American Journal Of Applied Science And Technology
(ISSN – 2771-2745)
VOLUME 03 ISSUE 04 Pages: 09-15
SJIF IMPACT FACTOR (2021: 5. 705) (2022: 5. 705) (2023: 7.063)
OCLC – 1121105677
Publisher: Oscar Publishing Services

Journal Website: https://theusajournals.com/index.php/ajast

Research Article

INTERCEPTION OF A PLANE WITH A TOPOGRAPHIC SURFACE WITH NUMERICAL MARKS

Submission Date: April 20, 2023, Accepted Date: April 25, 2023,
Published Date: April 30, 2023
Crossref doi: https://doi.org/10.37547/ajast/Volume03Issue04-03

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ABSTRACT

This article discusses the solution of various metric and positional problems in the field of descriptive geometry and topographic drawing, improving the graphic literacy of students, knowledge, methods of applying the theoretical laws of topographic drawing. Knowledge of the theoretical rules and regulations of topographic drawing helps students gain deeper knowledge in the field of topographic drawing.

KEYWORDS

Descriptive geometry, Topographic drawing, Spatial imagination, Surfaces, Surface types, Planes, Straight line, Parallelism, Perpendicularity, Head lines, projection, scientific research, knowledge, skills, development, mountainous reliefs, different levels of options.

INTRODUCTION

It is known that the discipline "Descriptive geometry" is one of the basic subjects that form the basis for training specialists in the construction industry. Geometric thinking is becoming more and more in demand in the professional activity of a future specialist not only in engineering, construction, architecture, but also in science and business. In this regard, and also because of the general trend towards the visualization of any information, the role of the geometric and graphic components in the educational sphere is increasing.

The purpose of studying the discipline is to master the basic methods for constructing technical images on a plane and in space in accordance with the regulatory and technical requirements of ESKD. Discipline tasks:

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– study of the laws of geometric formation of space models;

– study of the basic rules and provisions of the current standards and instructions for the preparation of technical documentation;

– development of spatial imagination;

– development of skills and abilities in the development and execution of drawings;

– study of the basic rules for the execution and execution of construction drawings.

The process of studying the discipline is aimed at forming students' general professional competencies:

DIC-3 - possession of the basic laws of geometric formation, construction and mutual intersection of plane and space models, necessary for the execution and reading of drawings of buildings, structures, structures, drawing up design documentation and details.

As a result of mastering the discipline, the student should have an idea:

- about the general rules for the design of graphic material;

know:

- the basic laws of geometric formation, construction and mutual intersection of plane and space models, necessary for the execution and reading of various drawings, as well as for the preparation of design documentation;

– current standards, regulations and instructions for the preparation of technical documentation.

be able to:

– perform images of spatial objects on flat drawings;

– solve graphical methods of metric and positional problems of spatial objects in the drawings;

- build and correctly draw up drawings in accordance with ESKD and SPDS;

- use different fonts.

This article is intended to help students in studying the section of descriptive geometry "Projections with numerical marks" and performing graphic work "Determining the boundaries of earthworks". The method of projections with numerical marks is a section of the course of descriptive geometry and is most often used in the preparation of drawings of building objects, in which the height dimensions are much smaller than the plan dimensions. The solution of problems in projections with numerical marks ultimately comes down to the development of drawings with a vertical layout for such structures as highways and railways, construction sites, airfields, dams, dams, etc.

Drawings in projections with numerical marks give an idea not only of the shape of the structure and its dimensions, but also of the slopes, the volume of earthworks, and the direction of the flow of flood and storm water.

This article discusses the concepts of projections with numerical marks of points, a straight plane, the surface of their relative position, examples of problem solving, questions for self-testing, as well as options for tasks and an example of work.

The plane in projections with numerical marks can be set:

- a straight line and a point outside it, Figure 1a;

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- three points not lying on one straight line, Figure 1b;

– two intersecting straight lines. A sign of the intersection of two lines on projections with numerical marks is the presence of a common point K, which has the same mark for each of the lines, Figure 1c;

– two parallel lines. A sign of parallelism of straight lines on projections with numerical marks is the parallelism of projections, the same direction of slopes and the equality of intervals, Figure 1d;

- a flat figure, figure 1e;

- the scale of the slope, Figure 1f.

The most convenient and illustrative image of the plane in projections with numerical marks is the assignment using the scale of the slope of the plane (graded slope line).

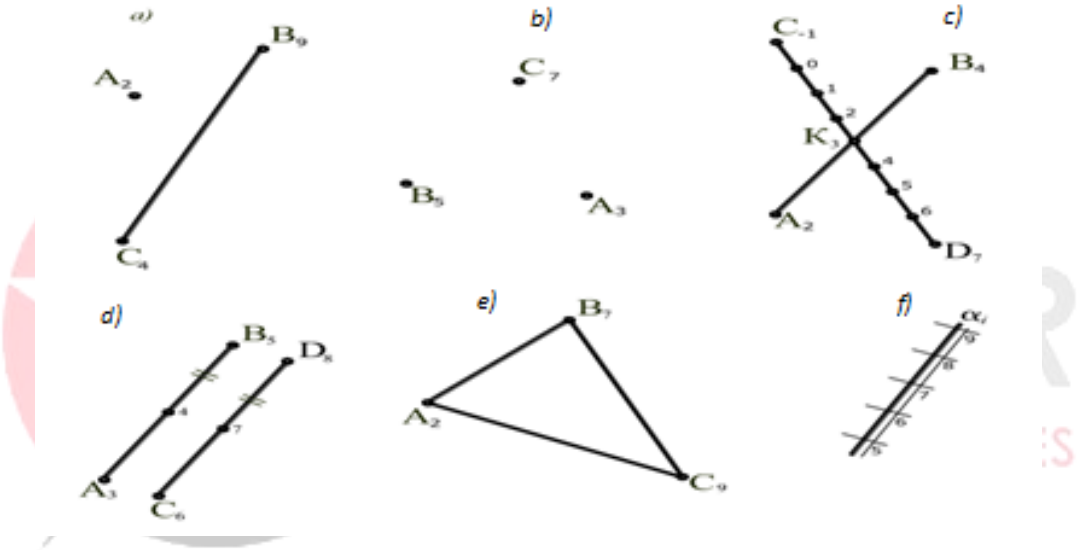

Figure 1.

Figure 2 shows an inclined plane ⍰, which is better represented as a flat mountain slope. We cut it with horizontal planes in height after 1m. The lines of intersection of these planes with the plane ⍰⍰ will be contour lines with marks 0, 1, 2, 3.

Horizontal plane - a straight line belonging to the plane and parallel to the plane of the zero level Π0.

The slope line of the MN plane - a straight line belonging to the plane and perpendicular to its horizontals. Thus, according to the right angle projection theorem, the angle between the slope scale and the contour projections will be a right angle.

The scale of the slope of the plane (MoNo) - a graduated projection of the line of the largest slope of the plane - MN.

The scale of the slope of the plane is perpendicular to the projections of contour lines, is depicted in the drawing by two parallel straight lines (thin and thickened) and is indicated by the same letter as the plane, with a subscript i (⍰i). Elevations of contour lines

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are indicated from the side of a thin line, along the scale of the slope of the plane.

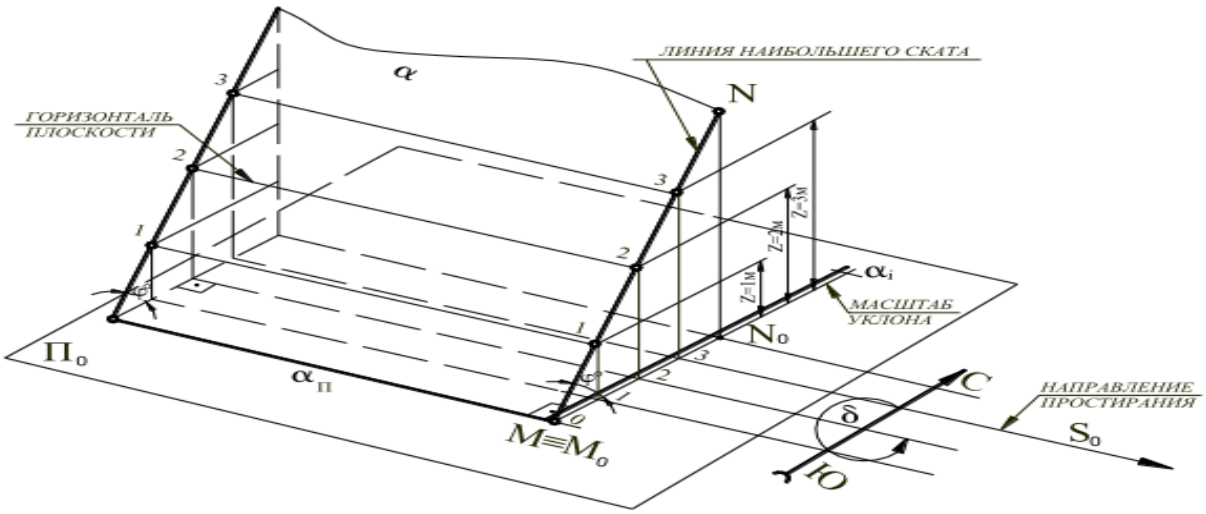

Figure 2.

The angle of incidence φ0 - the angle of inclination of the plane ⍰⍰ (the angle of inclination of the slope line) to the plane of the zero level П0.

The plane interval - the distance between adjacent contours of the slope scale ⍰i, corresponding to a unit of elevation.

The direction of the strike of the plane S0 - the left direction of the horizontals, if the observer looks along the line of the slope of the plane in the direction of its descent.

Plane strike angle ⍰0 - the angle between the direction of the meridian from south to north and the direction of the plane strike, which is measured counterclockwise from the northern end of the meridian.

Construct a line of intersection of the plane Q, setting it by the scale of the slope Qi with the topographic surface, Figure 3.

The line of intersection of a plane with a topographic surface is built in the same way as the intersection of planes: they find the intersection of contour lines with the same marks.

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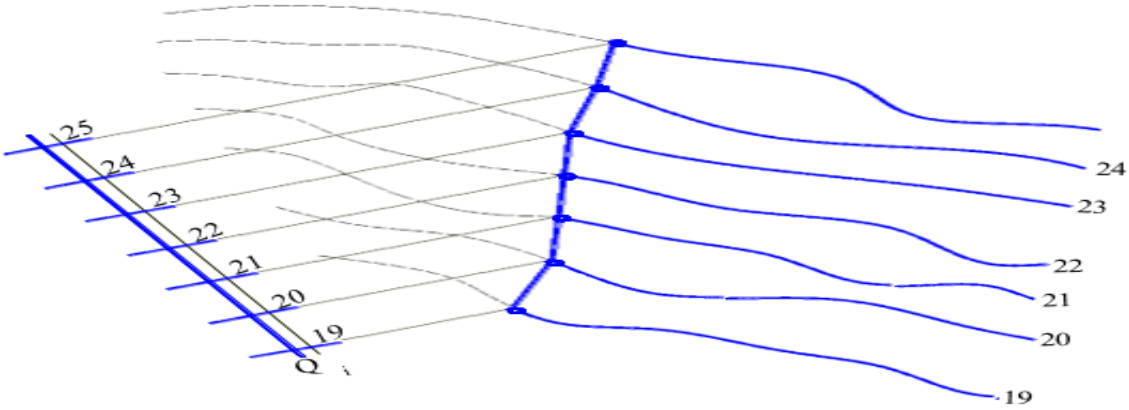

Figure 3.

Since the result of the intersection of the plane and the topographic surface is a curved line, to construct it, it is necessary to find the intersection of all contour lines of the plane with the surface contour lines that have the same numerical marks.

Further improvement in the quality of education is expected as a result of the enrichment of teaching methods in the field of higher education with modern information tools. In this regard, the distance learning method is of particular importance, since it has a number of conveniences for both the teacher and the students. Such technological methods as the Internet, multimedia set themselves the task of developing computer programs based on educational materials, manuals necessary for student students. After all, distance learning makes it possible to have generalized access to methodological literature, modern and relevant information from world educational centers in any field.

Distance learning method differs from traditional forms of education. It allows you to teach students at a convenient time for them, in a convenient place and conditions for them. Curricula are developed based on individual and group requirements, regardless of the course of study. In the learning process, it is possible to introduce a mutual exchange of information between pupils and students through a centralized network of scientific information and data. It is expected that the effective use of training areas, technical and vehicles will be expressed in the systematization of data collection, as well as in reducing the cost of retraining specialists. In the educational process, the most modern information and telecommunication technologies are used.

Distance learning allows the teacher to create broad conditions for self-study, saving time and increasing the material interest of specialists, depending on the level of their capabilities. The organization of the exchange of achievements in the field of education within the framework of the world education system will undoubtedly ensure achievements in this area.

The Tashkent University of Architecture and Civil Engineering has also established distance learning, which teaches topographic drawing. Students are given material on the subject and a database of tasks is created.

Based on the theoretical information provided to the students above, we have tried to define them in the

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following ways to evaluate their knowledge. These tasks help students work on metric and positional problems with numerical marks and develop their spatial imagination, Figure 4.

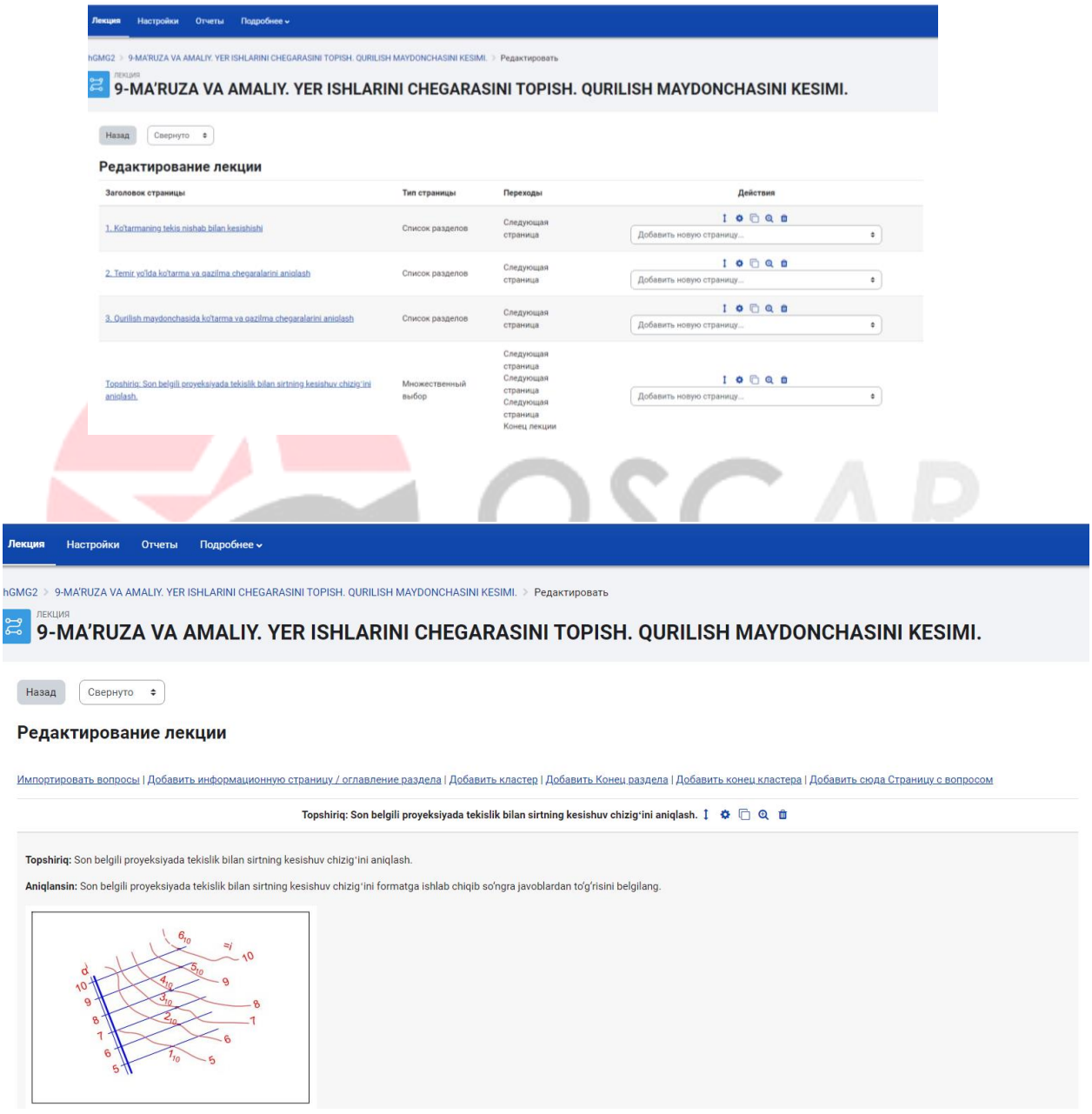

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Figure 4.

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