RULES FOR DRAWING AND READING DRAWINGS THROUGH PROJECTION IN DRAWING

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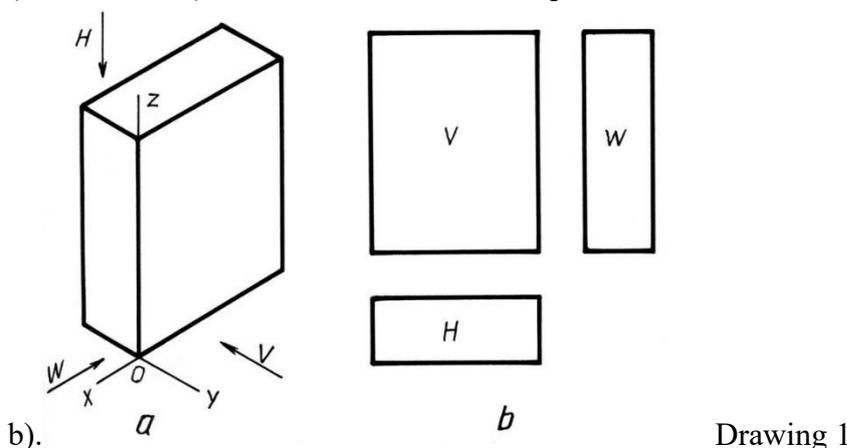
Annotation: In this article, before creating any object, building, etc., their drawings are drawn. Drawing is a concept that is written about the idea of   a certain range of geometric constructions, in compliance with all the laws and regulations of the current state standard, and is carried out with the help of drawing tools in pursuit of a goal.

Keywords: Drawing, teacher, projection, method, appearance, graphics, spatial imagination, aesthetic, realistic, body, cube, skill.

INTRODUCTION

Drawing a drawing. In general, a person who does not know how to read drawings in our everyday life cannot master modern technical technologies. In order to fully master the knowledge of drawing, the basis for learning to draw and read drawings begins with mastering the conditional simplification of each object in drawing.

In the conditional simplification of an object on a plane, for example, if a matchbox is depicted in one view, it is considered a clear representation. If the matchbox is depicted in three planes, one from the front (V direction), the second from above (H direction, and the third from the left (W direction), it is called a simplified conditional representation (Figure 1, a,

b).   Drawing 1

Here, if we consider a matchbox as a geometric figure, it is called a parallelepiped and is depicted without thickness in its front view. Its thickness is determined in the top and left views. When these three views are depicted in one drawing, they are called views. Therefore, in order to

learn to draw and read a drawing, it is necessary to combine three separate views of the object and perceive them as one clear image.

To study views, it is permissible to get acquainted with the methods of projecting an object onto a plane. The term view is replaced by the term projection.

Projection methods. To better study these methods, a straight line segment AB is used.

There are mainly two types of projection.

1. Central projection. In this method, the center of the projections is determined at point S to project the segment AB onto the plane H. Point S is connected to points A and B and this ray is continued until it intersects H. Then A′ and B′ are formed at H. When A′ and B′ are connected to each other, the projection (view) of AB at H is formed (Figure 2).
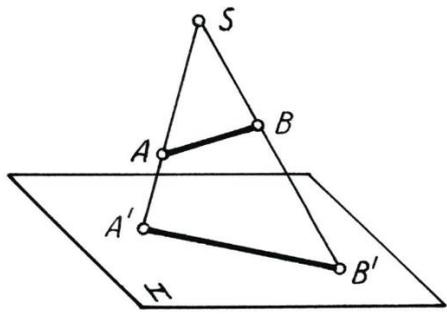
Figure 2

2. Parallel projection. In this method, the center S is directed to infinity, that is, it is replaced by the Moon or the Sun. Then the rays (lines) SA and SB coming from S become parallel to each other, and the center S is replaced by the direction s.

Through points A and B, parallel lines are drawn to the direction of projection s, which intersect with H. A′ and B′ are connected together and the resulting projection is analyzed. When the direction s is inclined (oblique) to H, if an oblique angle, perpendicular (at a right angle (90°) to H) is taken, a right-angled (orthogonal - Greek ortho-right, gonal-angled) projection is formed (Figure 3, a, b).
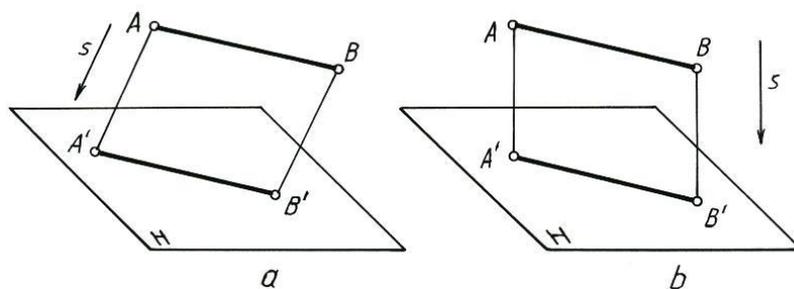
Drawing 3

After this, the projections (views) of the object (detail) in the drawing are studied only through orthogonal projection. Drawings are not drawn using central projection, which is the method used by artists. Because the science of perspective is mainly based on central projection.

In order to thoroughly study orthogonal projection, let's make projections of a geometric object. We will consider the depiction of a parallelepiped in the H, V and W systems.
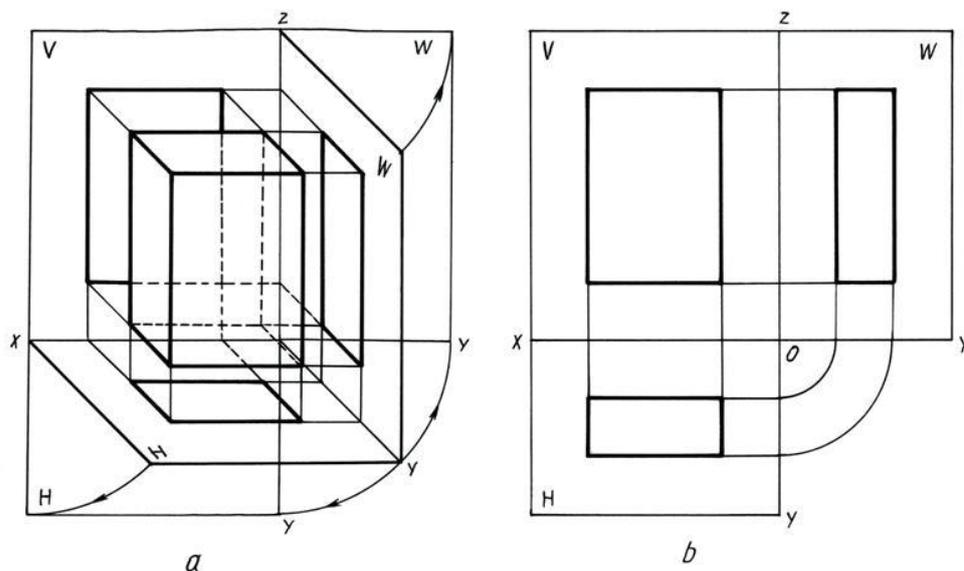

Figure 4

If a parallelepiped located in the space of mutually perpendicular projection planes H, V and W is taken perpendicular to H, its upper and lower bases overlap and are projected as a small rectangle. Here, the direction s was perpendicular to H. Now, if the direction s is taken perpendicular to V, the front and rear ends (sides) of the parallelepiped overlap and are projected as a large rectangle (Figure 4, a).

To represent these three projections in one plane, the parallelepiped is taken and its projections in H and W are placed below and next to the projection in V, a flat drawing is formed. For this, H is rotated to the left through OX, and W is rotated to the right through OZ. Then the axis OY is

divided into two. Then the projections are exchanged into views (Figure 4, b).

Reading drawings. Reading drawings is an inextricable link between spatial imagination and spatial thinking, and by looking at the views (projections), we try to bring the image of the object (detail) to our attention, that is, by synthesizing the views of the details, all the views are collected in one place (like a clear image). Only then can we fully perceive the detail and have clear information about it. The shape of any object (detail) is formed from a set of geometric bodies. Therefore, the shape of each detail is characterized by geometric concepts. In order to have a clear idea about the shape of the detail, it is necessary to have a clear idea of the geometric bodies and their interconnections. In the process of reading the drawing of the views of the detail, as a result of dividing it into individual geometric bodies and examining their interconnections, the size and shape of the detail appear in our minds.

As a result of analyzing all the views, the spatial image of the detail is embodied in the drawing. The ability to visualize a clear image of the detail based on the views depicted in the drawing is called reading the drawings. Reading the drawing begins with reading the views of simple geometric bodies.

In the process of reading the drawings, you can learn to draw them.

Example. Two given views of a parallelepiped are given. Determine its third (from the left) view (Figure 5, a).

1. The two given views of the parallelepiped are copied and drawn (Figure 5, b).

2. The axes OX, OY, OZ are drawn (Figure 5, c).

3. The contours of the view at H (parallel to OX) are continued to OY and through point O are transferred to OY at W on the circle or lines are drawn at 450 (Figure 5, c).

4. The view of the parallelepiped from V is obtained by drawing perpendicular lines from the contour lines (parallel to OX) to OZ and intersecting them with lines drawn from OY parallel to OZ. As a result, these lines intersect and form a view of the parallelepiped from the left. This example is compared with the process of projecting the parallelepiped onto H, V, W. Then the projection procedure and the method of reading the drawing are
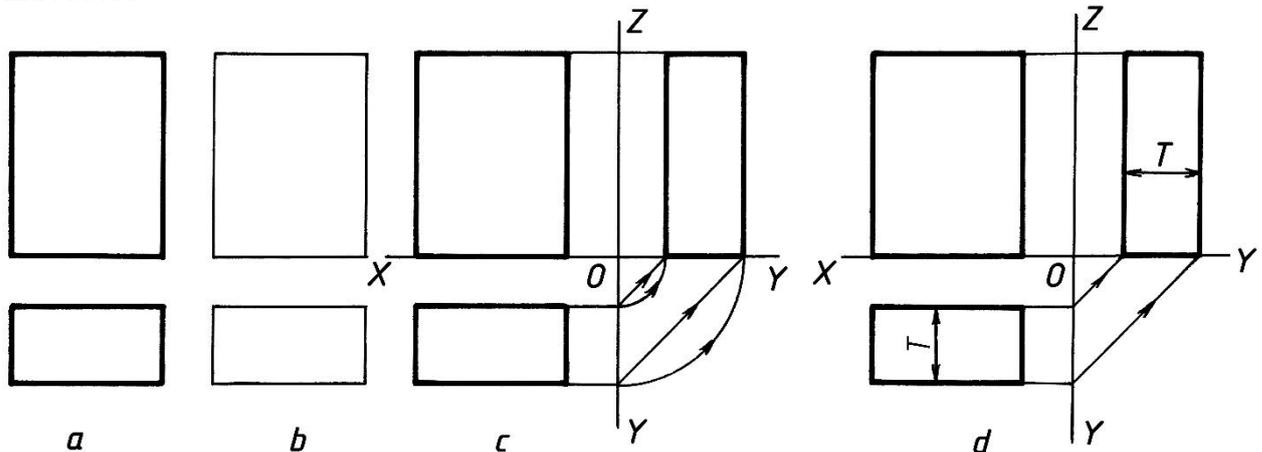
introduced.

Figure 5

To summarize, when determining the third view of an object from two views, it is possible to determine the third view by drawing auxiliary lines directly from the upper and lower faces in V and measuring the thickness "T" in H. In order to strengthen this method, the following problem is considered using the example of a square, triangle and circle.

1. If a square is placed exactly like itself under the view of a square in V, what kind of object can it be?

For this, which of the geometric objects is depicted by a square of the same size in V and H. This will certainly be a cube.

2. If a triangle is depicted under the view of a square in V, what kind of object can it be? It must certainly be a prism.

3. If a circle is depicted under a given view of a square in V, then it can actually be a cylinder.

Therefore, in order to determine what kind of object it is by one view of the object, its second view must be given.

4. If the view of the object in V is a triangle, and a square is placed under it, then it can certainly be a prism.

5. If the view of the object in V is a square with diagonals under a triangle, then what kind of object can it be? The answer is a pyramid.

6. If the view of the object in V is a circle under a triangle, then it can certainly be a cone.

7. If the view of the object in V is a circle and a triangle is depicted under it, then it can certainly be a cone.

8. If the view of the object in V is a circle and a square is given under it, then it can certainly be a cylinder.
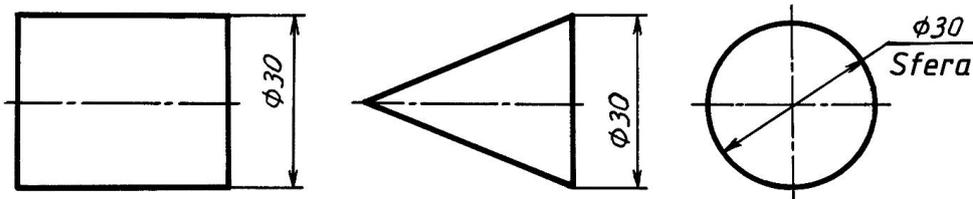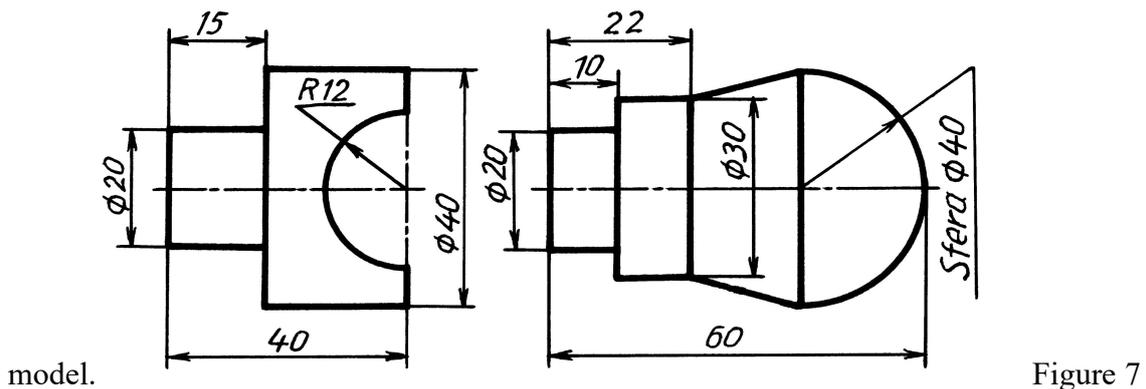

Figure 6

9. If the view of an object in V is a circle and the same circle is depicted below it, then that object is a sphere. In the drawing, some geometric objects can be depicted in one view using simplifications and conventions allowed by the standard. For example, cylinders, cones, spheres (Figure 6). It is customary to depict such surfaces of revolution by inserting the diameter symbol Ø in front of the dimension numbers, and the inscription "sphere" for a sphere. Using these symbols, details consisting of surfaces of revolution can also be depicted in one view (Figure 7).

In this order, we begin to learn to read the simplest and simplest objects through their views. The image of an object in V is called a head or front view, the image in H is called a top view, and the image in W is called a left or side view. An object embodied (composed of) several geometric objects can be called a model or detail. To master the art of reading a drawing, you can practice by gradually adding more elements to the

model.   Figure 7

Example 1. Figure 8 shows the front and top views of a single-element object. Describe what kind of object it is by looking at it from the

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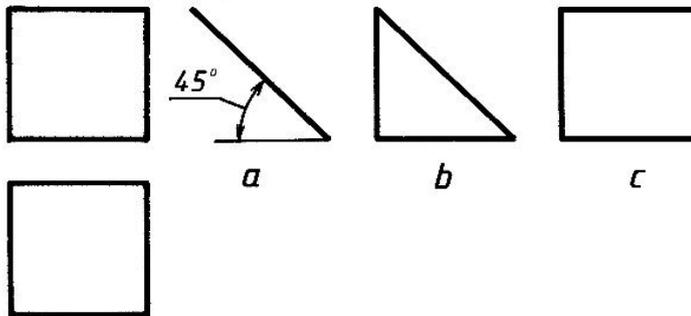
left.   Figure 8

a) A straight line section at an angle of 45' to H and V proves that it is a right rectangle. (Figure 8, a).

b) A triangle with equal legs proves that it is half a cube (Figure 8, b).

c) Using a square equal to the front and top views, it is determined that it is a cube (Figure 8, c).

Example 2. Figure 9 shows the front and top views of a two-element model. Determine what kind of body it is by its side view and . From its top views, it is known that it is a cube with six different views (Figure 9, a, b, c, d. e, f).

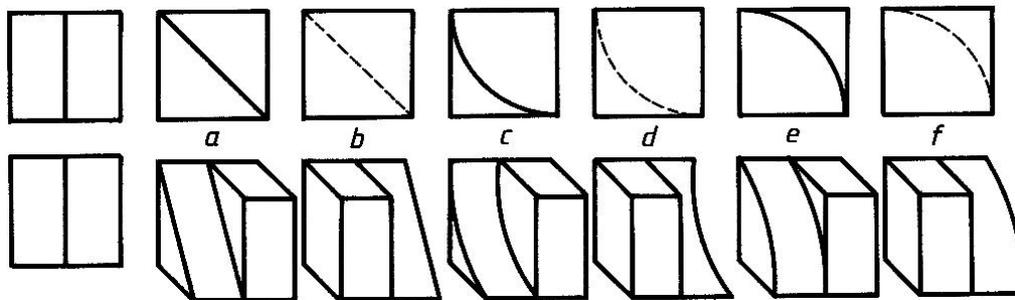a   b   c   d   e   f

Figure 9

Example 3. Figure 10 shows front, top, and left views of an object. Determine what kind of object it is by making a clear drawing.

Solution. A clear drawing of a cube is drawn in thin lines. A clear drawing can be made in frontal dimetry or isometry.

The vertices of the cube are marked with the numbers 1, 2, 3, 4, 5, 6, 7, 8. The midpoints of each edge are determined and marked as A, C, D, E, and they are connected to each other (Figure 10, a).

In this order, changes are made to the remaining parts of the cube and the drawing is prepared
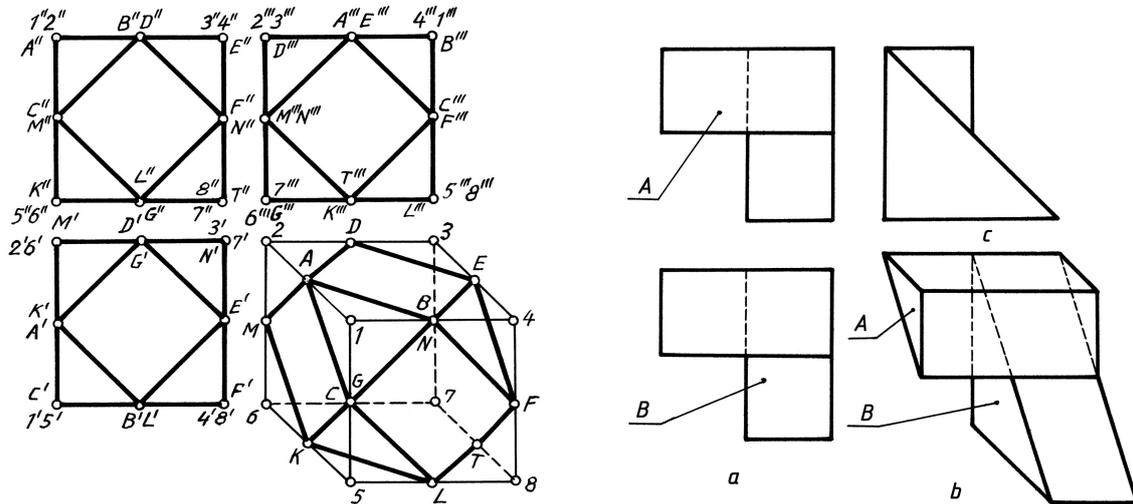
(Figure 10, b).

Figure 10 Figure 11

Example 4. Figure 11 shows the front and top views of a model made of triangular prisms A and B. Determine its model by its clear image and draw a view from the left.

Solution. Draw a clear image of prism A. Also draw a clear image of prism B (Figure 11, b). The visible and invisible contours of both prisms are determined and the drawing is made. The view of the model from the left is determined by the clear image.

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