UNIT 7

PICTORIAL DRAWING

Total Period: 25

Unit Outcomes

At the end of this unit, students should be able to:

- ✓ Understand the basic principle of pictorial drawing;
- ✓ Recognize the different types of projection and the three types of pictorial drawing;
- ✓ Apply the principle of Axonometric, Oblique and perspective projection in describing 3D objects;
- ✓ Appreciate the importance of pictorial drawing to describe the shape of structures in today's world.

Unit Overview

There are four common types of drawings that you need to learn. During Graphic Communications, you will be expected to use three of these four types. Of these four drawing types, Isometric, Oblique, and Perspective are called **Pictorial Drawings.** They are used to convey general shape and structure of an object. They are much easier for people who do not have a background reading blueprints and multi-view drawings to comprehend.

For specific size information, multi-view drawings are heavily relied on and are the most common technical choice.

General comments about pictorial drawings:

Construction of drawings should proceed in this order:

1. Create a box of construction (very light) lines along the principal axes which enclose the entire overall form and general shape of the body.
2. Next add other construction lines along principal axes to locate features of the body (usually edges of planes and surfaces).
3. Use offset dimensions to locate lines which don't follow the principle axes and lightly construct them.
4. Locate the center of circular features, and make construction boxes for creating the arcs.
5. Darken in the final lines starting with
    a. Circles and Arcs
    b. Straight Lines (starting from the front of the object)
6. Construction lines need not be erased if they're drawn very lightly.
7. Final lines should be dark, sharp, and consistent in width.
8. Do not show hidden lines in pictorial drawings.
9. Do not show center lines in pictorial drawings.

Lesson 7.1 *Introduction & Types of pictorial drawing*

Number of Period: 2

Learning Competencies

At the end of this lesson, students should be able to:

- describe the concept of projection and its constituting element;
- identify the different types of pictorial drawing.

Planning ahead

This unit is to introduce students to the language of technical drawing. Through demonstration, handouts and, the students will learn the beginning standards for technical drawing.

1. Prepare visual aids to show "examples of drawings drawn by hand and CAD"
2. Prepare to make a review of a projection and the different ways of projection to understand the types of pictorial projection.

Hints for Teaching

1. Allow your students to survey the types of pictorial drawing, giving each one a try.
2. For all the lessons, list new vocabulary discussed each day and review at end of class and begin the next day class with review of the terms.

Discussion

1. Demonstrate by showing the difference in orthographic and pictorials. Give definitions and have students list in notes. Show PPT "Technical Sketching" and/or PPT "Sketching."

2. Sketch a person as a pictorial and then a person as an orthographic. Do the same thing with a common object such as a chair. Explain what determines whether orthographics or pictorials are to be used.
3. Explain the three dimensions. Ask which dimension (width, depth, and height) would show on the sketch of the person.
4. Let the student to do activities 7.1 &7.2 and check point 7.1

Teaching Note

Projection defined as the representation of an object on a picture planes as it would appear to an observer stationary at a point and viewing along the direction of projection. a plane of projection or picture plane on which the projection is made. Projection can be categorized into two broad groups namely: *central* or *perspective projection* and *parallel projection*.

Pictorial drawing is a means by which the three principal faces and dimensions of an object are represented on a single 2D projection plane (sheet of paper). Pictorial drawing is divided into three classifications:

i. Axonometric projection,
ii. Oblique projection, and
iii. Perspective or central projection.

Lesson 7.2 *Axonometric Projection*

Number of Periods: 14

(3 period theory and 10 periods for practice)

Learning Competencies

At the end of this lesson, students should be able to:

- Define the principle of axonometric projection;
- Identify the types of axonometric projection;
- Choose appropriate position of isometric axis to describe the shape of an object;
- Identify isometric and non isometric lines;
- Identify the procedure of constructing angles are located in isometric drawing;
- Draw circles, arcs and irregular curves in isometric;
- Apply offset location measurement in isometric drawing;
- Prepare the isometric drawing using box method and center line layout method;
- Perform Isometric drawing of an object with its principle;

Planning ahead

This unit is to introduce students to the language of technical drawing. Through demonstration, handouts and, the students will learn the beginning standards for technical drawing.

1. Prepare visual aids or models to show "examples of types of axonometric projection drawn by hand and CAD"

2. Make a further reading on axonometric projection too.
3. Teacher uses three periods for theoretical concept and demonstration about Axonometric projection and Isometric drawing specially. In addition ten periods for student practice on activities and check points.

Hints for Teaching

When you teach this lesson you can use the following discussion points:

Discussion

1. Start the lesson by asking students from the textbook about Axonometric projection.
2. Discuss and demonstrate by showing the types of Axonometric projection from the teaching aid or diagram and also on black board.
3. Discuss and demonstrate how principles of constructing isometric drawing. Have students take notes from the demonstration.
4. Activate students to do activities 7.3 and 7.4 and check points 7.3 &7.4 from the textbook on isometric drawing and the principle of construction.

Teaching Note

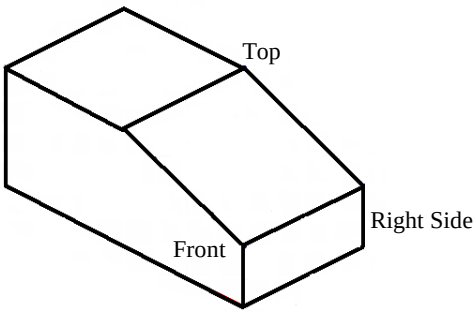
How do reading the face of a clock and sketching isometric pictorials relate to each other? Picture a cube in your mind. All of the surfaces of the cube form right angles with their adjacent faces. If you were to draw an isometric pictorial of the cube, you would see that the edges point toward 2 and 10 o'clock, and 12 o'clock. This idea helps when sketching

isometric pictorials on writing surfaces that do not have isometric grids so tell the students this idea.

What to do

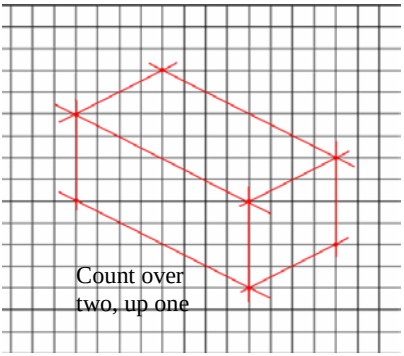
In this activity, you will develop your isometric sketching skills by drawing views of objects that are already given in an isometric orientation. You will then apply your sketching skills throughout the remainder of the course.

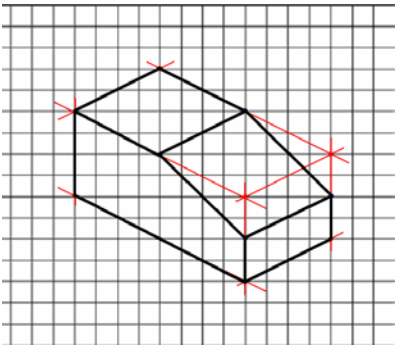
Before you begin, you must understand how an isometric view is called out. The image below represents a top, front, right side view isometric. The order is first face, second face, then third face.



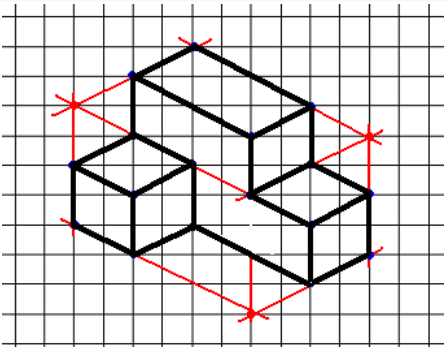
In your Engineering Notebook, complete the isometric pictorial of the object pictured below. Use points and construction lines to layout the isometric sketches. DO NOT ERASE YOUR POINTS AND CONSTRUCTION LINES. To construct the box, first draw the front vertical corner. Next to approximate the angle to show the front and right side views count over two blocks up one. Continue to do this until you sketch the width and depth of the box.

In your Engineering Notebook, complete the isometric pictorial of the object pictured below. Use points and construction lines to layout the isometric sketches. DO NOT ERASE YOUR POINTS AND CONSTRUCTION LINES. To construct the box, first draw the front vertical corner. Next to approximate the angle to show the front and right side views count over two blocks up one. Continue to do this until you sketch the width and depth of the box.

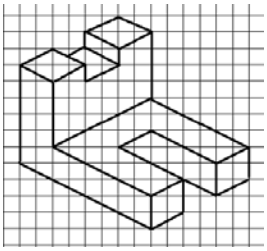


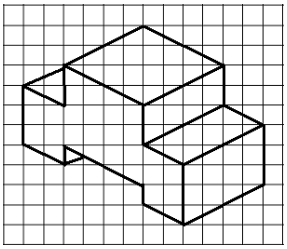


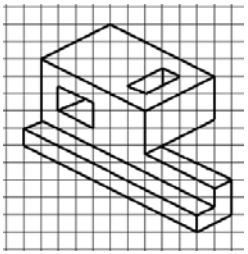
In your Engineering Notebook, make isometric sketches of the three objects pictured below. Sketch the objects in the same orientation that they are pictured in. Use points and construction lines to layout the isometric sketches. Then, delineate the visible edges of each sketch with object lines to make them stand out. DO NOT ERASE YOUR POINTS AND CONSTRUCTION LINES. Add tonal shading to the sketches when finished.



Study the isometric objects below. Recreate the three objects for practice. Add tonal shading to the sketches when finished.







What did you learn?

1. What are the three common sides that are shown with an isometric sketch?
2. Why do designers use tonal shading on their sketches?
3. Describe the technique you used to approximate the proper isometric angles in order to complete an isometric sketch?

Lesson 7.3 *Oblique projection*

Number of Periods: 5

(1 period theory and 4 periods for practice)

Learning Competencies

At the end of this lesson, students should be able to:

- Describe the principle of oblique projection;
- Identify the types of oblique drawing;
- Identify the axis and position of objects in oblique drawing;
- Apply method of construction of oblique drawing;
- Draw circle and arcs in oblique drawing;
- Perform Oblique drawing of an object with its principle;

Planning ahead

This unit is to introduce students to the language of technical drawing. Through demonstration, handouts and, the students will learn the beginning standards for technical drawing.

1. Prepare visual aids or models to show "examples of types of axonometric projection called Oblique drawing drawn by hand and CAD"
2. Make a further reading on oblique drawing too.
3. Teacher uses one period for theoretical concept and demonstration about type of Axonometric projection called oblique drawing specially. In addition four periods for student practice on activities and check points.

Hints for Teaching

When you teach this lesson you can use the following discussion points:

Discussion

1. Start the lesson by asking students from the textbook about oblique drawing.
2. Discuss and demonstrate by showing the types of Axonometric projection called oblique drawing by using the teaching aid or diagram and also on black board.
3. Discuss and demonstrate about the principles of constructing oblique drawing. Have students take notes from the demonstration.
4. Activate students to do check points 7.5, 7.6 &7.7 from the textbook on oblique drawing and its principle of construction.

Teaching notes

Have you ever tried to tell someone what an object looks like by using words and hand gestures? It usually does not work very well, especially if the person does not understand the vocabulary you use.

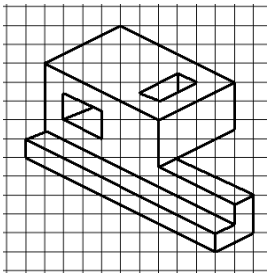
In Engineering Design it is often the case that an idea will need to be communicated and explained quickly. Questions, such as "What does the idea look like? How will it work?" In most cases, words and hand gestures alone cannot answer these questions. Sketching is a quick and efficient method that is used in all fields of engineering to get ideas down before they are lost. If the idea turns out to be a possible solution, the sketch will serve as the basis for more advanced drawings and conveying ideas, such as Computer-Aided Design (CAD) solid-modeling.

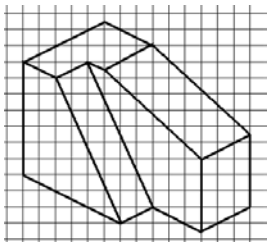
What to do

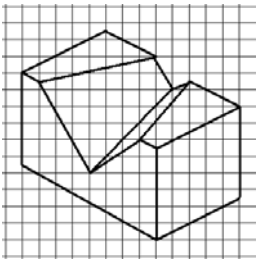
In this activity, you will practice your sketching and technical communication skills by creating *general oblique sketches* of objects in your Engineering Notebook. A general oblique sketch has lines that can be drawn at any scale and any angle. The most common angles are 30, 45 and 60 degrees, but any angle can be used.

Study the figures below.

- Use points and construction lines to layout a general oblique sketch of the object on the large grid.
- Remember that one unit distance in the figure is equal to one unit distance on the large grid.
- Show the object in a top, front, right side view orientation in your general oblique sketch.
- Delineate the visible edges of the sketch with object lines.
- DO NOT ERASE YOUR POINTS AND CONSTRUCTION LINES.
- Add tonal shading to the sketch when finished.







What did you learn?

1. Why practice sketching shapes when a Computer-Aided Design (CAD) program can produce much more accurate Geometry?
2. What pencil techniques are used to create the differences between construction lines and object lines?
3. What are the differences between oblique sketches and isometric sketches?

Lesson 7.4 *Perspective Projection*

Number of Periods: 5

(1 period theory and 4 periods for practice)

Learning Competencies

At the end of this lesson, students should be able to:

- Explain the terms of perspective drawings;
- Identify the best location of station point, picture plane and vanishing point,
- Show the location of ground line and Horizon line;
- Identify the three types of perspective drawing;
- Apply the procedure of construction of objects in perspective;
- Draw circles and arcs in perspective drawing;
- Perform perspective drawings with its principle.

Planning ahead

This unit is to introduce students to the language of technical drawing. Through demonstration, handouts and, the students will learn the beginning standards for technical drawing.

1. Prepare visual aids or models to show "examples of types of axonometric projection called Perspective drawing drawn by hand and CAD"
2. Make a further reading on perspective drawing too.
3. Teacher uses one period for theoretical concept and demonstration about type of Axonometric projection called perspective oblique drawing specially. In addition four periods for student practice on activities and check points.

Hints for Teaching

When you teach this lesson you can use the following discussion points:

Discussion

1. Start the lesson by asking students from the textbook about Perspective drawing and its three types.
2. Discuss and demonstrate by showing the types of Axonometric projection called perspective drawing by using the teaching aid or diagram and also on black board.
3. Discuss and demonstrate about the types of perspective and principles of constructing perspective drawing. Have students take notes from the demonstration.
4. Activate students to do check points 7.8 from the textbook on perspective drawing and its principle of construction.

Teaching Note

If you can stand on a straight road and look down the road, it appears to you the sides of the road begin to look as if they are narrowing to one point and the center of the road vanishes when the road meets the horizon. If the road is straight enough and long enough, the sides of the road not only look like they are converging to a single point, but the road seems to appear to vanish as it meets the horizon. A similar effect happens if you stare upward from the base of a tall building. The vertical edges of the building will appear to angle in toward each other. This effect is called perspective.

The human eye sees the world in perspective. Objects that are further away from the eye appear smaller, and edges appear to recede into the distance. Perspective sketches depict objects in much the same way that the human eye sees the world.

There are three different types of perspective drawings: one-point, two-point, and three-point perspective. The different types of sketches are frequently used by architects, industrial designers, and illustrators when representing large scale objects or environments in which the effect of distance must be taken into consideration.

Procedure

In this activity, you will practice your sketching skills by generating a one-point, two-point, and three-point perspective of a given object. You will then apply your skills by creating either a one-point, two-point, or three-point perspective of an object you randomly choose.

Study the objects in Figures 1 and 2. Use lightly drawn points and construction lines to layout a one-point perspective sketch of the object within the given box. **The perspective sketch must show the object in a top, left side, front view orientation.** Delineate the visible edges of the sketch with object lines. DO NOT ERASE YOUR POINTS AND CONSTRUCTION LINES. Add tonal shading to the sketch when finished.

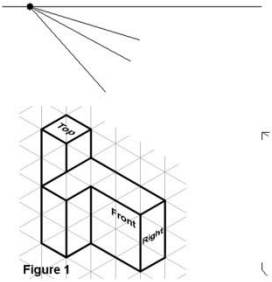


Figure 1

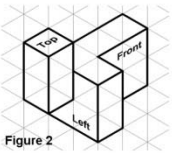
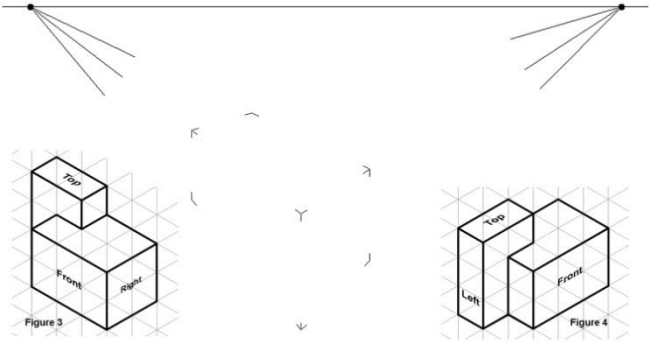
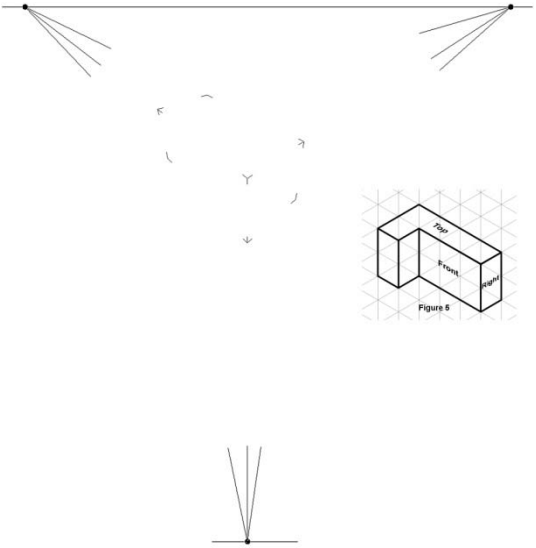


Figure 2

Study the objects in Figures 3 and 4. Use lightly drawn points and construction lines to layout a two-point perspective sketch of the object within the given box. **The perspective sketch must show the object in a top, front, right side view orientation.** Delineate the visible edges of the sketch with object lines. DO NOT ERASE YOUR POINTS AND CONSTRUCTION LINES. Add tonal shading to the sketch when finished.



Study the pictorial in Figure 5. Use lightly drawn points and construction lines to layout a three-point perspective sketch of the object within the given box. **The perspective sketch must show the object in a top, front, right side view orientation.** Delineate the visible edges of the sketch with object lines. DO NOT ERASE YOUR POINTS AND CONSTRUCTION LINES. Add tonal shading to the sketch when finished.



Lesson Guide

Period	Lesson title	Starter activity	Main activity	Concluding activity
2	1.1 Introduction and types of pictorial drawing	• Ask brain storming question about projection and types of pictorial drawing from the textbook	• Discuss and demonstrate the types of pictorial projection • Let the students to practice on activities 7.1 &7.2 and check points 7.1.	• Students give feedback about today's lessons. (Teacher acts as facilitator.) • Give home work to do exercises from the textbook
13	1.2 Axonometric drawing	• Ask brain storming question about the type of axonometric projection called isometric drawings from the textbook	• Illustrate how to apply the principles to draw objects in isometric • Let the students to practice on activities 7.3 & 7.4 and check points 7.3 and 7.4.	• Students give feedback about today's lessons. (Teacher acts as facilitator.) • Give home work to do exercises from the textbook
5	1.3 Oblique drawing	• Ask brain storming question about oblique and the type of Oblique drawings from the textbook	• Discuss and demonstrate where and how to apply the principles to draw objects in oblique • Let the students to practice on check points 7.5,7.6 and 7.7.	• Students give feedback about today's lessons. (Teacher acts as facilitator.) • Give home work to do exercises from the textbook
5	1.4 Perspective drawing	• Ask brain storming question about perspective and the type of perspective drawings from the textbook	• Discuss and demonstrate where and how to apply the principles of construction of perspective drawing. • Let the students to practice on check 7.8	• Students give feedback about today's lessons. (Teacher acts as facilitator.) • Give home work to do exercises from the book

Evaluation

Instruct your students to:

- Identify the use of orthographic projection and pictorial drawing in working drawings.
- state differences in the application of orthographic projection and pictorial drawing in working drawings.
- Draw isometric, oblique and perspective drawing

Method

- Presentation (lecture)
- Demonstration
- Group discussion (6-8 students per a group)

Assessments

The teacher should follow and assess each student's work continuously over the whole activity of the each lesson and compare it with the following description to determine whether the student has achieved the minimum required level.

Students working below the minimum requirement level will require extra help if they are to catch up with the rest of the class. They should be given extra attention in class and additional activities at the end of the lesson or during breaks.

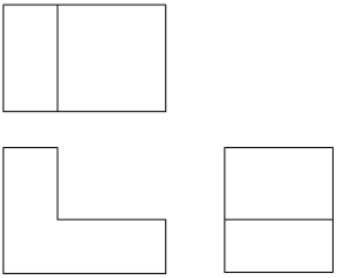
Students working above the minimum requirement level should be praised and their achievements recognized. They should be encouraged to continue working hard and not become complacent.

Pictorials Quiz I

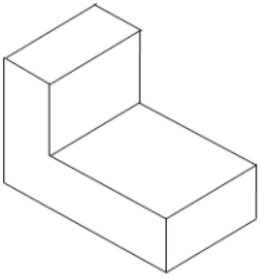
Name _____

Use either inclined or vertical lettering to fill in the blanks.

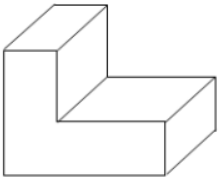
Label each type of drawing in the blanks below.



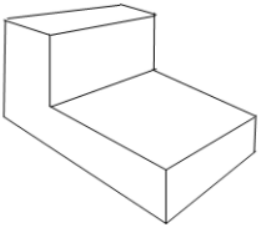
1 _____



2 _____



3 _____



4 _____

5. Which of these is not a pictorial drawing? _____

   Isometric b) Oblique c) Orthographic

6. A circle will appear in an isometric as a(n)_____.

   a) Template b) ellipse c) parabola d)arc

7. In what kind of pictorial does the front view show its true shape?

   _____

   a) An isometric b) A perspective c) An oblique

8. What kind of oblique shows its depth at half its true distance? _____.

9. To make true measurements in isometrics, you only measure along the _____.
10. What type of pictorial gives you a view of how an object actually looks to the eye? _____

Pictorials Quiz II

Name _____

1. Which common drawing method is not a pictorial drawing?
   a) Multiview drawing
   c) Isometric drawing
   b) Oblique drawing
   d) Perspective drawing
2. What is the major advantage of an oblique drawing over an isometric?
   a) Oblique drawings just look better.
   b) Oblique drawings are better for showing dimensions.
   c) In oblique drawings, frontal features are easier to draw.
   d) In oblique drawings, all circular features appear circular.
3) Lines in an isometric drawing are not distorted when
   a) they are construction lines.
   b) they run along the principal axes.
   c) they do not run along the principal axes.
   d) None of these, all lines are distorted in isometric drawings.
4) What is the difference between a cabinet and cavalier drawing?
   a) Cabinet is an isometric drawing; cavalier is oblique.
   b) Cavalier is an isometric drawing; cabinet is oblique.
   c) Cabinet drawings are only half as large as cavalier drawings.
   d) The depth scale is reduced in cabinet drawings.

Answer to the Exercises for textbook

Answer for check point 7.1

1. Representation of an object on a picture plane as it would appear to an observer station point and viewing along the direction of projection. The constituting element that should be fulfilled are:-
   Object, observer, station point, projection rays (projectors), plane of projection (picture plane)
2. Central and parallel projection. In central projection system projectors start from a single point where as in parallel projection projectors are parallel.
3. Both use parallel projectors. But oblique uses other than 90 where orthographic projection only uses 90◦ for its projectors.

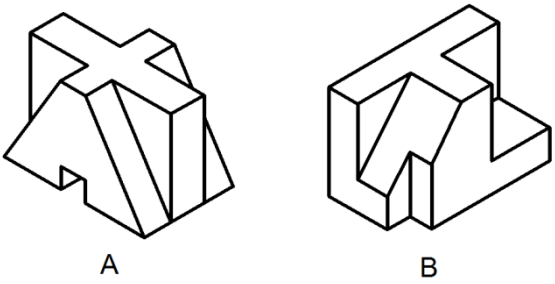
Answer for check point 7.2

1. To represent a three dimensional object on a two dimensional plane. And to let illiterate persons on drawing visualize drawing proposal of an object.
   The limitation of pictorial representation are
   - It has distorted appearance
   - Require more time to prepare
   - Difficult to measure and give dimensions
2. Axonometric projection mostly shows the three planes exposed equally.

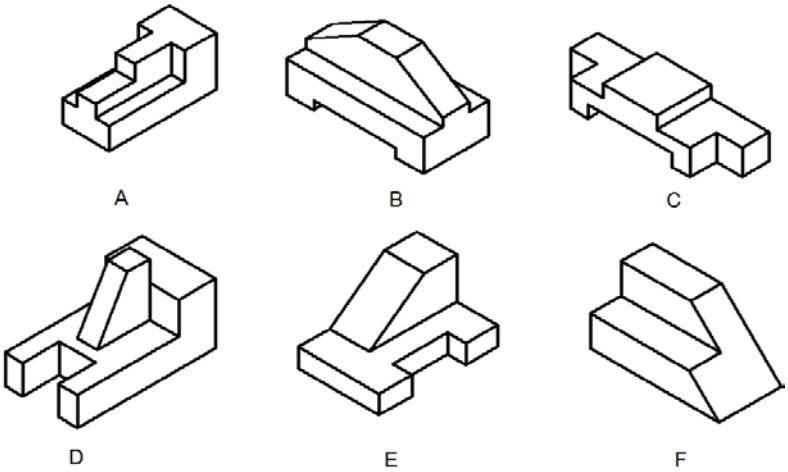
   Oblique projection keeps the front view as it appears on the multi view drawing and projects the side edge at an angle of 30◦, 45◦ or 60◦.

   Perspective drawing represents an object pictorially as if the object was captured with a camera.

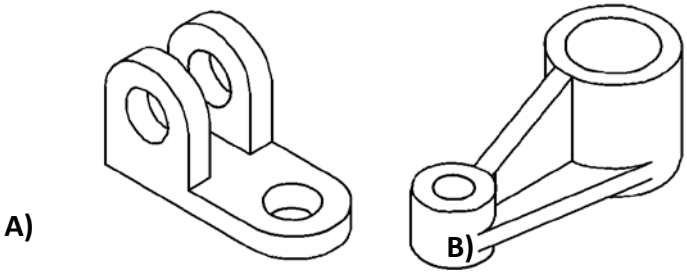
Solution for check point 7.3



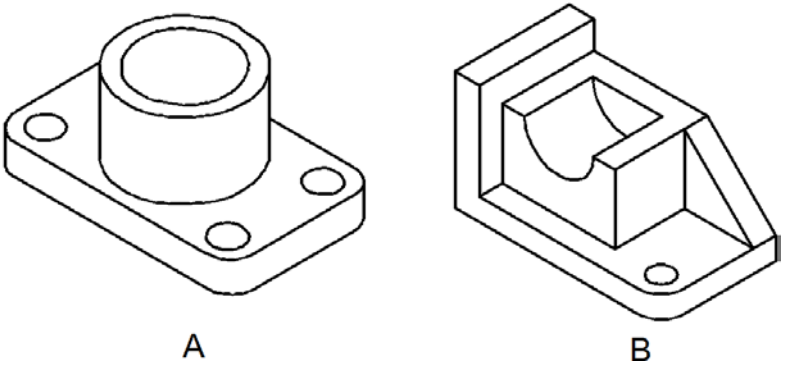
Solution for exercise 1



Solution for check point 7.4



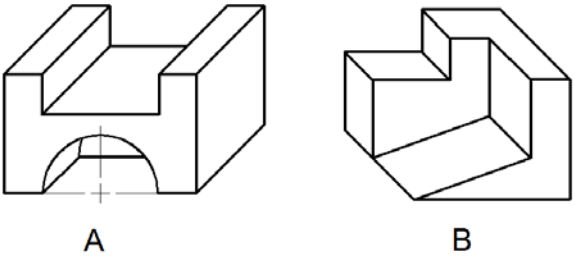
Solution for exercise 2



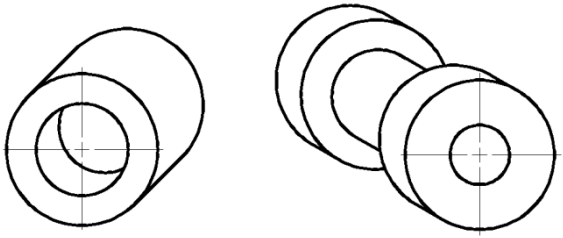
Answer for check point 7.5

1. Axonometric projection inclines the three principal planes more or less in a similar exposure, especially if it is isometric projection. But when we go to oblique projection the front plane as it appears on elevation where the side edges will be projected with 30◦, 45◦ or 60◦.
2. Cavalier and cabinet

Solution for check point 7.6

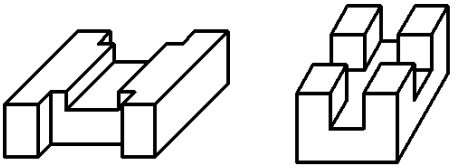


Solution for check point 7.7

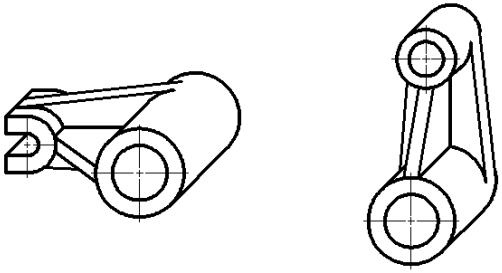


A B

Solution for exercise 3

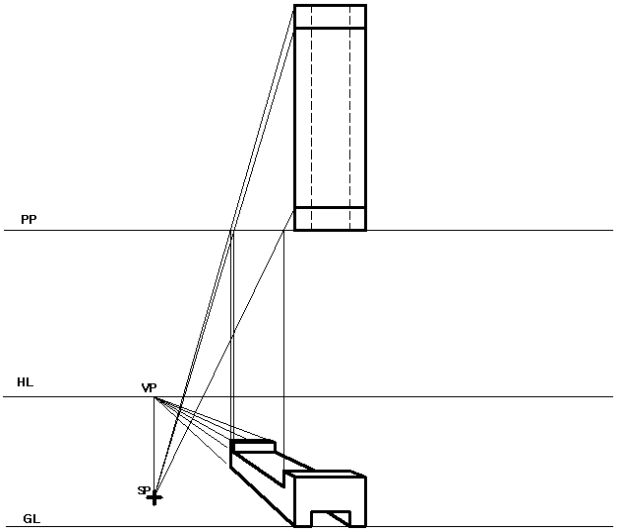


A B



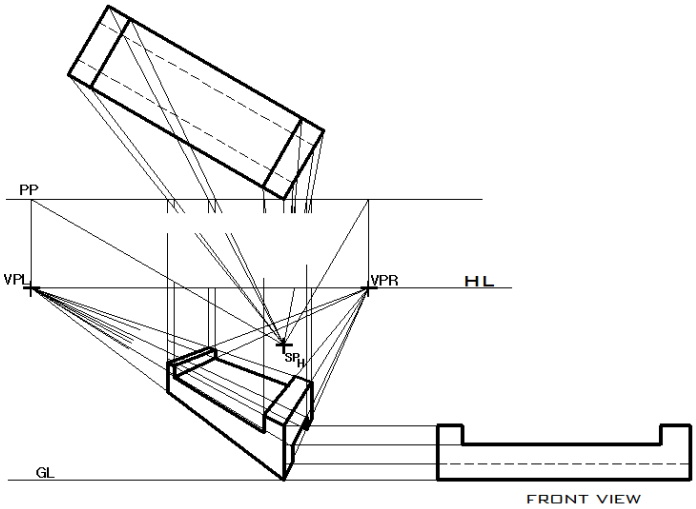
C D

Solution for check point 7.8

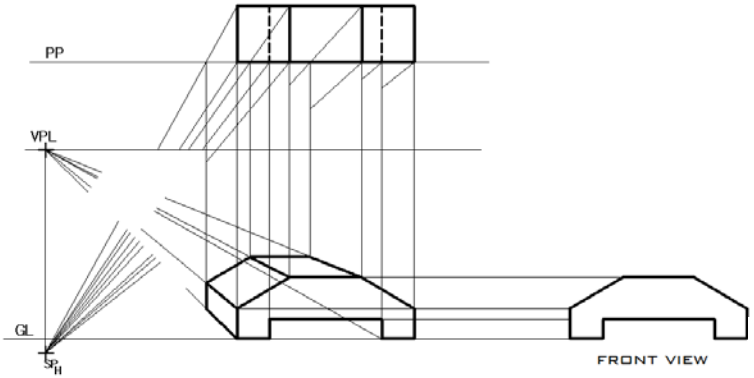


A

One point perspective

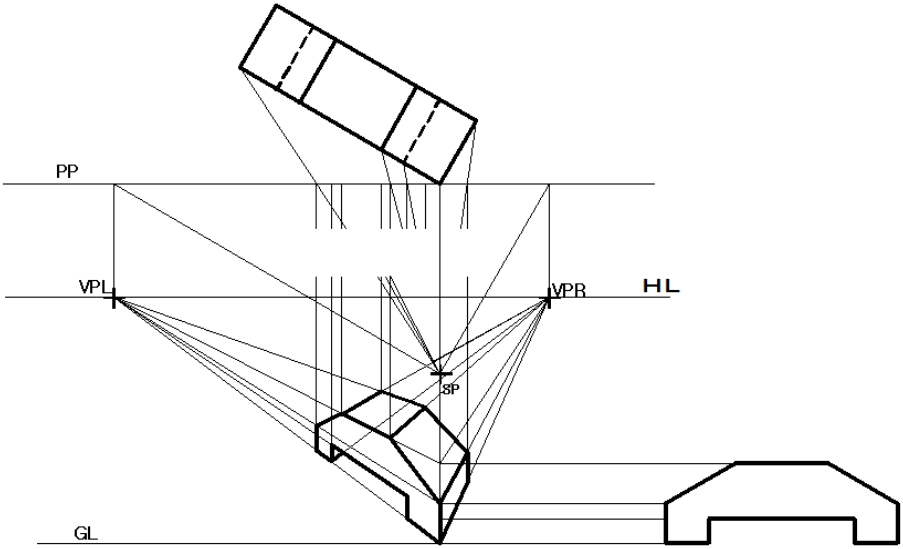


Two point perspective



B

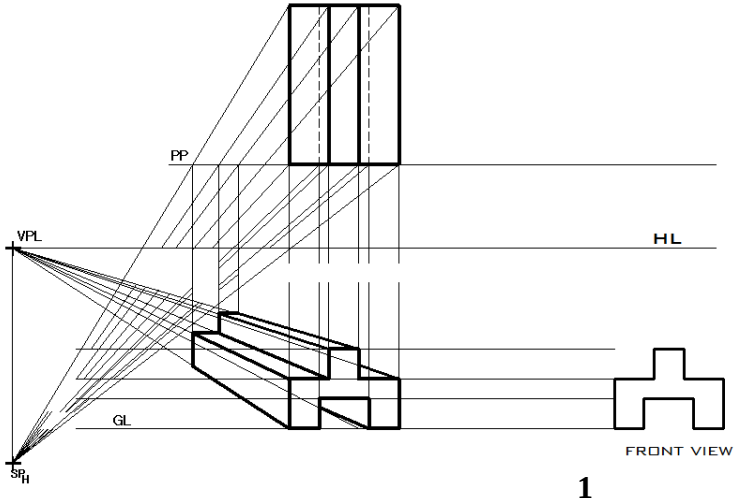
One point perspective



Two point perspective

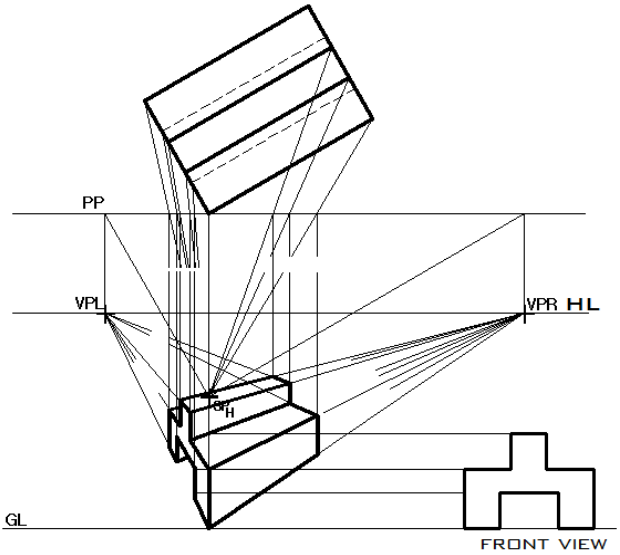
Solution for exercise 4

1

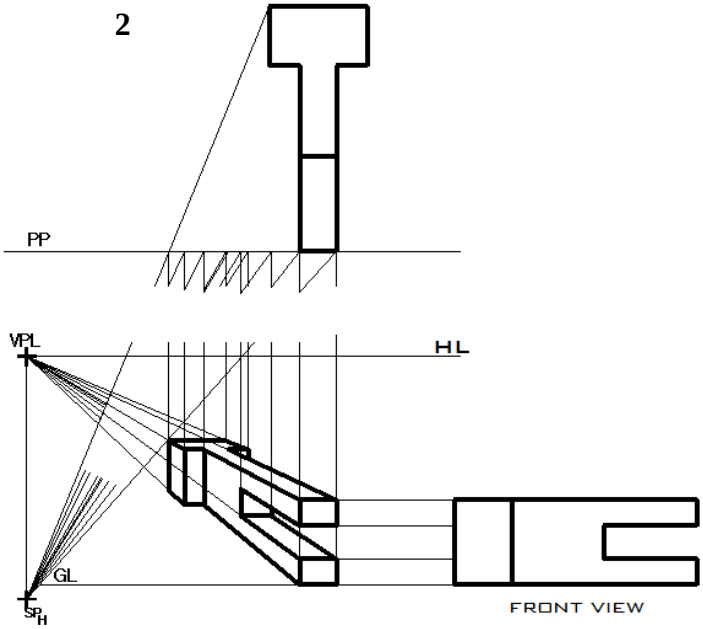


1

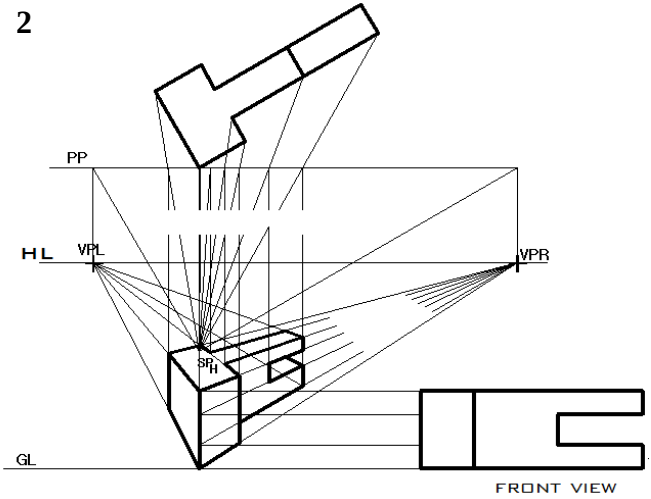
One point perspective



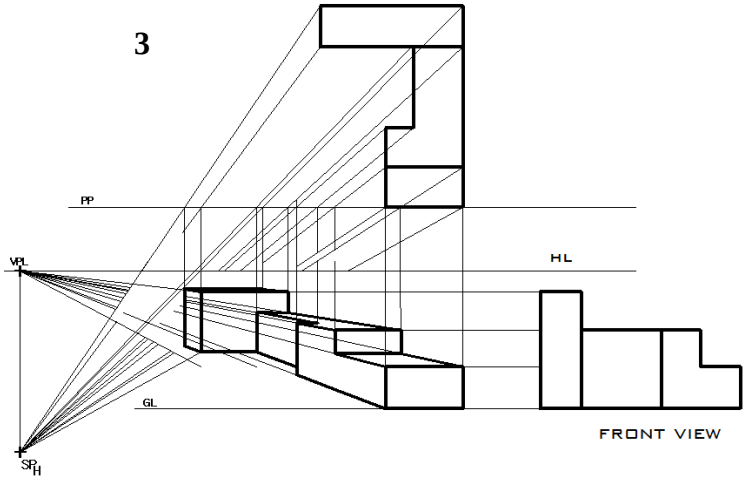
Two point perspective



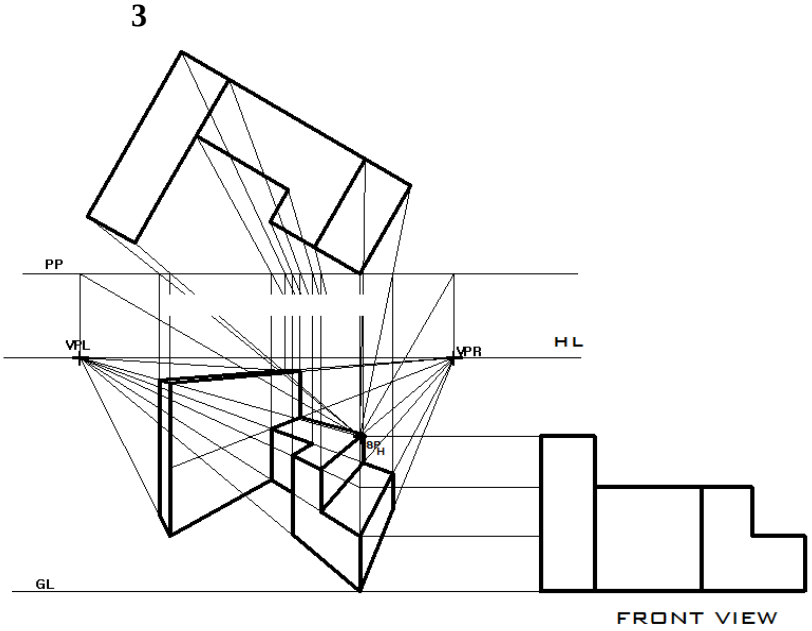
One point perspective



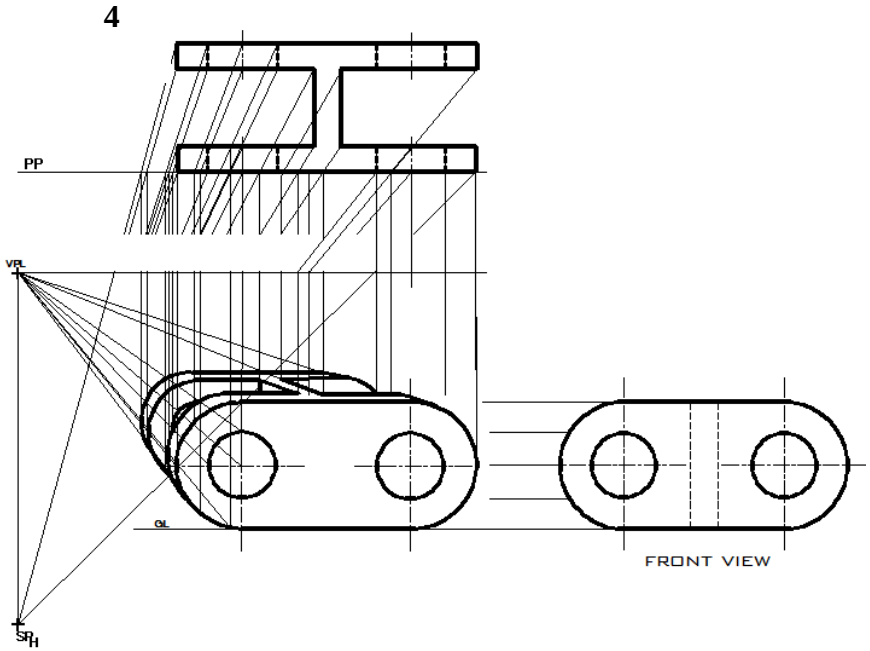
Two point perspective



One point perspective



Two point perspective



Reference

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