

EXPERIENCE WORKSHOP



THE EXPERIENCE-CENTERED
MATH/ART MOVEMENT
www.experienceworkshop.org



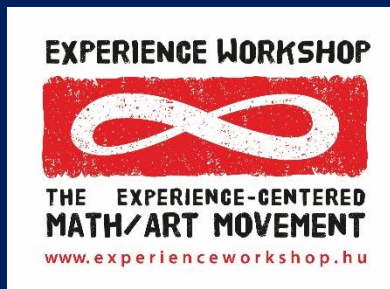
Experience Workshop's STEAM Learning Material

4Dframe SOCCERBALLS

by Kristóf Fenyvesi, Finland
University of Jyväskylä

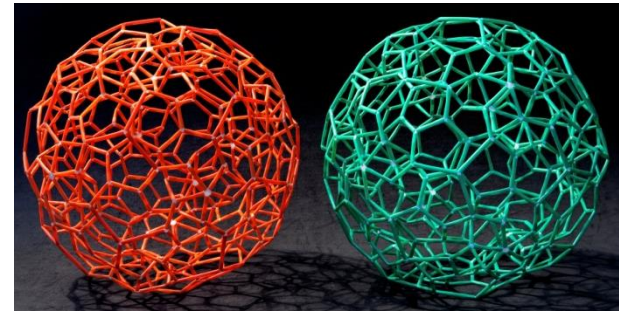


Co-funded by the
Erasmus+ Programme
of the European Union



Introduction of 4D Frame

For Free Imagination and Infinite creativity

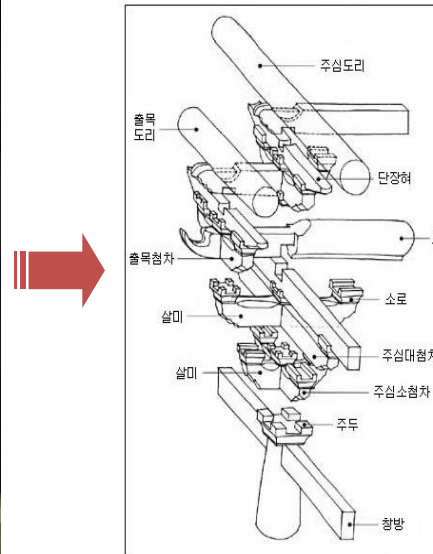


The Brand : 4D Frame

- ❖ The 4Dframe educational modelling kit is based upon the analysis of building techniques utilized in the construction of Korea's traditional, wooden buildings, in which no any nails have been used.
- ❖ 4Dframe has been proved to be a very appropriate tool for developing various skills in the transdisciplinary framework of STEAM learning.



Traditional Korean Wooden Palace



Principle of Architecture

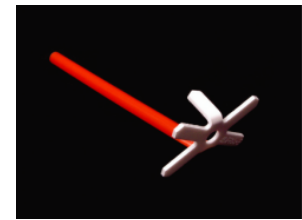
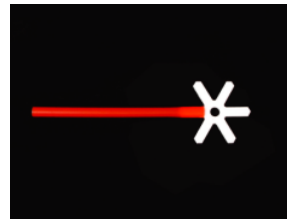
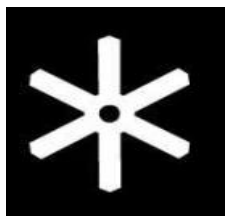


4D Frame Tube

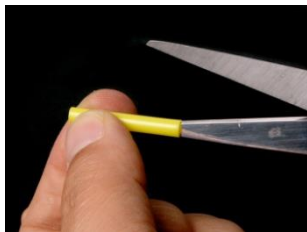


4D Frame Connector

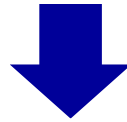
Character : Flexibility



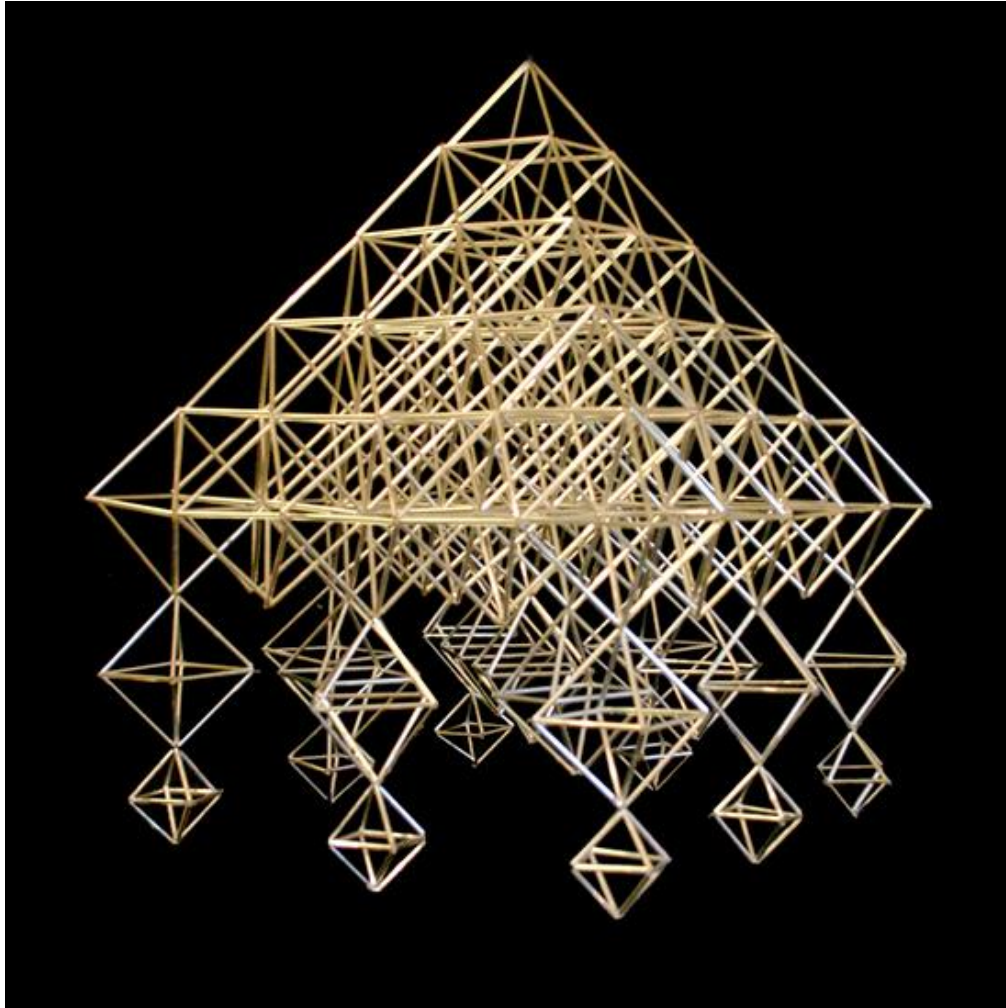
Bend, Cut & Connect!



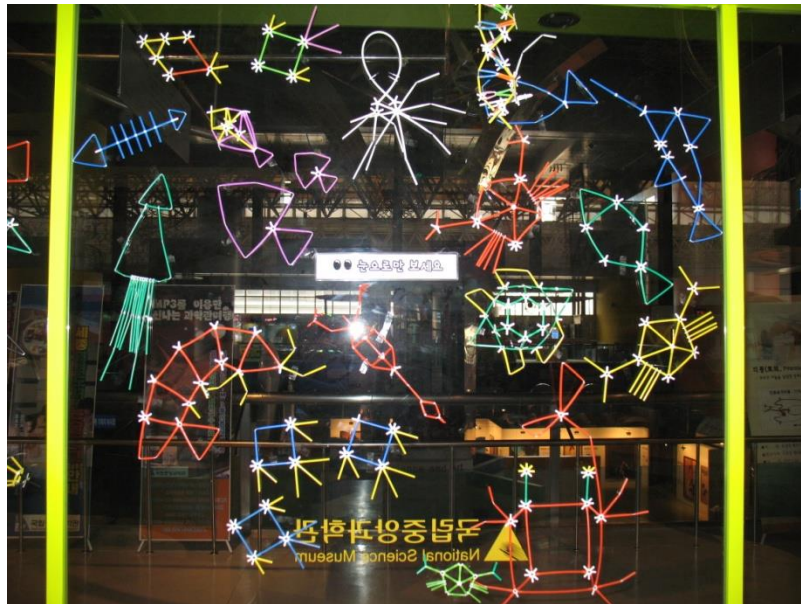
Character : Infinite Expansion

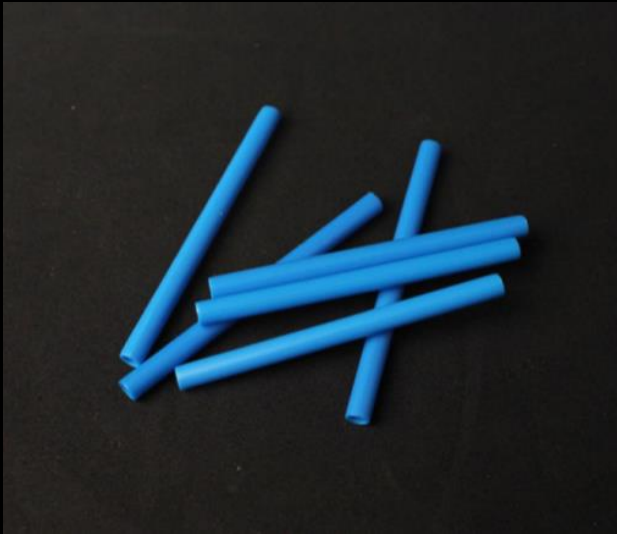


Character : Infinite Expansion



The traditional Nordic
christmas decoration:
the himmeli





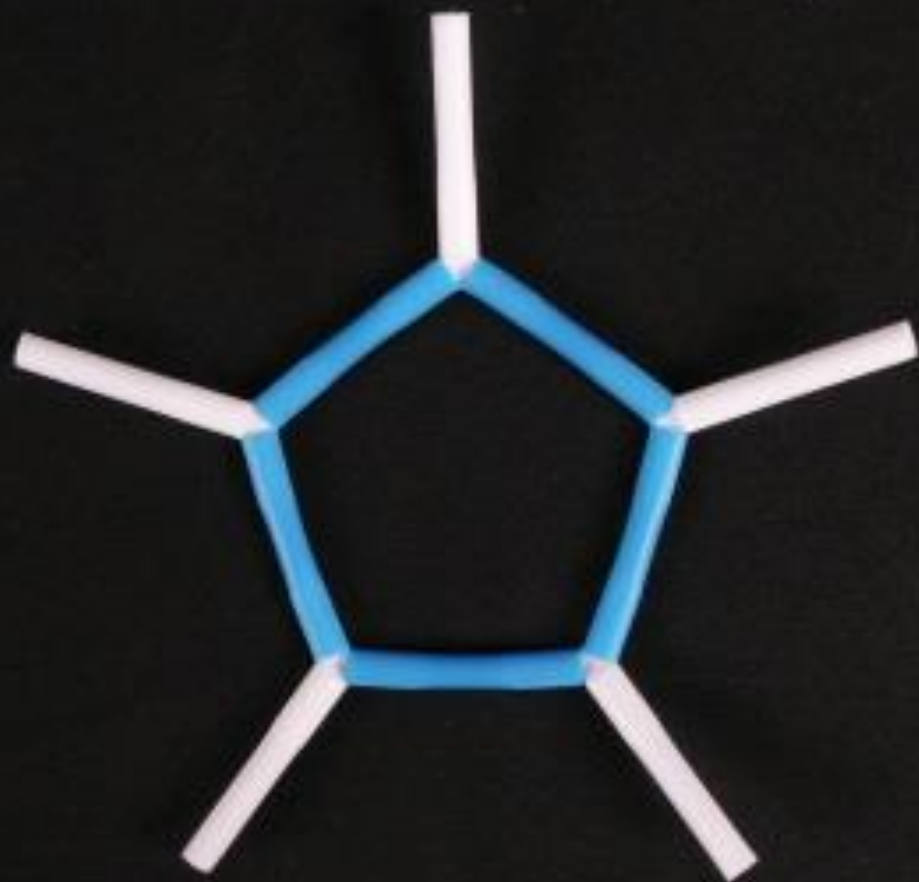
Tubes

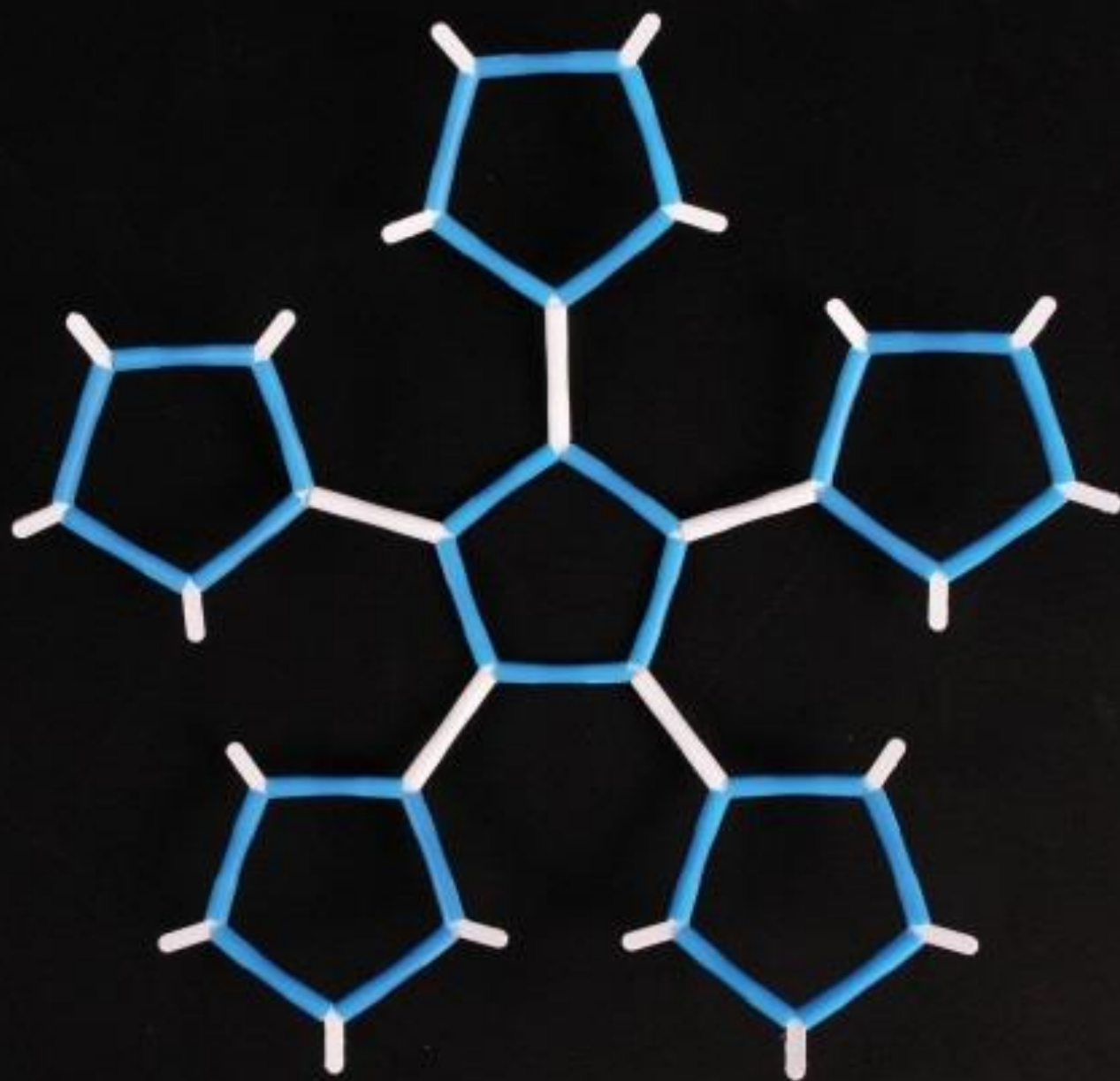


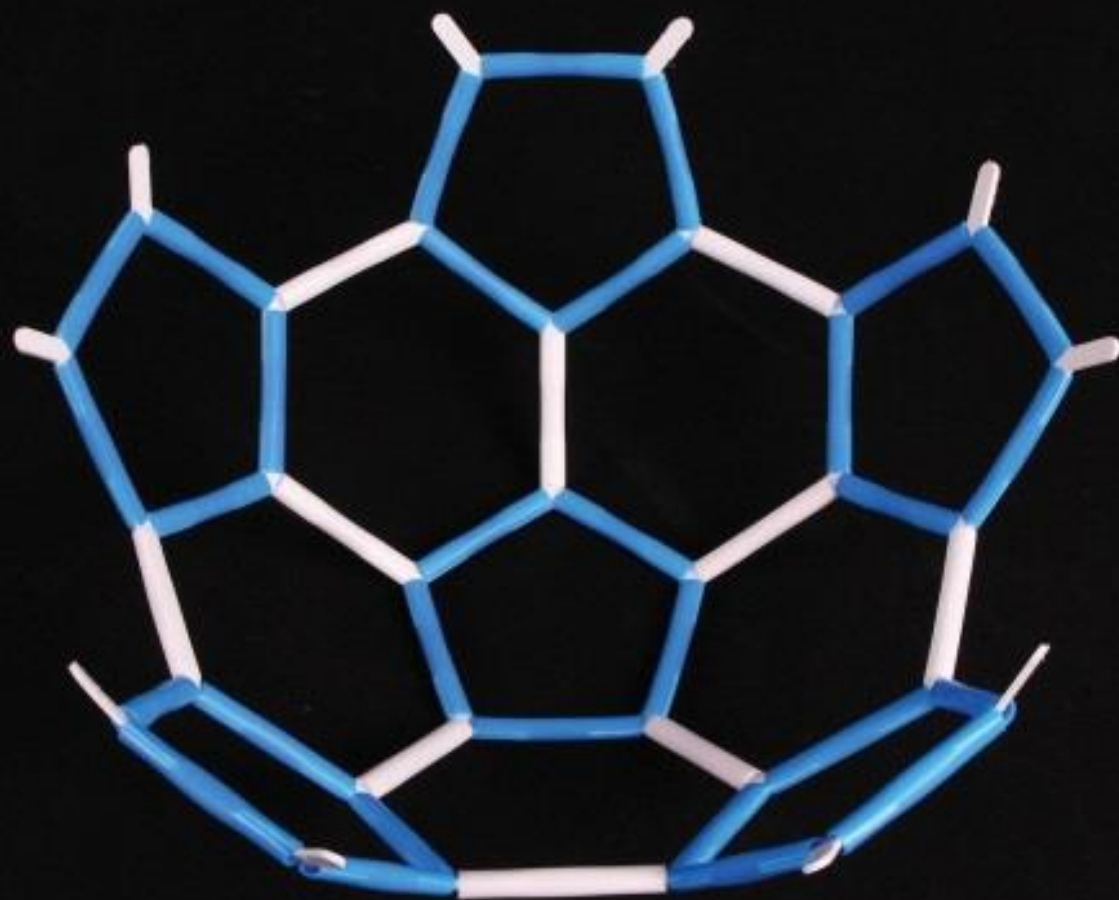
Connectors

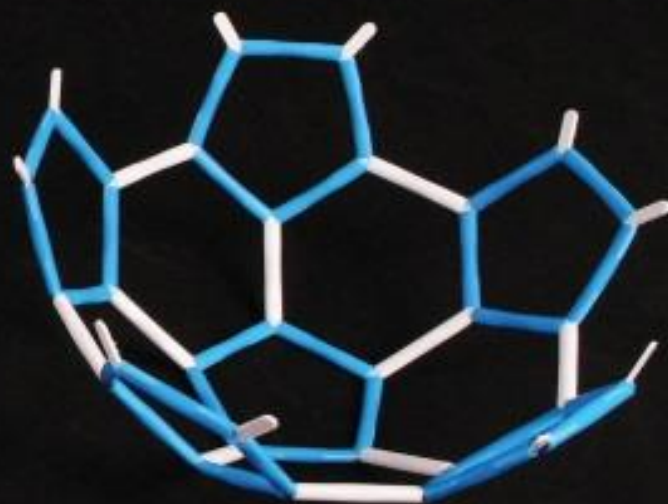
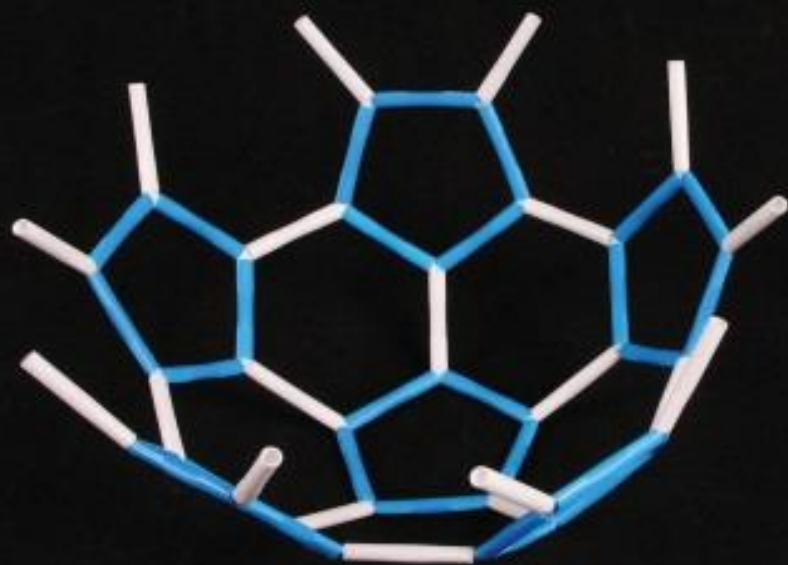


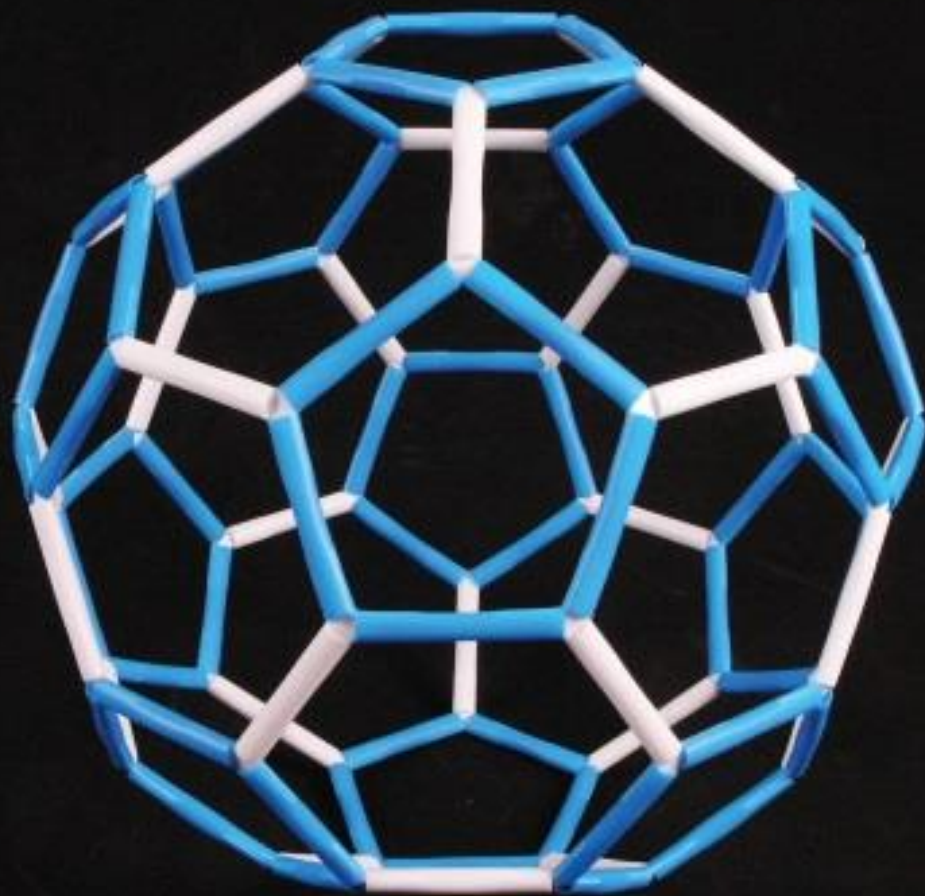


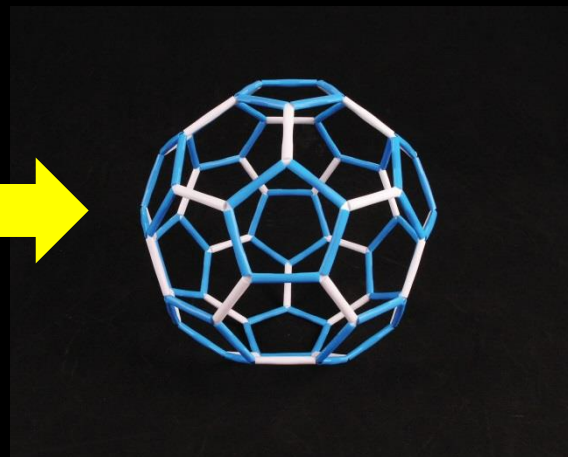
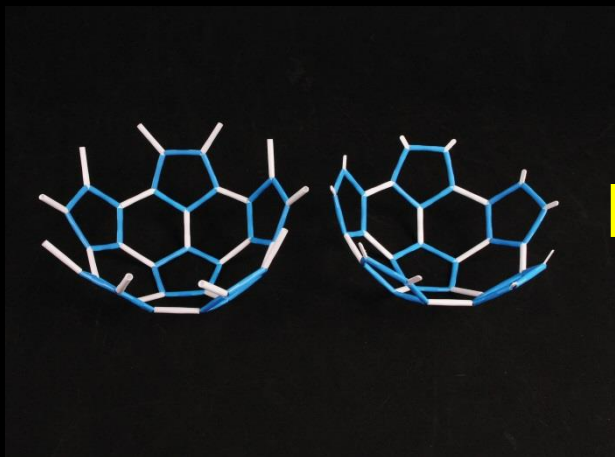
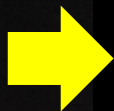
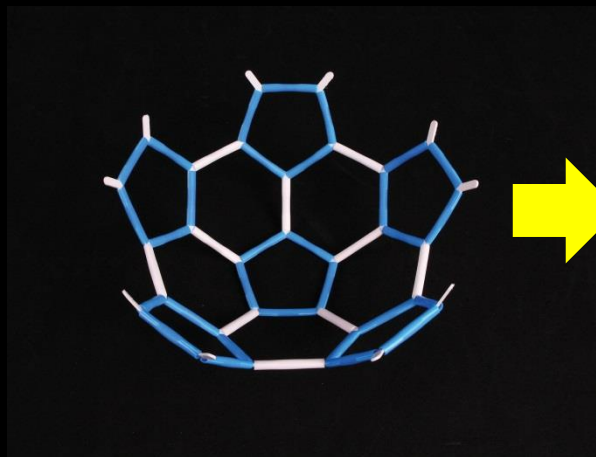
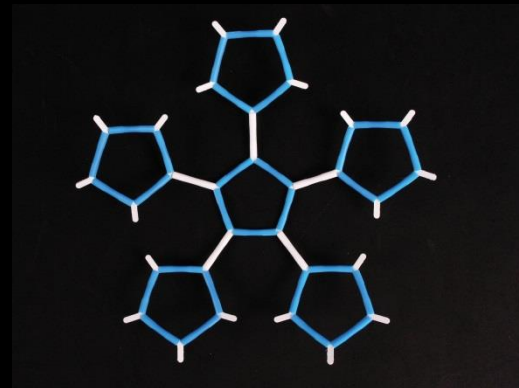
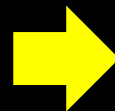
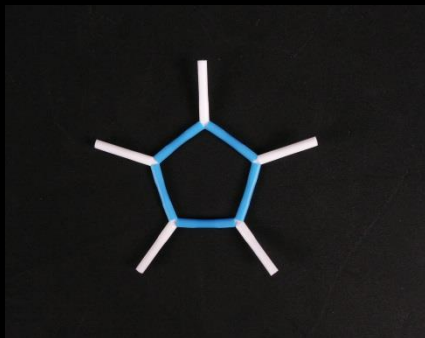
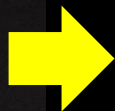
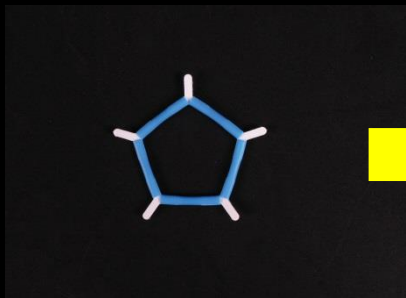




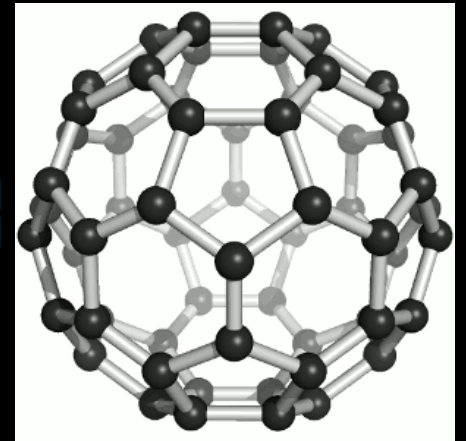
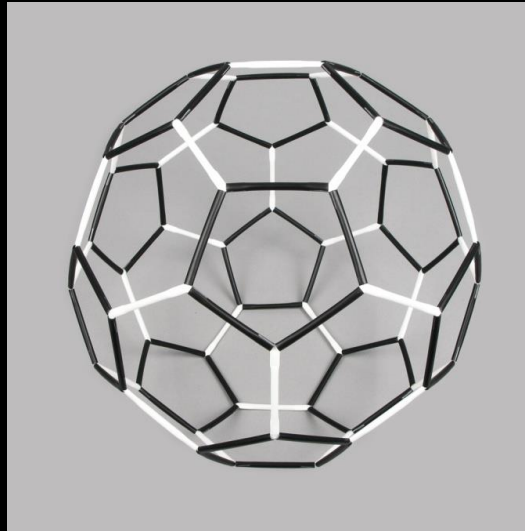
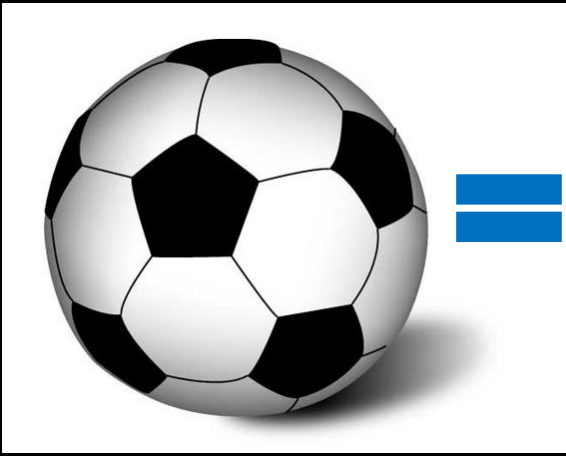












Soccer Ball

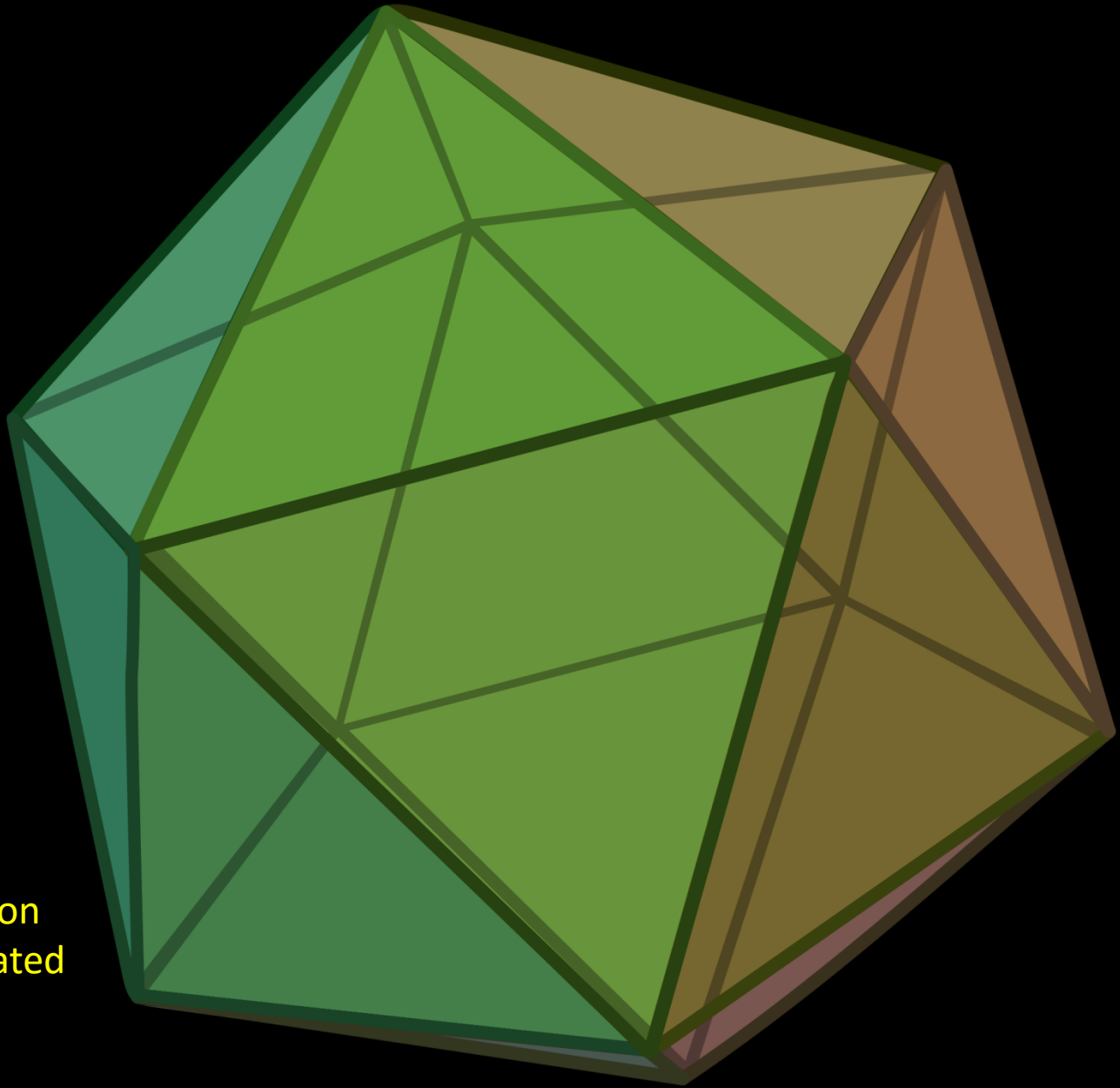
Real Life

Truncated icosahedron

Mathematics

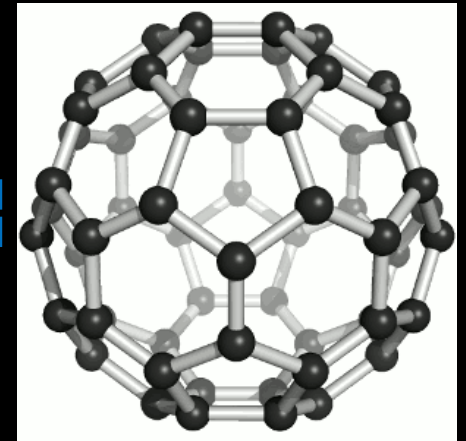
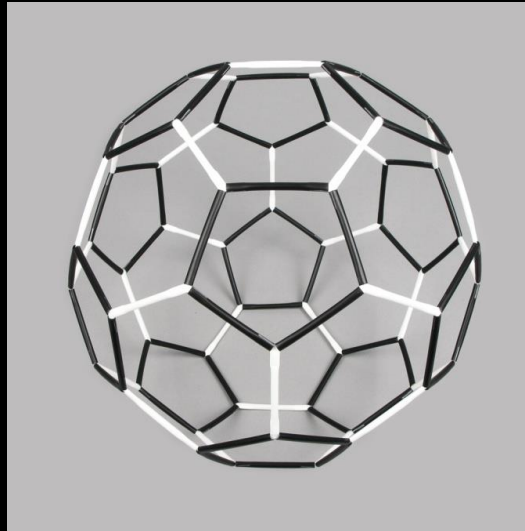
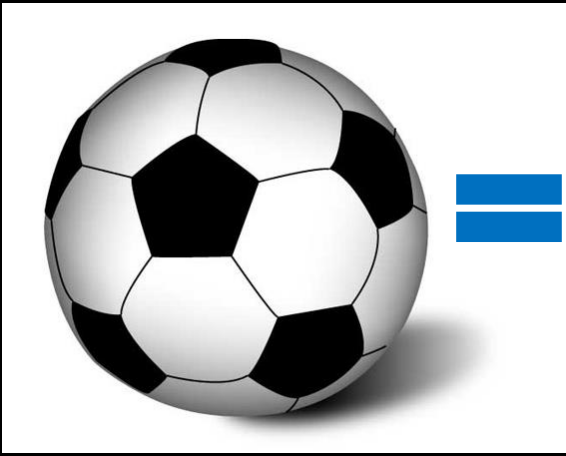
Fullerene Structure

Science



The icosahedron
and the truncated
icosahedron:

<https://www.youtube.com/watch?v=4mEk7d8oRho>



Soccer Ball

Real Life

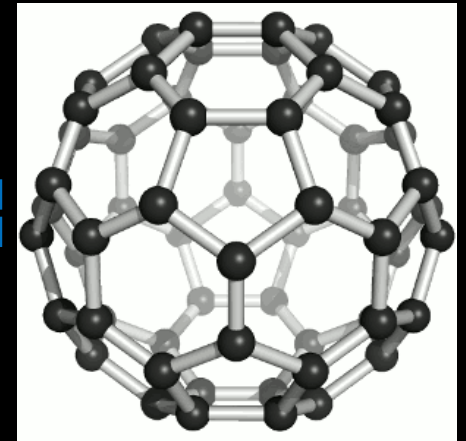
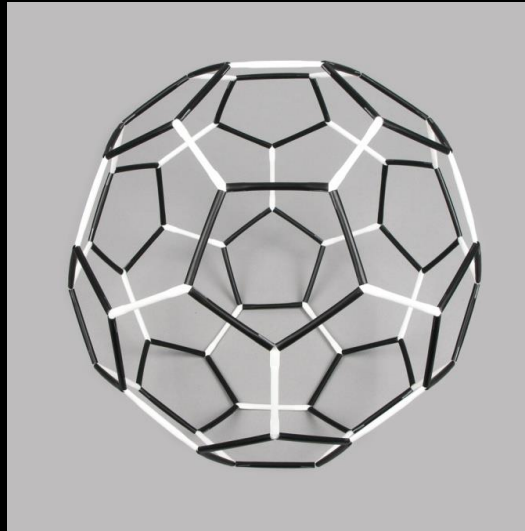
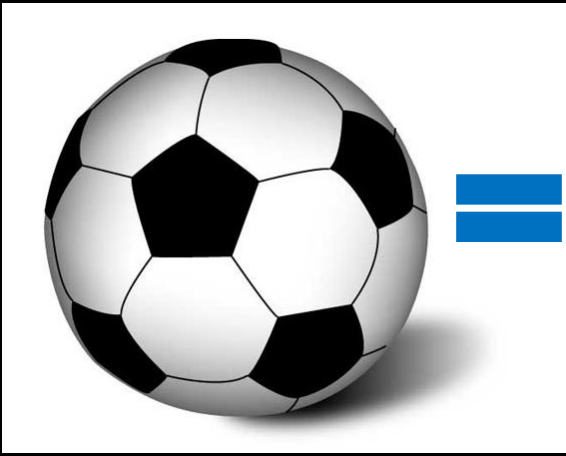
Truncated icosahedron

Mathematics

Fullerene Structure

Science

What you can tell about the number of pentagons and hexagons in the structure?



Soccer Ball

Real Life

Truncated icosahedron

Mathematics

Fullerene Structure

Science

12 pentagons and 20 hexagons

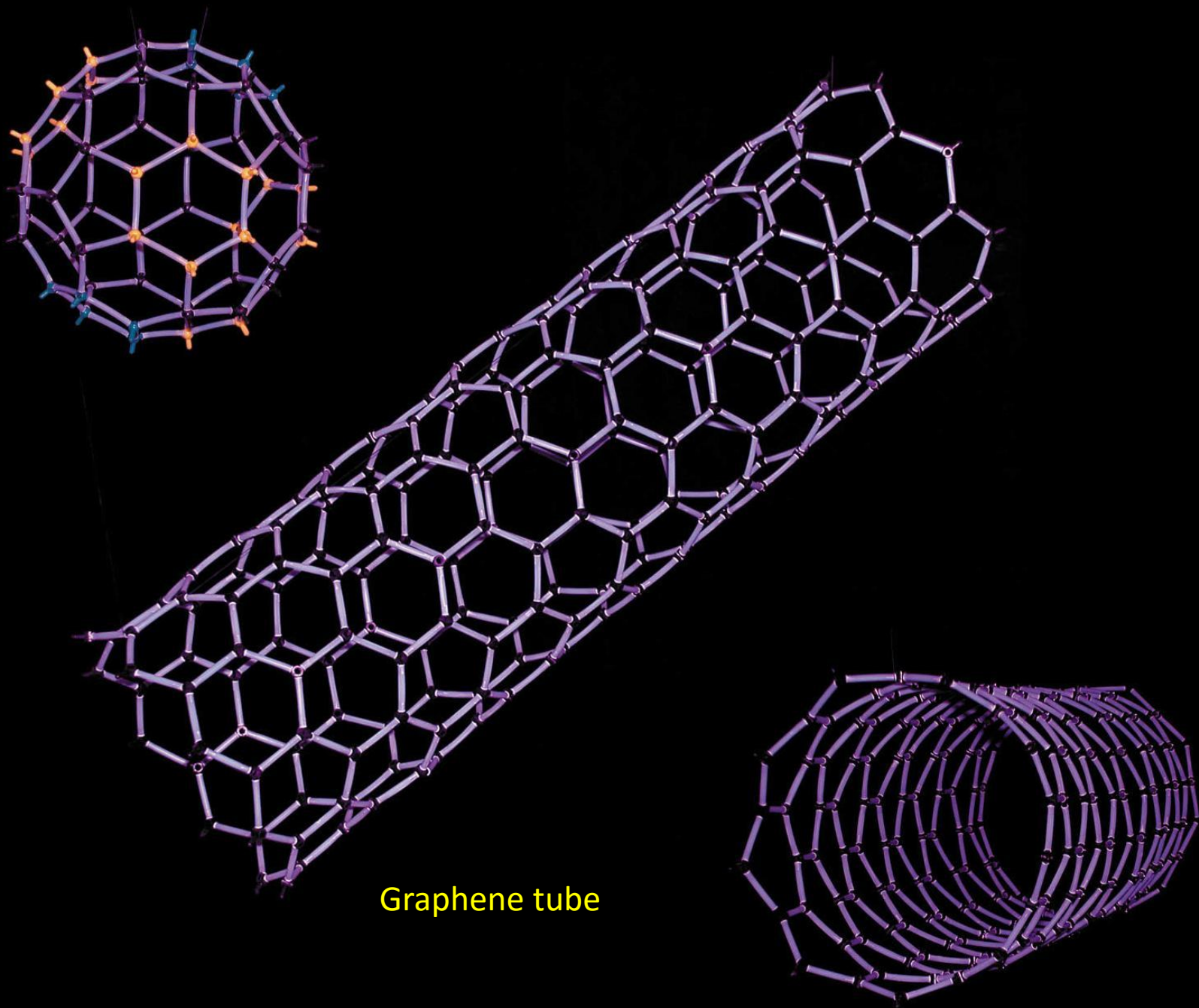
A photograph of Sir Harold W. Kroto, a man with grey hair wearing a light blue button-down shirt and light-colored trousers, sitting cross-legged and smiling. He is holding two carbon nanospheres in his hands. Several other carbon nanospheres of various sizes are floating in the air around him against a black background. The nanospheres are depicted as spherical structures made of interconnected hexagons and pentagons, with some edges highlighted in red.

CARBON IN NANO AND OUTERSPACE

The MSU Department of Chemistry presents 1996 Nobel Prize Winner

SIR HAROLD W. KROTO





Graphene tube

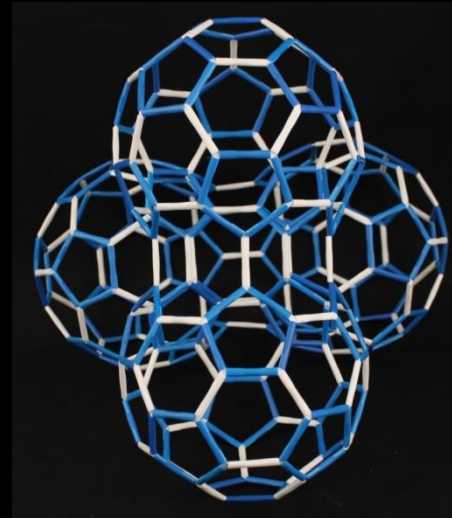
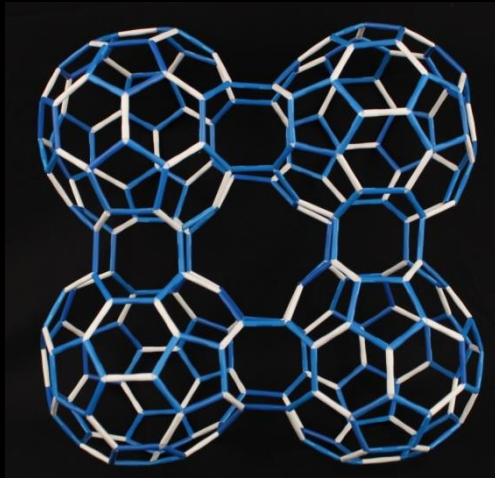
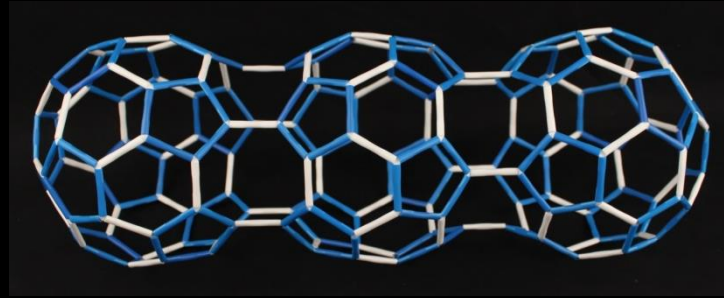
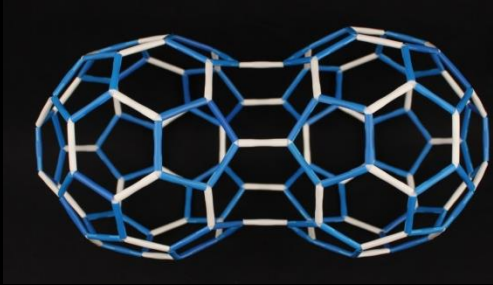


2006's Tour de France winner nanotube bicycle

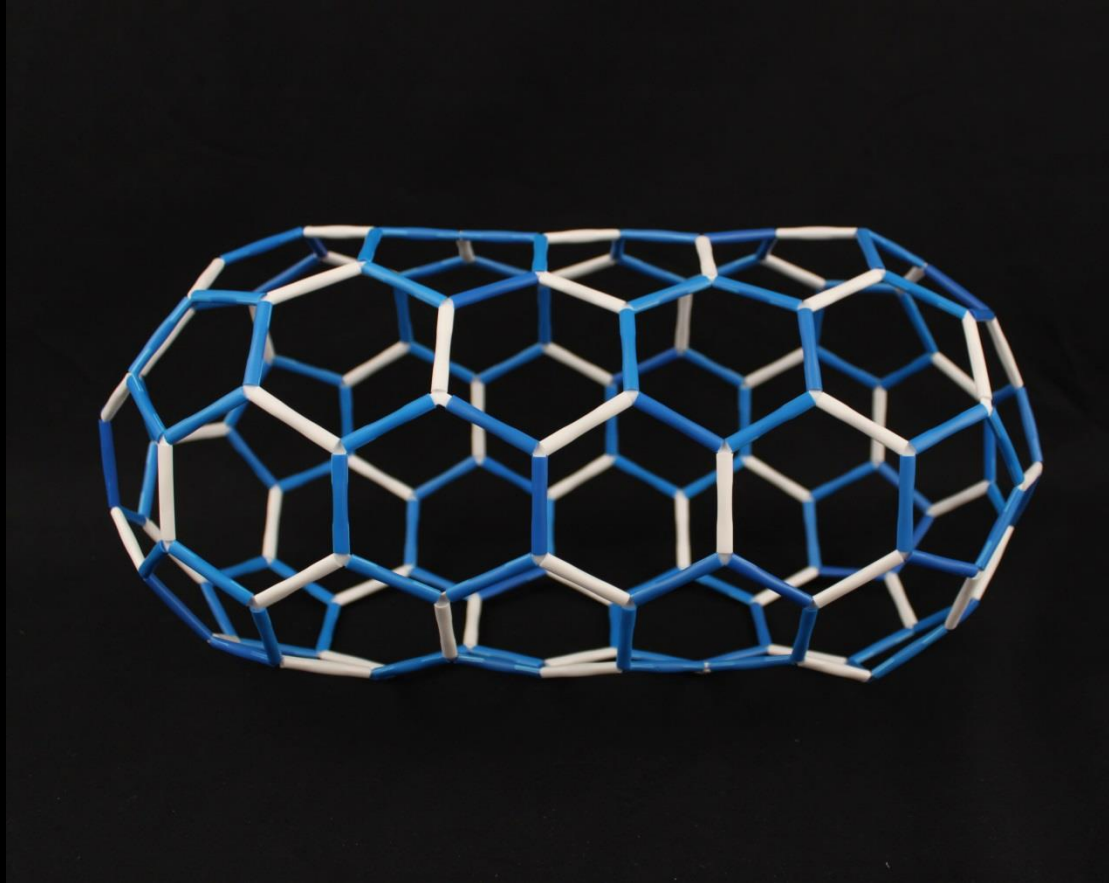


When you are ready with the soccerballs and a graphene tube, try to hit the ball into the tube! 😊

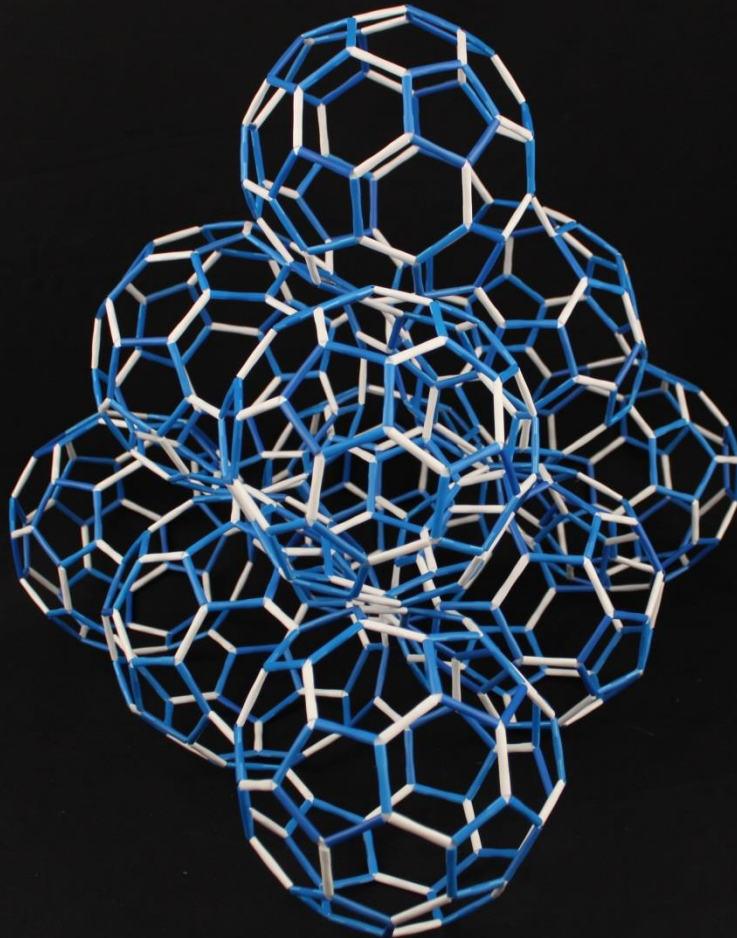
Artistic & Scientific Compositions with Soccer Ball Structure



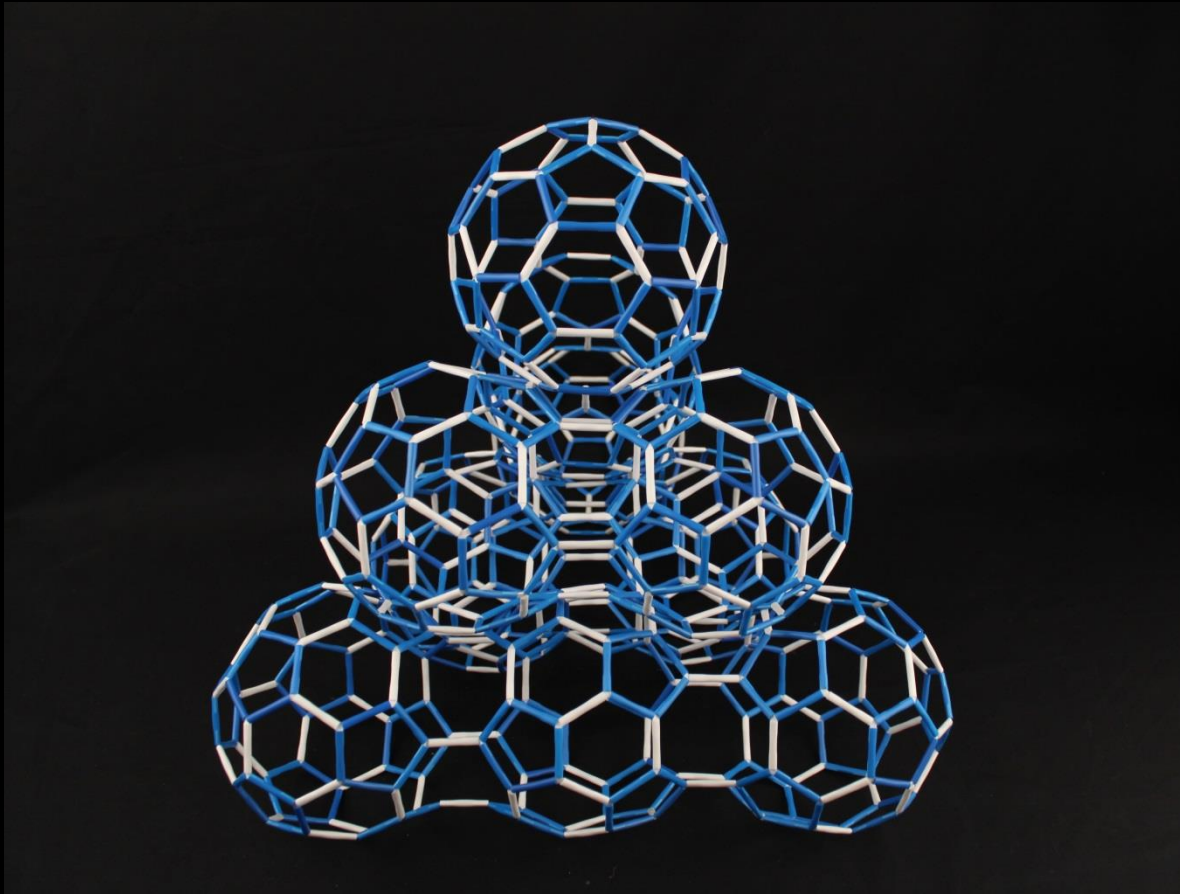
Artistic & Scientific Compositions with Soccer Ball Structure



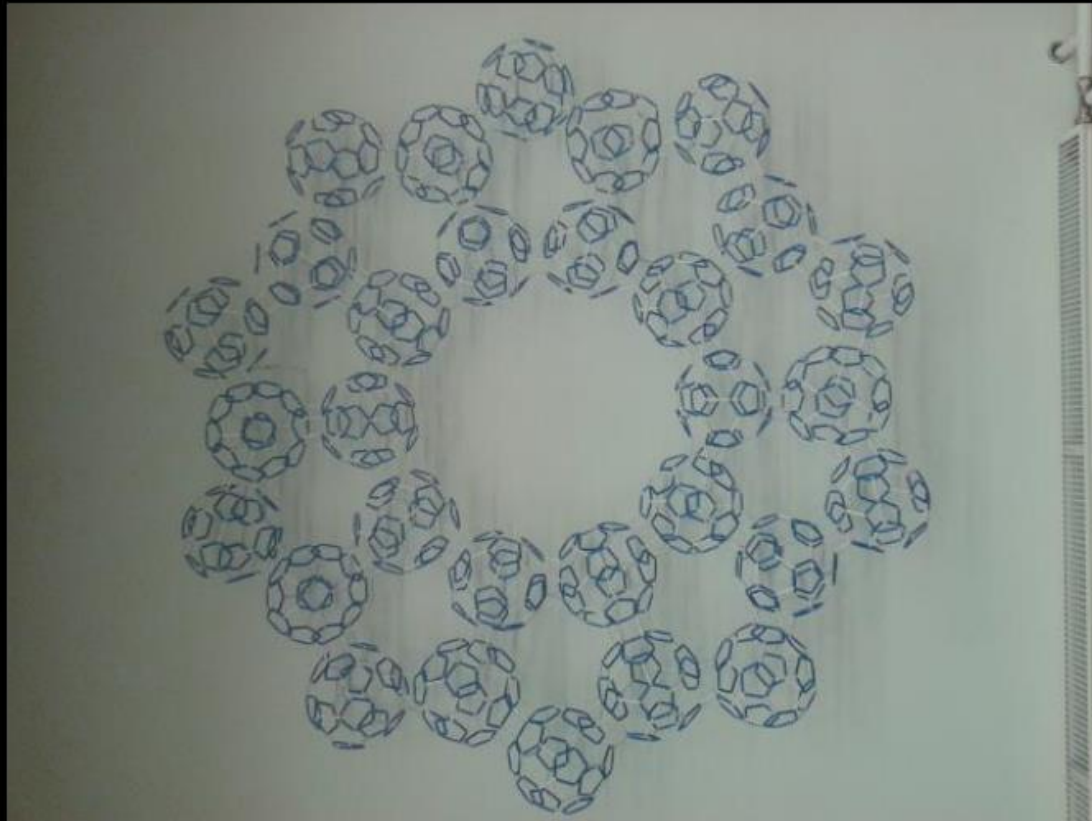
Artistic & Scientific Compositions with Soccer Ball Structure



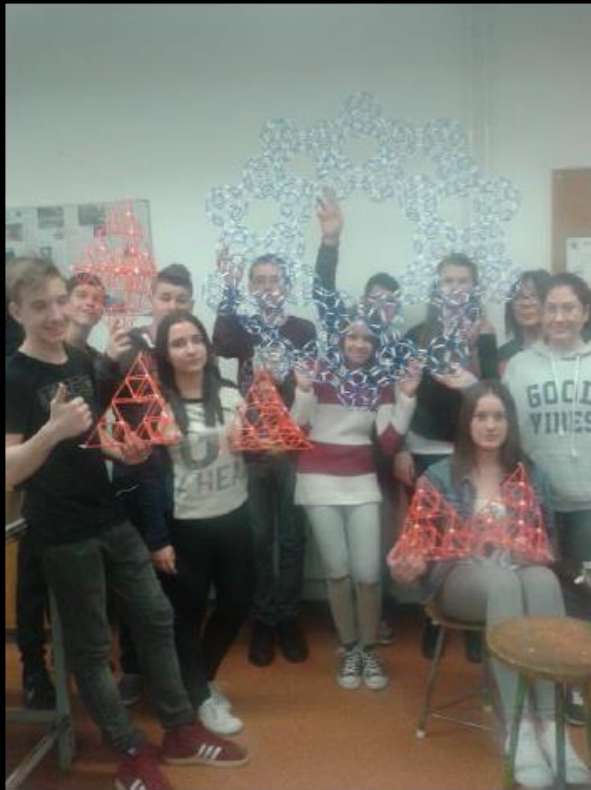
Artistic & Scientific Compositions with Soccer Ball Structure



Artistic & Scientific Compositions with Soccer Ball Structure



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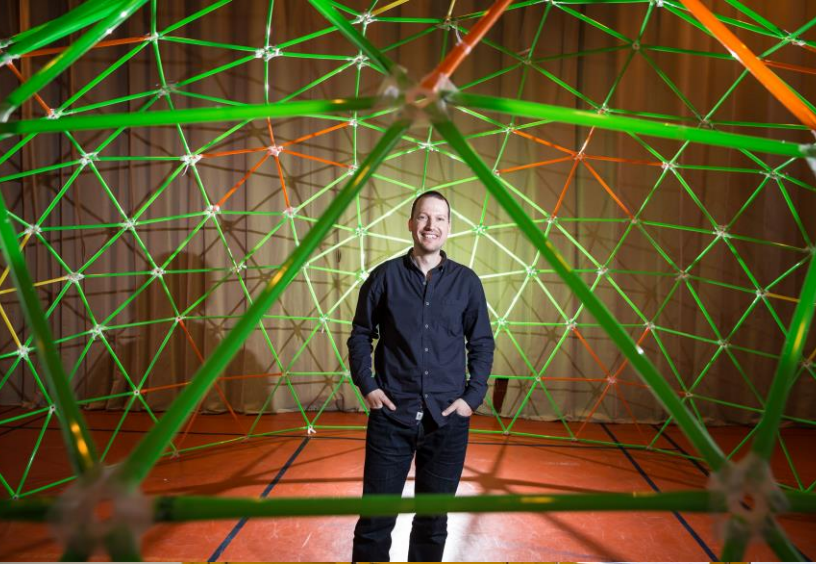
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Work in pairs or in small groups! Work as a team of engineers!

You need to solve a given problem within a given amount of time, based on a given amount of resources:

- Set goals
- Make plans
- Do tests
- Record the thinking / design process
- Do more with less



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

Contact us: info@experienceworkshop.org

Website: www.experienceworkshop.org

Facebook: www.facebook.com/experienceworkshop.math.art