



Edu2000 America Inc
PO Box 2636, Carson City, NV 89702
Ph: 775-887-1744 Fax: 775-887-1479

http://www.education2000.com
e-mail: info@education2000.com

Edu2000

Geometry Journey Video Series

Program #14

Regular Polyhedrons

**Satellite Broadcasting
VHS
and Internet/Intranet Streaming**



Topic

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Geometry Journey Series

Program #14 - Regular Polyhedrons

Program Description

One amazing fact is that there are only five kinds of possible regular convex polyhedrons -- regular tetrahedron, regular hexahedron or cube, regular octahedron, regular dodecahedron, and regular icosahedron. Their sheer beauty alone attracts many people to study them. Watch this video to find out why there are only five and how to easily construct these fascinating shapes.

This program is the #14 episode in the fifteen 15-minute Geometry Journey Series.

Synopsis

This program will cover the following topics:

1. Polyhedral Angles
2. Introduction to Regular Polyhedrons
3. Construction of a Regular Tetrahedron
4. Construction of a Regular Hexahedron
5. Construction of a Regular Octahedron
6. Construction of a Regular Dodecahedron
7. Construction of a Regular Icosahedron
8. Number of Regular Convex Polyhedrons Possible

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Program #14 - Regular Polyhedrons

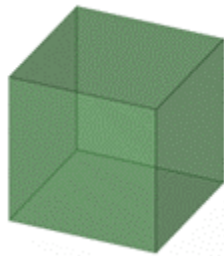
Student Worksheet

Name _____

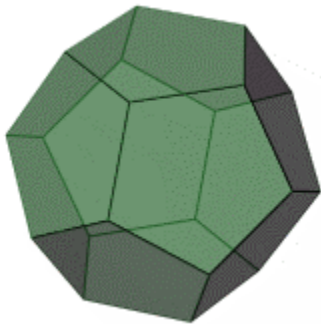
1) Is the soccer ball a regular polyhedron? Assume that each piece is flat enough to be a polygon.



2) Show what a regular hexahedron (cube) would look like if it were cut open along the lateral edges, top edges and bottom edges and unfolded in one piece.



3) Show what a regular dodecahedron would look like if it were cut into two equal parts and unfolded in one piece.



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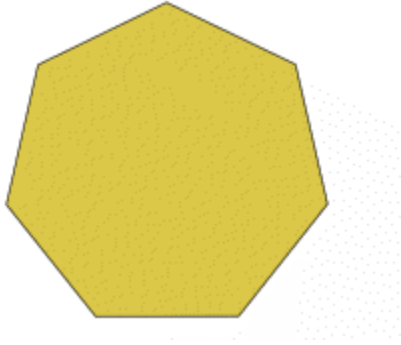
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Geometry Journey Series

Program #14 - Regular Polyhedrons

Discussion Questions

Question: Please explain why it is impossible to construct a regular polyhedron with regular heptagons.



Answers to the Student Worksheet

1) Is the soccer ball a regular polyhedron? Assume that each piece is flat enough to be a polygon.

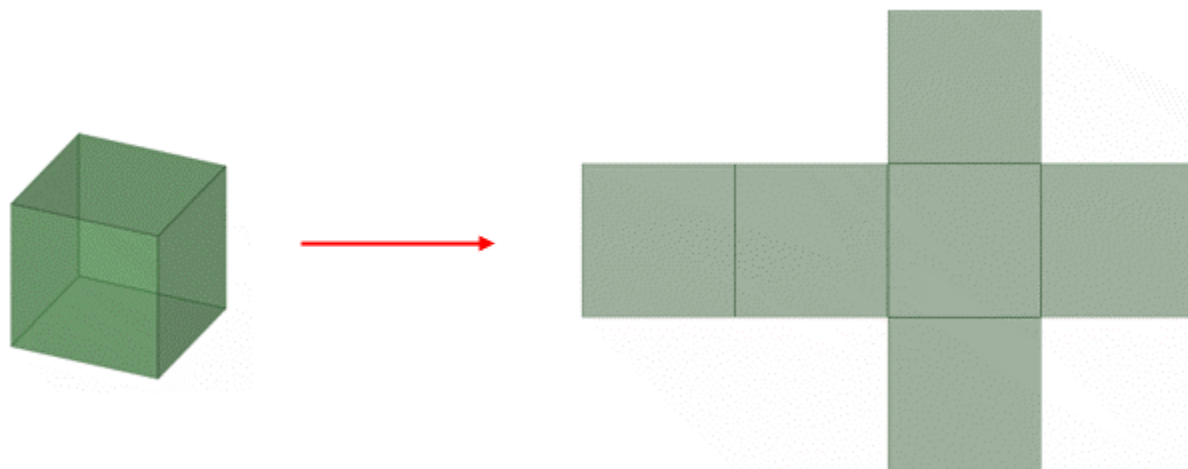


Answer: No.

All faces are regular polygons, but not congruent. Some are regular pentagons and some are hexagons.

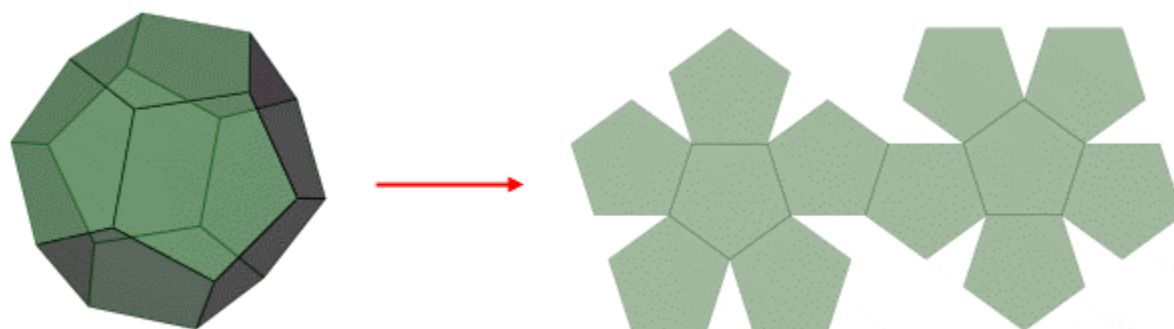
2) Show what a regular hexahedron (cube) would look like if it were cut open along the lateral edges, top edges and bottom edges and unfolded in one piece.

Answer: One possible look is as follows.

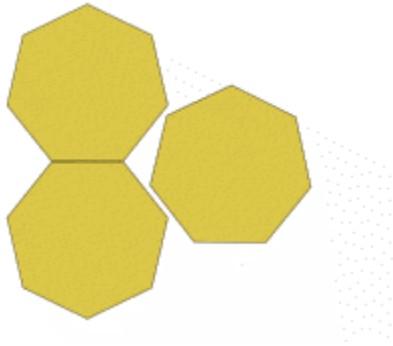


3) Show what a regular dodecahedron would look like if it were cut into two equal parts and unfolded in one piece.

Answer: One possible look is as follows.



Question: Please explain why it is impossible to construct a regular polyhedron with regular heptagons.



Hint: A polyhedral angle is part of a polyhedron. If we cannot construct a convex polyhedral angle with regular heptagons, we know for sure that we cannot construct a regular polyhedron using this same regular heptagon.

Since a convex polyhedral angle must have at least three faces, we will try to use three regular heptagons to construct the polyhedral angle. As shown, they overlap when placed around a common point. This means that no polyhedral angle can be formed with regular heptagons. Therefore, no regular polyhedron can be built using regular heptagons.