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Mixed department (Stereometry)

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Annotation: This article describes in detail the transformative potential of modern technologies, the axioms of stereometry, and the results derived from the axioms of stereometry, with special attention to virtual reality in the context of teaching stereometry.

Key words: Stereometry, transformation potential, modern technologies, geometric figures.

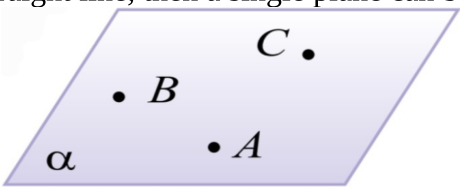
Introduction:

Stereometry is a branch of geometry that studies figures in space. In stereometry, a branch of geometry, as in planimetry, the properties of geometric figures are determined by proving relevant theorems. These proofs are based on the properties of basic geometric figures represented by axioms. The main figures in space are a point, a straight line and a plane. A plane is infinite like a straight line. In the picture, we depict only a part of the plane, but we imagine it to be infinitely extended in all directions. Planes are designated by Greek letters α, β, γ.

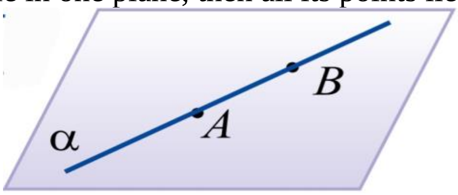
Main part:

Stereometry is a branch of geometry that studies geometric objects whose points do not lie in the same plane. When studying the stereometry part of geometry, it is necessary to have a sufficient number of axioms that do not contradict each other and are not calculated as the result of one another. In stereometry, as in planimetry, the properties of some geometric shapes are accepted without proof. We take the following properties of planes in space as axioms of group S without proof:

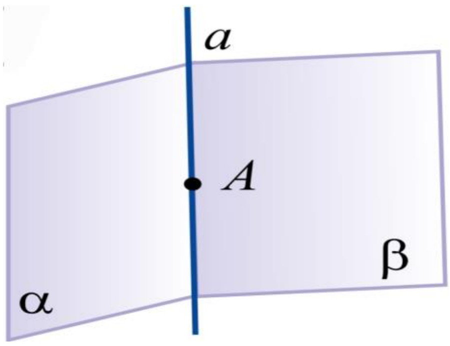
If three points do not lie on a straight line, then a single plane can be drawn through them.



If two points of a straight line lie in one plane, then all its points lie in this plane.



If two planes have a common point, then these planes also have a common straight line passing through that point.



Together with the axioms introduced in planimetry, these three axioms form the basis of stereometry. In planimetry, we had a single plane on which all the shapes we were looking at were located. In

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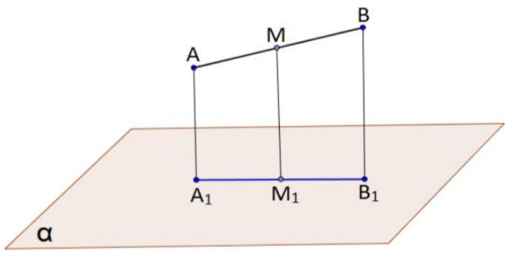
stereometry, there are an infinite number of such planes, and it is considered that the axioms of planimetry and all the properties proved in planimetry apply to all of them. Also, in the course of stereometry, it is necessary to look at the axioms of planimetry from the point of view of stereometry.

Question 1. Parallel straight lines intersecting a plane at points A1, B1, M1 are drawn from the ends of section AB and its center M. If the section AB does not cross the plane and $AA_1 = 5m$ $BB_1 = 7m$, find the length of the section MM_1.

Solution: $AA_1 \parallel BB_1$, the bases of ABB_1A_1 form a trapezoid AA_1 and BB_1. Section MM_1 is the middle line of this trapezoid.



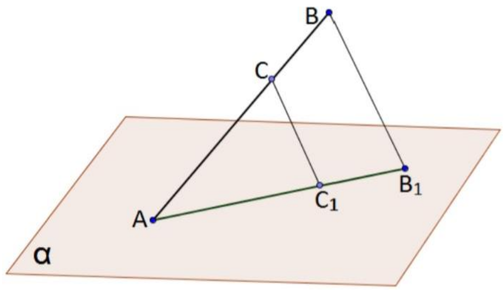
The middle line of the trapezoid is equal to half the sum of the bases:

$$MM_1 = \frac{AA_1 + BB_1}{2} = \frac{5m + 7m}{2} = \frac{12m}{2} = 6m$$

Answer: 6m

Question 2. A plane is drawn from the end A of the section AB. From the end B and point C of this cross-section, parallel straight lines intersecting the plane at points B_1 and C_1 were drawn. Find the length of the segment BB_1, where $CC_1 = 15$, AC : BC = 2 : 3

Solution:



$BB_1 \parallel CC_1 \Rightarrow ABB_1 \sim ACC_1$ is similar.

$$\frac{BB_1}{CC_1} = \frac{AB}{AC}$$

By condition, AC : BC = 2 : 3

$$AC = \frac{2}{3}BC$$

$$AB = AC + BC = \frac{2}{3}BC + BC = \frac{5}{3}BC$$

$$\frac{AB}{AC} = \frac{\frac{5}{3}BC}{\frac{2}{3}BC} = \frac{5}{2}$$

$$BB_1 = \frac{AB}{AC} \cdot CC_1 = \frac{5}{2} \cdot 15 = \frac{75}{2} = 37,5$$

Answer: 37, 5.

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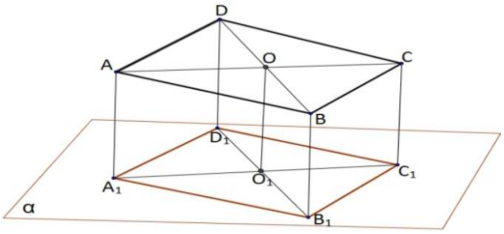
Question 3. Given a parallelogram ABCD and a plane that does not intersect it. Parallel straight lines crossing the given plane at points A_1, B_1, C_1, D_1 are drawn from the ends of the parallelogram. Find the length of section DD_1 where: $AA_1 = 2m$, $BB_1 = 3m$, $CC_1 = 8m$

Solution: AA_1 \\ BB1 \\ CC_1 \\ DD_1 $AA_1 = 2m$, $BB_1 = 3m$, $CC_1 = 8m$



Since AA_1 \\ CC_1, ACC_1A_1 is a trapezoid, and OO_1 is its midline. That is why:

$$OO_1 = \frac{AA_1 + CC_1}{2} = \frac{2m + 8m}{2} = 5m$$

Similarly, DBB_1D_1 is also a trapezoid whose midline is OO_1:

$$OO_1 = \frac{DD_1 + BB_1}{2}$$

$$2OO_1 = DD_1 + BB_1$$

$$2OO_1 - BB_1 = DD_1$$

$$DD_1 = 2OO_1 - BB_1$$

$$DD_1 = 2OO_1 - BB_1 = 2 \cdot 5 - 3 = 10 - 3 = 7$$

Answer: 7 m.

The development of the Dalest Stereometry and Applications aimed to promote constructivist teaching approaches in geometry, to change the role of the teacher in the teacher in the classroom, to make the students more responsible for their learning, to enable the students to understand the underlying concepts and to make mathematics more meaningful and realistic and thus give purpose and enjoyment in mathematics for the students.

Conclusion:

In conclusion, the activities were developed and trialled in all countries involved in the project and allparticipants met together to discuss the value of the activities and different approaches to the same task, thus ensuring that the final activities met the needs of all schools in the European Union. We hope the out-come of all approaches will be that the students have a more positive attitude towards stereometry

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