ENGINEERING DRAWING
SKKK 1021

FUNDAMENTALS

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LEARNING OUTCOMES

INTRODUCTION TO ENG. DRAWING

It is expected that students will be able to:

- Identify and using the basics of engineering drawing

FUNDAMENTALS OF ENG. DRAWING

- INTRODUCTION
- ALPHABETS AND NUMBERS
- ENGINEERING DRAWING LA
- TYPES OF LINES
- SCALES
- DIMENSIONING

INTRODUCTION

Elements of Engineering Drawing

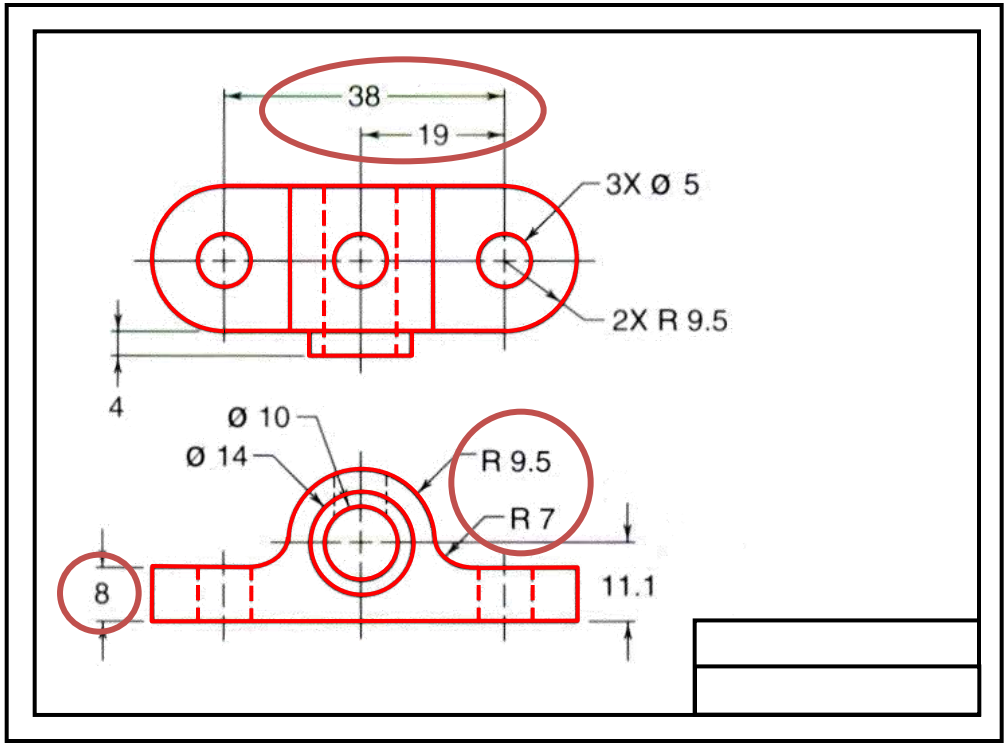
Engineering drawing are made up of ***graphics language*** and ***word language***.

Graphics language

Describe a shape (mainly).

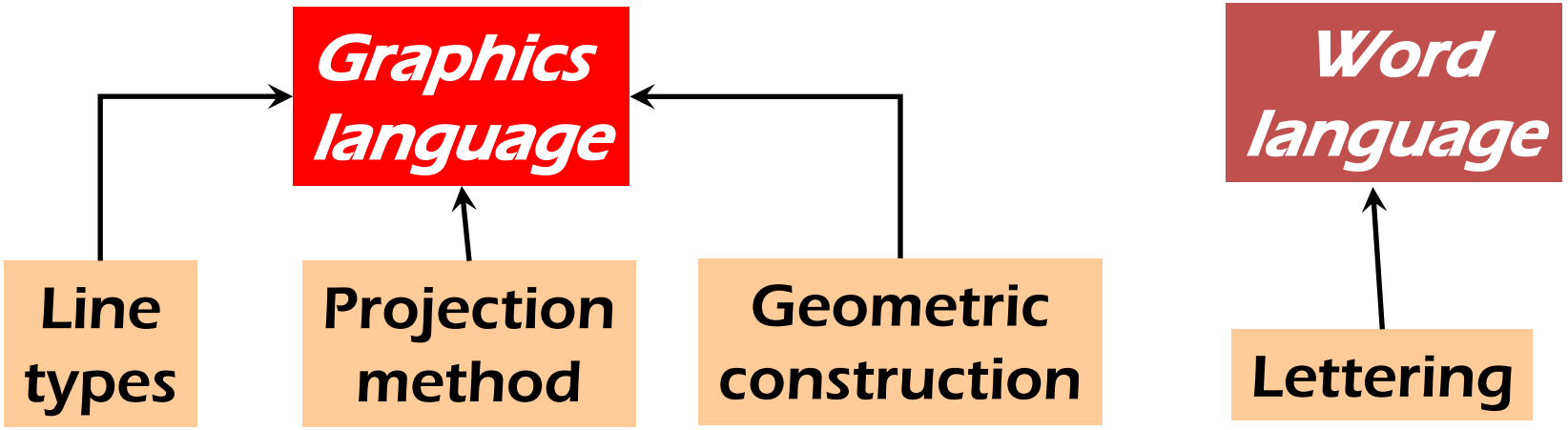
Word language

Describe size, location and specification of the object.



INTRODUCTION (cont'd)

Basic Knowledge for Drafting



ALPHABETS AND NUMBERS

Text on Drawings

Text on engineering drawing is used :

- To communicate nongraphic information.
- As a substitute for graphic information, in those instance where text can communicate the needed information more clearly and quickly.

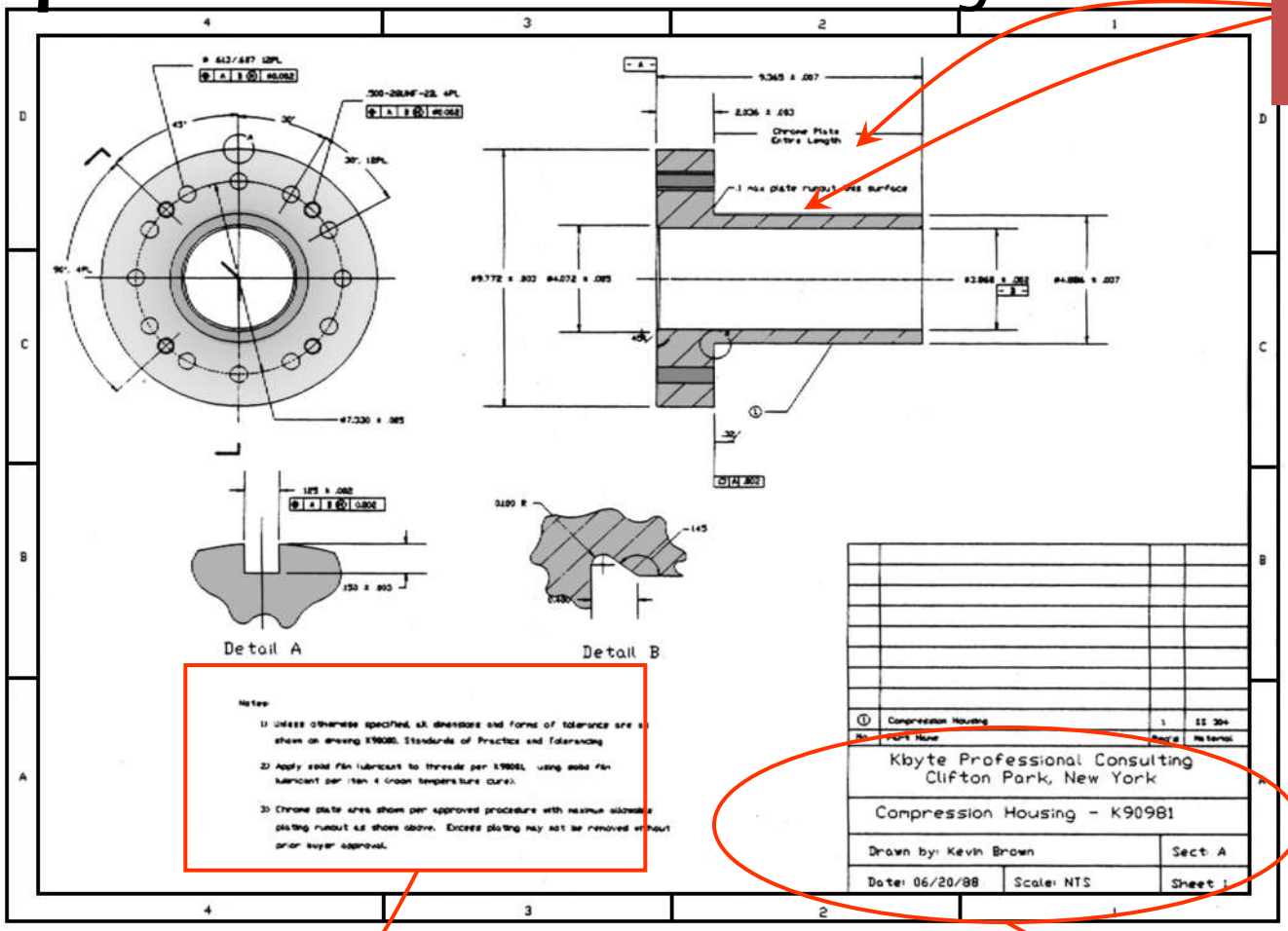
Thus, it must be written with

Legibility - shape
- space between letters and words

Uniformity - size
- line thickness

ALPHABETS AND NUMBERS (cont'd)

Example *Placement of the text on drawing*



ALPHABETS AND NUMBERS (cont'd)

Lettering Standard

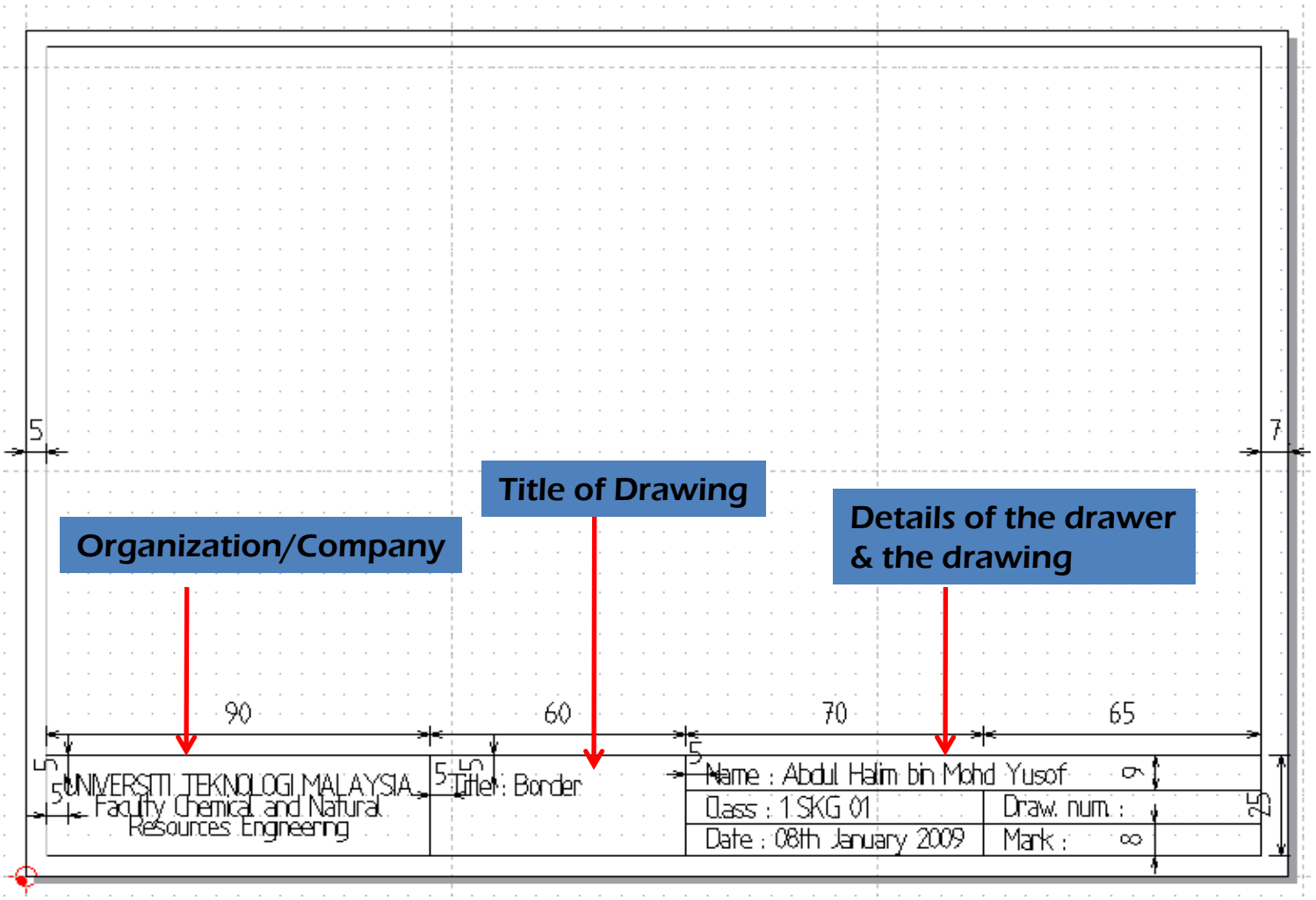
ANSI Standard

- Use a Gothic text style, either inclined or vertical.
- Use all capital letters.
- Use 3 mm for most text height.
- Space between lines of text is at least 1/3 of text height.

This course

- Use only a Normal text style.
- Use both capital and lower-case letters.
- For letters in title block it is recommend to use 5 mm text height

ENGINEERING DRAWING LAYOUT



TYPES OF LINES

Basic Line Types

Types of Lines	Appearance	Name according to application
Continuous thick line		Visible line
Continuous thin line		Dimension line
		Extension line
		Leader line
Dash thick line		Hidden line
Chain thin line		Center line

TYPES OF LINES (cont'd)

Meaning of Lines

Visible lines represent features that can be seen in the current view

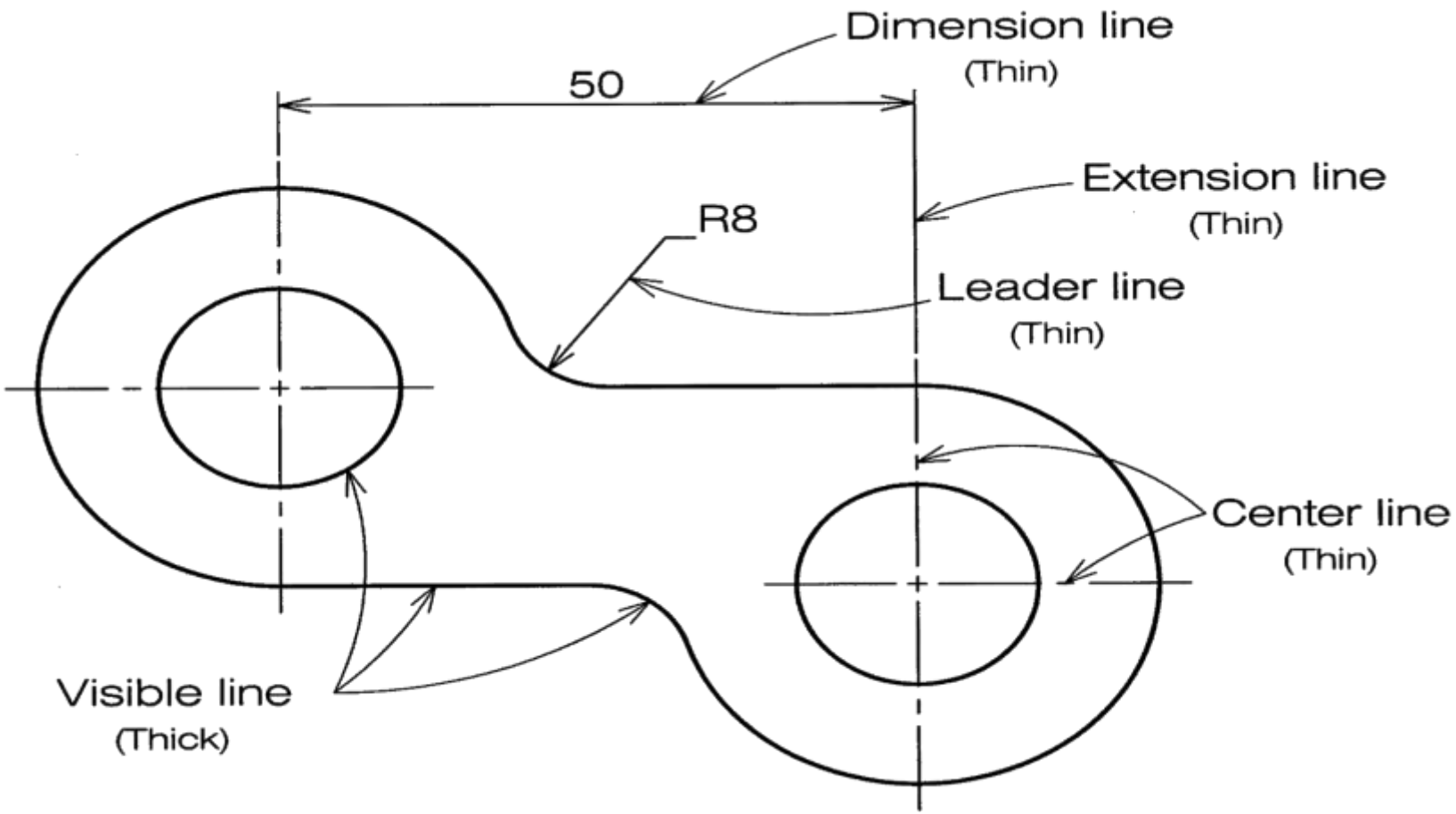
Hidden lines represent features that can not be seen in the current view

Center line represents symmetry, path of motion, centers of circles, axis of axisymmetrical parts

Dimension and Extension lines indicate the sizes and location of features on a drawing

TYPES OF LINES (cont'd)

Example : Line conventions in engineering drawing

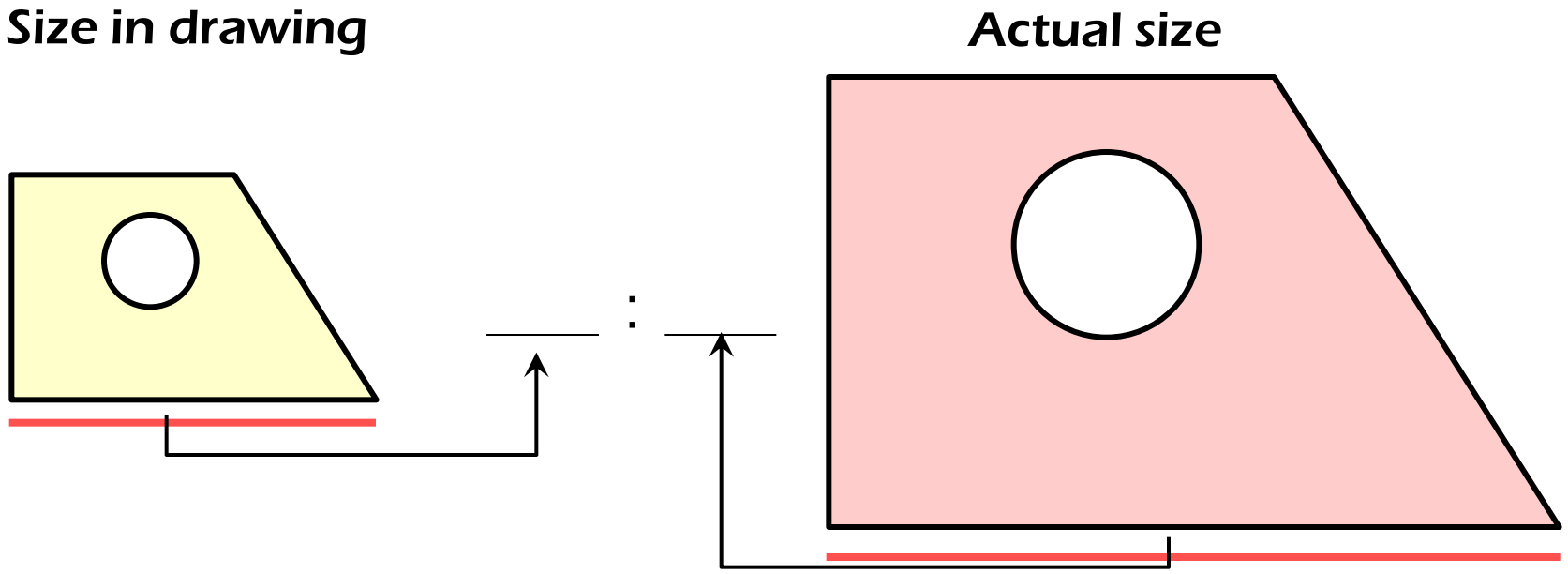


SCALES

Drawing Scales

Length, size

Scale is the ratio of the linear dimension of an element of an object shown in the drawing to the real linear dimension of the same element of the object.



SCALES (cont'd)

Drawing Scales

- Designation of a scale consists of the word "SCALE" followed by the indication of its ratio, as follow

  SCALE 1:1 for full size

  SCALE X:1 for *enlargement* scales (X > 1)

  SCALE 1:X for *reduction* scales (X > 1)

- Dimension numbers shown in the drawing are correspond to "true size" of the object and they are independent of the scale used in creating that drawing.

DIMENSIONING

ENGINEERING DESIGN

PROCESS	RESULT	TRANSFERRED INFORMATION
Design a part	Sketches of ideas	
Create drawings	Multiview Drawing	Shape
	Dimensioning	1. Size, Location 2. Non-graphic information
Manufacture		

DEFINITION

Dimensioning is the process of specifying part's information by using of **figures, symbols** and **notes**.

This information are such as:

1. **Sizes and locations of features**
2. **Material's type**
3. **Number required**
4. **Kind of surface finish**
5. **Manufacturing process**
6. **Size and geometric tolerances**

DIMENSIONING SYSTEM

1. Metric system : ISO and JIS standards

Examples 32, 32.5, 32.55, 0.5 *(not .5)* etc.

This course

2. Decimal-inch system

Examples 0.25 *(not .25)*, 5.375 etc.

3. Fractional-inch system

Examples $\frac{1}{4}$, $5\frac{3}{8}$ etc.

DIMENSIONING COMPONENTS

- Extension lines
- Dimension lines
  (with arrowheads)
- Leader lines

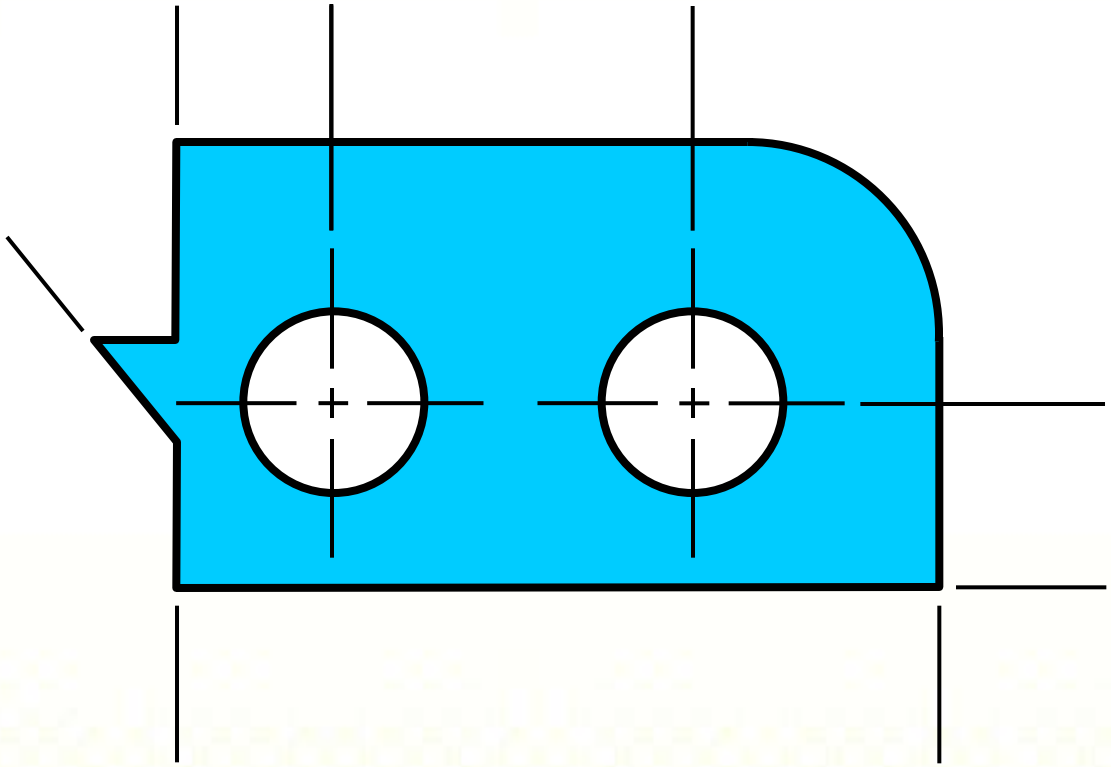
→ Continuous thin line

- Dimension figures
- Notes :
  - *local note*
  - *general note*

→ Using text function

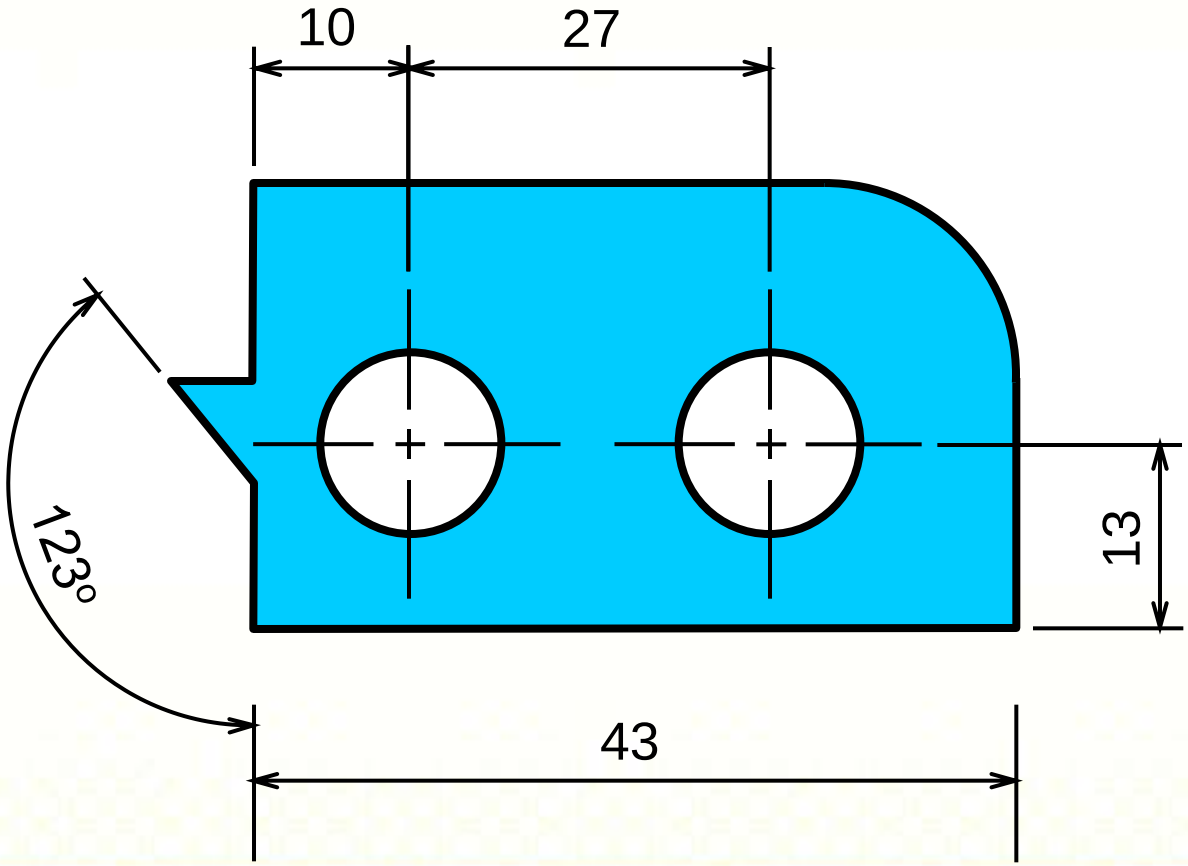
EXTENSION LINES

indicate the location on the object's features that are dimensioned.



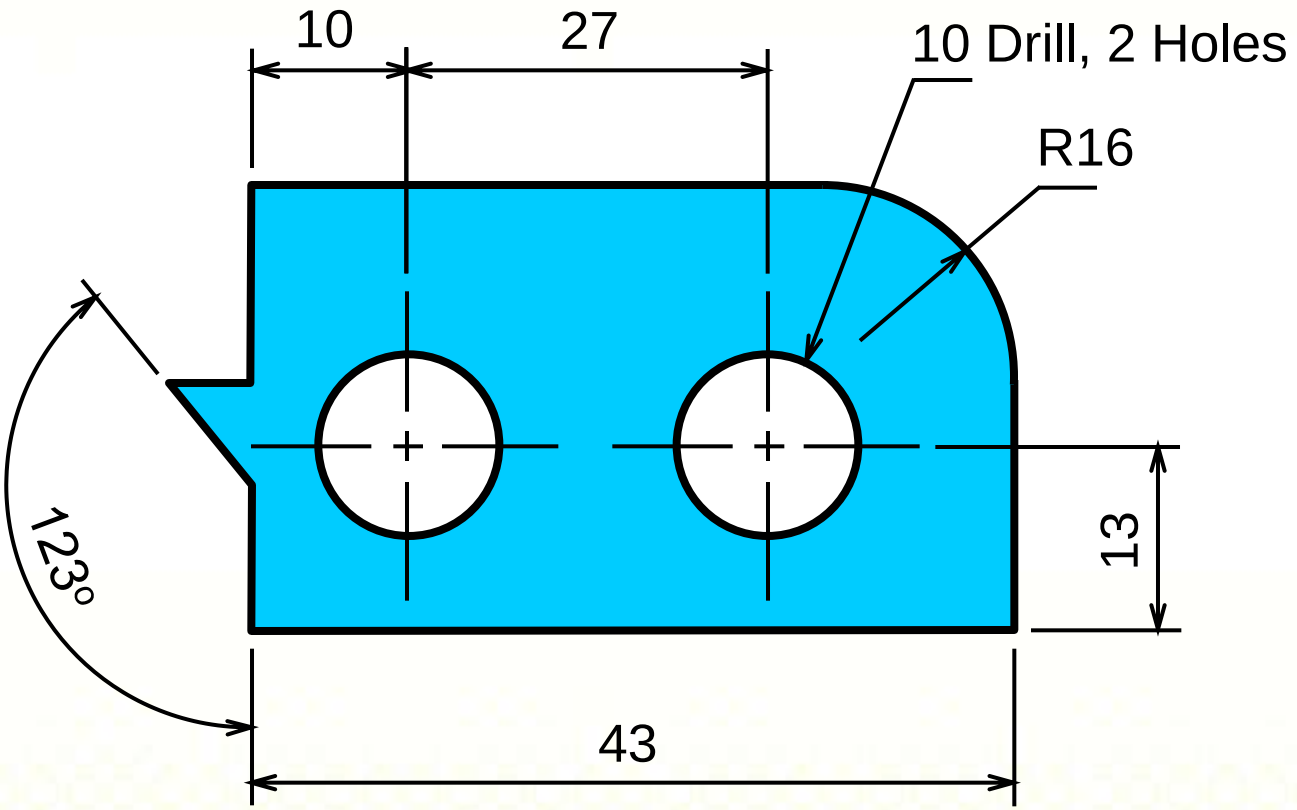
DIMENSION LINES

indicate the direction and extent of a dimension, and inscribe *dimension figures*.

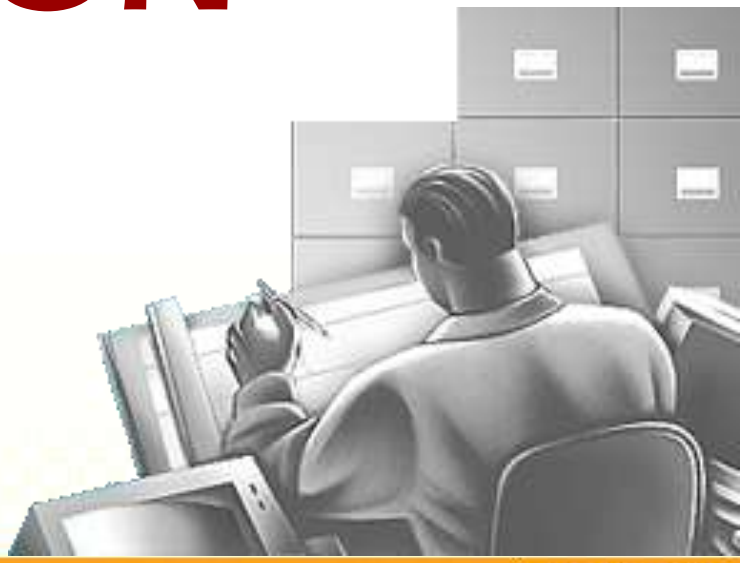


LEADER LINES

indicate details of the feature with a *local* note.



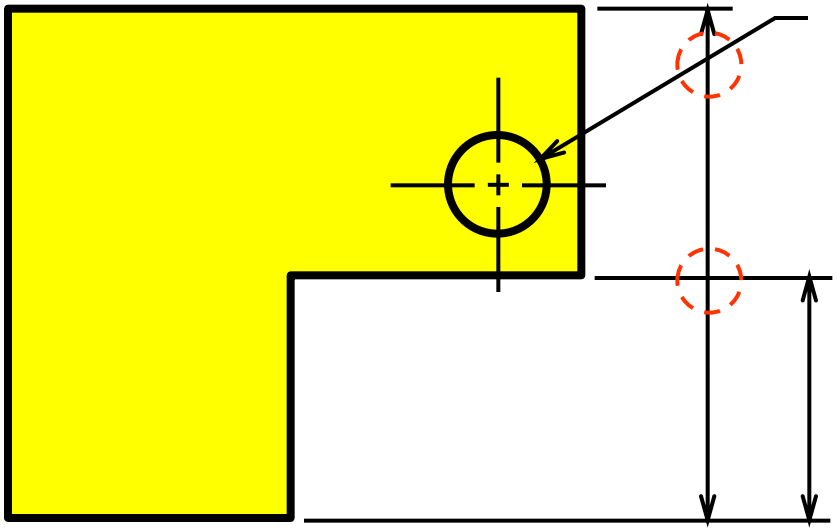
PLACEMENT OF DIMENSION



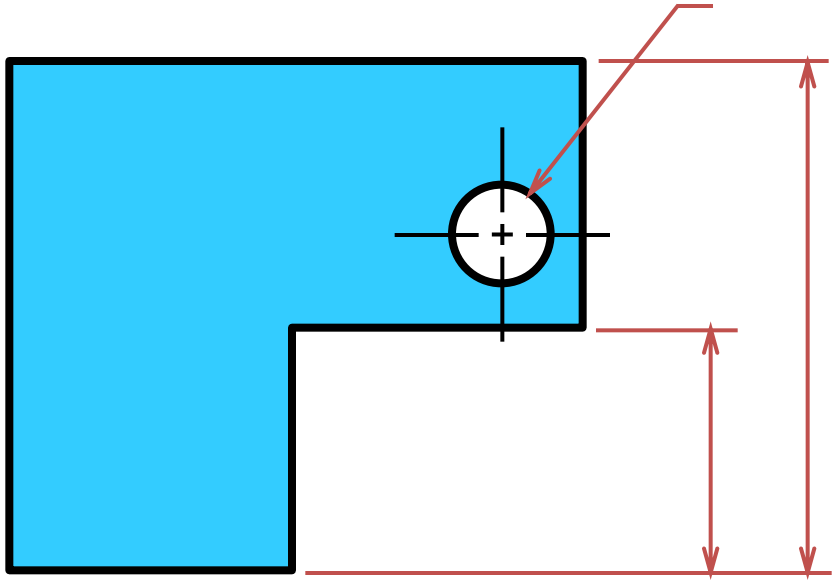
RECOMMENDED PRACTICE

1. Extension lines, leader lines **should not** cross dimension lines.

POOR



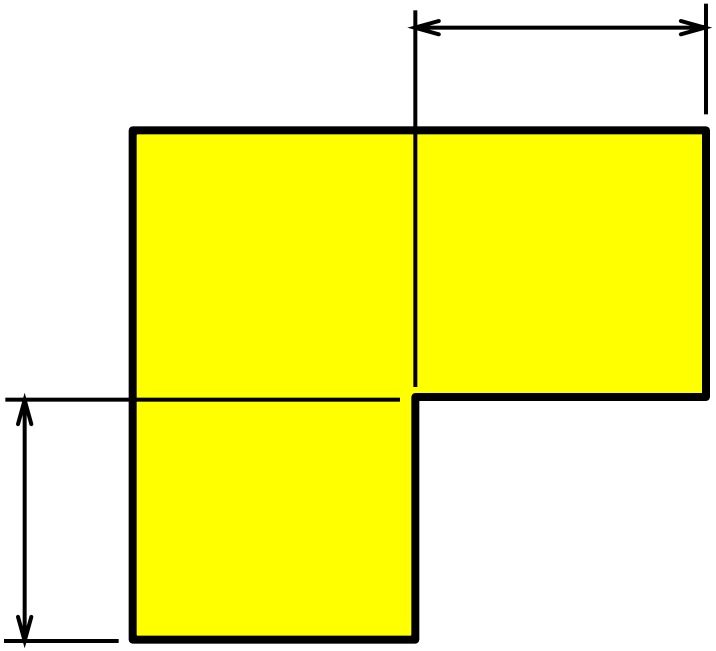
GOOD



RECOMMENDED PRACTICE

2. Extension lines **should be** drawn from the nearest points to be dimensioned.

POOR



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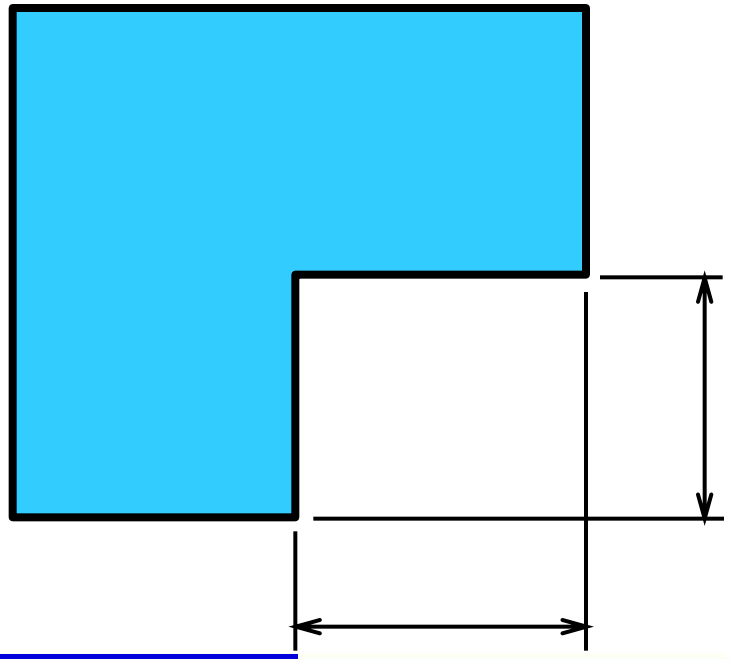
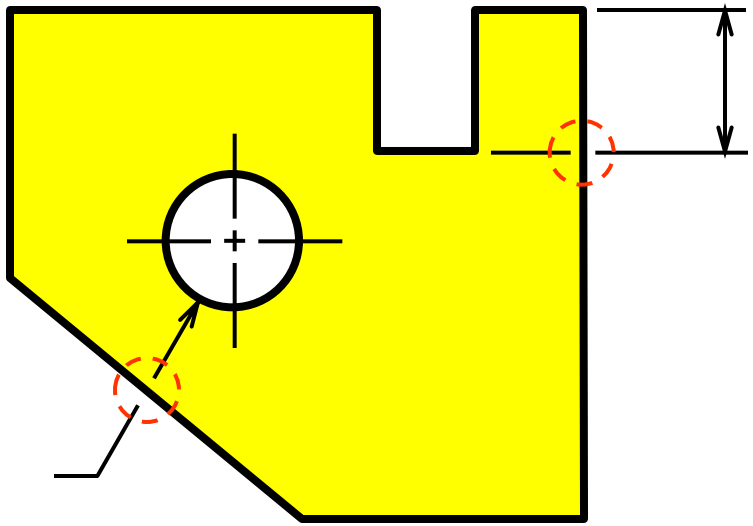


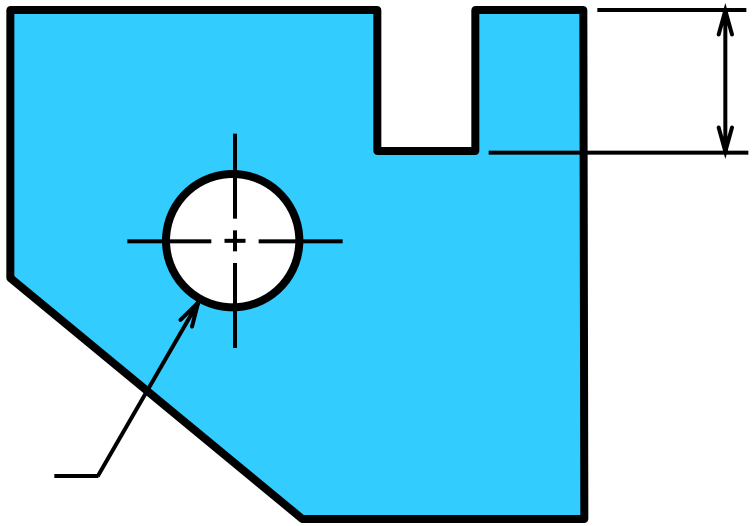
RECOMMENDED PRACTICE

*3. Extension lines of internal feature **can** cross visible lines **without** leaving a gap at the intersection point.*

WRONG



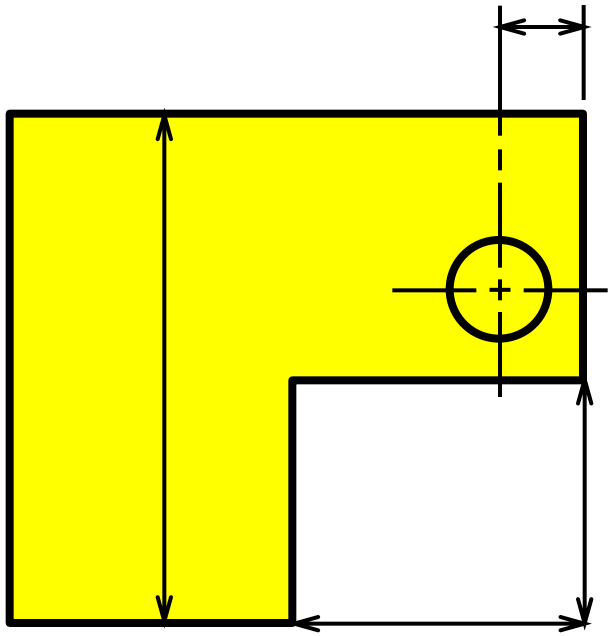
CORRECT



RECOMMENDED PRACTICE

4. **Do not** use object line, center line, and dimension line as an extension lines.

POOR



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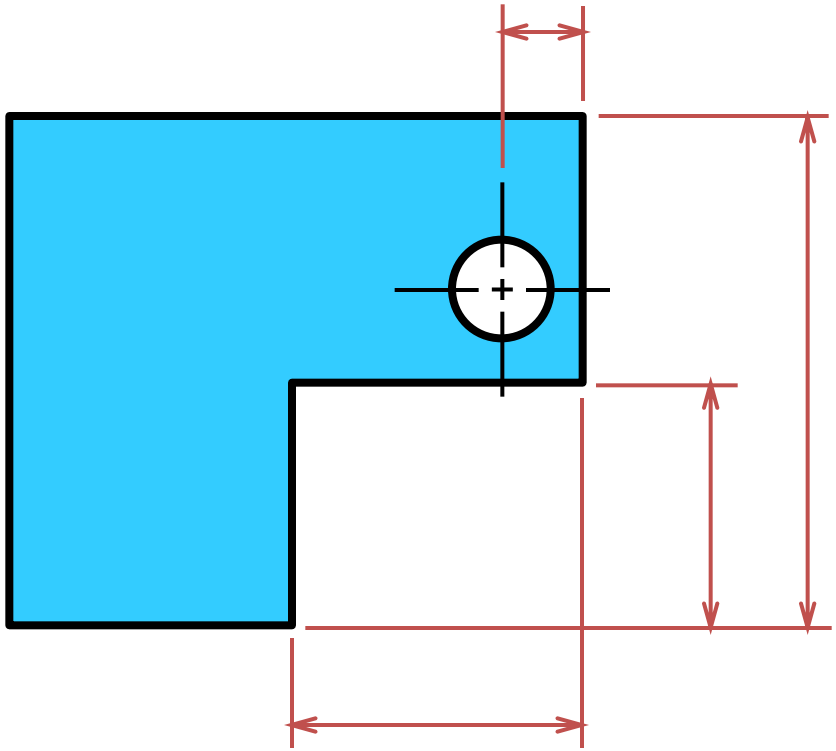
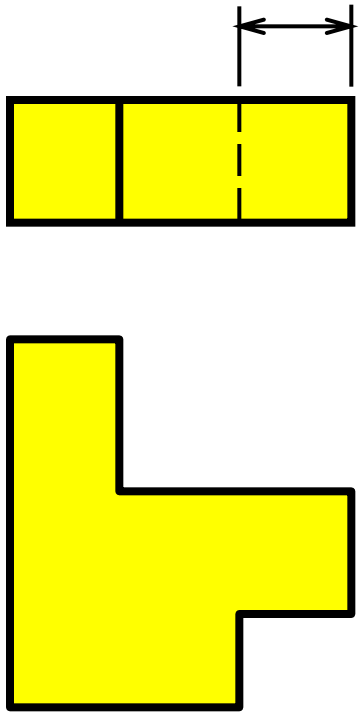


RECOMMENDED PRACTICE

5. Avoid dimensioning hidden lines.

POOR



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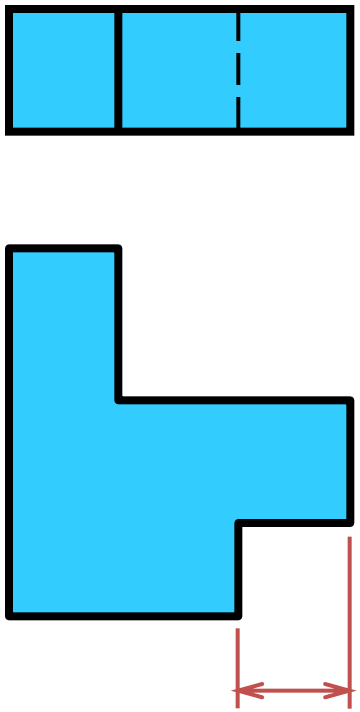
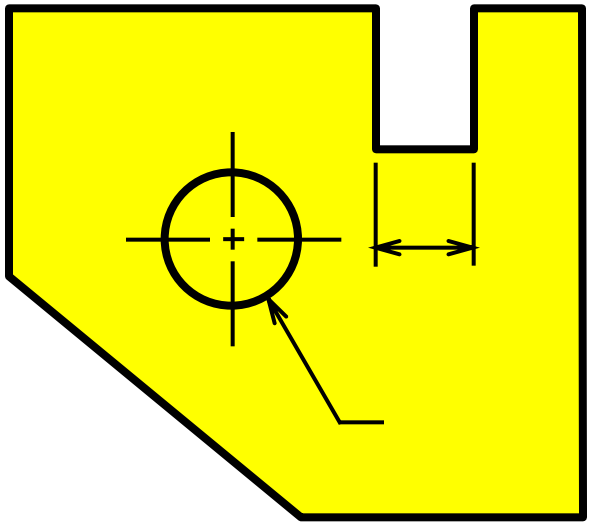


RECOMMENDED PRACTICE

6. Place dimensions outside the view, unless placing them inside improve the clarity.

POOR



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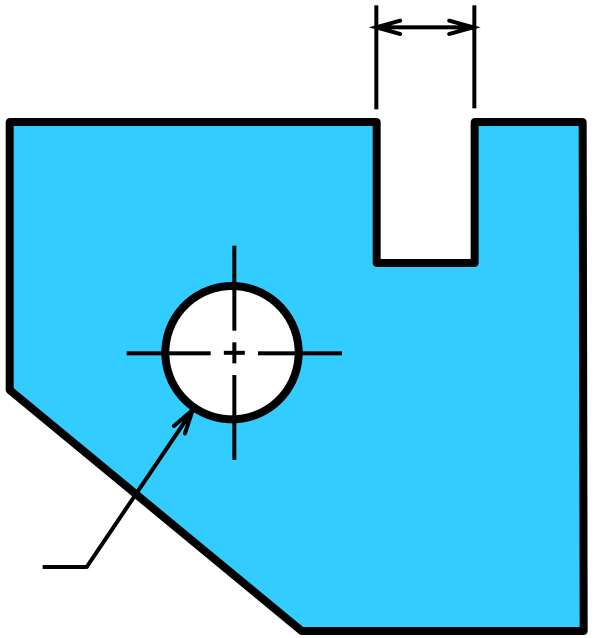
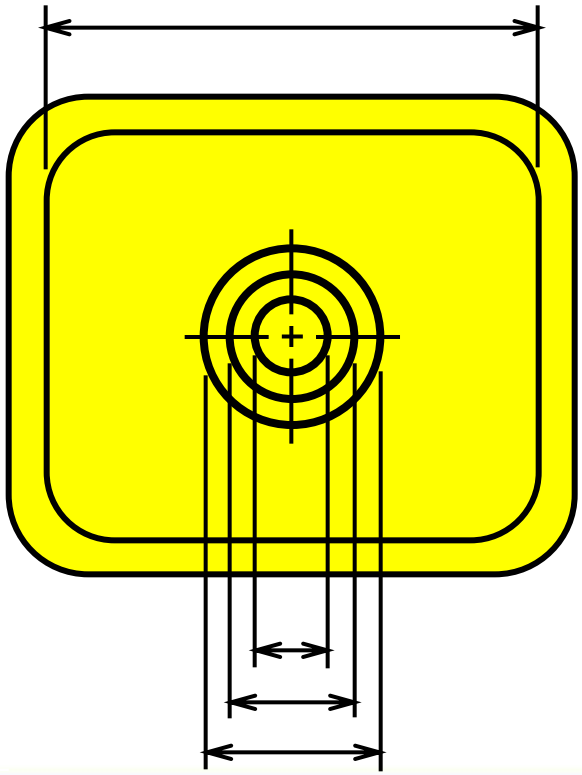


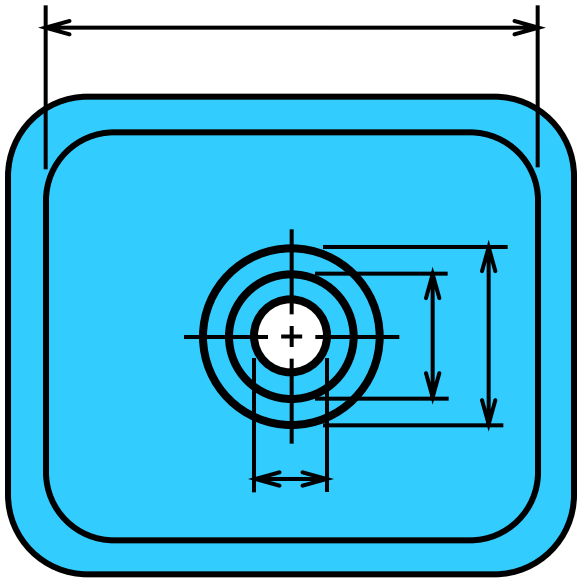
RECOMMENDED PRACTICE

6. Place dimensions outside the view, unless placing them inside improve the clarity.

JUST OK !!!



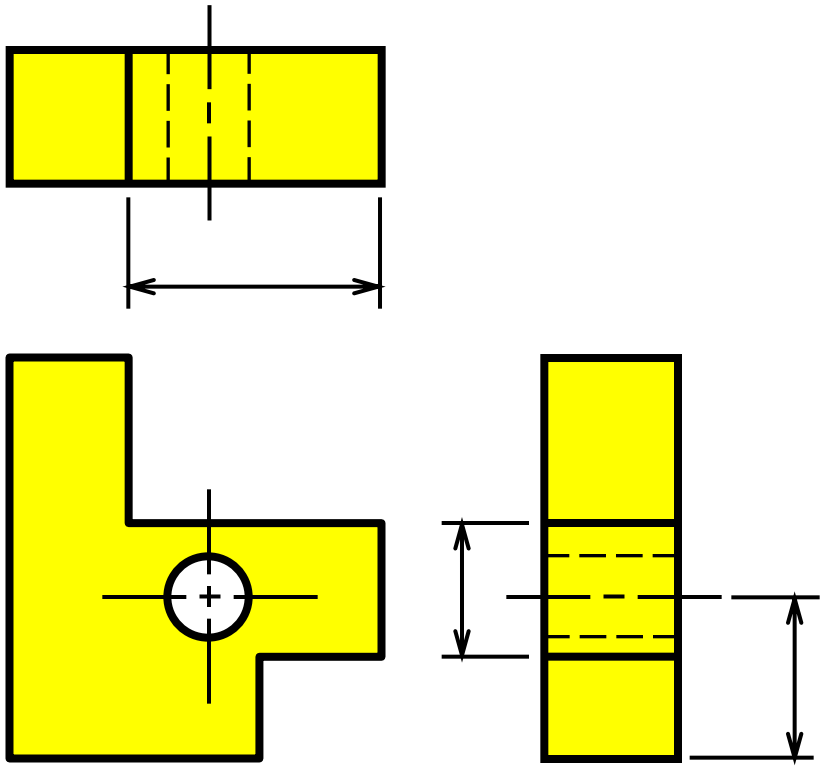
BETTER



RECOMMENDED PRACTICE

7. Apply the dimension to the view that clearly show the shape or features of an object.

POOR



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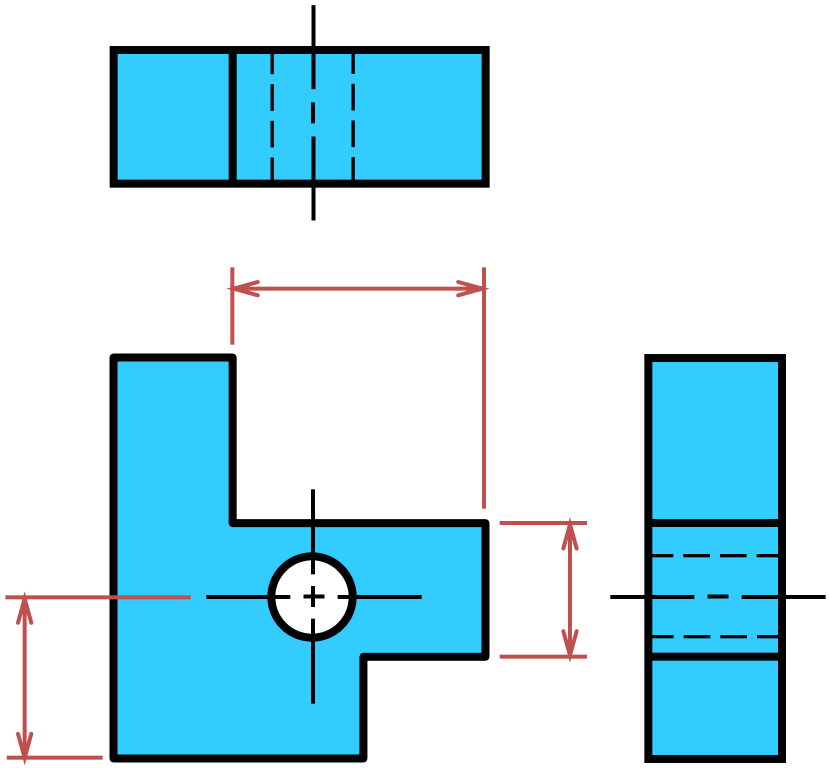
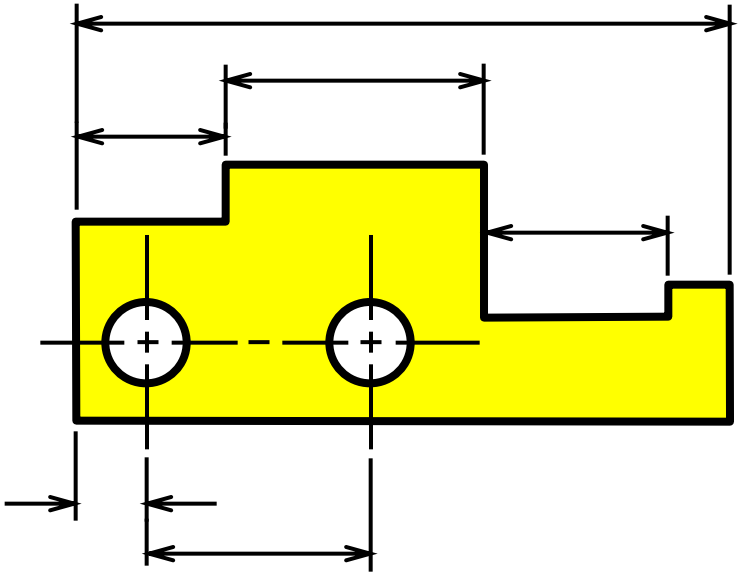


RECOMMENDED PRACTICE

8. Dimension lines should be lined up and grouped together as much as possible.

POOR



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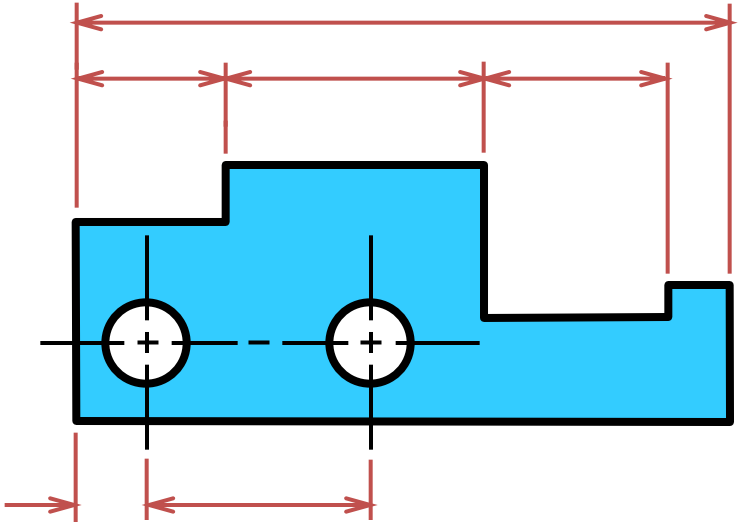
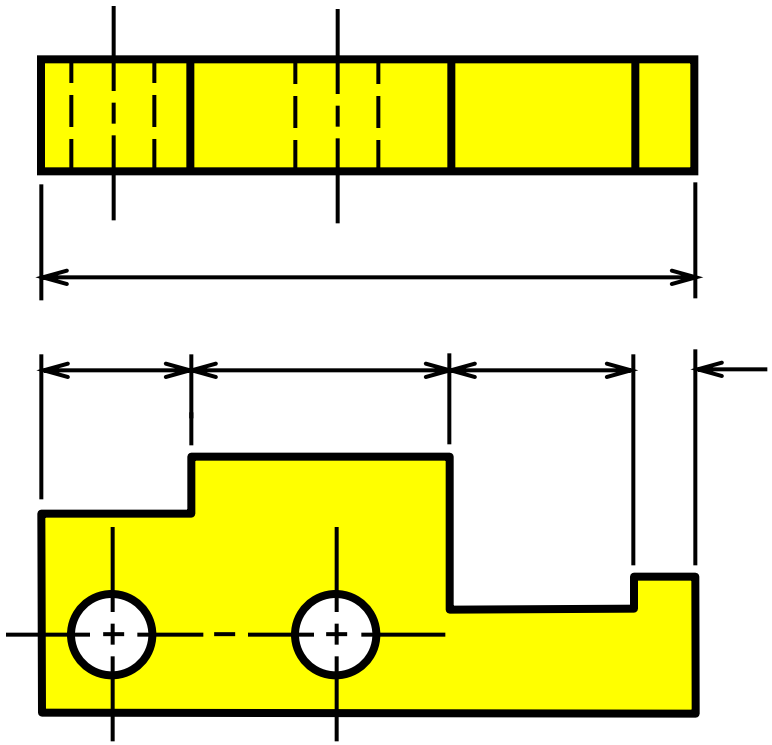


RECOMMENDED PRACTICE

9. Do not repeat a dimension.

POOR



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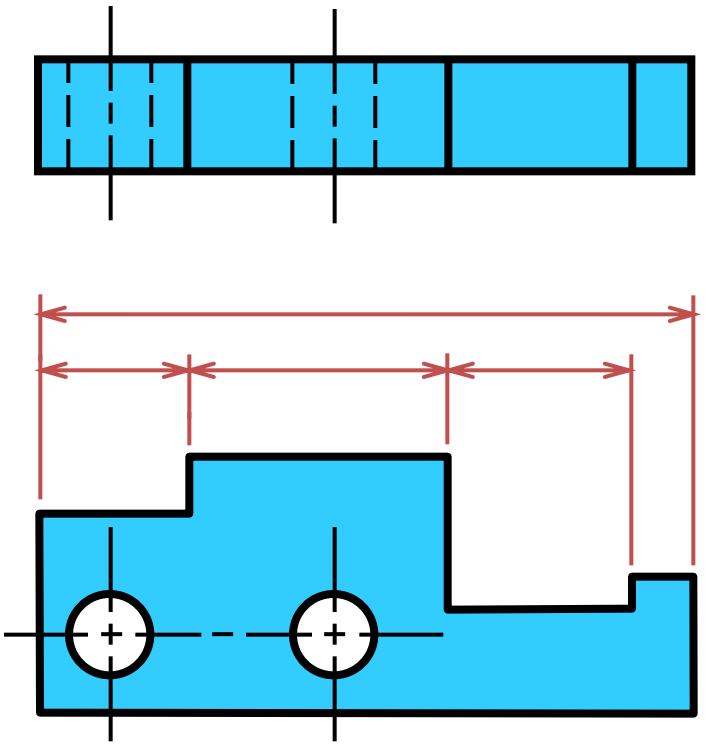

END OF CHAPTER 2