

UNIT 3

SECTIONAL VIEW

Total Periods: 12

Unit Outcomes

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

- ✓ Understand the main purpose of sectional views;
- ✓ Analyze the types of sectional views according to their particular advantage in describing the interior feature of objects;
- ✓ Show sectional view of structure to describe the interior feature for complete description.

Unit Overview

Sections are used to show interior details clearly. For sections it is commonly used a cutting-plane line which shows where object was cut to obtain the section view. In addition a cross hatching in the section view shows the solid surface of the object which was cut through to produce the section.

Section views may replace standard views however there're some conventional practices, such as not showing hatching on ribs and webs, help make sections easier to interpret correctly. Mainly section views are used when important hidden details are in the interior of an object. These details appear as hidden lines in one of

the orthographic principal views; therefore, their shapes are not very well described by pure orthographic projection. Consequently this unit familiarizes students with the purposes and the many different types of sections

Lesson 3.1 *Terminology and common practices of sectioning*

Number of Periods: 1

Learning Competencies

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

- ✓ explain the concept and importance of sections;
- ✓ describe the location of cutting plane to create sectional view;
- ✓ Select the location of cutting plane line;
- ✓ Identify the different types of section lining symbols;
- ✓ Make different types of section lining;
- ✓ visualize the sectional view of an object.

Planning ahead

Organize yourself in advance to given a review on multi-view drawing, plus presentations, reading assignments, and discussion, so that the students will explain the rationale for using sectioning and the major elements in a section view, with a degree of accuracy and completeness. Therefore, plan the following instructional materials

1. Prepare visual aids to show “examples of sectional view drawings”
2. Review essential questions, “what are the importances of sectional view in a design process?”

Hints for Teaching

Suggested instructional strategies are:

1. You can start the class by inviting students in text question about section like what are the importances of sectional view in a design process.
2. Provide various split wood block forms which have been predrilled, counter bored, and counter sunk. Illustrate the sectioned interior split apart versus a hidden line image which is drawn on the outside of the block.
3. Discuss and demonstrate the importance of sectional view, cutting plane line and section lining. Have students keep main points from discussion about sectional view in a notebook.
4. Use the split wood block forms to illustrate a sectioned interior versus hidden line representation.
5. Allow students to practice on activity 3.1 individually or in group.

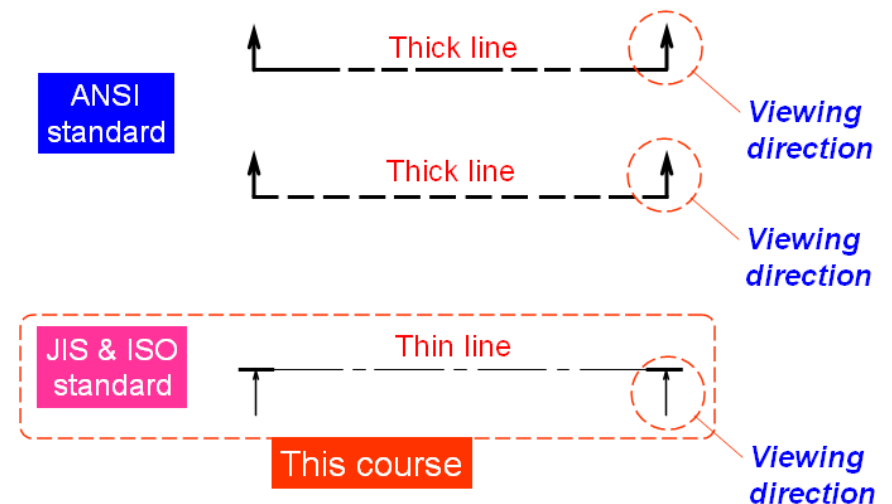
Teaching Note

The purpose of sectioning is:

- Drawings are intended to communicate design intent from the engineer/drafter to the craftsman making the components.
- If an orthographic view does not clearly identify design intent, due to the number of features and details involved, then the section view is often utilized to show interior details and to provide additional clarity.

- Also, according to ANSI, you should not dimension to hidden lines, so a section view may be the only way to properly dimension an interior feature.

Cutting plane is a plane that *imaginarily cuts* the object to reveal the internal features, whereas *cutting plane line* is an *edge view* of the cutting plane. Below is cutting plane line styles using ANSI standard, JIS and ISO standards.



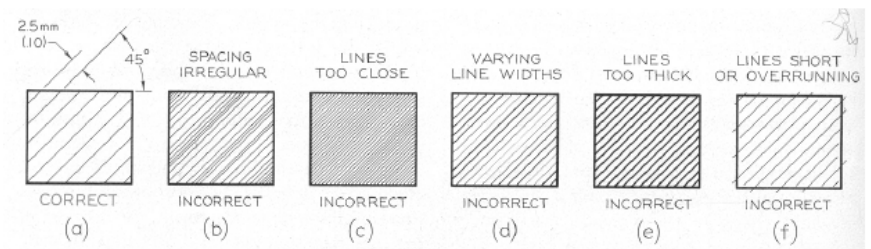
Section lines or **cross-hatch lines** are used to *indicate the surfaces that are cut* by the cutting plane. The section lines are different for each of material's type. For practical purpose, the cast iron symbol is used most often for any materials.

Section lining practices are that the spaces between lines may vary from 1.5 mm for small sections to 3 mm for large sections and It

should not be drawn *parallel* or *perpendicular* to contour of the view.

Section-lining rules

- The correct method of drawing section lines is shown in part (a). Draw section lines with a sharp medium-grade pencil (H or 2H).
- Always draw lines at 45° with the horizontal unless there is an advantage of using different angles.
- Space the section lines as uniformly spaced as possible by eye. Section lines should be uniformly thin, and not varying in thickness.
- Avoid running the section lines beyond the visible outline, or stopping the line too short.



If section lines drawn at 45° with horizontal would be parallel or perpendicular (Or nearly so) to a prominent visible outline, the angle should be changed to 39° or some odd angle.

Lesson 3.2 *Types of Sections*

Number of Periods: 8

(2 period theory and 6 periods for practice)

Learning Competencies

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

- ✓ identify the types of sectional views;
- ✓ select the appropriate types of sectional views;
- ✓ perform the sectional view of an object with preferable type of section.
- ✓ Compare and contrast the advantage of all types of sectional views;

Planning ahead

Be ready to give a presentation on sectional views, so that the student will demonstrate sectioning techniques and the various types of sections, to the satisfaction of you; hence:

- Prepare visual aids to show “examples of sectional view drawings”
- Teacher uses two periods for theoretical concept and demonstration about types of section and compare and contrast the types of section. Six periods for student practice on activities and check points.

Hints for Teaching

Suggested instructional strategies are:

1. You can start the class by inviting students in text question about types of section from the textbook.

2. Discuss and demonstrate the types of sectional view and their special purpose. Have students keep discussion main points about types of section view in a notebook.
3. Provide enough split forms for the entire class to draw.
4. Have students display models of sectioned articles along with drawings. Use transparent colored Plexiglas to illustrate the cutting plane line.
5. Create a display illustrating materials and the sectioned symbols they represent.
6. Provide parts of a small gas engine from which sections have been precut. Have students draw these parts as section drawings. (Be sure all parts are thoroughly cleaned.)
7. Allow students to practice on check points 3.1 up to 3.4 one by one individually.

Teaching Note

A full section is obtained when the cutting-plane line extends entirely through an object in a straight line and the front half of the object is “removed.” But a half-section is a view of an assembly or object that shows one-half of the view in section.

An offset section is used for features that are not in a straight line. But revolved or removed sections are used to show the cross-sectional shape of ribs, spokes, and arms when the shape is not obvious in the regular views. And therefore a revolved section is often used for spokes and arms for clarity. While a partial or broken-out section is used to show just a portion of an object.

Lesson 3.2 *Other sectional view representation and conventional Practices in sectioning*

*Number of Periods: 3
(1 period theory and 2 periods for practice)*

Learning Competencies

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

- ✓ identify the conventional representation of section;
- ✓ apply conventional representation of section in technical drawing;
- ✓ use other sectional view representation when they are needed.

Planning ahead

You could give presentations, demonstrations, assigned readings, and related assignments, that the student will draw a section view, with a degree of accuracy. In order to do this, the teacher must be able to practice visualization and implementation of information in order to develop a sectional drawing. And need to understand how ribs, webs and spokes are treated when in section view and how are the patterns chosen for hatching sectioned views? In addition,

- Prepare visual aids to show “examples of other representation of sectional view and conventional representation in sectioning”.
- Teacher uses one period for theoretical concept and demonstration about conventional representation in sectioning. Two periods for student practice on activities and check points.

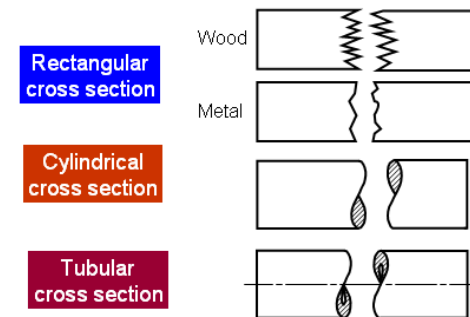
Hints for Teaching

Suggested instructional strategies are:

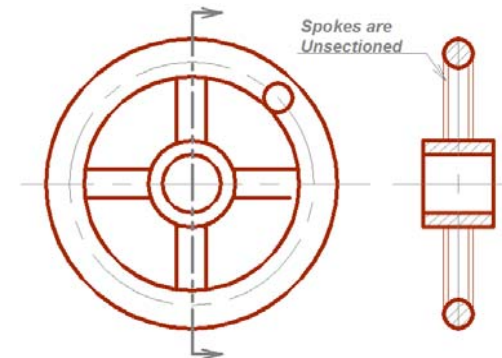
1. You can start the class by inviting students in text question about conventional representation in sectioning and other sectional view representation from the textbook.
2. Create a display illustrating materials and the sectioned symbols they represent
3. Discuss and demonstrate about conventional representation in sectioning and other sectional view representation. Have students keep main points from the discussion in a notebook.
4. Provide parts of a small gas engine from which sections have been precut. Have students draw these parts as section drawings. (Be sure all parts are thoroughly cleaned.)
5. Allow students to practice on check points 3.5 and exercises in class individually and in group.

Teaching Note

One of an example of conventional practice is for *long objects* that have to draw in a small scale to fit them on the paper; it is recommended to remove its long portion (which contains *no* important information) and draw the break lines at the broken ends.



Some solid features of certain parts like spokes of a wheel are not sectioned, even though the cutting plane passes through them. Such representation is used to distinguish a wheel with spokes from a wheel with thin plate or web. The general practice, the sectional representation of a wheel with spokes and with plate is as follows.



Lesson Guide

Period	Lesson title	Starter activity	Main activities	Concluding activities
1	1.1 Introduction, terminology and common practices of sectioning	Ask brain storming question like what are the importance of sectional view in a design process	- Discuss the difference between auxiliary planes and principal planes with students. - Demonstrate with visual aid principles and rules to draw sectional views of an object. - Let the students to practice on activity 3.1.	- Allow students to present their group work activity result in front of the class - Give home work to do exercises from the textbook
8	1.2 Types of sections	Ask brain storming question about types of section from the textbook purposes.	- Discuss and demonstrate using visual aids the different types of section - Let the students to practice on check points 3.1 up to 3.4.	- Students give feedback about today's lessons. (Teacher acts as facilitator.) - Give home work to do exercises from the textbook
3	1.3 Other sectional view representation and conventional Practices in sectioning	Ask brain storming question about Other sectional view representation and conventional Practices in sectioning from the textbook.	- Demonstrate all the conventional practices in sectioning and other representation of sectional view using visual aid. - allow the student to practice on them by providing activities and check points 3.5 from the text or from yourself	- Students give feedback about today's lessons. (Teacher acts as facilitator.) - Make the students to work in a group of six and eight on the exercises and to peer observed by any other group - Give home work to do exercises from the textbook

Evaluation

Ask your students the following concepts

- state concept of sectioning.
- state five reasons of using sectional view.

- explain the principles of constructing true shapes of cut surfaces.
- Describe other conventional representation in sectioning

Method

- Presentation (lecture) and Demonstration
- group discussion (6-8 students per a group)
- individual practice

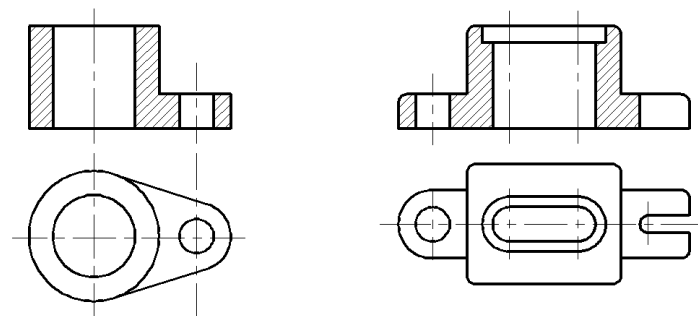
Assessments

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.

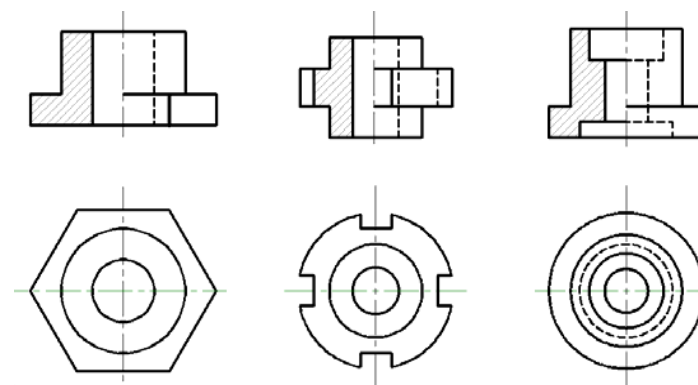
Students working below the minimum requirement level will require extra help if they are to catch up with the rest of the class. They should be given extra attention in class and additional activities at the end of the lesson or during breaks.

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.

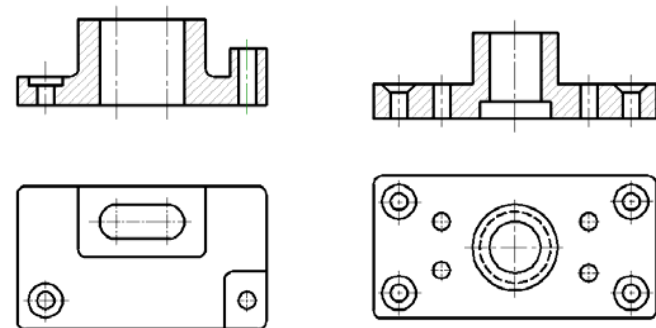
Answer key for the question in the textbook
Answer to check point 3.1



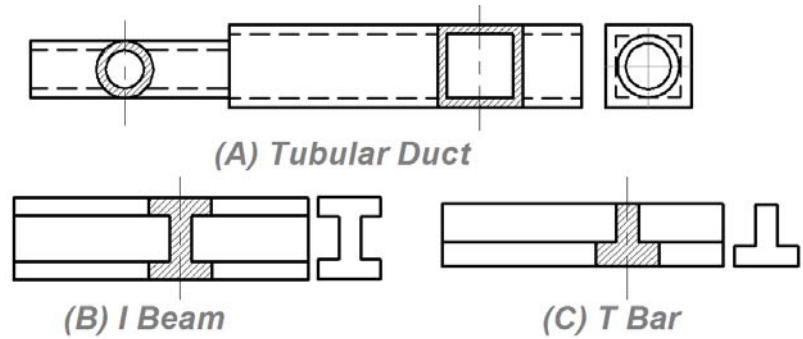
Answer to check point 3.2



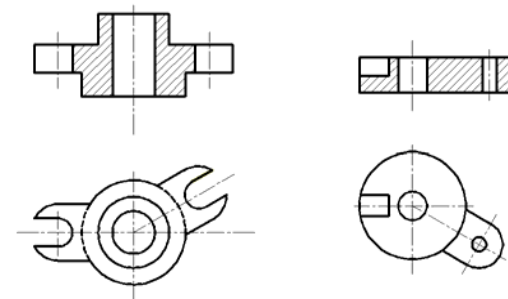
Answer to check point 3.3



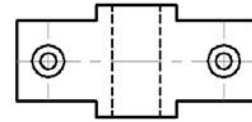
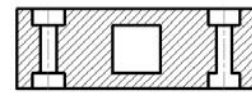
Answer to check point 3.4



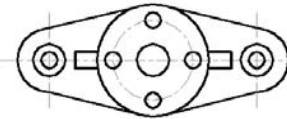
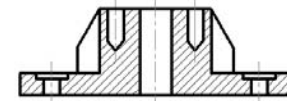
Answer to check point 3.5



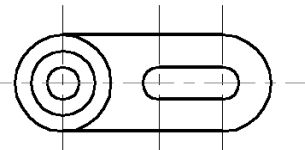
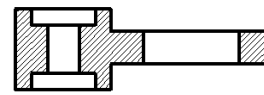
Answer to exercise 1



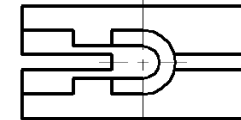
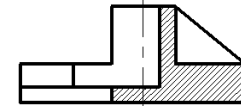
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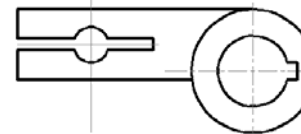
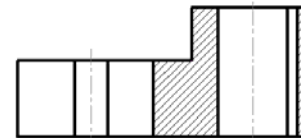
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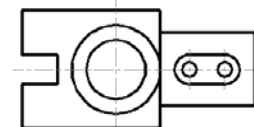
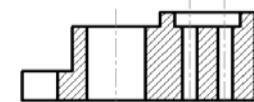
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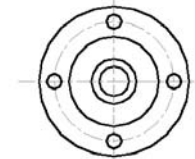
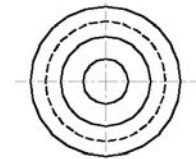
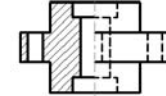
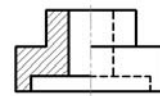


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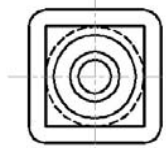
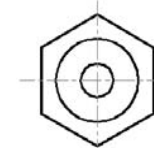
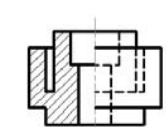
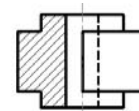
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Answer to exercise 2



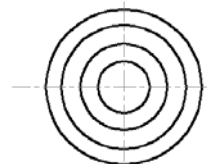
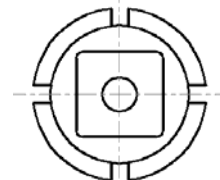
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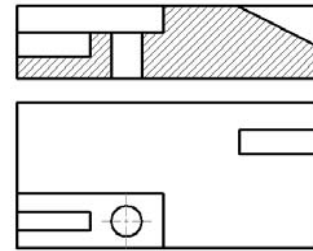
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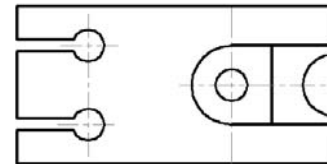
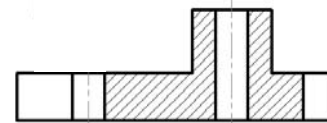
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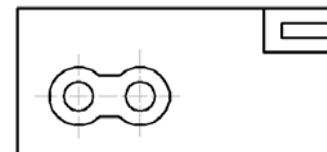
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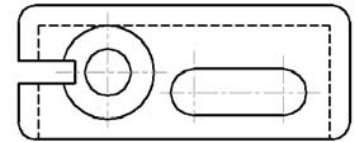
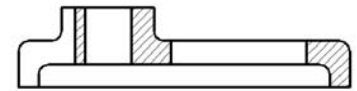
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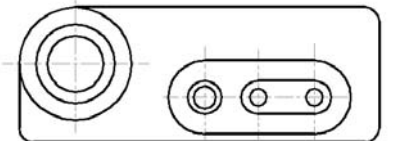
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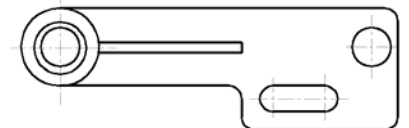
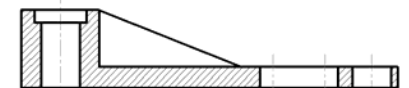
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