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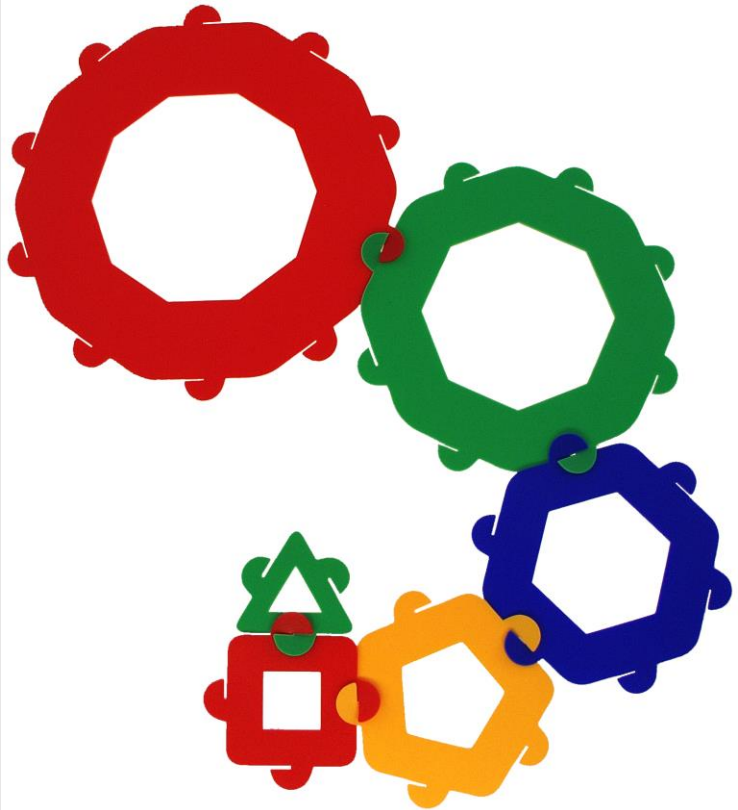
HALLÅ STEAM!

Experience Workshop's STEAM Learning Material

Exploring

***S**cience,*
***T**echnology,*
***E**ngineering,*
***A**rts and*
***M**athematics*

with ITSPHUN



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What is STEAM education?

- The **Finnish National Core Curriculum** makes recommendations to teachers and schools about the development of *student-centered*, *multidisciplinary / phenomenon-based learning* programs and collaborative teaching.

- **STEAM** provides a reasonable basis to complete this requirement, as it means the *multidisciplinary or transdisciplinary integration of* **S**cience-, **T**echnology-, **E**ngineering-, **A**rts- and **M**athematics learning about various topics.

- **STEAM** is based on the collaboration between the teachers.

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STEAM EDUCATION

What is STEAM Education?

STEAM stands for Science, Technology, Engineering, the Arts, and Mathematics, referring to an integrated approach to learning.

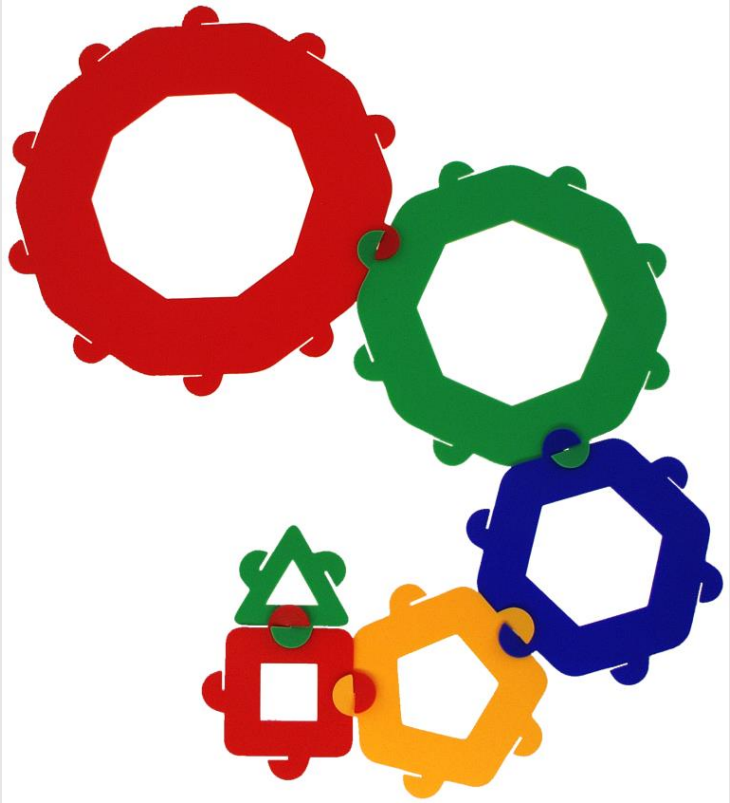
Through project-based, creative methods, STEAM Learning aims to foster problem-solving, collaboration, integrative thinking.

STEAM can boost students' engagement, motivation and their joy of learning.

What is ITSPHUN?

A system of geometric shapes that can be combined in myriad ways to make wonderful and colorful creations at the intersection of art and mathematics.
Learn more about 3D geometry while having fun!

Itsphun pieces are cut from food-grade, environmentally-friendly Priplak polypropylene.
Regular pieces range from 5 to 10cm in diameter.



ITSPHUN is distributed by Experience Workshop in Europe.
You can purchase it from www.learningbydoing.fi. ITSPHUN is manufactured by ITPSHUN LLC.

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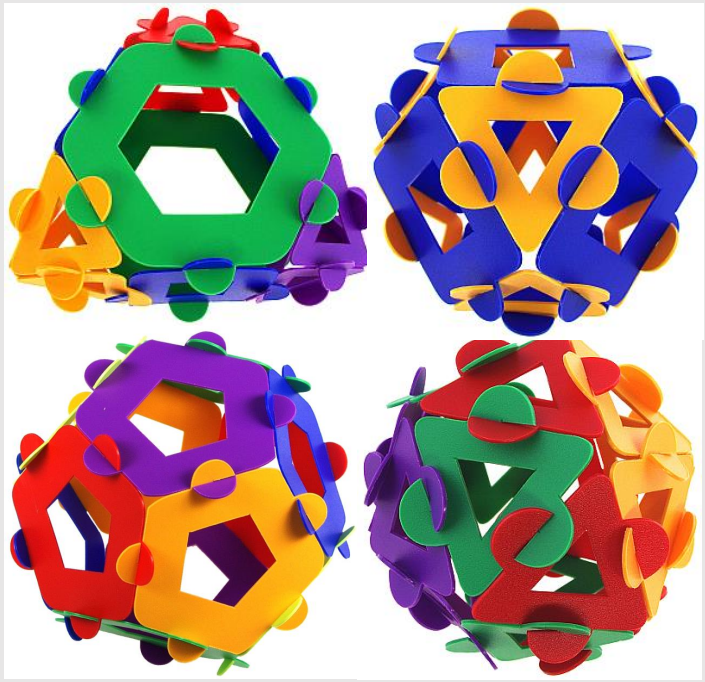
ITPSHUN parts

ITSPHUN pieces are models of regular polygons with 3, 4, 5, 6, 8 and 10 sides. All the pieces, regardless of shape, have the same side length which allows for modeling geometric solids with regular faces.



With these pieces one can make both *convex* and *non-convex* polyhedra. Among the convex polyhedra with regular faces, there are five important classes that are described in this presentation.

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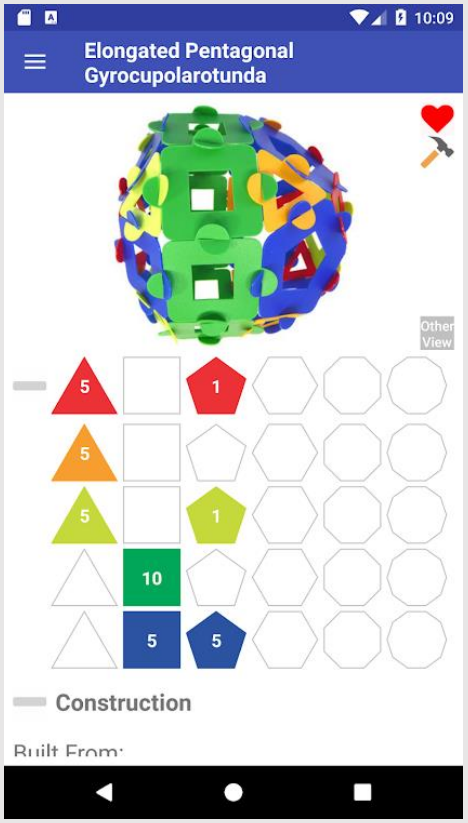
The ITSPHUN app

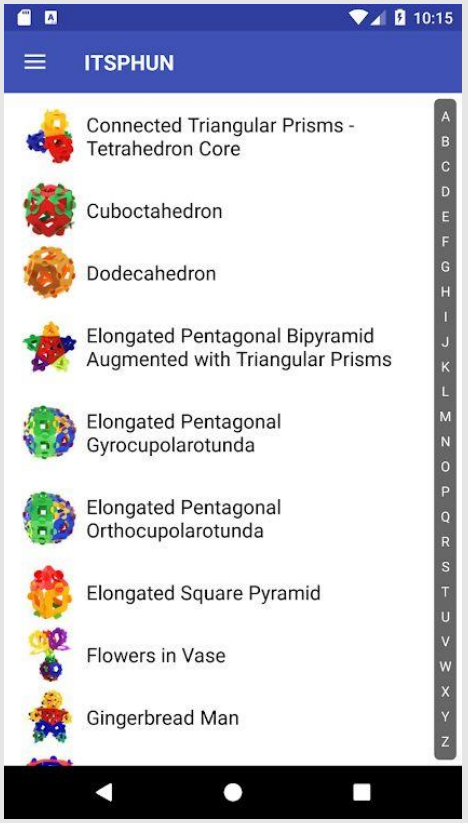
This app contains a large searchable database of models that can be built with ITSPHUN Geometric Art construction sets. The models are presented along with construction tips and math information. The browser also contains explanations for the math concepts and construction methods used. The objects can be tagged as built or favorite and the models can be searched using these and other criteria.

SEARCH FOR THE APP:

Download on the App Store

GET IT ON Google Play

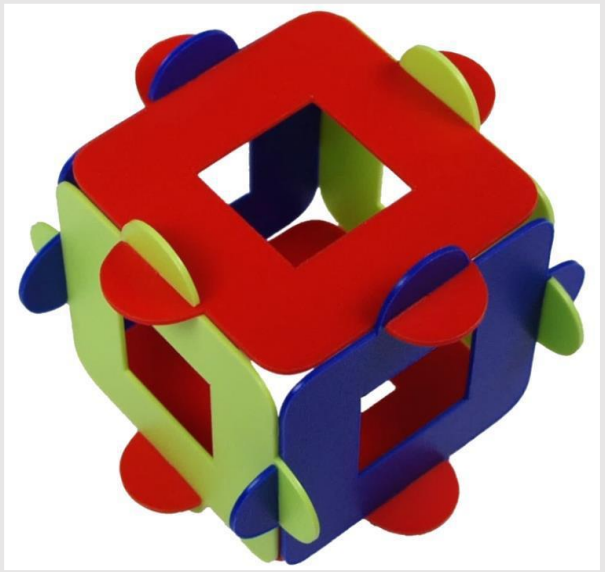




Platonic solids

All faces of a **Platonic solid** have the same shape and size. There are only 5 Platonic solids and you can create all of them with the pieces in the kit.

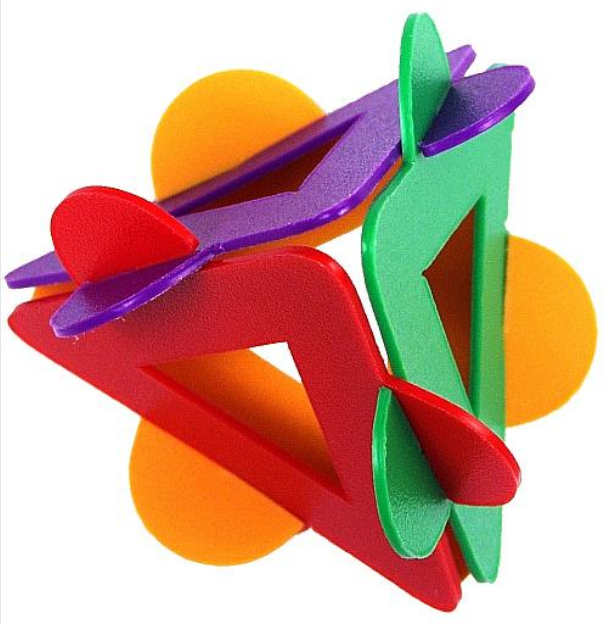
- Tetrahedron
- Dodecahedron
- Cube
- Icosahedron
- Octahedron



Platonic solids

Tetrahedron

In geometry, a tetrahedron (plural: tetrahedra or tetrahedrons), also known as a triangular pyramid, is a polyhedron composed of four triangular faces, six straight edges, and four vertex corners. The tetrahedron is the simplest of all the ordinary convex polyhedra and the only one that has fewer than 5 faces. Source



https://youtu.be/MRFMdnftT2o

Platonic solids

Dodecahedron

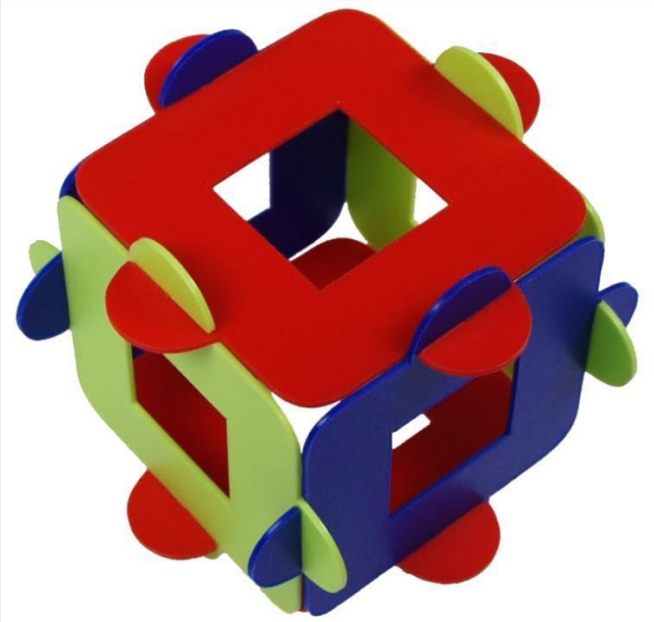
In geometry, the **augmented dodecahedron** is one of the Johnson solids (J_{58}), consisting of a dodecahedron with a pentagonal pyramid (J_2) attached to one of the faces. When two or three such pyramids are attached, the result may be a parabiaugmented dodecahedron, a metabiaugmented dodecahedron or a triaugmented dodecahedron.
Source

https://youtu.be/VO2dhQQqp10

Platonic solids

Cube

In geometry, a **cube** is a three-dimensional solid object bounded by six square faces, facets or sides, with three meeting at each vertex. The cube is the only regular hexahedron and is one of the five Platonic solids. It has 6 faces, 12 edges, and 8 vertices. Source



https://youtu.be/vXEKUCm_IJ0

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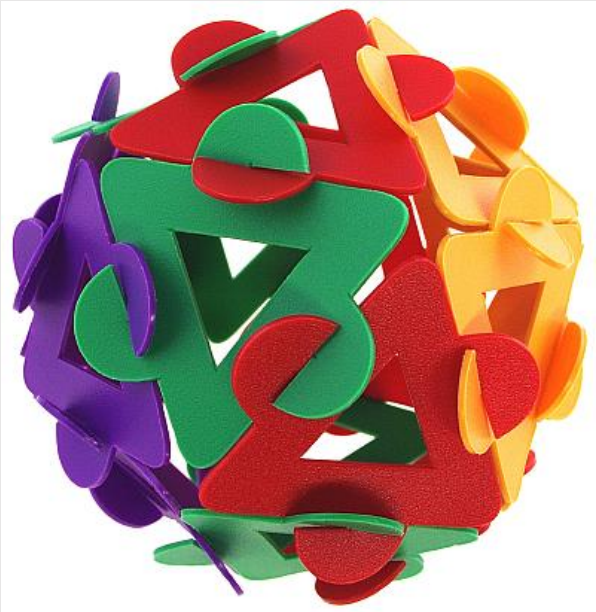
Platonic solids

Icosahedron

In geometry, an **icosahedron** is a polyhedron with 20 faces. There are infinitely many non-similar shapes of icosahedra, some of them being more symmetrical than others. The best known is the (convex, non-stellated) regular icosahedron - one of the Platonic solids - whose faces are 20 equilateral triangles. Source



https://youtu.be/WkJTv4OpU68

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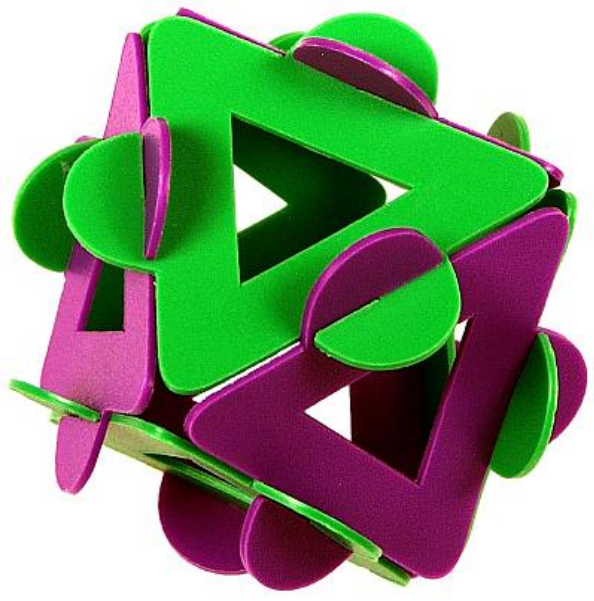
Platonic solids

Octahedron

In geometry, an octahedron is a polyhedron with eight faces, twelve edges, and six vertices. A regular octahedron is the dual polyhedron of a cube. It is a rectified tetrahedron. It is a square bipyramid in any of three orthogonal orientations. It is also a triangular antiprism in any of four orientations. Source



https://youtu.be/qLSpErreMsw

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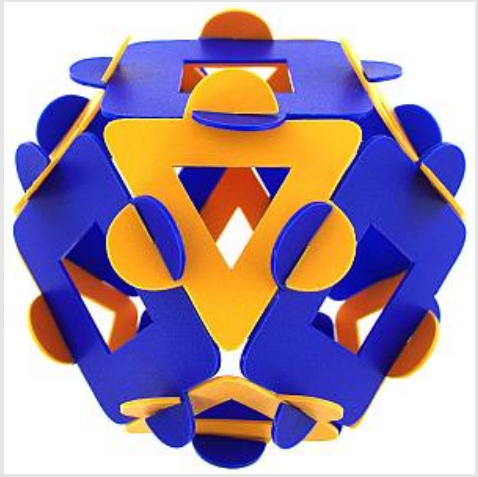
Archimedean solids

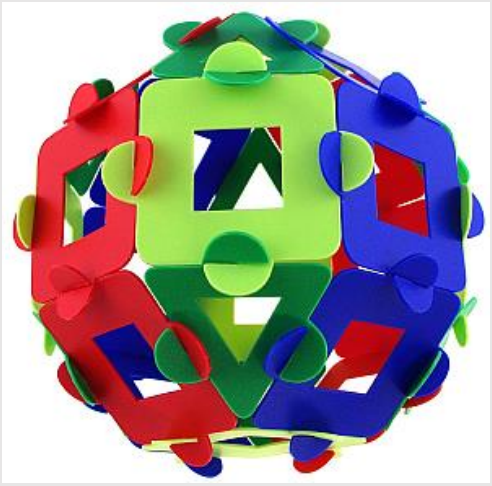
The faces of an **Archimedean solid** are not all the same, but any corner of the solid still looks like any other corner. There are 13 Archimedean solids (not including the prisms and antiprisms) and you can make 7 of them with this kit.

Truncated tetrahedron



Cuboctahedron

Truncated icosahedron



Rhombicuboctahedron

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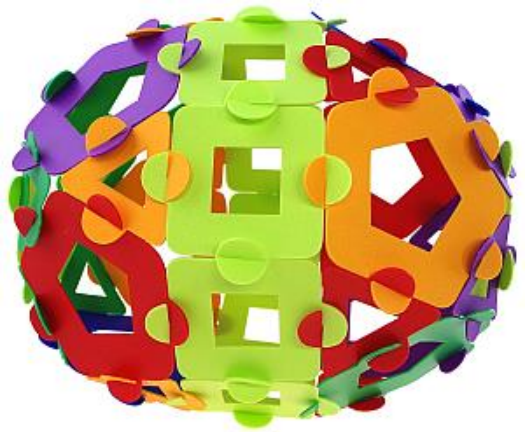
Johnson solids

Johnson solids have the fewest restrictions: not all their corners look the same. There are 92 Johnson solids and you can make many of them with the pieces in the kit.

Triaugmented hexagonal prism

Augmented sphenocorona



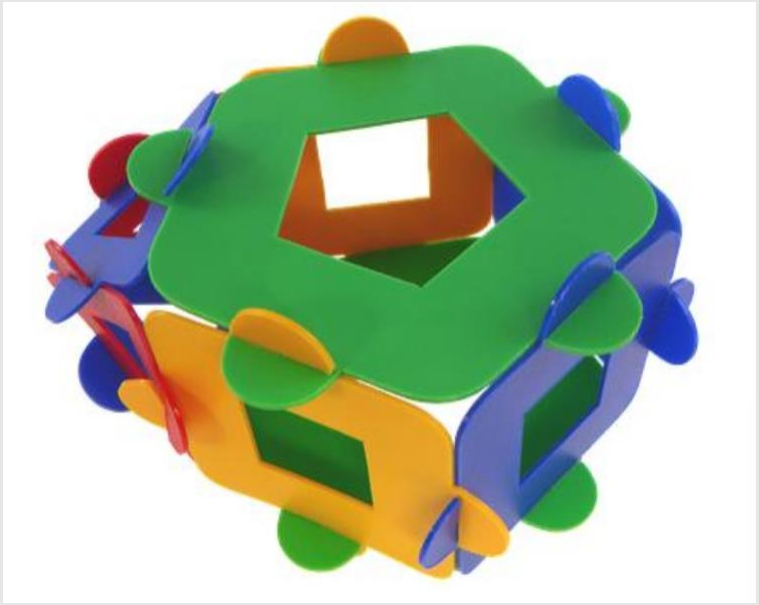
Elongated pentagonal gyrobirotunda

Gyroelongated pentagonal cupolarotunda

Johnson solids

Augmented pentagonal prism

In geometry, the augmented pentagonal prism is one of the Johnson solids. As the name suggests, it can be constructed by augmenting a pentagonal prism by attaching a square pyramid to one of its equatorial faces. Source

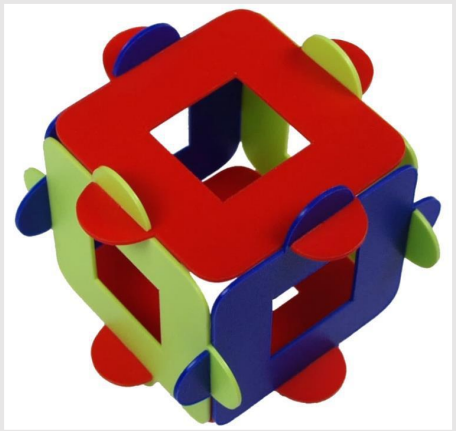


https://youtu.be/Mb22VIGWzkg

Uniform prisms

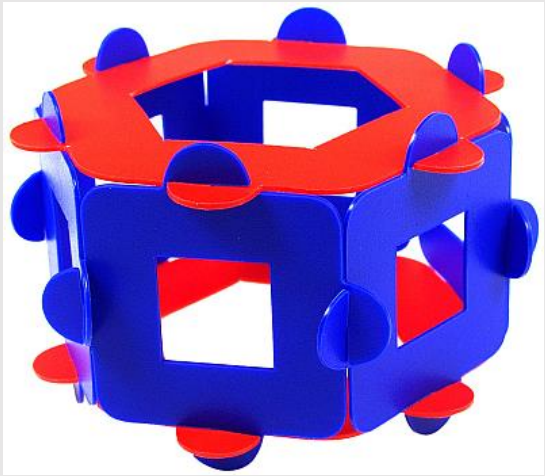
Uniform prisms have two *n*-sided regular polygons as ends and *n* squares as sides. The *cube* is also a square prism. There are infinitely many such prisms and 6 of them can be made with the kit.

- Cube
- Decagonal Prism
- Hexagonal
- Octagonal
- Pentagonal
- Triangular



Cube

Triangular Prism

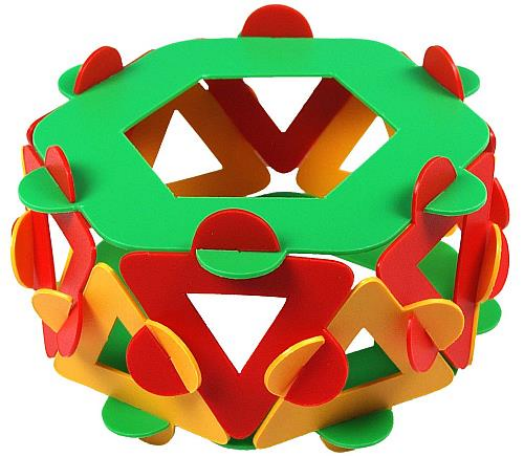


Gyroelongated pentagonal cupolarotunda

Uniform antiprisms

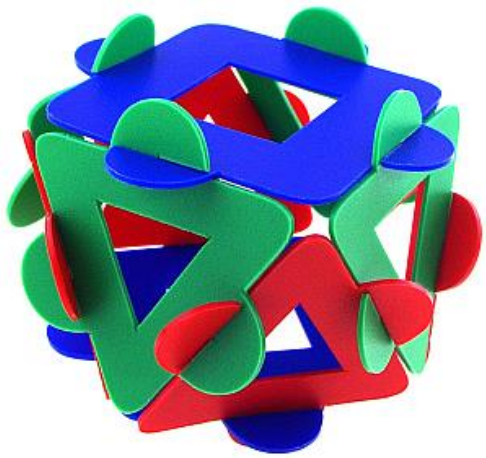
Uniform antiprisms have two *n*-sided regular polygons as ends connected by a band of 2*n* equilateral triangles. There are infinitely many such prisms and 6 of them can be made with the kit. If n=3, the object is an *octahedron*.

- Decagonal Antiprism
- Hexagonal Antiprism
- Octagonal Antiprism
- Octahedron
- Pentagonal Antiprism
- Square Antiprism



Hexagonal Antiprism

Octahedron



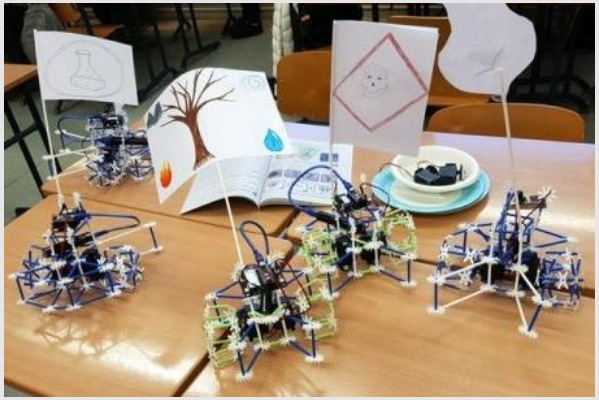
Square Antiprism

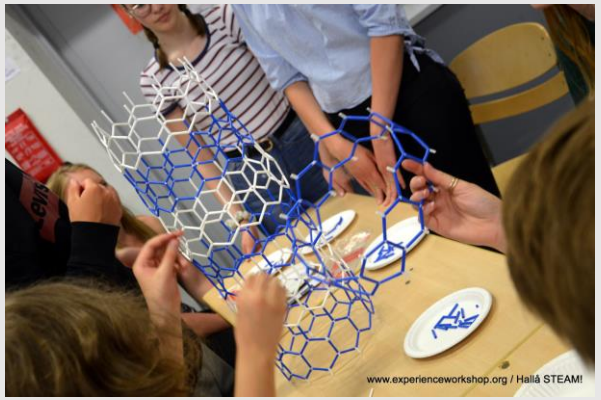
HALLÅ STEAM!

This educational material was created within the frameworks of the HALLÅ STEAM! program, realized with the support of the **Swedish Cultural Fund** in Finland.

The **Swedish-Finnish STEAM Learning Day "HALLÅ STEAM!"** offers STEAM activities, partially based on historical connections between art and sciences in the Swedish-Finnish context.

The content of the STEAM Learning Day **involves local teachers and students** of the hosting school and is designed in close cooperation with them.





Webpage: https://experienceworkshop.org/halla-steam-svensk-finska-steam-learning-day-2018-2021
The program is realized by **Experience Workshop ay** and supported by the **Swedish Cultural Fund**.

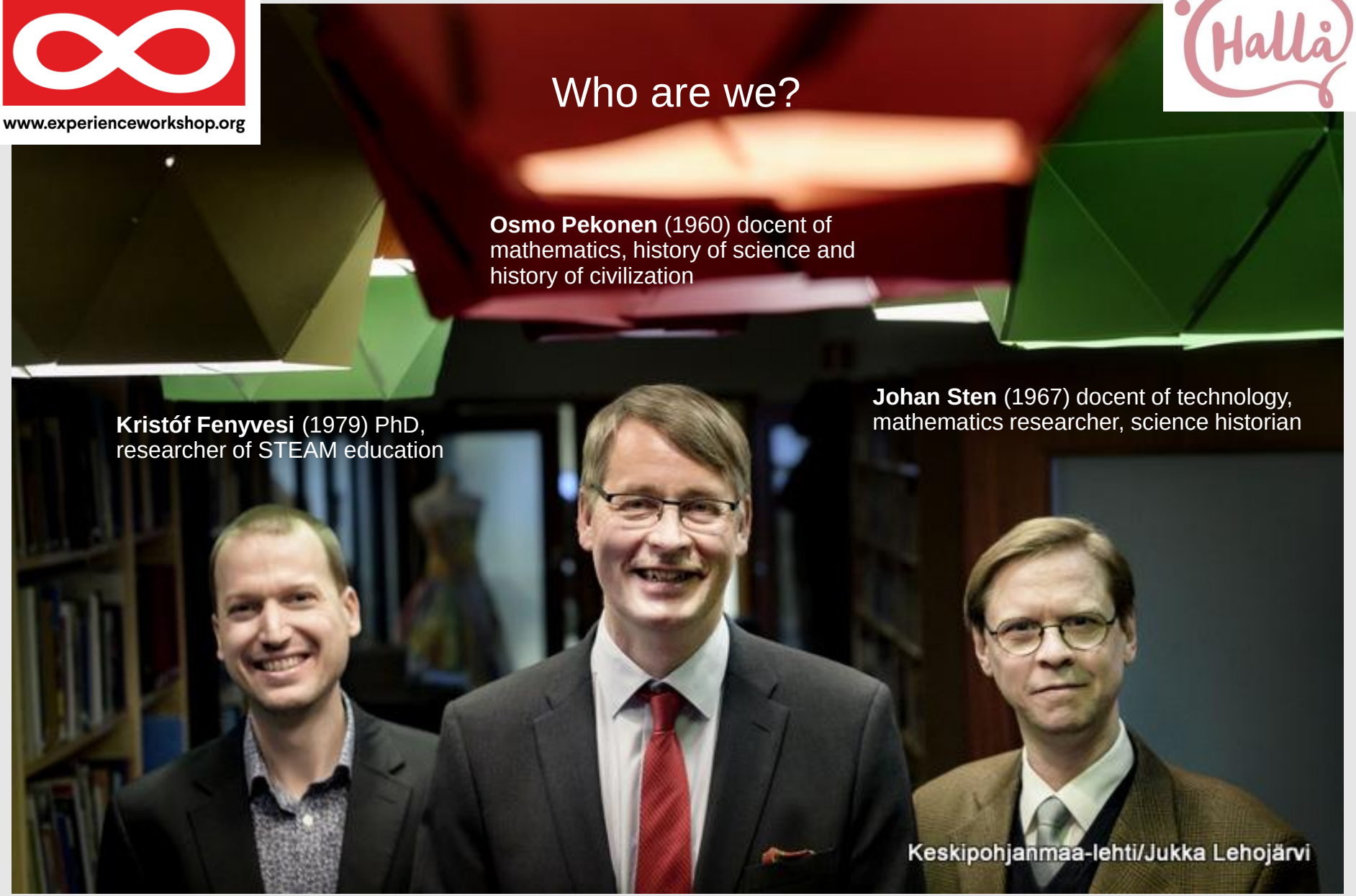
HALLÅ STEAM!

Who are we?

Osmo Pekonen (1960) docent of mathematics, history of science and history of civilization

Kristóf Fenyvesi (1979) PhD, researcher of STEAM education

Johan Sten (1967) docent of technology, mathematics researcher, science historian



Experience Workshop

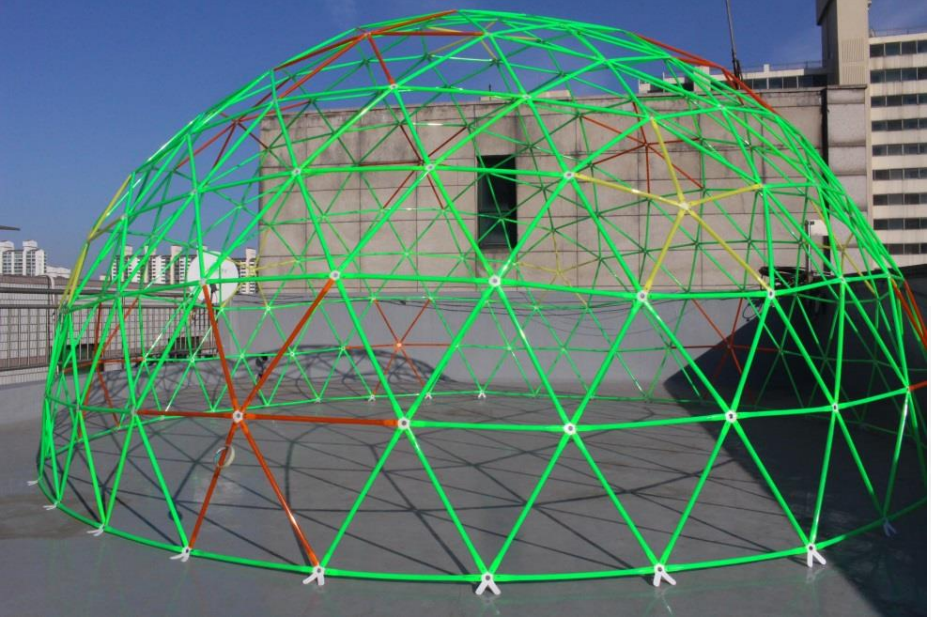
SYNERGIES IN ACTION
Our goal is to offer opportunities for everyone to learn mathematics through the arts, and to create art through mathematics.

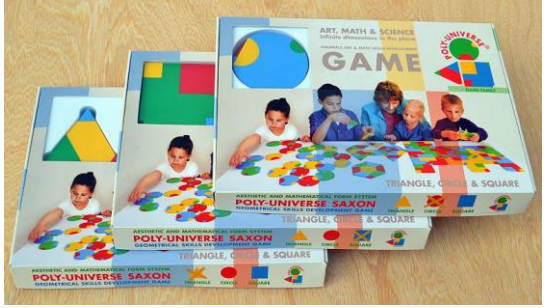
NETWORK & EVENTS
We organize creative school days / mathematics & art education programs / multidisciplinary festivals / family days / exhibitions / workshops / seminars and trainings

FULL STEAM AHEAD
We offer research, consultancy and project management in the field of multidisciplinary learning and STEAM (Science, Technology, Engineering, Arts and Mathematics) education.

ARTS AND SCIENCE FOR CHILDREN
Our International Travelling Exhibition of Mathematical Art is ready to visit you. The collection includes artworks, scientific modelling tools, math-art puzzles, and other spectacular objects.

Contact us: info@experienceworkshop.org
Website: www.experienceworkshop.org





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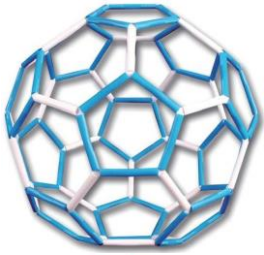

Explore the world of **Science, Technology, Engineering, Arts and Mathematics**!
Browse among the best tools of STEAM education!

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Interested in STEAM? Looking for support in connecting mathematics and art in education? Do you have a good idea?

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tinyurl.com/mathart-channel

Dr Kristof Fenyvesi

Nora Somlyody

Väliaitankatu 10 A7
40320 Jyväskylä, Finland
+358452560420
info@experienceworkshop.org