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SPATIAL OBJECTS

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Annotation

This article provides an overview of spatial objects and their brief history from elementary school.

Keywords: tetrahedron, hexahedron, octahedron, icosahedron, dodecahedron, prism, parallelepiped, pyramid, cylinder, cone, sphere, sphere, truncated pyramid, truncated cone.

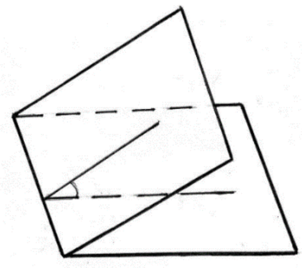
Аннотация

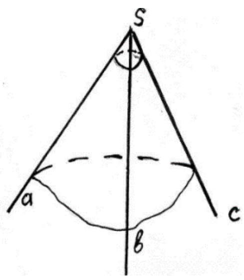
В данной статье представлен обзор пространственных объектов и их краткая история из начальной школы.

Ключевые слова: тетраэдр, шестигранник, октаэдр, икосаэдр, додекаэдр, призма, параллелепипед, пирамида, цилиндр, конус, сфера, сфера, усеченная пирамида, усеченный конус

Polyhedral angles

A figure consisting of two half-planes and a common straight line delimiting them is called a dihedral angle. half-planes are the sides of a two-sided angle, and the straight line limiting them is called the edge of a two-sided angle. If a plane is drawn perpendicular to the edge of a two-sided angle, it will intersect the sides in two semi-straight lines. The angle formed by these semi-straight lines is called the linear angle of a dihedral angle. A figure consisting of three flat angles is called a three-sided angle. (*ab*), (*bc*), and (*ac*) are plane angles, and (*abc*) is a three-sided angle.





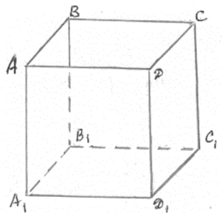
Flat angles are called the sides of a three-sided angle, and their sides are called the edges of a three-sided angle, and the common triangle is called the tip of a three-sided angle.
A three-sided angle is made up of three two-sided angles.
It can be noted that a similar polygon is made up of flat angles.

Spectrum Journal of Innovation, Reforms and Development

A body whose surface consists of a finite number of flat planes is called a polyhedron .If the polyhedron itself lies on one side of each polygonal plane on its surface, such a polyhedron is called a convex polyhedron. The common part of such a plane with the surface of a convex polyhedron is called a side. The sides of a convex polyhedron consist of convex polygons. The sides of the polyhedron are called its edges, and the vertices of the polyhedron are called vertices.

Polyhedron

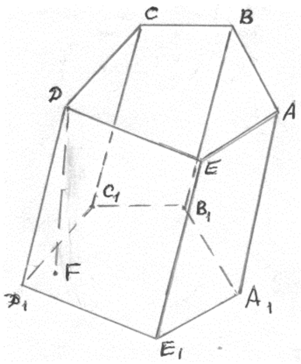
We explain this definition on the example of a cube .A cube is a convex



polyhedron. Its surface consists of six squares: ABCD, B B1 C1 C,... These squares are the sides of the cube. The sides of these squares AB, BC, B B1 ... will be the edges of the cube. The vertices of the squares A, B, C, D, A1, ... are the vertices of the cube.

Prism

A polygon whose corresponding sides are parallel to each other and whose other sides are parallelograms is called a polygonal prism.



According to the definition of a prism:

1). The bases of a prism consist of two equal polygons, the corresponding sides of which are parallel:

2). The sides of the prism are parallelograms.

A prism whose lateral edges are inclined to the plane of the base is called an inclined prism. A prism whose sides are perpendicular to the base is called a right prism.

A right prism whose bases are regular n-angles is called regular. The height of a perpendicular prism lowered from one of the ends of the parallel planes to the other plane is called.

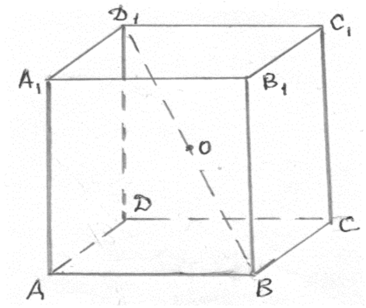
Parallelepiped.

A prism whose base is a parallelogram is called a parallelepiped A parallelepiped whose sides are perpendicular to the base is called regular. A regular parallelepiped with a rectangular base is called right-angled.

A cube is a right-angled parallelepiped with all equal sides.

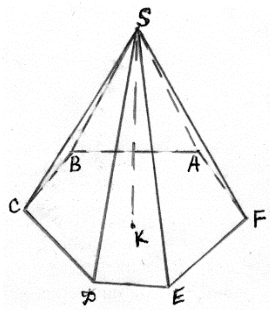
Properties of a parallelepiped:

1. The center of the parallelepiped diagonal is its center of symmetry.
2. Opposite sides of a parallelepiped are congruent and parallel in pairs.
3. All diagonals of a parallelepiped intersect at one point and are bisected at this point.



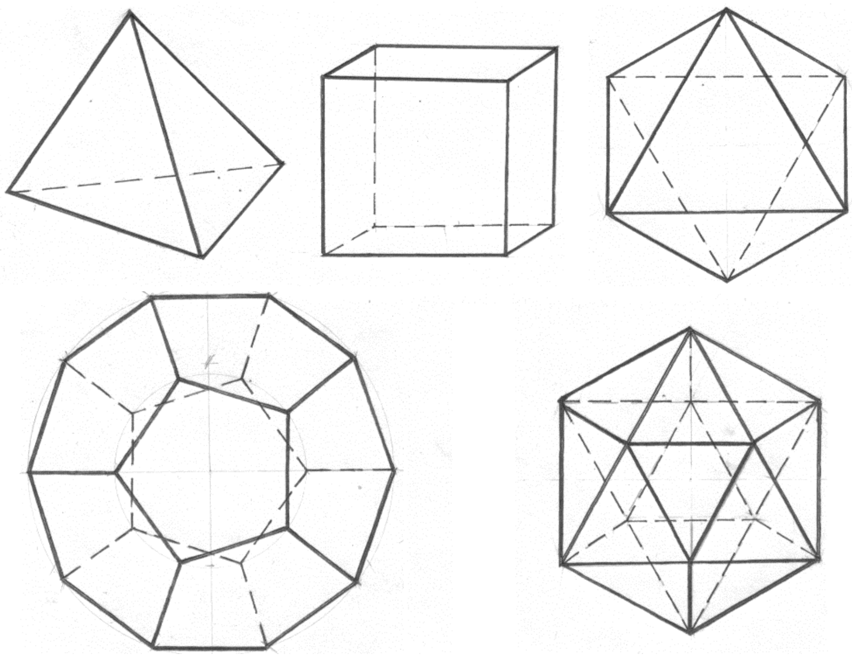
The surface area of a right-angled parallelepiped is equal to the sum of the surface area of the lateral surface and the surfaces of the two bases.
The surface of the lateral surface is equal to the product of the perimeter of the base and its height.
All diagonals of a right-angled parallelepiped are of equal length.

Pyramid
If a polygon is cut by a plane that does not pass through the vertex, then the body bounded by the cutting plane and the sides of the polygon is called a pyramid
The segment of the cutting plane between the angles of the polygon is called the base of the pyramid.
ABCDEF-base, SAB, SBC, ...- sides, S- common three.



Regular polyhedral
Polyhedrals consisting of regular polygons with all equal sides are called regular polyhedrals.
The following Euler's theorem expresses the connection between the vertices-U, the sides-Y, and the edges-Q of the polyhedron.
Theorem: For a regular polyhedron, the following relation holds:
$U + Y - Q = 2$
This is called the Euler characteristic for a regular polynomial. (The Euler characteristic is equal to 2).
We will see the proof of this theorem in particular for regular polynomials.
There are 5 types of regular arthropods. These are: tetrahedron, cube(hexahedron), octahedron, icosahedron, dodecahedron.
The sides of a regular tetrahedron consist of regular triangles, with three edges meeting at each end. A tetrahedron consists of a triangular pyramid with all sides equal. It has 4 sides, 6 edges, and 4 vertices.
All sides of the cube are squares, with three edges meeting at each end. A cube is a right-angled parallelepiped with equal sides.
It has 6 sides, 12 edges, and 8 vertices.
The sides of an octahedron are regular triangles, and it differs from a tetrahedron in that four edges meet at each end.
It has 8 sides, 12 edges, and 6 vertices.

The sides of the dodecahedron consist of regular pentagons. At each end of it, three edges join together.
It has 12 sides, 30 edges, and 20 vertices.
The sides of an icosahedron consist of regular triangles, and it differs from a tetrahedron and an octahedron in that five of its edges meet at each end.
It has 20 sides, 30 edges and 12 vertices .
Euler's theorem holds for all regular polynomials above.



A brief history of regular polygons

Regular polyhedra are discussed in Book 13 of Euclid's "Fundamentals". But information about regular polynomials was also reflected in the works of ancient Greek mathematicians. Greek mathematician Proclus (412-485) noted that Pythagoras discovered five regular polyhedra. But later it became known that Pythagoras knew only the hexahedron, tetrahedron and dodecahedron from regular polyhedra, and the octahedron and icosahedron were discovered by Tetetus of Athens (e.o.IV). The Greek philosopher Plato compared the four elements of nature, earth, air, water and fire, to regular polyhedra and compared the shape of the earth to a dodecahedron. Later, Archimedes discovered 13 semi-regular spheres.Johann Kerler, whose hobby is regular polyhedra, discovered the existence of two concave, regular, star-shaped polyhedra by regularly studying Archimedean surfaces. Later, the French mathematician L. Poinsot discovered the existence of two more half-concave stellate regular polyhedra, and in 1812, Cauchy proved that there are only four types of stellate regular polyhedra. Representatives of the Renaissance Leonardo da Vinci and Luca Pocoli also worked on regular and semi-regular shoes and described their research in the work "On the Divine Proportion (1509)".Al-Biruni in the geometry section of the book "Kitab al-tafkim" (1029-1034) studied regular polyhedrons and mentioned that they can be placed inside the sphere, and called the tetrahedron "noriy" i.e. fiery, and the octahedron "airy" ' is air, the cube is called "arziy", i.e.

earth, the icosahedron is "oil", i.e. water, and the dodecahedron is "falakiy", i.e. sky. Plato looked for connections between the structure of the universe and regular polyhedra. Plato stated that the "four elements" that make up the universe, "Fire", "Earth", "Air", and "Water" particles are in the form of tetrahedron, cube, octahedron and dodecahedron.

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