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Plains in a Special Case. The Relationship Between the Planes

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Annotation: To develop students' understanding of straight lines and planes and to develop skills and competencies in working on related issues. The listener must complete the given task on A4 paper with the necessary tools.
Keywords: straight lines, perpendicular, horizontal projection, frontal projections.

I. INTRODUCTION

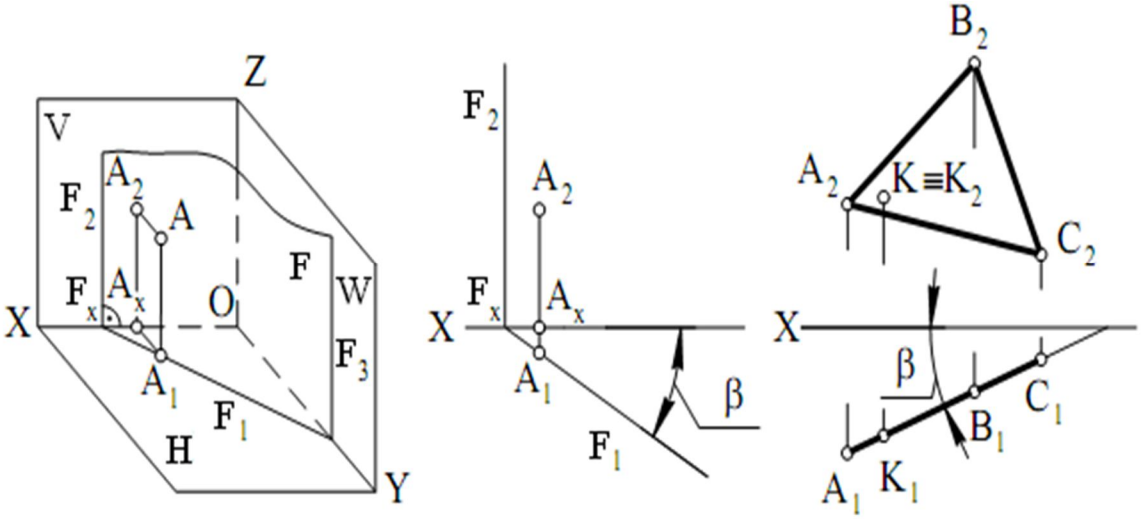
To develop students' understanding of straight lines and planes and to develop skills and competencies in working on related issues. The listener must complete the given task on A4 pAaper with the necessary tools..

Solution: The plane in space H, V, W can be in the following position with respect to the plane of projections: the plane of all projections - in the general case, the plane perpendicular to one of the planes of projection - the projection plane, perpendicular to the plane of two projections at the same time, ie the third projection parallel to the plane - level plane.

II. MAIN PART

Projection planes: horizontal projection plane (perpendicular to H), frontal projection plane (perpendicular to V), profile projection plane (perpendicular to W).

The frontal trace F_2 of the horizontal projection plane is perpendicular to the plane of projections H and the axis OX, the horizontal trace can be located at any angle. The horizontal trace of the plane has the property of accumulation, i.e. any point lying in the plane F, the shape is always projected on the horizontal trace F_1, the same applies to the point A lying in the plane F (see Figure 1, b).



a) b) c)

Figure 1

Figure c depicts a triangle ABC that occupies a projection position with respect to the plane of projections H. The point K lies in this triangle. Its K2 frontal projection overlaps with K ($K_2 \equiv K$). K_1 The horizontal projection of the triangle $A_1B_1C_1$ projected to the horizontal projection. X of the plane of the axis F_1 relative to the horizontal trace β angles, as well as an angle b between the horizontal projection of the triangle $A_1B_1C_1$ and the X axis, which is the angle of inclination formed by the plane F and the plane of the frontal projections of the triangle ABC.

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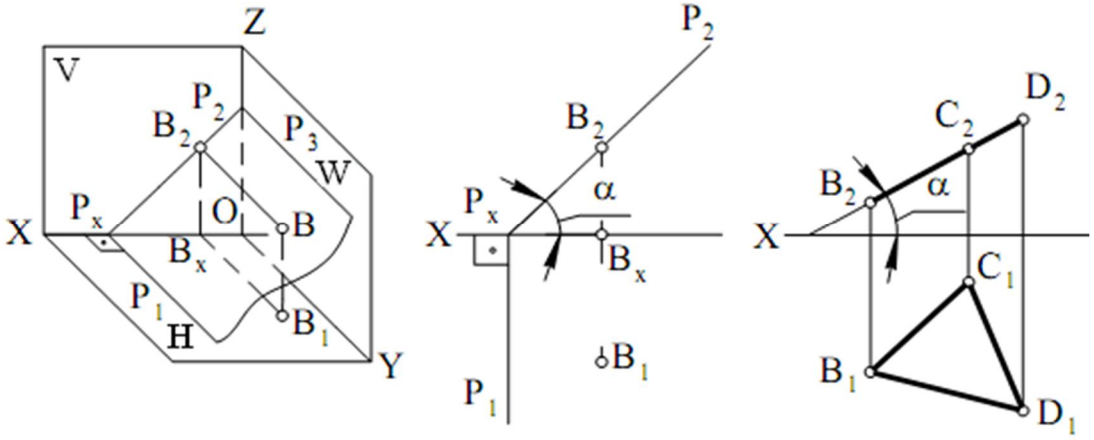
The frontal projection plane R, a clear image of R_2, R1, and the angular BCD ($B_1C_1D_1iB_2C_2D_2$) are shown in Figure 2.



a) b) c)

Figure 2

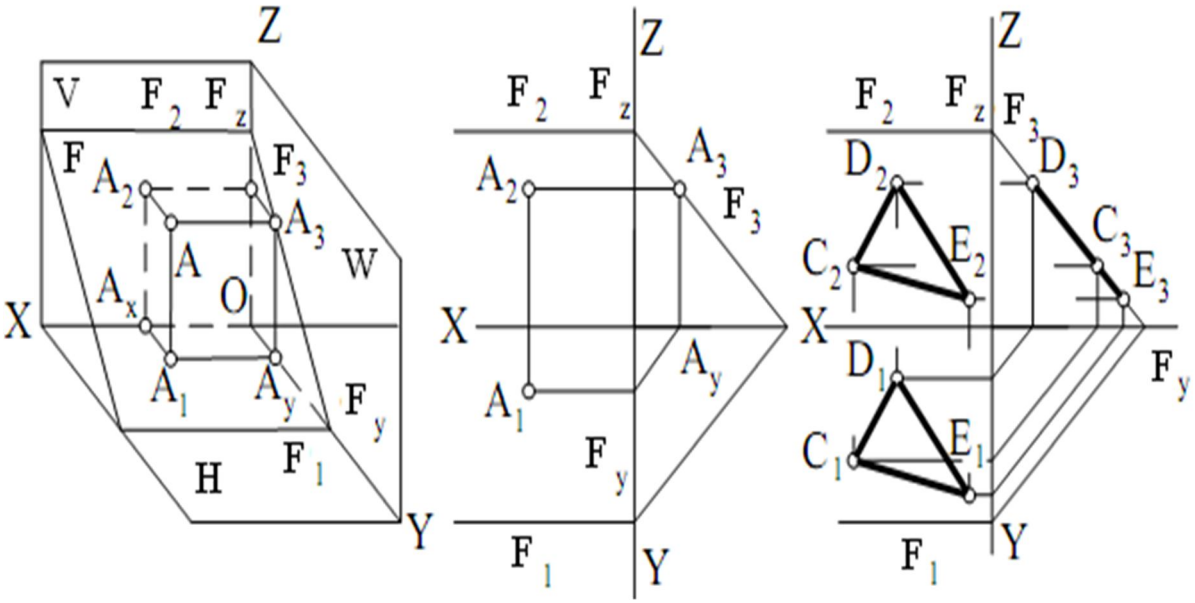
In this case (see Figure 2 a) the horizontal trace P_1 is perpendicular to the V and X axes. Point B lying in the plane P is forcibly projected onto the frontal trace P_2. With respect to the frontal projection plane V, the BCD occupies a triangular projection position (Fig. 2 c), so that its projection is projected in the form of a straight line section $V_2S_2D_2$.

P_2 va X o'qi orasidagi hamda $B_2C_2D_2$ vaX o'qi orasidagi α (2 b va c shaklga qarang) burchak P va BCD uchburchak tekisliklarining H proektsiyalar tekisligiga nisbatan qiyalik burchagi hisoblanadi.

The profile projection plane is depicted in Figure 3. The point A corresponding to the profile projection plane and its projection are depicted in Figure 3 a. The A_3 profile projection lies on the F_3 profile track. Figures 3 b and c depict the profile projection plane given by the traces F (F_1, F_2, F_3) of the plane and the triangle CDE ($C_1D_1E_1$; $C_2D_2E_2$; $C_3D_3E_3$).

X The projection plane of the profile passing through the axis is called the profile projection plane along the axis, and the profile projection plane dividing the angle between the projections H and V by two is called the bisector plane.

The level plane consists of the following planes: the horizontal plane - parallel to H, the frontal plane - parallel to V, and the profile plane - parallel to W. These plane planes are perpendicular to the two projection planes at the same time. For example, the horizontal plane is parallel to the frontal and profile planes at the same time.



a) b) c)

Figure 3

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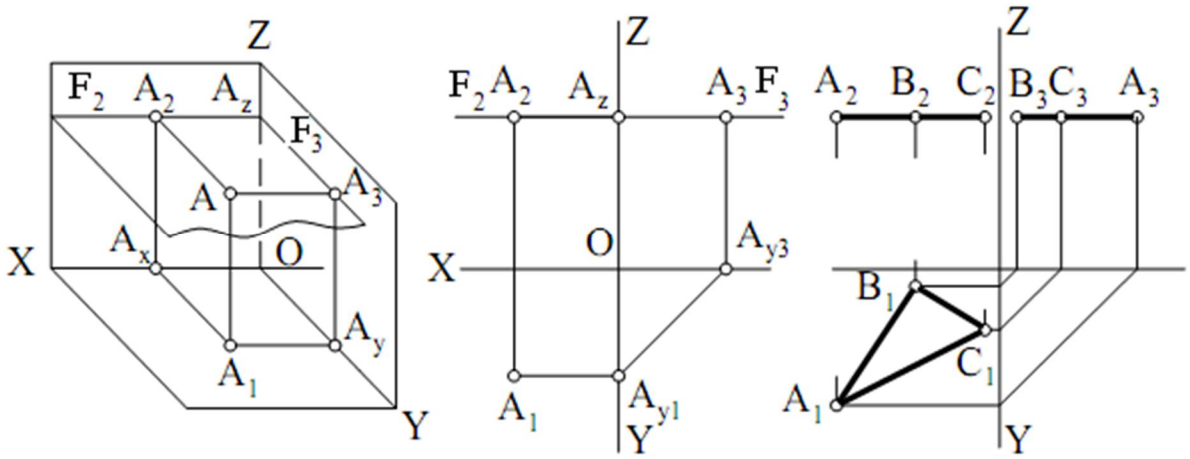
Figure 4a shows a clear representation of the horizontal plane F (F_2, F_3) in the system of projections H, V and W, and Figure 4b shows the frontal and profile traces of this plane (F_1 and F_3). It is also shown that the point A lying in the plane F is projected onto the plane of projections.



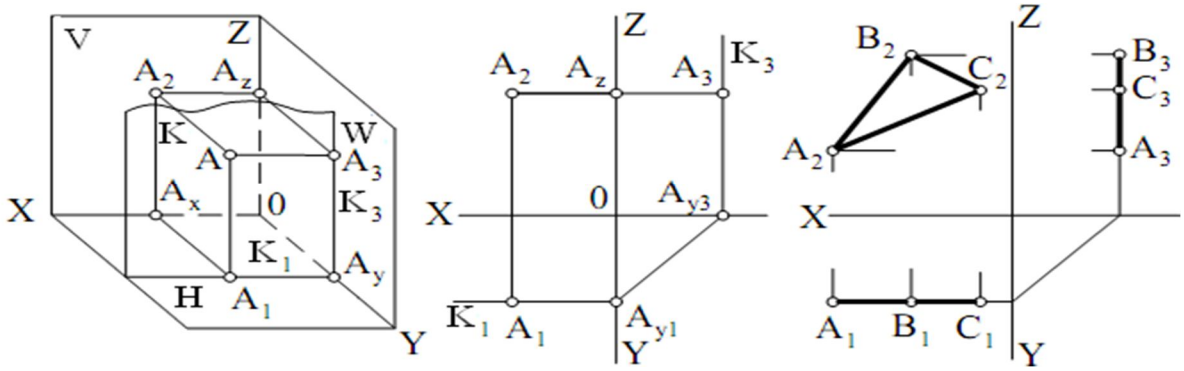
a) b) c)

Figure 4

The horizontal plane of the triangle ABC (see Figure 4 c) is given by projections $A_1B_1C_1$, $A_2B_2C_2$, and $A_3B_3C_3$. In this case, the frontal and profile projections are represented by the intersections of a straight line, and the horizontal projection is equal to the actual size of the triangle, i.e. ABC, and is in a position parallel to the plane of horizontal projections H in space.

Figures 5 a and b show the K frontal plane and show the horizontal traces K_1 and profile K_3 of this plane and the projections of point A corresponding to this plane. In this case, the horizontal and profile projections of point A overlap with the corresponding traces of the plane.

The horizontal projections $A_1B_1C_1$ and the profile projections $A_3B_3C_3$ of the plane ABC are projected as a straight line, the frontal projection is projected in the form of a triangle $A_2B_2C_2$, and the frontal projection is equal to the actual size of the triangle, ie $A_2B_2C_2$ = ABC.



a) b) c)

Figure 5

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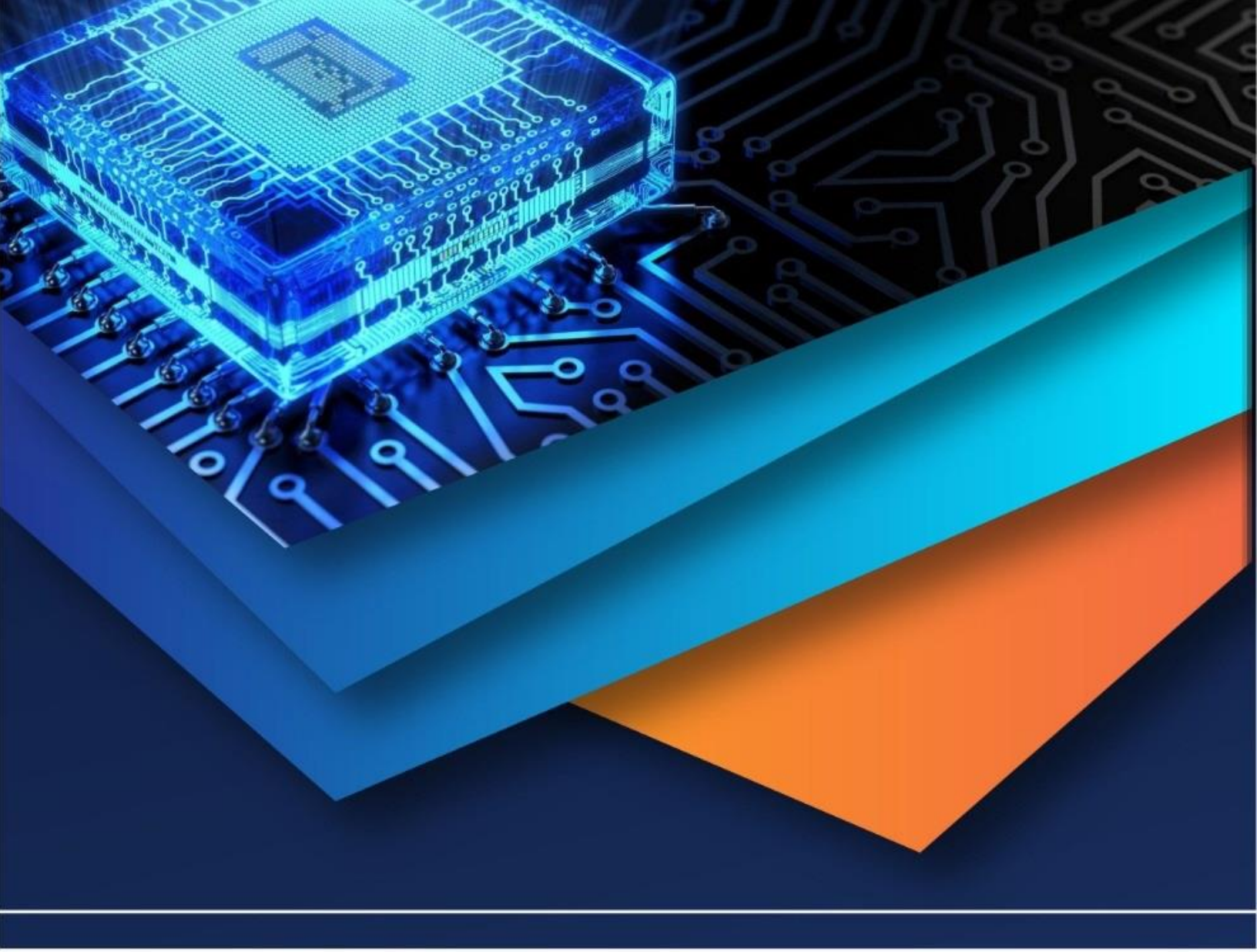

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