ORIGAMI
- od kolijevke do groba

- Predavanja i radionice na 8. kongresu nastavnika matematike RH
od 3. do 5. srpnja 2018. godine na Prirodoslovno - matematičkom fakultetu u Zagrebu
posvećene:

pedagogu *Friedrichu W. A. Fröbelu* i akademiku *Stanku Bilinskom*, matematičaru

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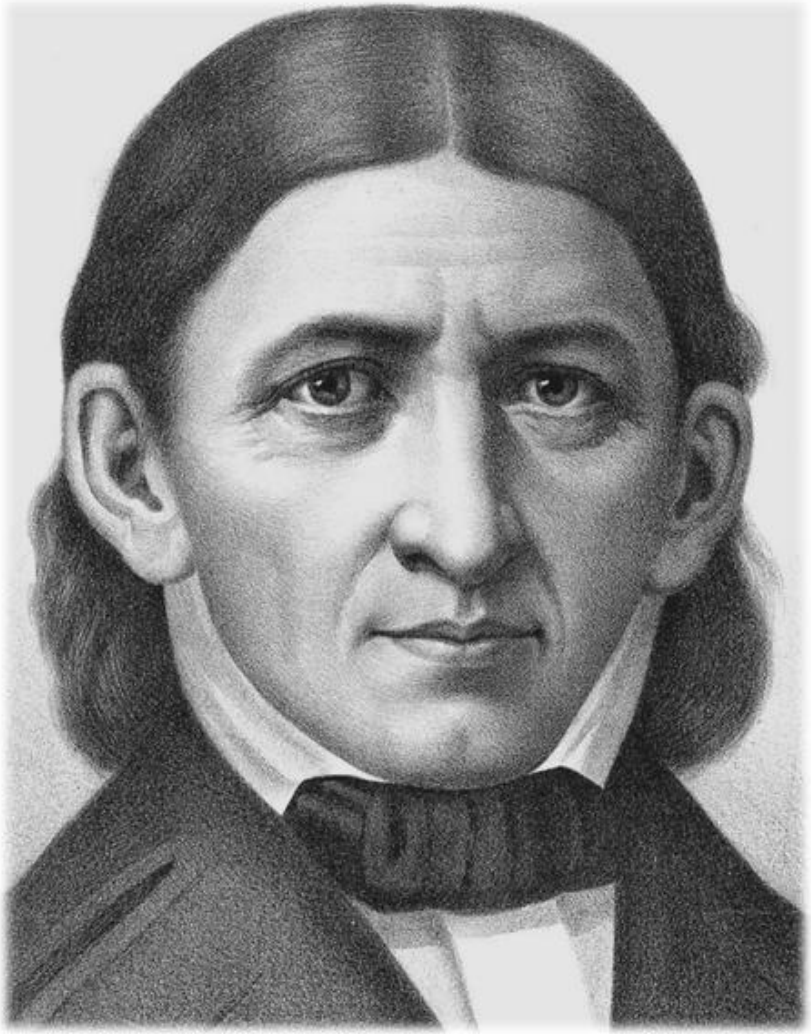
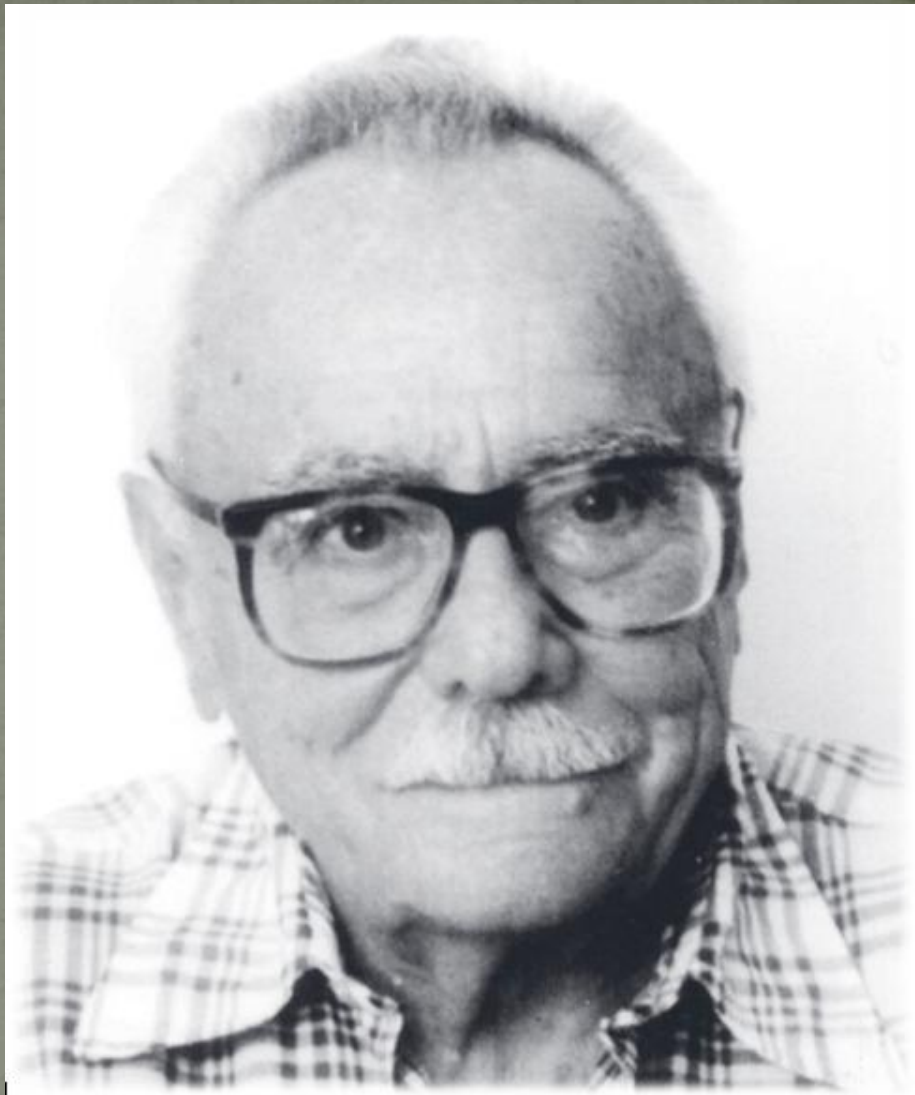


Friedrich Wilhelm August Fröbel

1782. - 1852.



Akademik Stanko Bilinski, matematičar

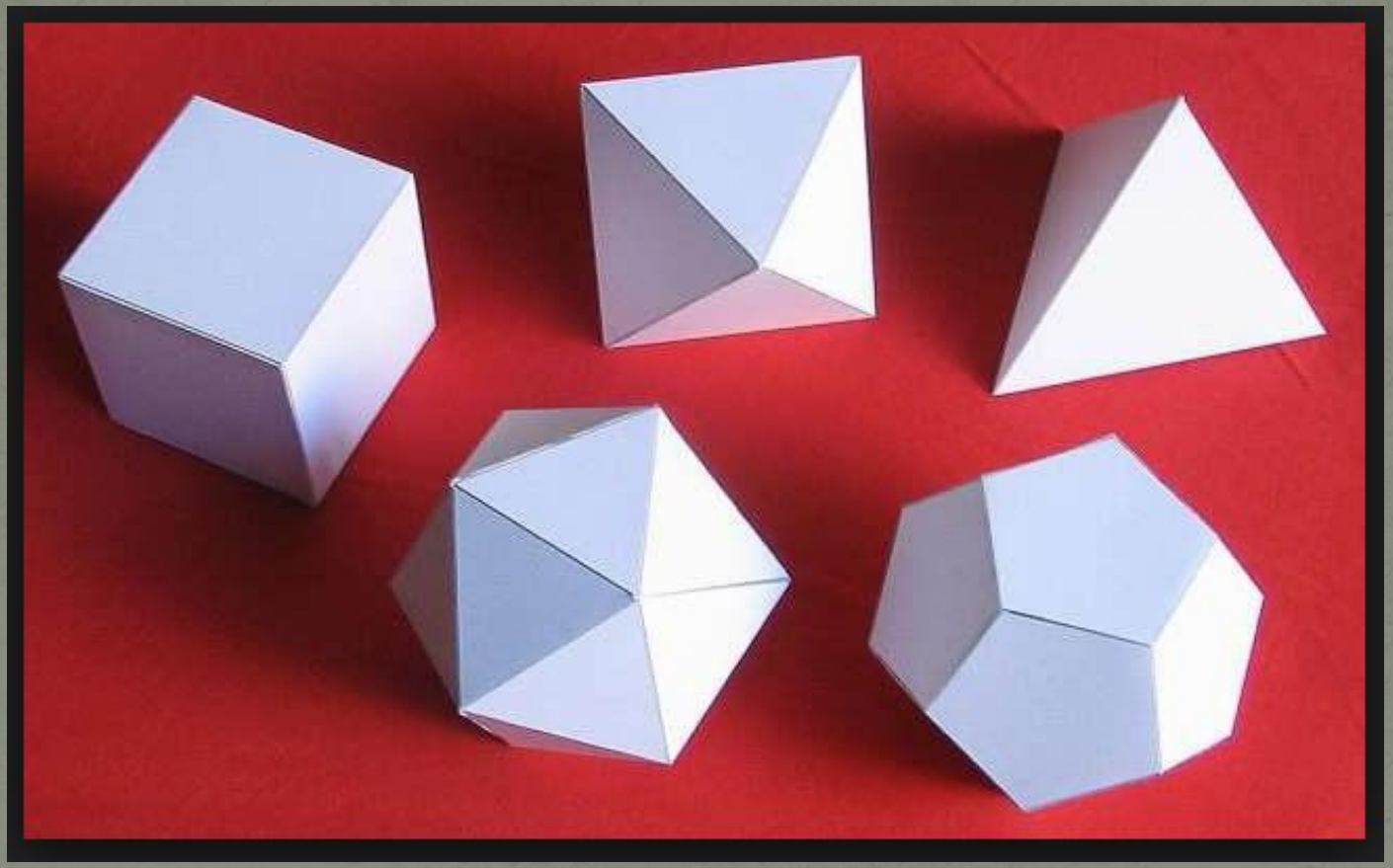
1909. – 1998.

Origami do groba

Platonova geometrijska tijela:

- tetraedar
- heksaedar
- oktaedar
- ikozaedar
- dodekaedar

Platonova geometrijska tijela:



Pentagon – dodekaedar

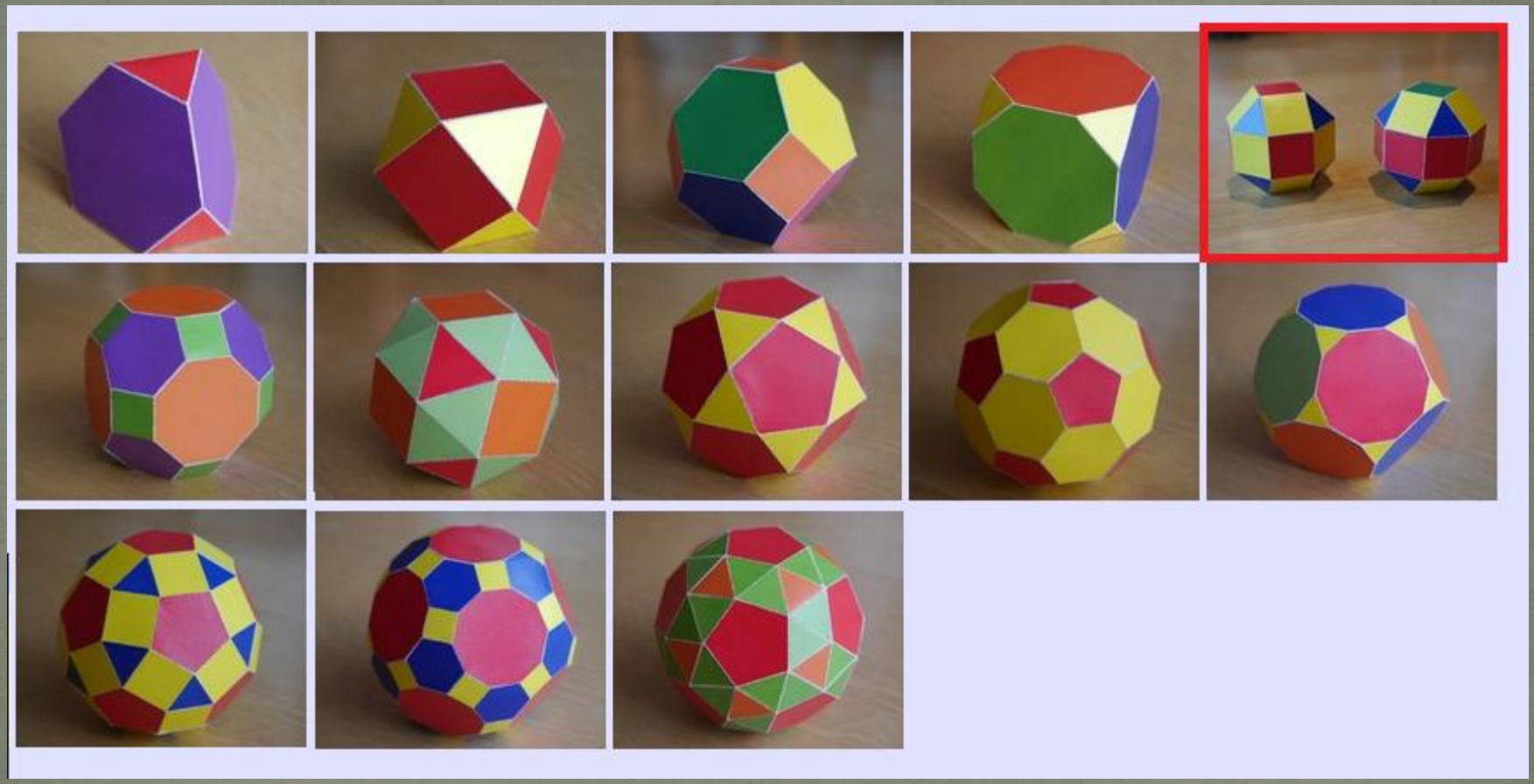
Rimski dodekaedar / Mjedena jabuka

- Početkom druge polovice XIX. stoljeća tadašnjem Narodnom muzeju u Zagrebu poklonjen je rimski brončani dodekaeder. Riječ je o pomalo "misterioznom" predmetu čija namjena tj. funkcija nije u potpunosti razjašnjena. U svakom slučaju radi se o geometrijskom tijelu koje ima 12 peterokutnih ploha s probušenim rupama različitih promjera. Takvih je predmeta na području Rimskog Carstva pronađeno malo, ukupno 92, a zagrebački primjerak jedan je od najbolje očuvanih.
- Pronađen je na oranici između sela Hof (hrv. Cimof) i Au (hrv. Cunava) im Leithagebirge u Donjoj Austriji i vrlo je zanimljiv način na koji je taj predmet došao u Zagreb. Poklonio ga je gradišćanski Hrvat Pavao Žulić koji je rođen u Hofu, a kako je kao profesor kemije dobio posao na gimnaziji u Zagrebu odlučio je da dodekaeder bude pohranjen u Zagrebu, a ne u Beču. Gradišćanski Hrvati su prije 500 godina napustili, kako to oni kažu svoju "staru domovinu" i preselili se u današnje Gradišće tj. novu domovinu. I nakon pet stoljeća sačuvali su svoj materinji hrvatski jezik, običaje i kulturu, a prije točno 150 godina zaslugom jednog gradišćanskog Hrvata taj je dragocjeni predmet dospio u fundus "Arkeologičkog odjela" tadašnjeg Narodnog muzeja.
- U inventarnoj knjizi koja se tada zvala "Popis darovah", upisana je 29. svibnja 1862. nova akvizicija i to na sljedeći način: "... mjedena jabuka, po svoj prilici stajala je na vrhu palice turskog konjskog repa (barjaka) ili na vrhu turskog šatora; nadjena je u selu Hof u Austriji dolnjoj". Naravno, atribucija nije točna jer u to vrijeme u Zagrebu nije bilo školovanih arheologa, no danas znamo da je riječ o dodekaederu iz razdoblja Rimskog, a ne Osmanlijskog Carstva.
- Međutim, ostaje upitno koja je bila namjena tog predmeta ? Među arheolozima postoje vrlo različita mišljenja o tome je li imao praktičnu namjenu (npr. držač nekog štapa, svjetiljke itd.) ili je bio korišten u kultne svrhe u kojima bi praktičnu namjenu našao u području astronomije i astrologije što izgleda prilično vjerojatno, a najnovije teorije govore u prilog tomu da su ga Rimljani koristili kao kalendar.

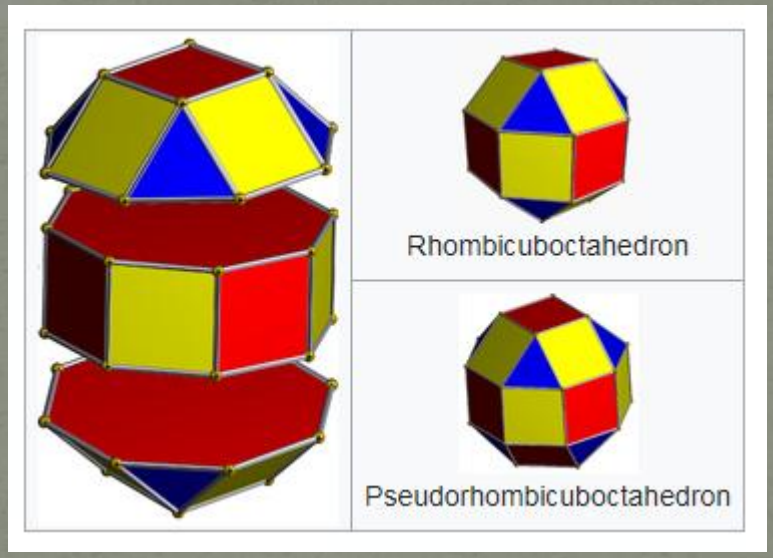
Arhimedova geometrijska tijela:

- krnji tetraedar
- krnji heksaedar
- krnji oktaedar
- krnji dodekaedar
- krnji ikosaedar
- kuboktaedar
- rombokuboktaedar
- veliki rombokuboktaedar
- skosena kocka
- ikosadodekaedar
- rombikosadodekaedar
- veliki rombikosadodekaedar
- skoseni dodekaedar
- ***pseudo–rombokuboktaedar***

rombokuboktaedar → ***pseudo - rombokuboktaedar***



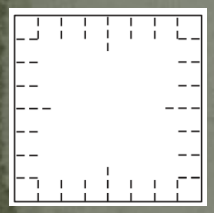
Rombokuboktaedar → ***Pseudo–rombokuboktaedar***

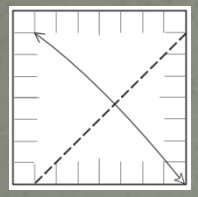


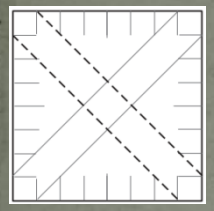
Truncated Cuboctahedron Box

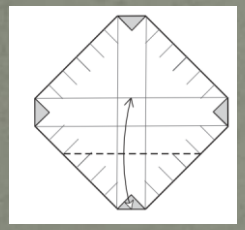
Designed by Kenneth M Kawamura ©1995

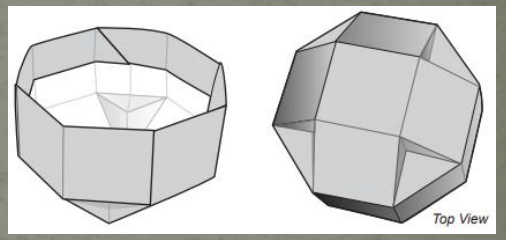
Diagrammed by Mari Michaelis ©2011

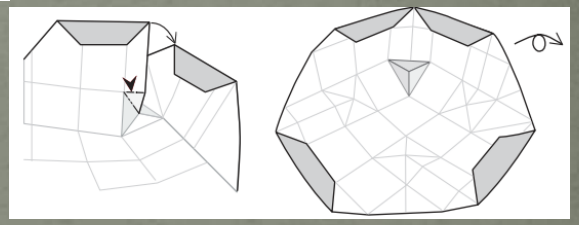


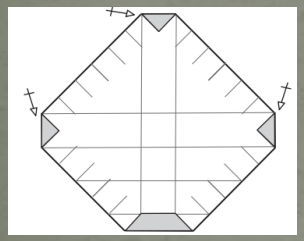


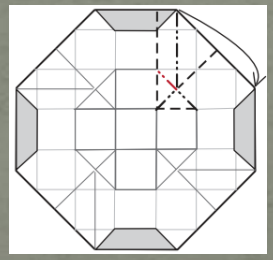


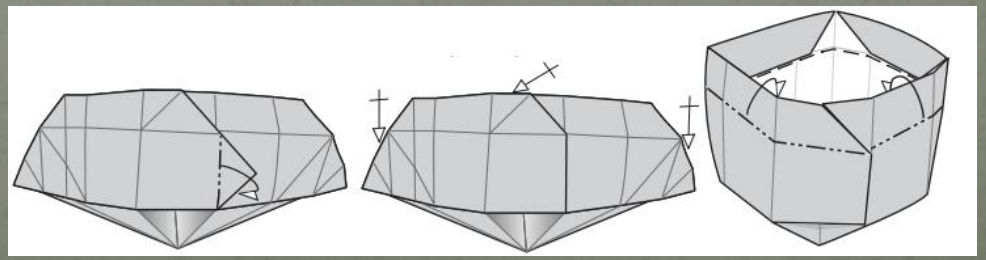






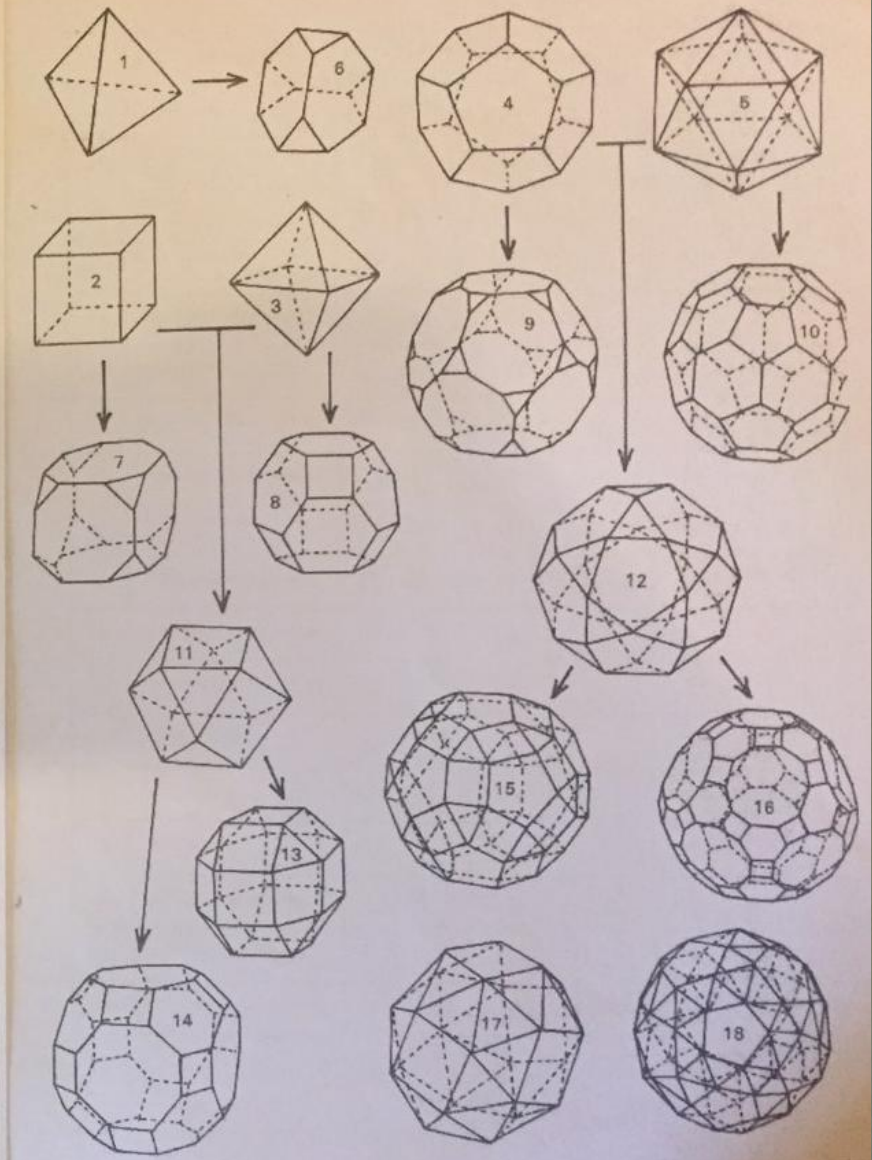


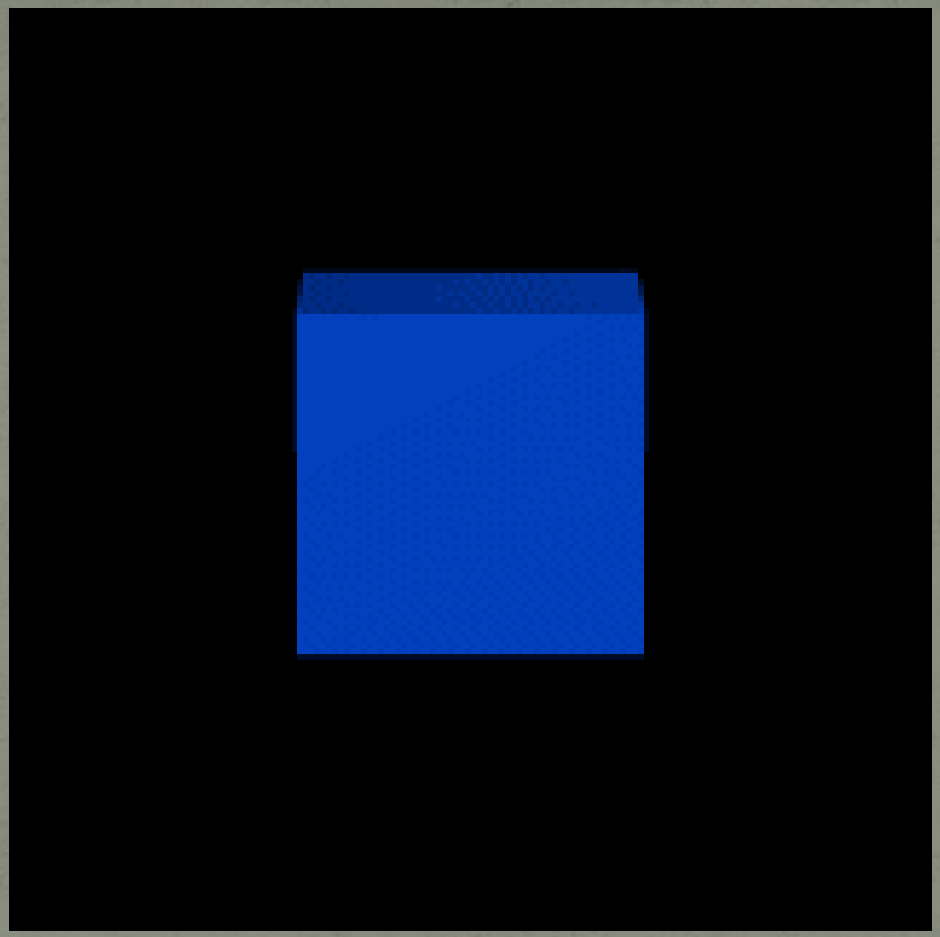




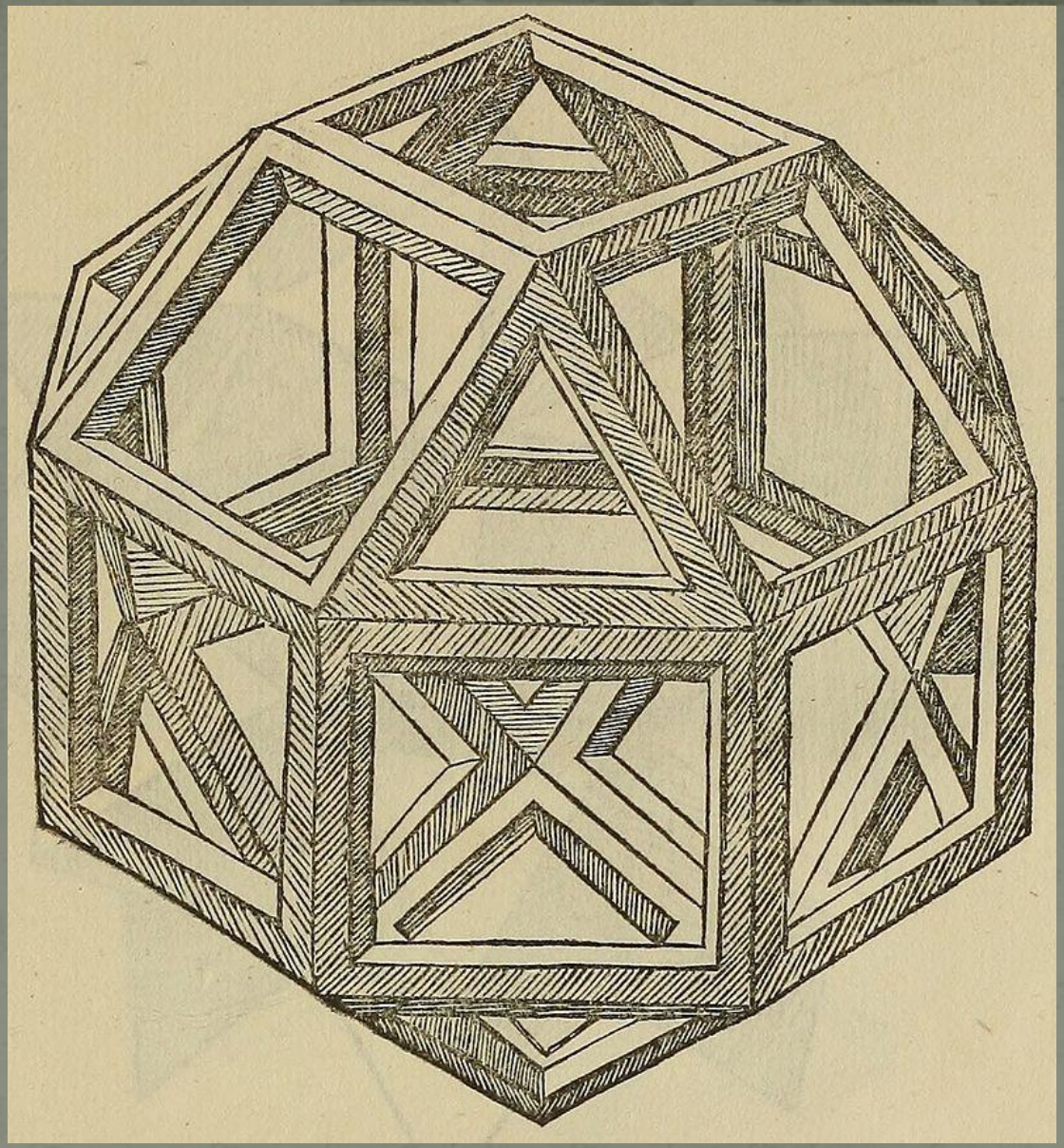
Polyhedrons Summarized

No.	Polyhedrons	Shape and Numbers of Surfaces	Surfaces	Apexes	Edges
1	Regular tetrahedron	△ ×4	4	4	6
2	Hexahedron (cube)	□ ×6	6	8	12
3	Octahedron	△ ×8	8	6	12
4	Dodecahedron	⬠ ×12	12	20	30
5	Icosahedron	△ ×20	20	12	30
6	Truncated tetrahedron	△ ×4 ⬡ ×4	8	12	18
7	Truncated hexahedron	△ ×8 ○ ×6	14	24	36
8	Truncated octahedron	□ ×6 ⬡ ×8	14	24	36
9	Truncated dodecahedron	△ ×20 ○ ×12	32	60	90
10	Truncated icosahedron	⬠ ×12 ⬡ ×20	32	60	90
11	Cuboctahedron	△ ×8 □ ×6	14	12	24
12	Icosidodecahedron	△ ×20 ⬠ ×12	32	30	60
13	Rhombicuboctahedron	△ ×8 □ ×18	26	24	48
14	Rhombitruncated cuboctahedron	□ ×12 ⬡ ×8 ○ ×6	26	48	72
15	Rhombicosidodeca-hedron	△ ×20 □ ×30 ⬠ ×12	62	60	120
16	Rhombitruncated icosidodecahedron	□ ×30 ⬡ ×20 ○ ×12	62	120	180
17	Snub cube	△ ×32 □ ×6	38	24	60
18	Snub dodecahedron	△ ×80 ⬠ ×12	92	60	150





Portrait of Luca Paciolli (1445–1517) with a student (Guidobaldo da Montefeltro?)



Illustrations by Leonardo da Vinci

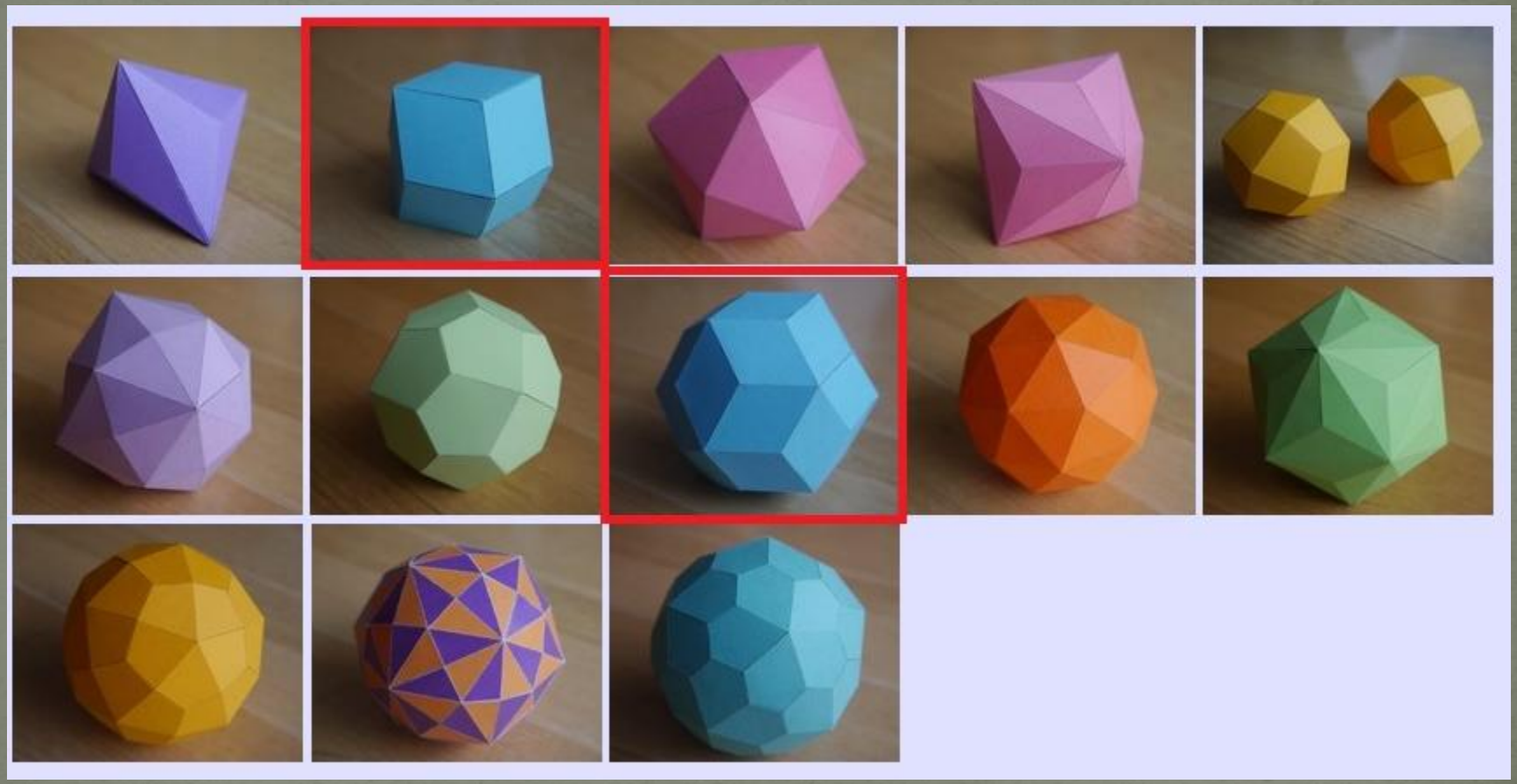
Nacionalna knjižnica u Minsku (Bjelorusija)

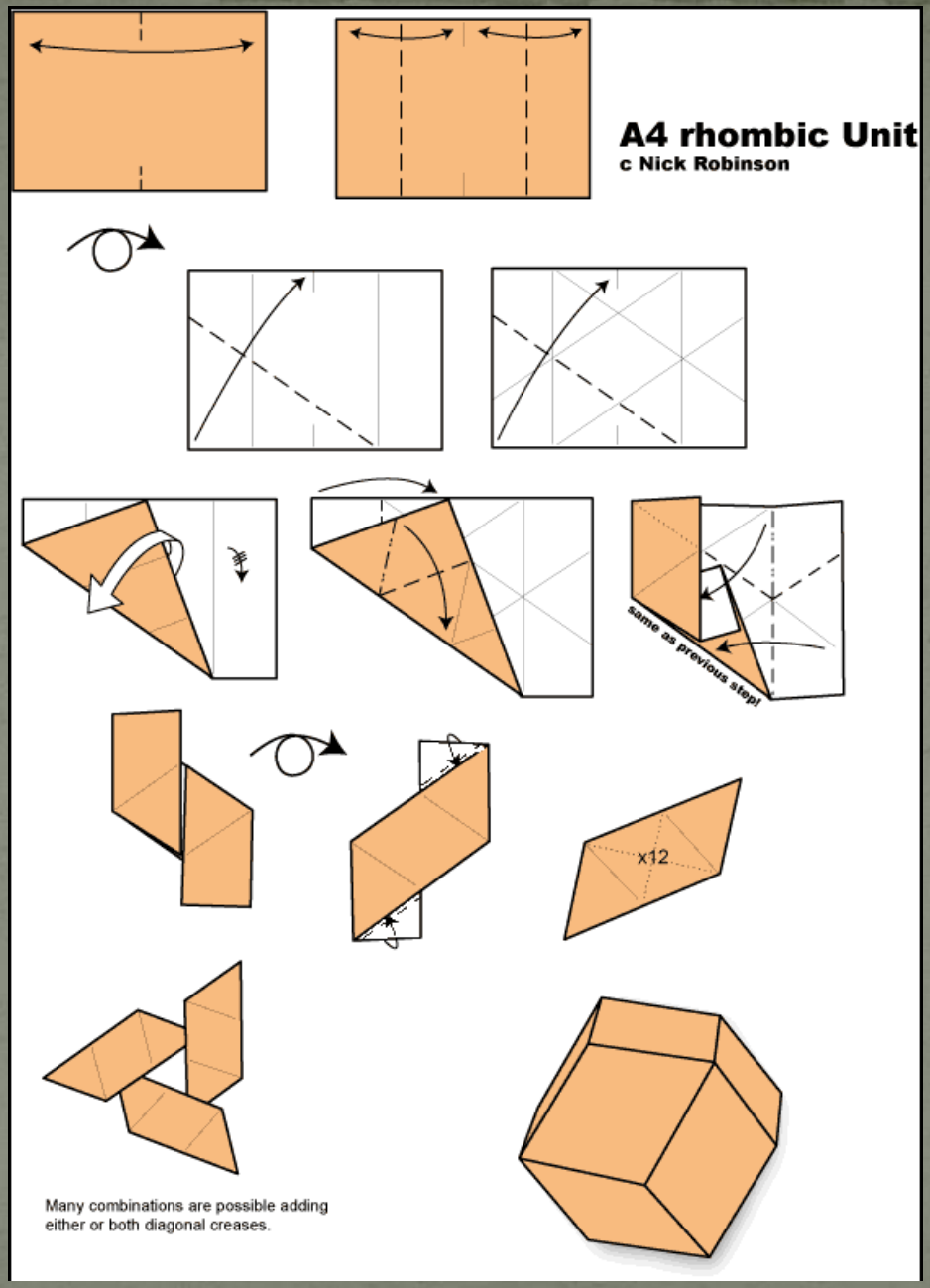
Sunčev sat

Catalanova tijela

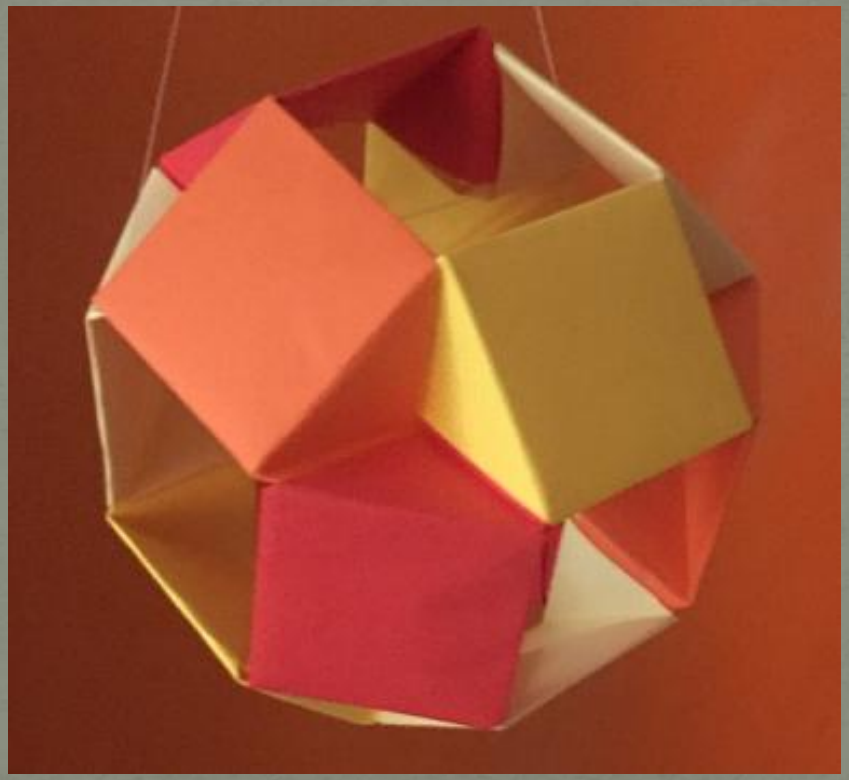
rombični dodekaedar –> Bilinski dodekaedar ?

srebrni omjer dijagonala romba zlatni omjer dijagonala romba

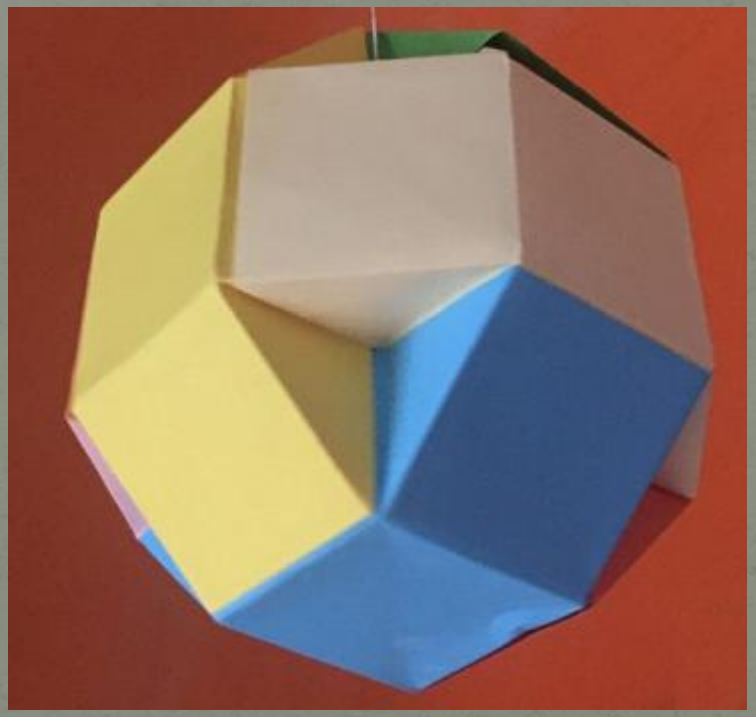



A4 rhombic Unit
c Nick Robinson
same as previous step!
x12
Many combinations are possible adding
either or both diagonal creases.

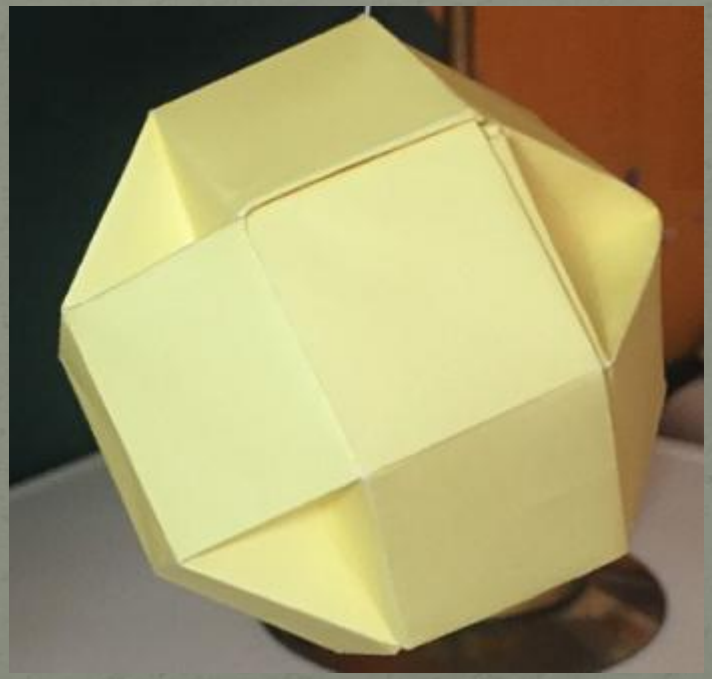
- Rombokuboktaedar sastavljen od 12 modula, autor modula Tomoko Fuse



- Rombokuboktaedar sastavljenod 6 modula, autorski rad inspiriran dizajnom Michael Naughton

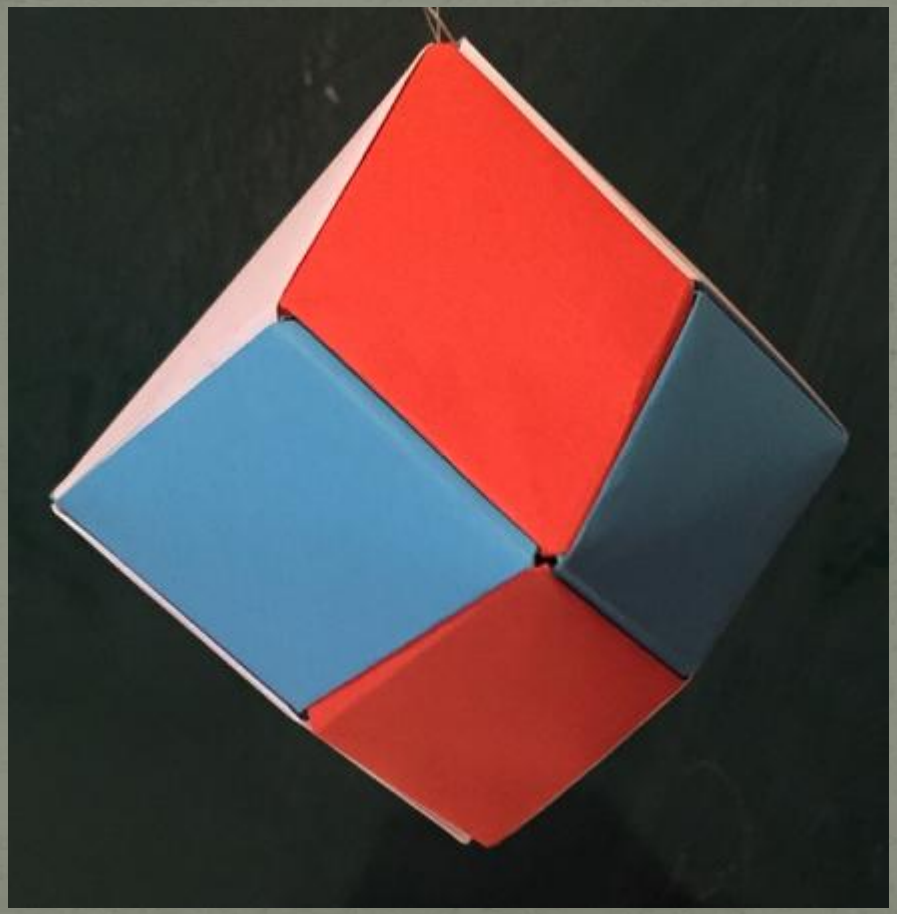


- Dvodjelna kutija kao model rombokuboktaedra koji rotacijom poklopca za 45 stupnjeva prelazi u pseudo-rombokuboktaedar koji je istraživao i akademik Stanko Bilinski, design Kenneth M Kawamura, dijagram Mari Michaelis



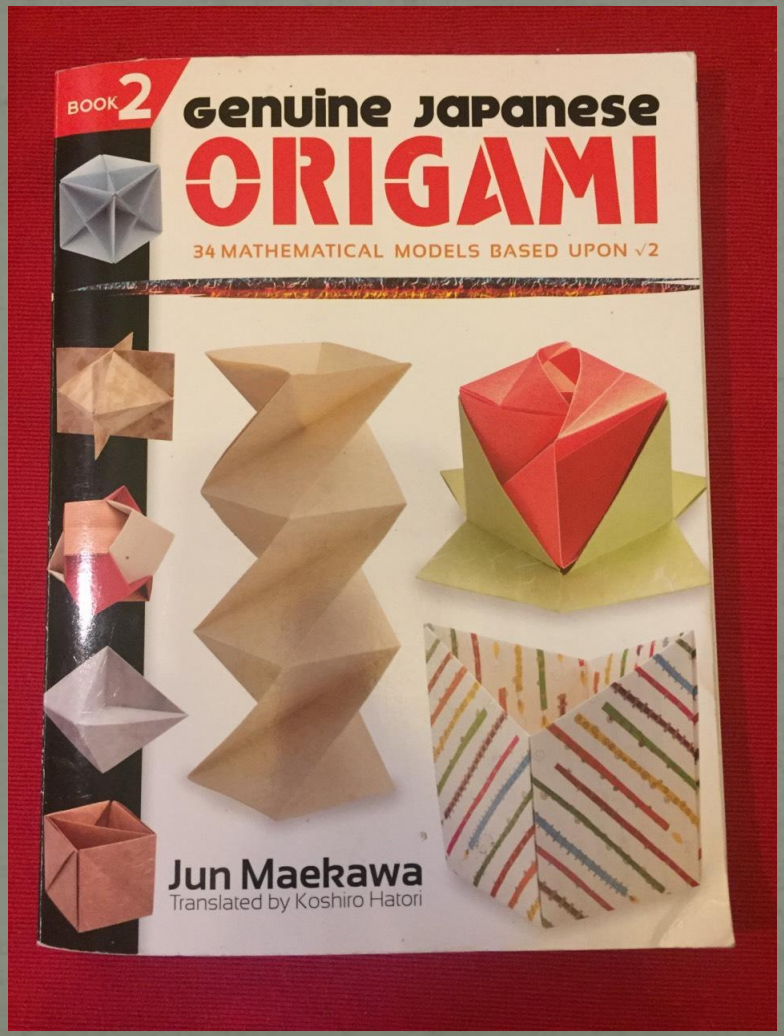
- Rombski dodekaedar 1. vrste sastavljen od 12 modula u 3 boje, autor Nick Robinson. Grupa profesora matematike osnovne i srednje škole bila je uspješna iznad očekivanja na origami radionici i izrazila veliko zadovoljstvo radionicom

- Bilinski dodekaedar, rombski dodekaedar
  2. vrste, autorski rad



- Mobil, visilica kao izložbeni stalak, ili na kolijevci uz muzičku kutiju

Literatura


BOOK 2
Genuine Japanese
ORIGAMI
34 MATHEMATICAL MODELS BASED UPON √2
Jun Maekawa
Translated by Koshiro Hatori