Visualization Puzzles

The visualization of objects and environments—the ability to picture them in your mind is an important skill for environmental design professionals. An aspect of visualization is the ability to move back and forth between the abstract representation of an object or environment and the thing itself—the ability to look at orthographic drawings and see things.

Introduction

Being able to look at the orthographic drawings and visualize the three-dimensional object they represent is often difficult for beginning students. It becomes easier with experience. The following exercises will develop your skills in visualizing three-dimensional objects and relating them to their orthographic representations. In the process you will learn how different configurations are represented in orthographic drawings. As you solve each puzzle, reflect on what you have learned about orthographic and axonometric drawing systems.

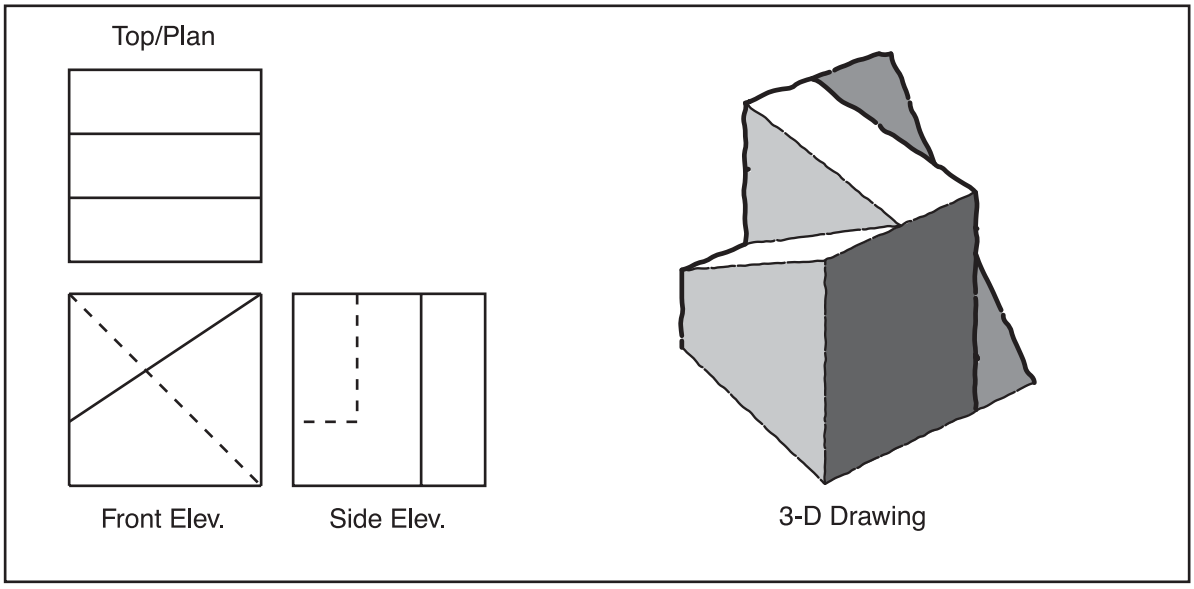
Orthographic Drawings

The puzzles are presented as a set of orthographic drawings. The drawings will always be in their standard orthographic relationship as shown below. All objects fit within a cube and the dimensions of any subdivisions always fall on some combination of half, third and quarter points. In the example, the Plan/Top view is divided into thirds, the solid diagonal line in the Front Elevation goes from the top of the cube to a point one-third the way up the opposite side, etc. Determine the proportions that are being used in the orthographic drawings and represent them in the three-dimensional solution.

3-D Drawings

The solution to each puzzle is to be represented with an axonometric drawing. You may establish any axonometric view that you wish including an isometric setup. The angle you choose to represent the solution should be chosen to make the form clear. If you draw the edges of the cube to measure about one inch, the drawing will be about the size of the one shown in the example on the previous page.

The axonometric drawings are an opportunity for you to develop your freehand sketching skills. The drawing should be laid out in pencil using a freehand approach. You may use a rolling ruler to assist you in the layout. Once the form has been blocked in you must finalize the drawing using felt tip pens (lines) and a black Prismacolor pencil (values). The final lines must be drawn freehand—do not use a straight edge. Line weights should reflect the difference between primary and secondary contours and the values of surfaces should be based on their orientation to an assumed light source that is located above and to one side. The surface(s) most directly facing the light source (the horizontal surfaces) must be left white. Do not erase the pencil construction lines.



Process

It is a matter of mental trial and error to imagine the shape. As an approach to visualization try to imagine yourself looking at the object from the particular point of view that one drawing takes. For example, the front elevation means that you are standing upright and looking straight ahead at the object. What possible forms could the lines stand for from that point of view? Then go to the next point of view and imagine the possible forms that view supports. Check one image against the other for things that would meet both possibilities or would eliminate some possibilities.

Another approach is indicated in the sketches to the right. The process involves drawing the orthographic drawings on the surfaces of an axonometric cube and then searching for their resolution by projecting the lines and points back into the cube.

Enjoy the challenge. Help each other if you get stuck.