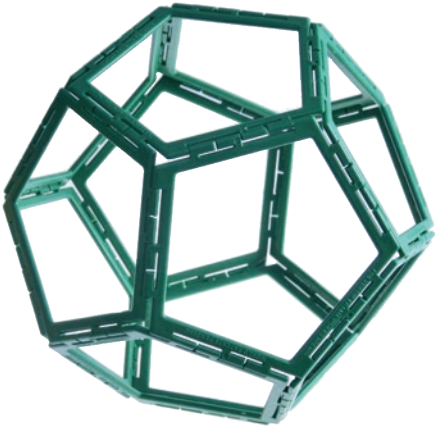
Platonic Solids

- There are five Platonic Solids, named after the Greek philosopher, Plato.
- Platonic Solids each contain only one sort of regular polygon. At every vertex you will see the same arrangement of polygons.
- This tetrahedron has four equilateral triangles, with three meeting at each vertex.

- The cube has six squares with three meeting at each vertex.
- The octahedron below has eight triangles with four meeting at each vertex.



- The dodecahedron needs twelve regular pentagons.

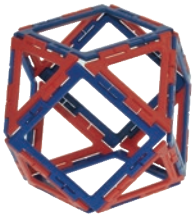


- The icosahedron has twenty equilateral triangles with five meeting at each vertex.

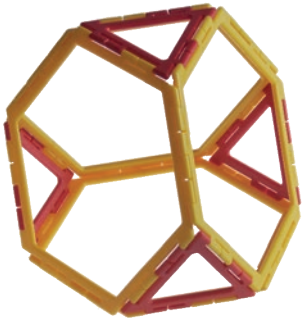
See the Platonic Solids video at **polydron.co.uk/videos**

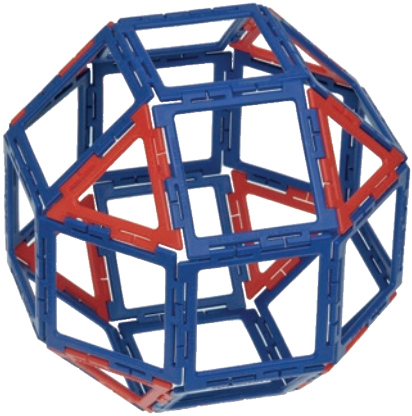
Archimedean Solids

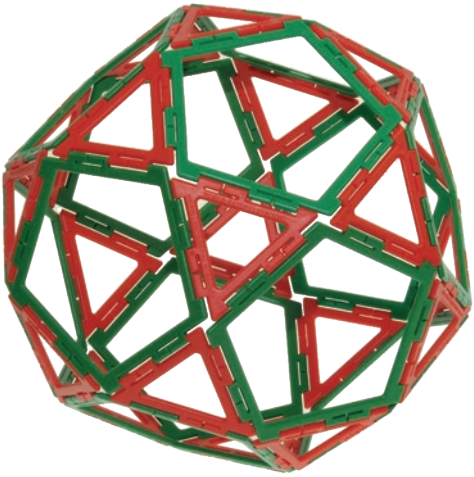
- Archimedean Solids are named after the Sicilian mathematician and engineer, Archimedes.

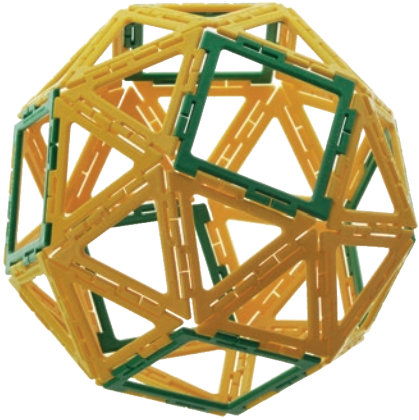


- These solids are made from more than one sort of regular polygon, but every vertex is the same.
- Here are some of the thirteen different Archimedean Solids.





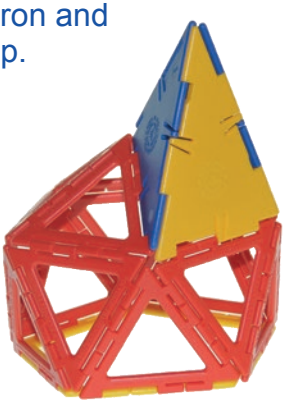




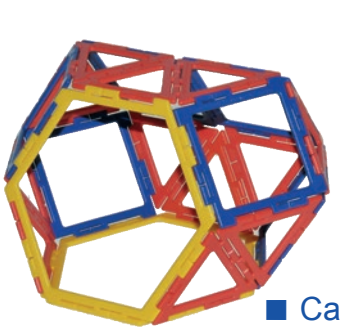
- Most of those above have symmetry. But the final one on the right, called the snub cube, has no symmetry, making it tricky to construct.

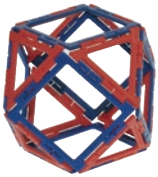
Funny Houses

- Make this funny house with large triangles and rectangles.
- The funny house below has been created from part of an icosahedron and then adding a strange top.



- The funny house below has been made from parts of the two smaller two solids. Can you see how it was done?





- Can you make it taller?

- This funny house has an octagon for a base.
- Make it taller or join two together.

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