



Republic of the Philippines
DEPARTMENT OF EDUCATION



K to 12 Basic Education Curriculum
Creative Technologies
Learning Module



PROJECT ROBO4ED

**CREATIVE TECHNOLOGY
GRADE 7**

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What Is This Module?

Welcome to the world of *2D & 3D Modeling!*

This module help learners understand the processes involved in the concept and technical drawing relationship, multiple part assembly drawings. It will prepare the learners to effectively plan and create 2D technical drawings.

These 2 common competencies are covered separately in 2 Lessons. As shown below, each lesson:

Lesson 1 – Concept and Technical Drawing Relationship (CTDR)

- 1.1 Identify sources of information and relevant ideas to enrich one's own concept of 2D technical drawings.
- 2.1 Draw preferences setup
- 3.1 Create simple parts by sketching outlines
- 4.1 Create profile constrain and dimension sketched outlines
- 5.1 Extrude profile into parts
- 6.1 View models from different viewports, revolve a profile into part and sweep a profile into a part
- 7.1 Draw 2D technical draw using:
 - Orthographic views
 - Perspective drawings

Lesson 2 – Multiple Part Assembly Drawings (MPAD)

- 1.1 Identify the parts of the object to be assembled
- 2.1 Discuss the Cartesian plane and joints
- 3.1 Modify 2D illustrations between two or more-part assembly
- 4.1 Create simple 3D parts for a 2D technical drawing using a software
- 5.1 Import 3D parts for a 2D technical drawing using a software

Your success in this lesson on 2D Modeling is shown in your ability to perform the performance standards found in each lesson.



How Do You Use This Module

This Module has 2 Lessons. Each Lesson has the following parts.

- Learning Outcomes
- Performance Standards
- Materials
- Definition of Terms
- What Do You Already Know?
- What Do You Need to Know?
- How Much Have You Learned?
- How Do You Apply What Have You Learned?
- How Well Did You Perform?
- How Do You Extend Your Learning?
- References

To get the most from this Module, you need to do the following:

1. Begin by reading and understanding the Learning Outcome/s and Performance Standards. These tell you what you should know and be able to do at the end of this Module.
2. Find out what you already know by taking the Pretest then check your answer against the Answer Key.
3. Do the required Learning Activities. They begin with one or more information Sheets. The information sheets contain information that you need to know.
4. Demonstrate what you have learned by doing what the Activity/Operation/Job sheet directs you to do.
5. You must be able to apply what you have learned in another activity or in real life situation.
6. Accomplish the scoring rubrics for you to know how well you performed.

If you have questions, ask your teacher for assistance.



Definition of Terms

AutoCAD – is a computer-aided design (CAD) program used for 2-D and 3-D design and drafting. AutoCAD is developed and marketed by Autodesk Inc. and was one of the first CAD programs that could be executed on personal computers.

Layers – are the primary method organizing the objects in drawing by function or purpose.

Units – It determine the quantity (as of length, time, heat, or value) adopted as a standard measurement.

Scale – It is used to reduce and enlarges sizes of the object according to the preferences scales.

Ribbon Tool Bars – A panel of reference tools according to their types, kinds and use.

LEARNING OUTCOME 1

Identify sources of information and relevant ideas to enrich one's own concept of 2D technical drawings.

PERFORMANCE STANDARDS

The learned independently draws 2D technical drawings using various illustrations methods.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

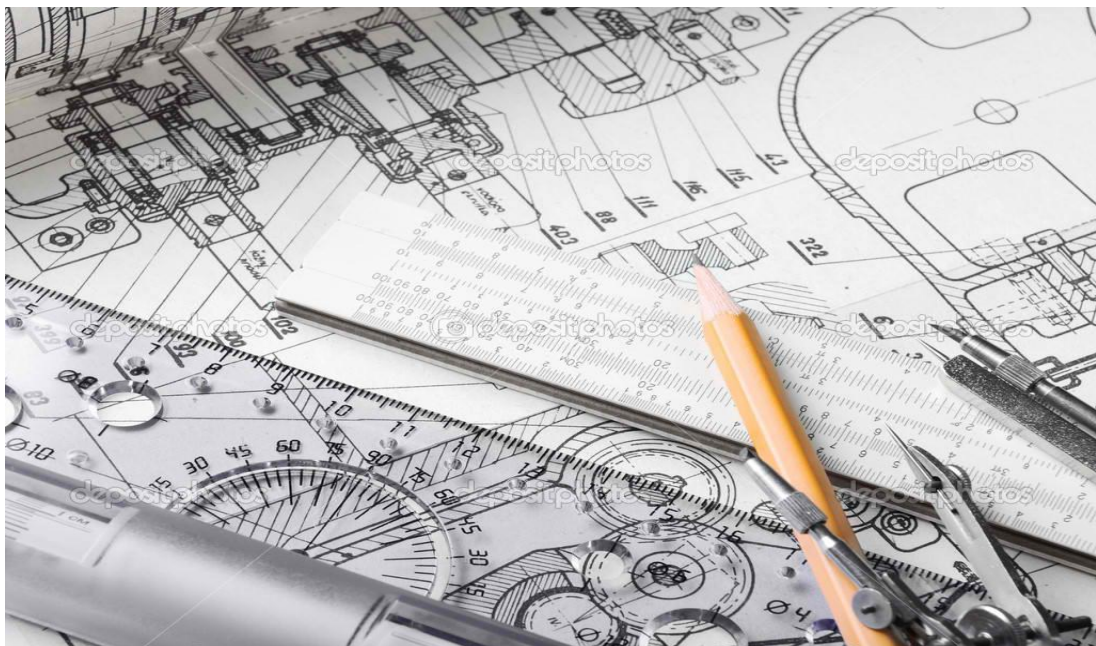
Pretest LO 1

Direction: Select the AutoCAD command most applicable to a specific job.

1. What do you call a panel of reference tool according to their types, kinds and use?
 - A. Drawing Tools
 - B. Info Center
 - C. Ribbon Tool Bars
 - D. View Cube
2. What do you call an endless drawing area where you can scale your drawing any sizes?
 - A. Drawing Tools
 - B. Info Center
 - C. Ribbon Tool Bars
 - D. View Cube
3. What do you called the part of the CAD where you can input your command and value?
 - A. Command Window
 - B. Drawing Tools
 - C. Info Center
 - D. View Cube
4. What do you call wherein you can control display properties of the views in AutoCAD.
 - A. Command Window
 - B. Drawing Tools
 - C. Ribbon Tool Bars
 - D. View Cube
5. This is the part wherein you can select the working environment you want to use.
 - A. Command Window
 - B. Drawing Tools
 - C. Ribbon Tool Bars
 - D. Workspace Switching

LESSON 1

Concept and Technical Drawing Relationship (CTDR)



LEARNING OUTCOMES

At the end of the lesson, you are expected to do the following:

- LO 1. Identify sources of information and relevant ideas to enrich one's own concept of 2D technical drawings.
- LO 2. Draw preference setup
- LO 3. Create simple parts by sketching outlines
- LO 4. Create profile constrain and dimension sketched outlines
- LO 5. Extrude profiles into parts
- LO 6. View models from different viewpoints; revolve a profile into a part
- LO 7. Draw 2D technical drawing using:
 - Orthographic views



What Do You Need to Know?

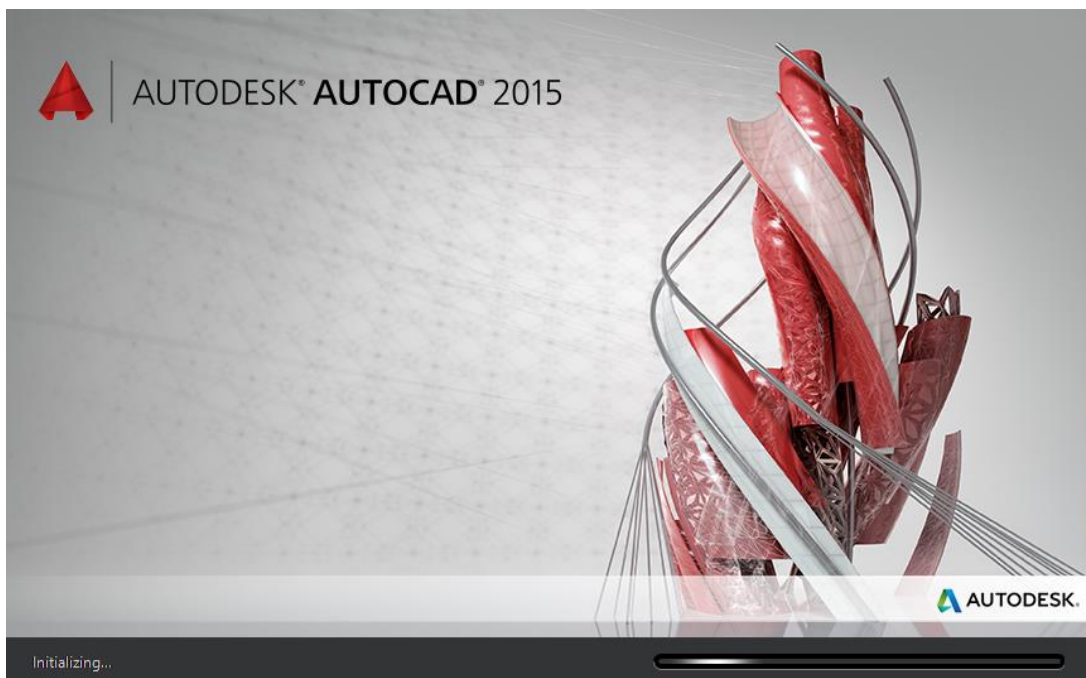
Read information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1

Information Sheet 1.1

PRINCIPLES OF 2D TECHNICAL DRAWING USING 2D SOFTWARE APPLICATION

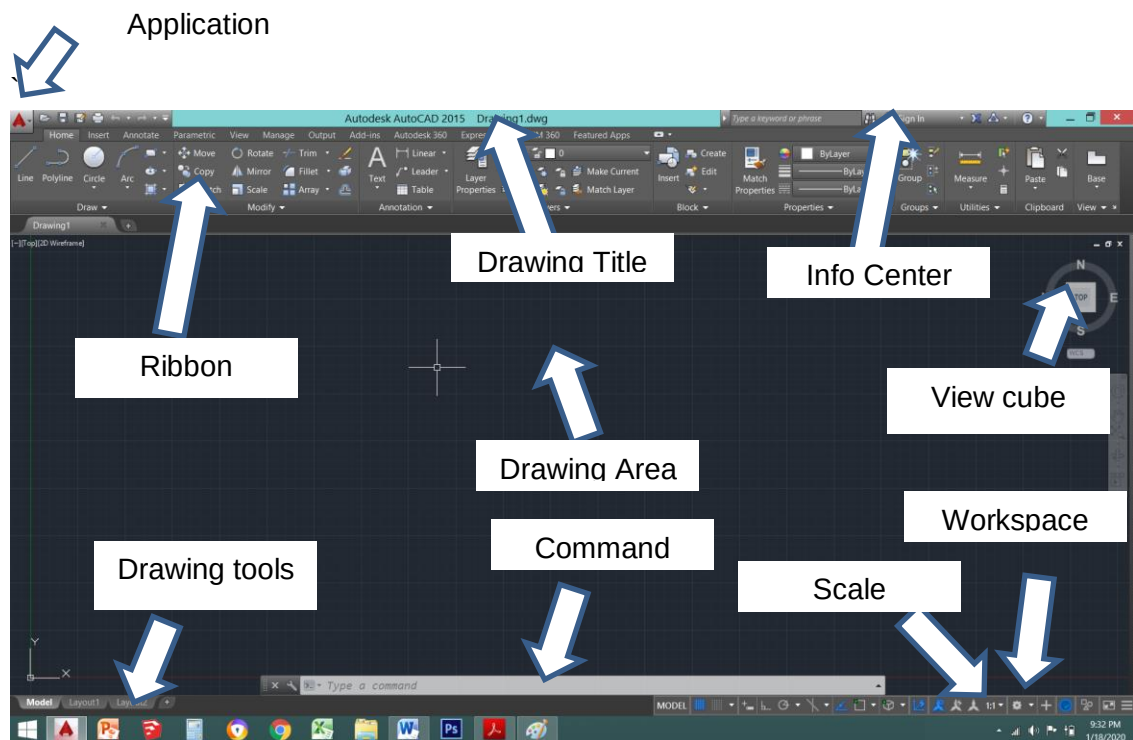
There is a great variety of 2D applications used in creating 2D drawings. One is what we called AutoCAD. In this module include most of the basic ones but sufficient enough for your initial understanding about 2D drawing. 2D is an object with just height and width without depth; therefore, two dimensional objects are flat.

AutoCAD is a commercial computer-aided design (CAD) and drafting software application. Developed and marked by Autodesk.



THE AUTOCAD 2015 USERS INTERFACE

Select configuration settings on the Workspace Switching.



RIBBON TOOLS BARS – A panel of reference tools according to their types, kinds and use.

INFO CENTER – Provides a web based experience directly or help within the product. Internet connection is mandatory for this.

VIEW CUBE – Controls the display properties of the views. View cube navigates display when you're working 2D and 3D drawings.

DRAWING TOOLS – An endless drawing area where you can scale your drawing in any sizes.

SCALE – It is used to reduce and enlarges sizes of the object according to the preferences scales.

COMMAND WINDOW – The part of the CAD where you can input your command and value.

WORKSPACE SWITCHING – Select here the working environment you want to use.

APPLICATION MENU – To search for command as well as to access tools or to create new files.

Did you enjoy reading the given information? Well, you are just starting how. Let's move ahead to enrich your understanding.

AUTOCAD FUNCTION KEYS

F1 – AUTOCAD EXCHANGE

F2 – AUTOCAD TEXT WINDOW

F3 – TURNS OSNAP ON/OFF

F4 – TURNS 3D OSNAP ON/OFF

F5 – TURNS ISOPLANE TOP,
RIGHT,

F6 – TURNS DUCS ON/OFF

F7 – TURNS GRID ON/OFF

F8 – TURNS ORTHO ON/OFF

F9 – TURNS SNAP ON/OFF

F10 – TURNS POLAR ON/OFF

F11 – TURNS OTRACK ON/OFF

F12 – TURNS DYN ON/OFF

AUTOCAD KEYBOARD SHORTCUTS

CTRL + K = HYPERLINK

CTRL + X = CUT TO LIPBOARD

CTRL + L = ORTHO ON/OFF

CTRL + Y = REDO

CTRL + M =

CTRL + Z = UNDO

CTRL + N = NEW

CTRL + O = OPEN

CTRL + P = PLOT

CTRL + Q = QUIT

CTRL + R =

CTRL + S = SAVE

CTRL + T = CALIBRATE TABLET

CTRL + U = POLAR ON/OFF

CTRL + V = PASTE FROM

CTRL + W = OTRACK ON/OF

AUTOCAD SHORTCUTS THAT IS ACCEPTED BY COMMAND WINDOW

AR = ARRAY

A = ARC

BH = HATCH

BR = BREAK

C = CIRCLE

CAM = CAMERA

CO = COPY

D = DIMSTYLE MANAGER

E = ERASE

EL = ELLIPSE

EX = EXTEND

F = FILLET

SU = SUBTRACT

L = LINE

LA = LAYER

M = MOVE

MI = MIRROR

O = OFFSET

OP = OPTIONS

PL = POLYLINE

PRESSPULL = PRESSPULL

PRINT = PLOT

SU = SUBTRACT

TR = TRIM

Z = ZOOM

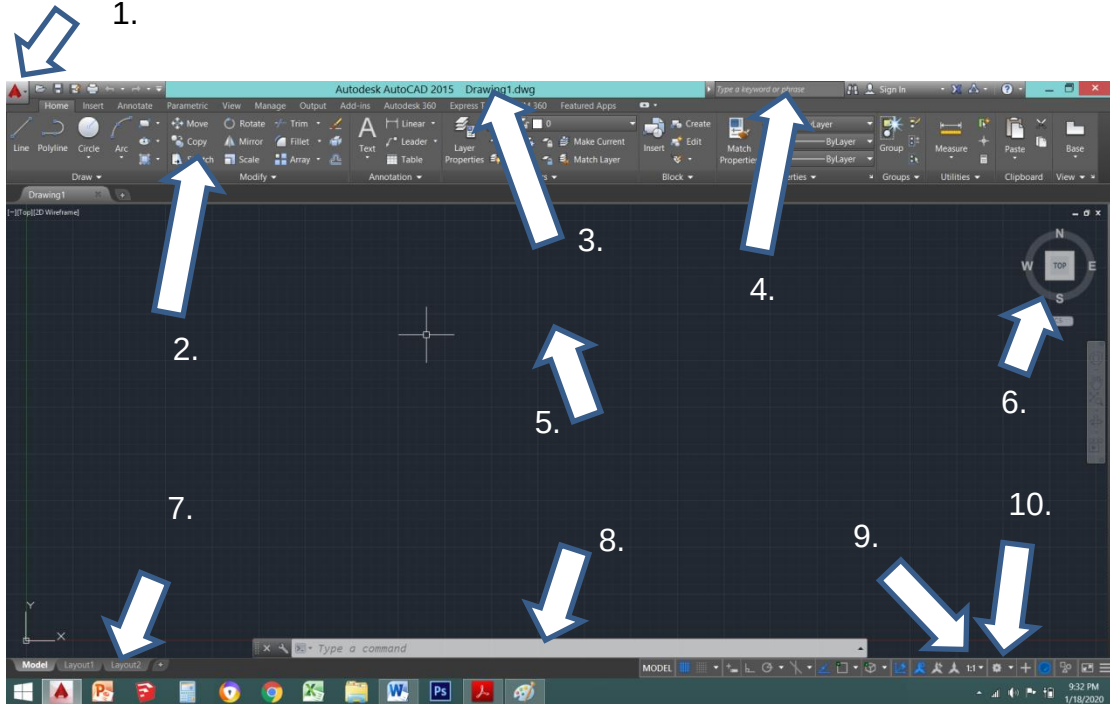


How Much Have You Learned?

Self-Check 1.1

Directions: Identify the name of the correspondent's arrow below.

1.



Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

It is not enough that you learned concepts on AutoCAD interface. Be sure that you are also being able to demonstrate skills.

Activity 1.1

Proper Opening of the AutoCAD Program

Directions: Below is the simple activity for you to work on. Practice the task following the given procedure.

Equipment:

- Computer
- AutoCAD software application

Procedure:

A.

1. Open Windows Start button
2. Right click the icon AutoCAD (If it is pinned in the Start Menu)

B.

1. Click the icon AutoCAD icon on the Monitor.
2. Right click mouse pointing Open.

PINNING THE AUTOCAD ICON ON YOUR COMPUTER

1. Open windows start button
2. Right click the icon AutoCAD
3. Right click Pin to Task Bar or Pin to Start Menu.



How Well Did You Perform?

Find out by accomplishing the Scoring Rubric honestly and sincerely.
Remember it is your learning at stake.

Learner's Name:	Date:	
Competency:	Test Attempt 1st 2nd 3rd ☐ ☐ ☐	
Directions: Ask your teacher to assess your performance in the following critical task and performance criteria below You will be rated based on the overall evaluation on the right side.	OVERALL EVALUATION	
	Level Achieved	PERFORMANCE LEVELS
		4 – Can perform this skill without supervision and with imitative and adaptability to problem situations.
		3 – Can perform this skill satisfactorily without assistance or supervision.
		2 – Can perform this skill satisfactorily but requires some assistance and or supervision.
		1 – Can perform parts of this skill satisfactorily, but requires considerable supervision.
	Note: Instructor will initial level achieved.	

LEARNING OUTCOME 2

Draw preference setup using 2D software application AutoCAD

PERFORMANCE STANDARDS

Draw preference setup using 2D software application AutoCAD

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 2

Direction: Select the AutoCAD command most applicable to a specific job.

1. This is where you can adjust the dimension style of your plan.
 - A. Drawing Tools
 - B. Dimension Style
 - C. Info Center
 - D. View Cube
2. This area wherein you can adjust any color of your lines.
 - A. Drawing Tools
 - B. Info Center
 - C. Layer Setup
 - D. View Cube
3. It determines the quantity of adopted as a standard measurement.
 - A. Command Window
 - B. Drawing Tools
 - C. Info Center
 - D. Units
4. What do you call wherein you can control display properties of the views in AutoCAD.
 - A. Command Window
 - B. Drawing Tools
 - C. Ribbon Tool Bars
 - D. View Cube
5. This is the part wherein you can select the working environment you want to use.
 - A. Command Window
 - B. Drawing Tools
 - C. Ribbon Tool Bars
 - D. Workspace Switching



What Do You Need To Know?

Read information Sheet very well then find out how much you can remember and how much you learned by doing Self-check 1.2

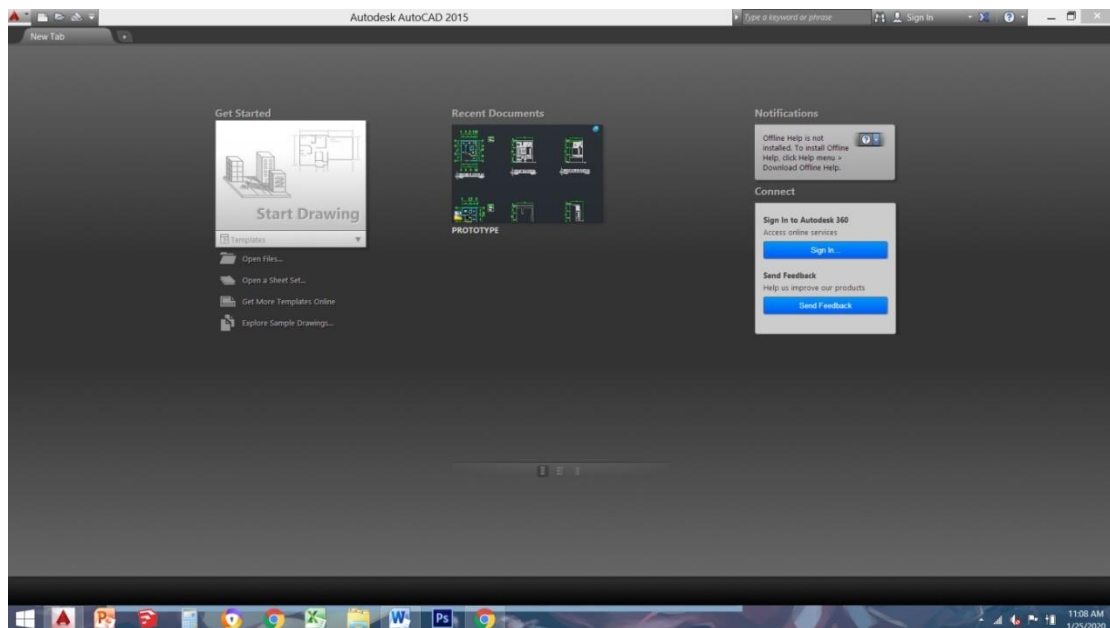
Information Sheet 1.2

PROCEDURES IN SETUP USING AUTOCAD APPLICATION

In creating a plan or drawing always remember to setup first the necessary settings and have plans before doing the work. Follow the steps on how to setup your desire plan.

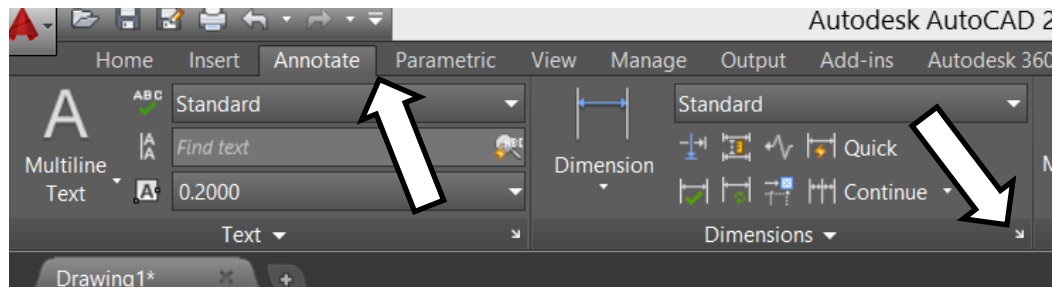
1. OPEN

Click the software application to open and click new to start the drawing.



2. SETUP

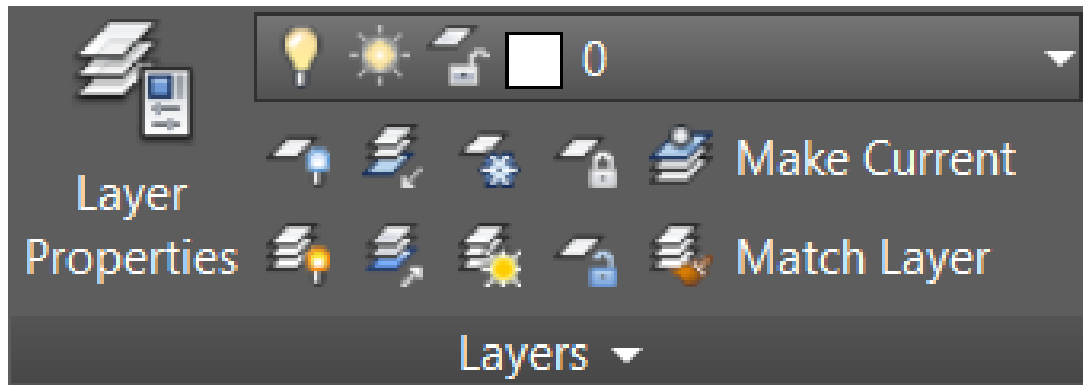
Annotation Setup.



To set the Annotation panel Dimension Style. Find.

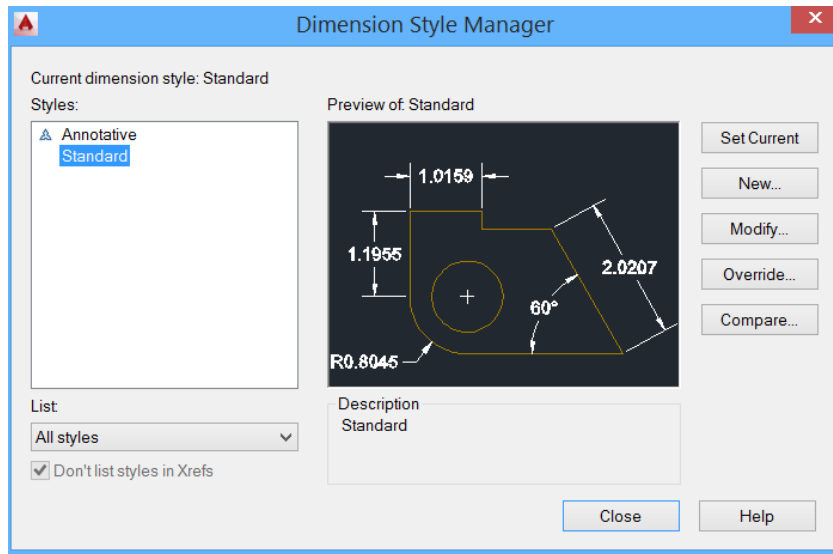
1. In the Dimension Style Manager, select the style you want to change. Click Modify.
2. In Modify Dimension Style box, Fit Tab, under Scale for Dimension Features, enter a value for the overall scale.
3. Click OK.
4. Click Close the exit the Dimension Style Manager.

Layer Setup



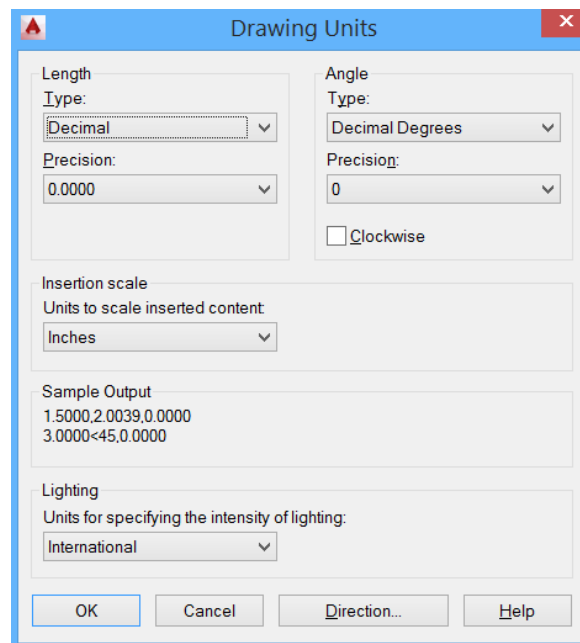
To set the Layer Panel. Find.

1. Click Home Tab Layers Panel Layer Properties.



2. Click Home Tab Layers Panel Layer Properties.
3. In the Layer Properties Manager, click the New Layer button.
4. Enter new layer name by typing over the highlighted layer name.
5. Specify settings and default properties of the new layer by clicking the icons in each column.

Unit Setup



To set units. Type.

1. Type units and windows will pop up
2. Choose the type you want from the list of available unit.



How Much Have You Learned?

Self-Check 1.2

TEXT TWIST

A. Directions: Under Column A are jumbled letters coinciding with the different types of forms used in setup for AutoCAD. Arrange it to form the correct word or words.

Column A	Column B
1. NNOETATA	1.
2. NOISNEMID	2.
3. AYERSL	3.
4. AYERSL SEITREPORP	4.
5. ITSUN	5.

Refer to the Answer Key. What is your score?

LEARNING OUTCOME 3

Create simple parts by sketching outlines

PERFORMANCE STANDARDS

1. Creating simple parts by sketching outlines using 2D application.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 3

Direction: Select the AutoCAD command most applicable to a specific job.

1. What is the shortcut key command for LINE?
A. A
B. C
C. L
D. P
2. What is the shortcut key command for RECTANGLE?
A. A
B. C
C. L
D. R
3. What is the shortcut key command for POLYLINE?
A. A
B. C
C. L
D. P
4. What is the shortcut key command for ARC?
A. A
B. C
C. L
D. P
5. What is the shortcut key command for CIRCLE?
A. A
B. C
C. L
D. P



What Do You Need to Know?

Read information Sheet 1.3 very well then find out how much you can remember and how much you learned by doing Self-check 1.3

Information Sheet 1.3

This chapter is introductory for the acquaintance of AutoCAD's common commands, set-up and movement before sketching parts and outlines.

1. USING LINE

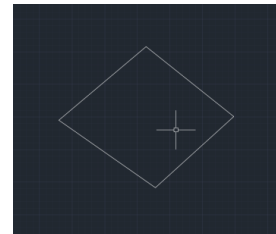
Command: L (Enter)

First point:

Next point:

Next point:

Next point:



2 USING RECTANGLE/SQUARE

Command: REC (Enter)

Let click the mouse pointing on the screen.

Drag the mouse and away. Left click to the mouse to stop the command.



3. USING POLYLINE

Command: PL (Enter)

Point the mouse on the screen and left click then drag.

Then left click the mouse to the next station.



4. USING ARC

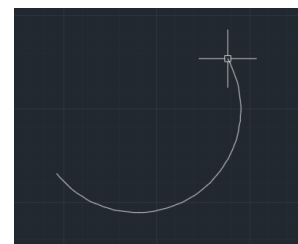
Command: ARC (Enter)

Point the mouse on the screen and left click the mouse.

Then drag to the next station and left click the mouse.

Drag again the mouse and to produce an Arc line.

Left click the mouse to cut the line.



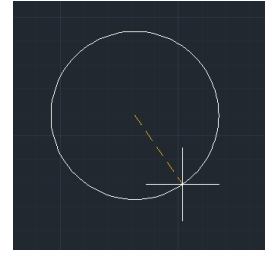
5. USING **CIRCLE**

Command: C (Enter)

Left click the mouse pointing on the screen.

Drag the mouse away.

Provide diameter value.



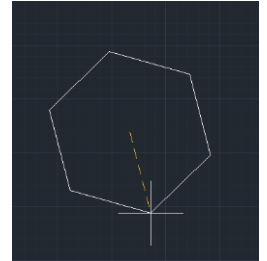
6. USING **POLYGON**

Command: POL (Enter)

Enter the number of sides then press enter key.

Left click the mouse pointing then screen to

Establish the center of polygon.



7. USING **SKETCH**

Command: SK (Enter)

Select for the Type, Increment and Tolerance by typing the first letter.

Enter a sketch type or value then press enter key.

Start sketching and dragging the mouse.





How Much Have You Learned?

Self-Check 1.3

Directions: There are 7 common commands in AutoCAD that is usually use for beginning that can be found in the puzzle. Identify at least 5.

P	H	A	V	C	B	F	E	A	F
K	O	M	J	C	I	R	C	L	E
P	S	L	P	L	G	F	S	I	G
L	F	D	Y	O	A	J	L	N	E
N	Q	H	L	G	D	G	P	E	W
F	A	C	B	M	O	I	O	P	S
T	R	E	C	T	A	N	G	L	E
C	K	D	D	R	G	G	Y	R	F
S	K	E	T	C	H	B	M	K	S
V	R	F	V	S	V	S	F	G	H

Refer to the Answer Key. What is your score?



How Do You Apply What You Have Learned?

It is not enough that you learned the different common commands in AutoCAD. Be sure that you are also being able to demonstrate skills.

Activity 1.3

Create simple parts by sketching outlines.

Directions: Below is a simple activity for you to work on. Practice the task by following the given procedure.

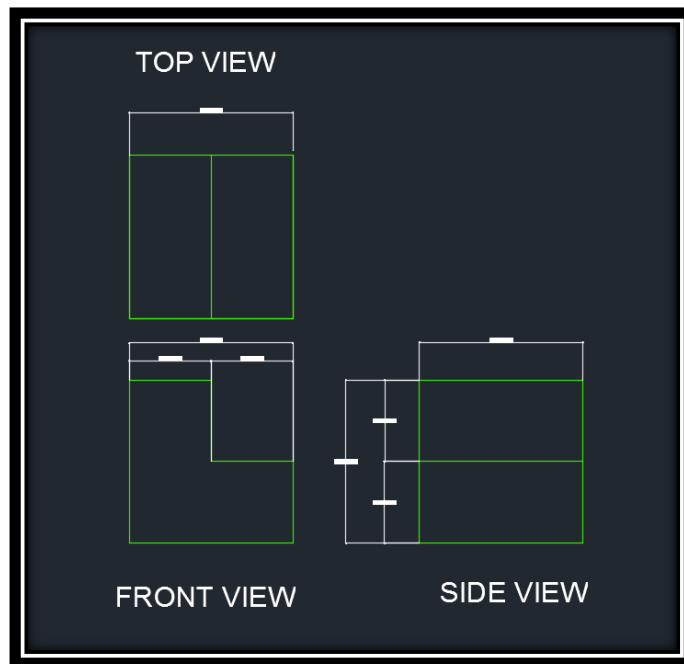
Equipment:

- Computer
- AutoCAD

Procedure:

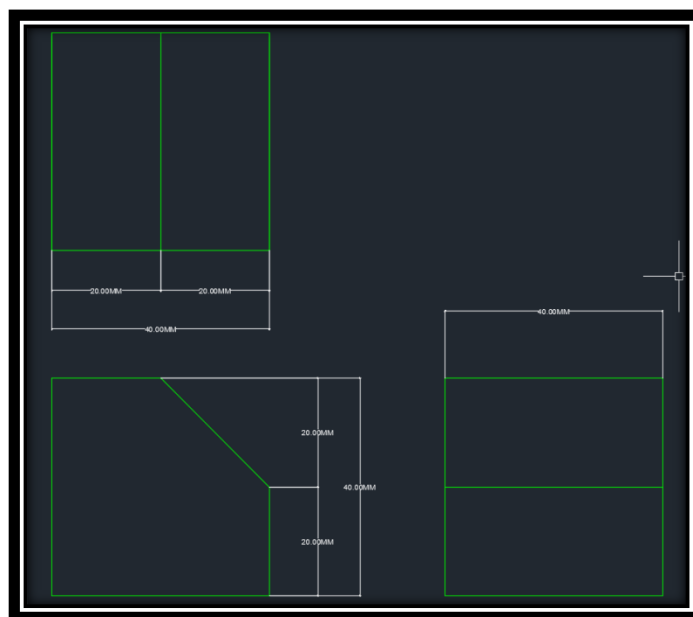
1. Study the given object carefully.
2. Sketch the regular views of the given object by using the following:
 - a. Type unit and adjust the decimal point into two and units into millimeter.
 - b. Click Annotation from the Ribbon Area and adjust the dimension.
 - c. Use the different drawing tools in AutoCAD in order to draw the given object. You can use the following command to start sketching.
 - Polyline
 - Trim
 - Line
 - XL - Xline

FIGURE 1



Note: Height and Width of the object is 40 millimeters.

FIGURE 2



Note: Height and Width of the object is 40 millimeters.

Find out by accomplishing the Scoring Rubric honestly and sincerely, remember it is your learning stake!

Criteria for Assessment: Analytic Rubrics Scoring

CRITERIA	5 POINTS	3 POINTS	1 POINT
Accuracy	The output is accurately done without any help from the teacher.	The output is satisfactorily done with some guidance of the teacher.	The output is done under the supervision of the teacher.
Lay-out/Presentation	The output is properly out and satisfactorily presented.	The output is satisfactorily laid out and presented with some guidance of the teacher	Lay-out and presentation done fairly even with the guidance of the teacher.
Speed	The output is done or before the given time.	The output is done after the allotted time.	The output is not thoroughly finished even after the given deadline.
Neatness	The output is neat and clean.	The output is neat and clean.	The output is neat and clean.

Rating Scales

POINTS EARNED	NUMERICAL	DESCRIPTIVE
15-20	90-100	VERY GOOD
10-14	86-90	GOOD
5-9	81-85	FAIR
1-4	75-80	NEEDS IMPROVEMENT

LEARNING OUTCOME 4

Create profile constrain and dimension sketched outlines.

PERFORMANCE STANDARDS

Creating simple parts by constraining and dimensioning the outlines

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 4

Direction: Select the AutoCAD command most applicable to a specific job.

1. What is the shortcut key command for POLYLINE?

A. A	C. L
B. C	D. P
2. What is the shortcut key command for ARC?

A. A	C. L
B. C	D. P
3. What is the shortcut key command for CIRCLE?

A. A	C. L
B. C	D. P
4. What is the shortcut key command for LINE?

A. A	C. L
B. C	D. P
5. What is the shortcut key command for RECTANGLE?

A. A	C. L
B. C	D. R



What Do You Need to Know?

Read information Sheet 1.4 very well then find out how much you can remember and how much you learned by doing Self-check 1.4

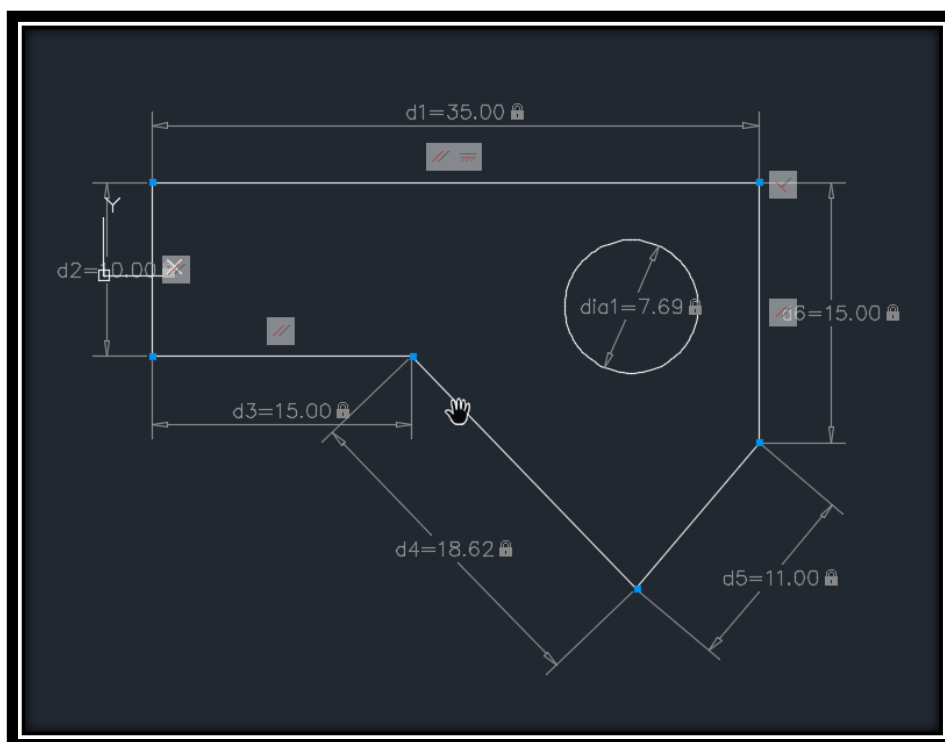
Information Sheet 1.4

About Dimensional Constraints

Dimensional constraints control the size and proportions of a design. They can constrain the following:

- Distances between objects, or between points on objects
- Angles between objects, or between points on objects
- Sizes of arcs and circles

For example, the following illustration includes linear, aligned, angular, and diameter constraints.



If you change the value of a dimensional constraint, *all* the constraints on the object are evaluated, and the objects that are affected are updated automatically.

Also, constraints can be added directly to segments within a polyline as if they were separate objects.

Note: The number of decimal places displayed in dimensional constraints is controlled by the LUPREC and AUPREC system variables.

Compare Dimensional Constraints with Dimension Objects

Dimensional *constraints* are different from dimension *objects* in the following ways:

- Dimensional constraints are used in the design phase of a drawing, but dimensions are typically created in the documentation phase
- Dimensional constraints *drive* the size or angle of objects, but dimensions *are driven* by objects
- By default, dimensional constraints are not objects, display with only a single dimension style, maintain the same size during zoom operations, and are not outputted to a device

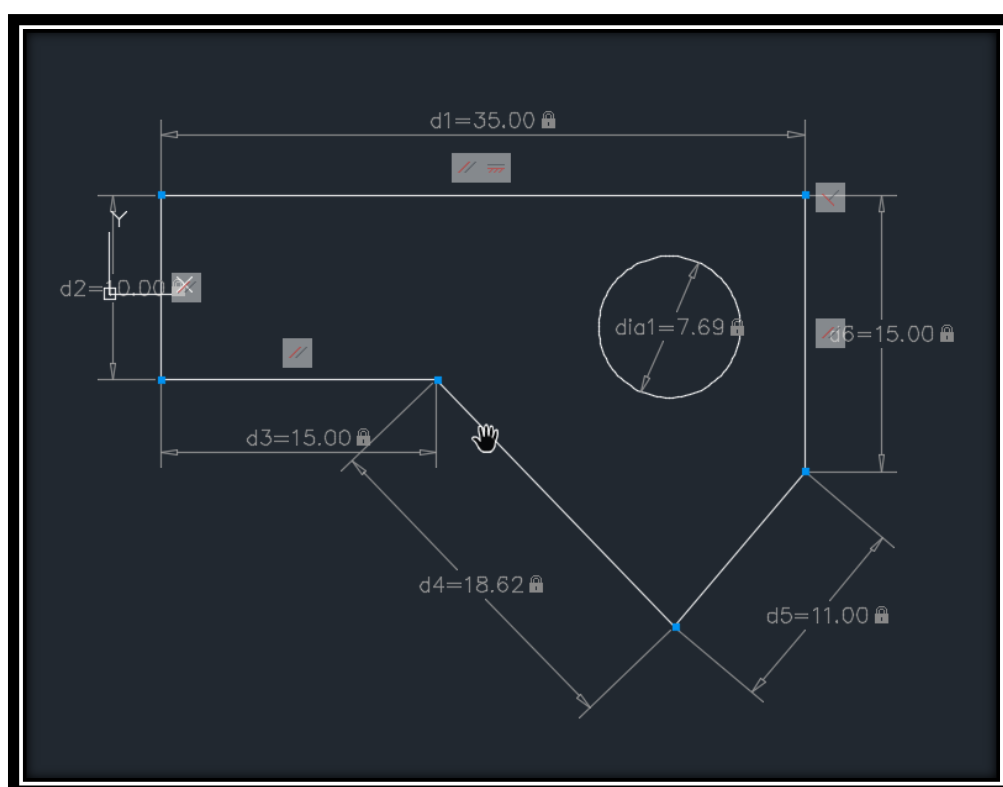
If you need to output a drawing with dimensional constraints or use dimension styles, you can change the form of a dimensional constraint from dynamic to annotational.



How Much Have You Learned?

Self-Check 1.4

Directions: Create this figure using the Parametric constrain and dimension.





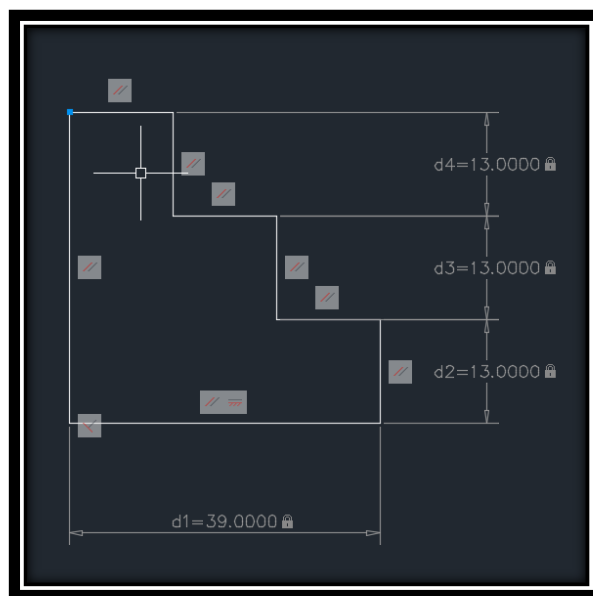
How Do You Apply What You Have Learned?

It is not enough that you learned to extrude a figures. Be sure that you are also being able to demonstrate skills.

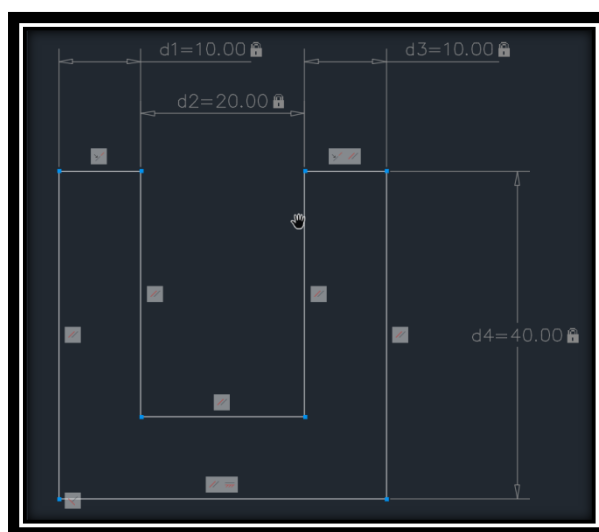
Activity 1.4

Directions: Create this figure using the Parametric constrain and dimension.

1.



2.



Note: Height and Width of the object is 39 millimeters

Find out by accomplishing the Scoring Rubric honestly and sincerely, remember it is your learning stake!

Criteria for Assessment: Analytic Rubrics Scoring

CRITERIA	5 POINTS	3 POINTS	1 POINT
Accuracy	The output is accurately done without any help from the teacher.	The output is satisfactorily done with some guidance of the teacher.	The output is done under the supervision of the teacher.
Lay-out/Presentation	The output is properly out and satisfactorily presented.	The output is satisfactorily laid out and presented with some guidance of the teacher	Lay-out and presentation done fairly even with the guidance of the teacher.
Speed	The output is done or before the given time.	The output is done after the allotted time.	The output is not thoroughly finished even after the given deadline.
Neatness	The output is neat and clean.	The output is neat and clean.	The output is neat and clean.

Rating Scales

POINTS EARNED	NUMERICAL	DESCRIPTIVE
15-20	90-100	VERY GOOD
10-14	86-90	GOOD
5-9	81-85	FAIR
1-4	75-80	NEEDS IMPROVEMENT

LEARNING OUTCOME 5

Extrude profiles into parts.

PERFORMANCE STANDARDS

1. Extruding profiles into different parts.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



Pretest LO 5

1. This is the distance from bottom to top.
A. Bottom C. Left
B. Height D. Width
2. This is the distance between sides to side.
A. Bottom C. Side
B. Height D. Width
3. What is the view above the Front view?
A. Bottom C. Left
B. Front D. Top
4. What is the view behind the Front view?
A. Bottom C. Left
B. Front D. Rear
5. What is the opposite of Top view?
A. Bottom C. Left
B. Front D. Rear



What Do You Need to Know?

Read information Sheet 1.5 very well then find out how much you can remember and how much you learned by doing Self-check 1.5

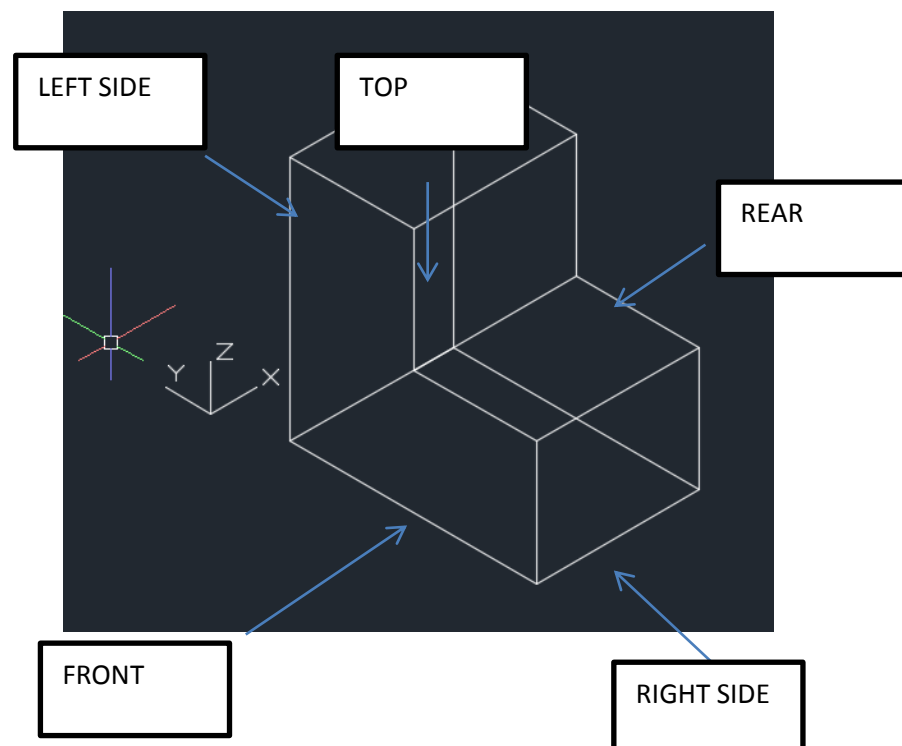
Information Sheet 1.5

Extrude profile into parts

When a profile is used to extrude objects or components, you need to set the following parameters:

- the position of each edge in a profile (left, right, back, discard, none)
- the axis along which the object is extruded from the shape of the profile

These settings determine how surface hatching is applied to objects created from the profile and how the objects are extruded from the two-dimensional (2D) profile.



Note: Objects already created from the profile change when you change profile edges or the axis of extrusion.

1. Click Manage tab Style & Display panel Profile Definitions.
2. Select the profile you want to change.
3. Click the Profile Edges tab.
4. Select an edge, and specify its position

If you want...	The...
Let the software determine the position of the edges	Click Calculate Default edge position.
Select the position for an edge	Select the setting for an edge, and select a new position
Exclude an edge from surface hatching	Select the setting for edge, and select none.
Discard an edge	Select the setting for edge, and select discard.

5. Click OK.

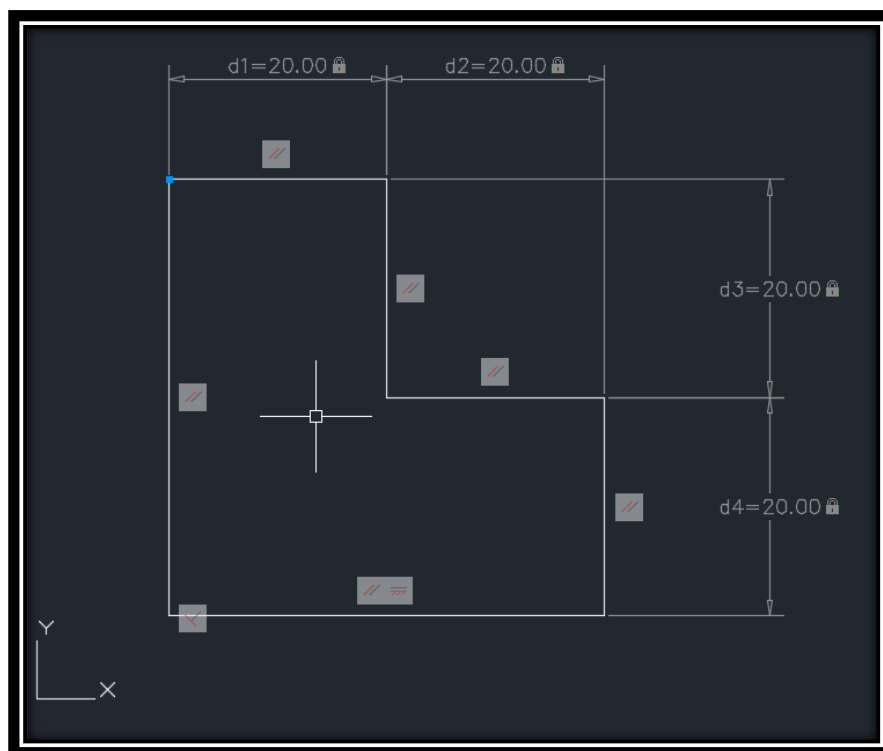


How Much Have You Learned?

Self-Check 1.5

Direction: Extrude the given figure, use the following dimension.

FIGURE 1



Refer to the Answer Key. What is your score?

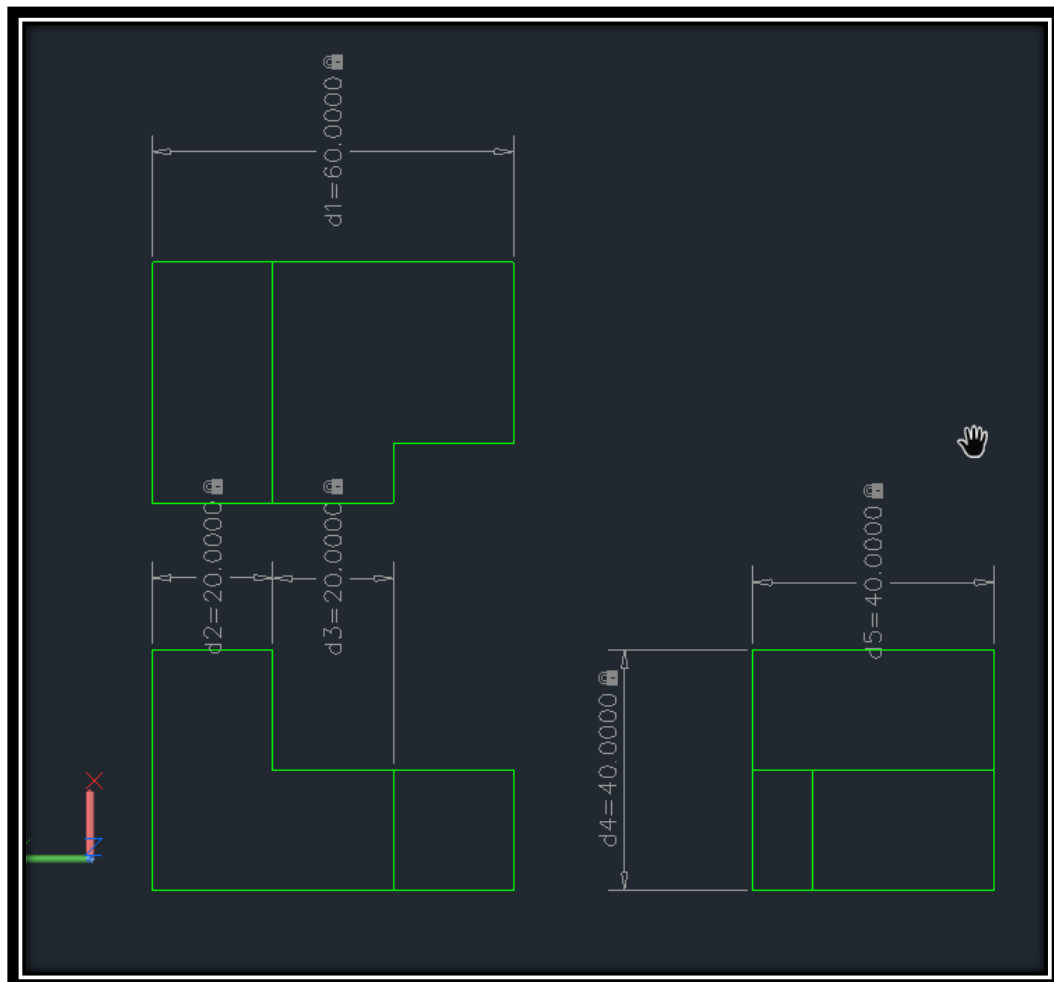


How Do You Apply What You Have Learned?

It is not enough that you learned to extrude figures. Be sure that you are also being able to demonstrate skills.

Activity 1.5

Direction: Extrude the given figure, use the following dimension provided below.



Find out by accomplishing the Scoring Rubric honestly and sincerely, remember it is your learning stake!

Criteria for Assessment: Analytic Rubrics Scoring

CRITERIA	5 POINTS	3 POINTS	1 POINT
Accuracy	The output is accurately done without any help from the teacher.	The output is satisfactorily done with some guidance of the teacher.	The output is done under the supervision of the teacher.
Lay-out/Presentation	The output is properly out and satisfactorily presented.	The output is satisfactorily laid out and presented with some guidance of the teacher	Lay-out and presentation done fairly even with the guidance of the teacher.
Speed	The output is done or before the given time.	The output is done after the allotted time.	The output is not thoroughly finished even after the given deadline.
Neatness	The output is neat and clean.	The output is neat and clean.	The output is neat and clean.

Rating Scales

POINTS EARNED	NUMERICAL	DESCRIPTIVE
15-20	90-100	VERY GOOD
10-14	86-90	GOOD
5-9	81-85	FAIR
1-4	75-80	NEEDS IMPROVEMENT

LEARNING OUTCOME 6

View models from different viewpoints, revolve a profile into a part and sweep a profile into a part.

PERFORMANCE STANDARDS

1. The learner independently draws 2D technical drawings using various illustration methods.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 6

Direction: Select the AutoCAD command most applicable to a specific job.

1. What is the opposite of Top view?

A. Bottom	C. Left
B. Front	D. Rear
2. This is the distance from bottom to top.

A. Bottom	C. Left
B. Height	D. Width
3. This is the distance between sides to side.

A. Bottom	C. Side
B. Height	D. Width
4. What is the view above the Front view?

A. Bottom	C. Left
B. Front	D. Top
5. What is the view behind the Front view?

A. Bottom	C. Left
B. Front	D. Rear



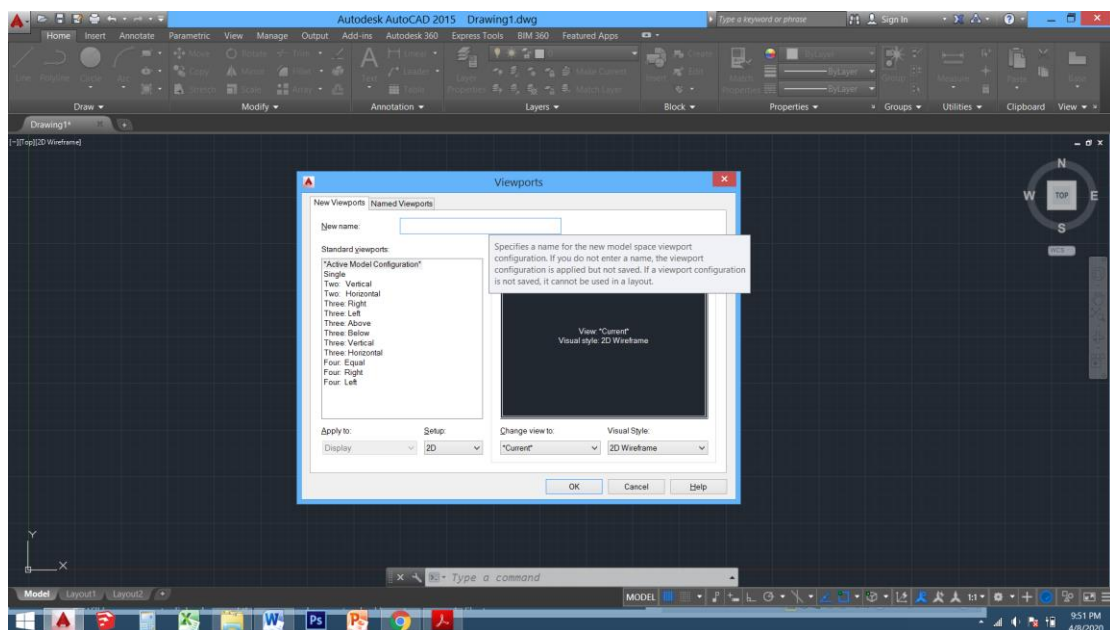
What Do You Need to Know?

Read information Sheet 1.6 very well then find out how much you can remember and how much you learned by doing Self-check 1.6

Information Sheet 1.6

What is a viewport on AutoCAD?

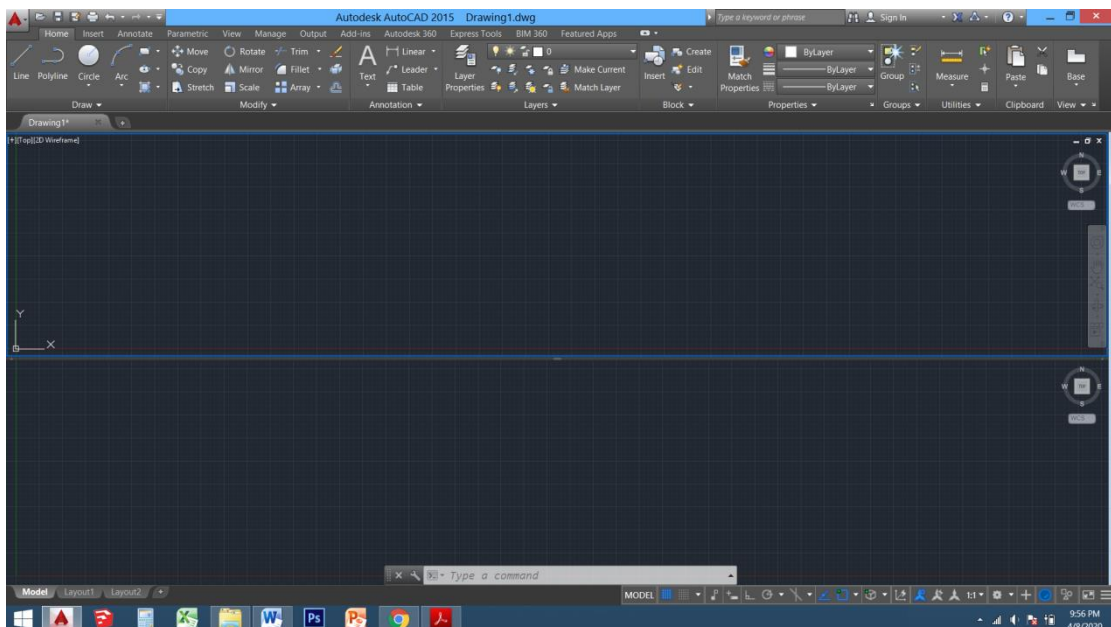
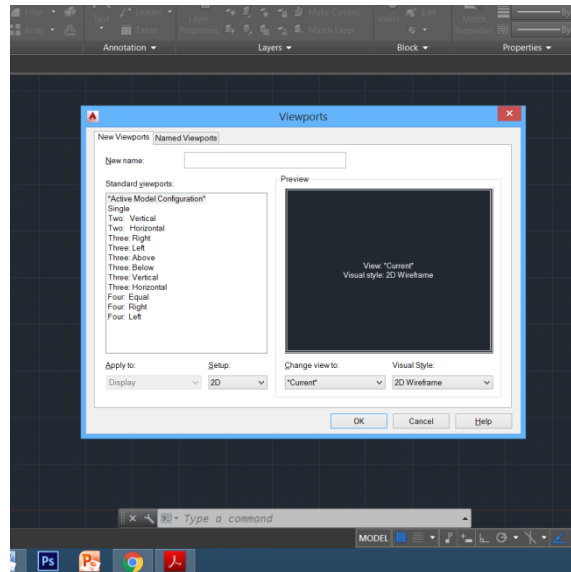
Layout **viewports** are objects that display views of model space. You create, scale, and place them in paper space on a layout. On each layout, you can create one or more layout **viewports**. Each layout **viewport** is like a closed circuit TV monitor of a view of the model at a scale and orientation that you specify.

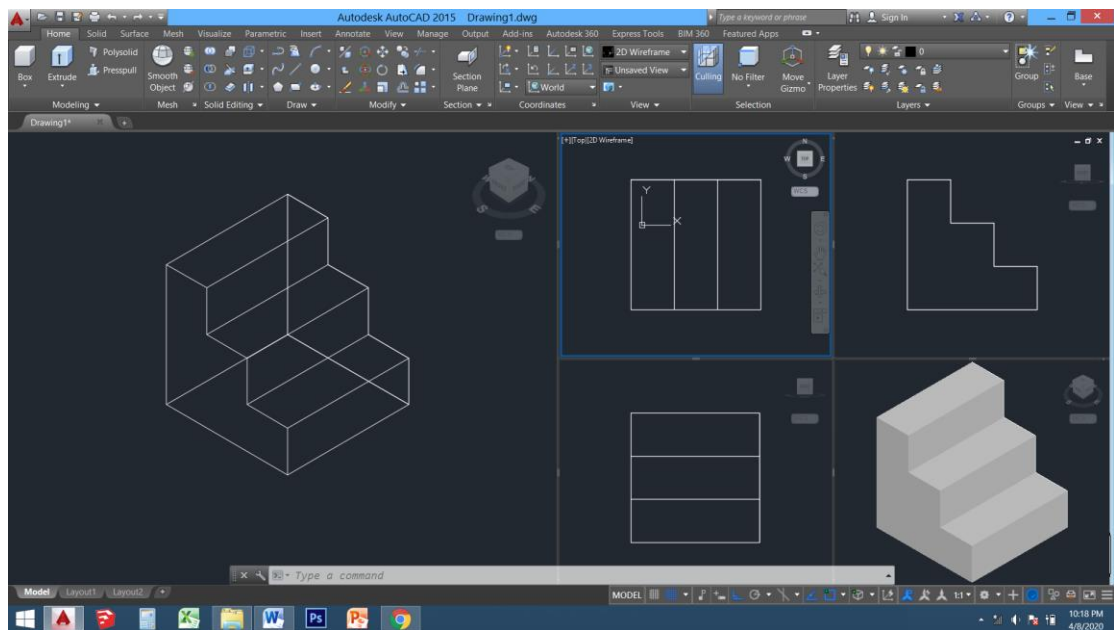


Viewport Command

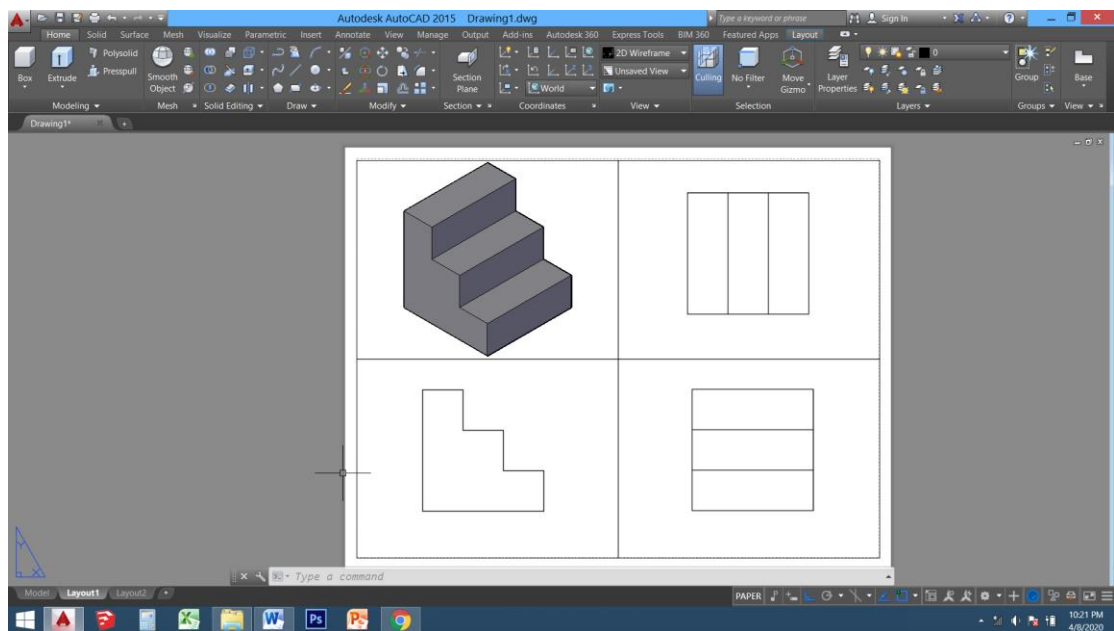
To Create a New Layout Viewport

1. Type Vports (enter)
 2. Will be open vports dialog box, and then you can choose standard layout, as example like two: vertical (click ok)
 3. And automatically, viewports change into 2 windows In Layout Tab, you can use MV command
1. Type MV (enter)
 2. Select first and second point (enter) to create new view ports





Viewport in Model Tab



Viewport in Layout Tab

LEARNING OUTCOME 7

Draw 2D technical drawings using:

- Orthographic views
- Perspective drawings

PERFORMANCE STANDARDS

1. The learner independently draws 2D technical drawings using various illustration methods.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 7

Direction: Select the AutoCAD command most applicable to a specific job.

1. What is the view above the Front view?

C. Bottom	C. Left
D. Front	D. Top
2. What is the view behind the Front view?

C. Bottom	C. Left
D. Front	D. Rear
3. What is the opposite of Top view?

C. Bottom	C. Left
D. Front	D. Rear
4. This is the distance from bottom to top.

C. Bottom	C. Left
D. Height	D. Width
5. This is the distance between sides to side.

C. Bottom	C. Side
D. Height	D. Width



What Do You Need to Know?

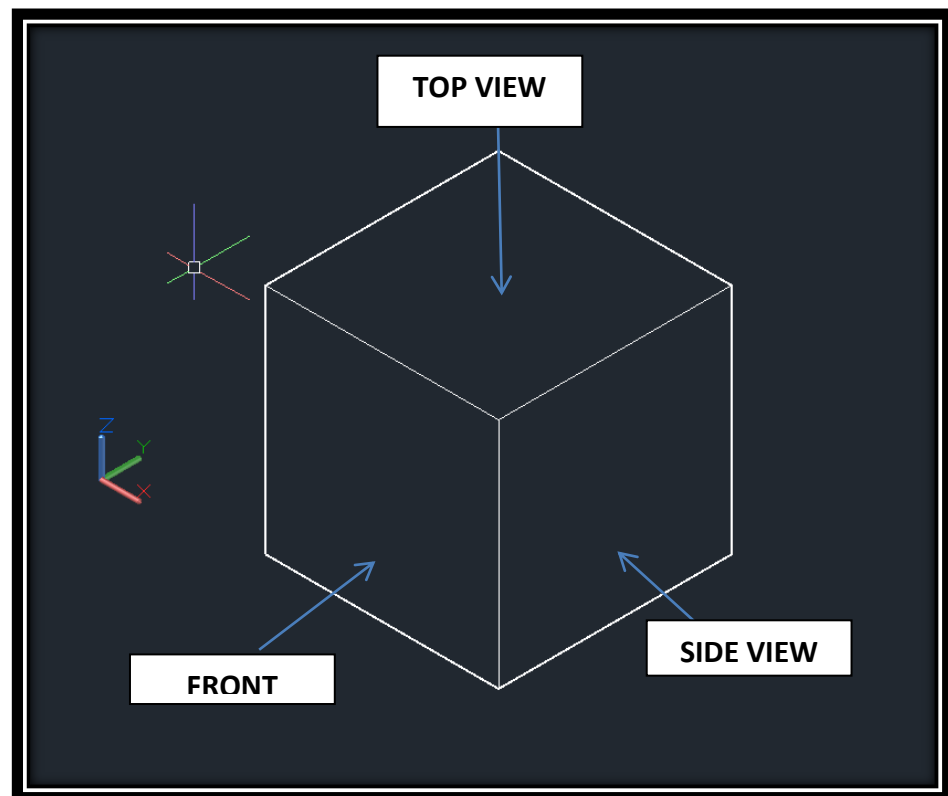
Read information Sheet 1.7 very well then find out how much you can remember and how much you learned by doing Self-check 1.7

Information Sheet 1.7

Draw 2D Technical Drawing

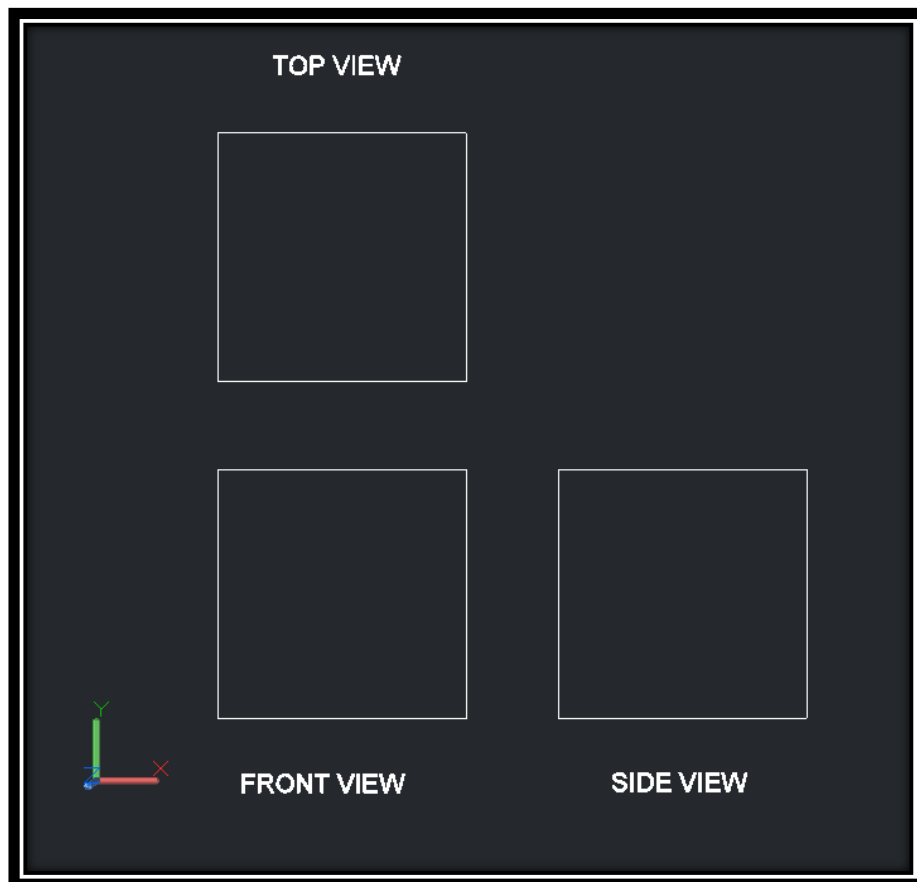
Orthographic Views

An orthographic drawing represents a three dimensional object using several two-dimensional views of the object. It is also known as an orthographic projection. For example you can see in this image the front, top and side views of the cube.



In first-angle projection, each view is shown as if the viewer is looking through the object and projecting the image on the other side. This style is the most common used in Europe.

If you try to unfolded the cube and draw the different views in to a flat surface the formation will be:





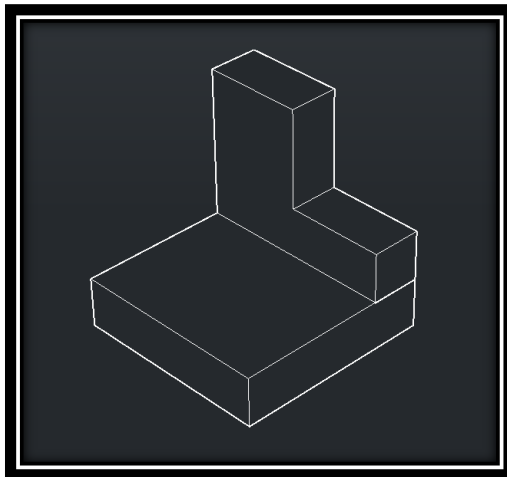
How Do You Apply What You Have Learned?

It is not enough that you learned. Be sure that you are also being able to demonstrate skills.

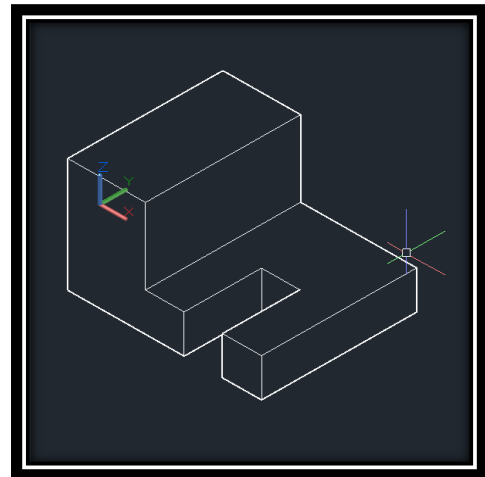
Activity 1.7

Direction: Draw the Top, Front and Side View of the given 3D drawing into 2D.

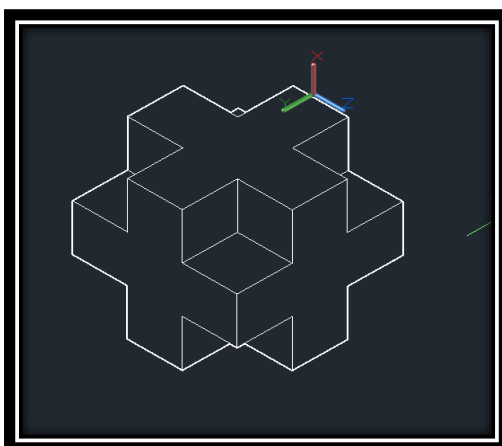
1.



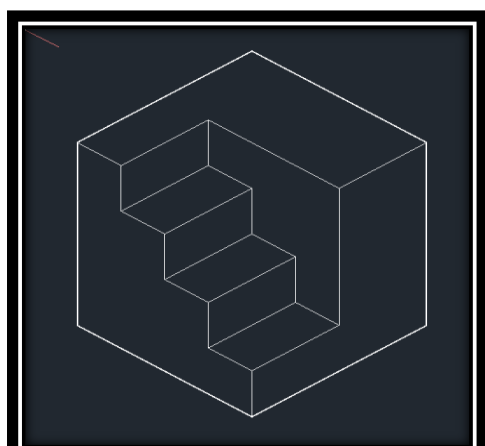
2.



3.



4.



Find out by accomplishing the Scoring Rubric honestly and sincerely, remember it is your learning stake!

Criteria for Assessment: Analytic Rubrics Scoring

CRITERIA	5 POINTS	3 POINTS	1 POINT
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Rating Scales

POINTS EARNED	NUMERICAL	DESCRIPTIVE
15-20	90-100	VERY GOOD
10-14	86-90	GOOD
5-9	81-85	FAIR
1-4	75-80	NEEDS IMPROVEMENT

Congratulations! You did a great job!

Rest and relax a while then move on to the next lesson. Good luck!

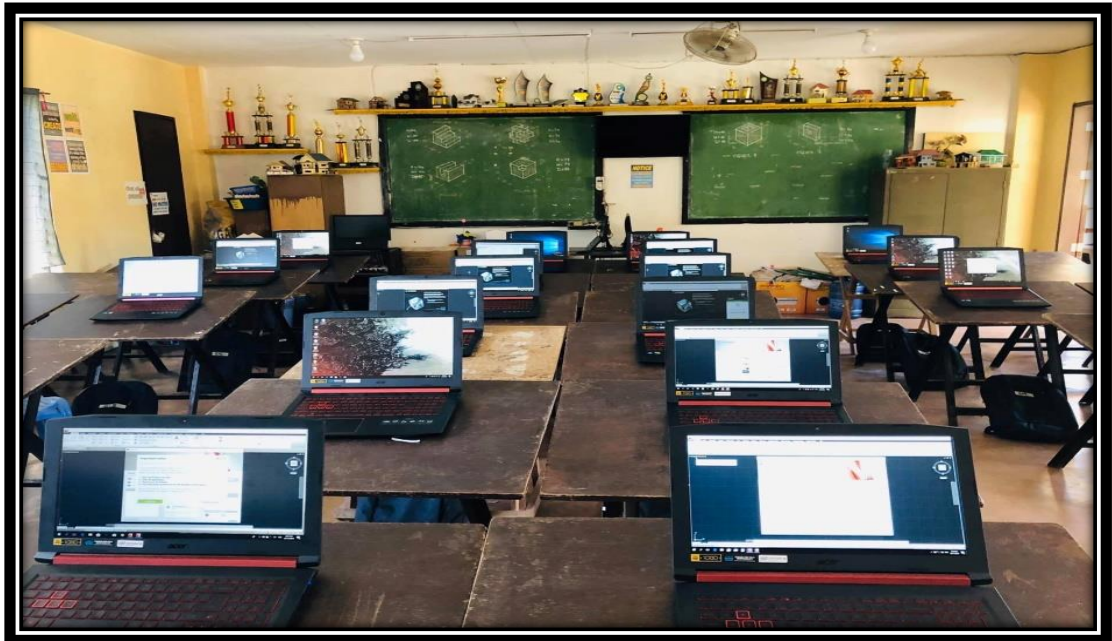
REFERENCES

LESSON 1

- Ernesto A. Arellano, AutoCAD 2D for All
- Esguerra and Molino, Exploratory Drafting; Abiva Publishing
- Randy Shih, Introduction to Autodesk

LESSON 2

Multiple Part Assembly Drawings (MPAD)



LEARNING OUTCOMES

At the end of the lesson, you are expected to do the following:

- LO 1. Identify the parts of the object to be assembled
- LO 2. Discuss the Cartesian plane and joints
- LO 3. Modify 2D illustrations between two or more part assembly
- LO 4. Create simple 3D parts for 2D technical drawing using software
- LO 5. Import 3D parts for a 2D technical drawing using software

LEARNING OUTCOME 1

1. Identify the parts of the object to be assembled.

PERFORMANCE STANDARDS

2. Identifying parts of the object to be assembled.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 1

Direction: Select the AutoCAD command most applicable to a specific job.

1. What is Isometric drawing?
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.
2. What is Orthographic projection
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.

3. What is Sketch?
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.
4. What is Perspective drawing?
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
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5. What is 3D?
 - A. It describes an image that provides the perception of depth.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.



What Do You Need to Know?

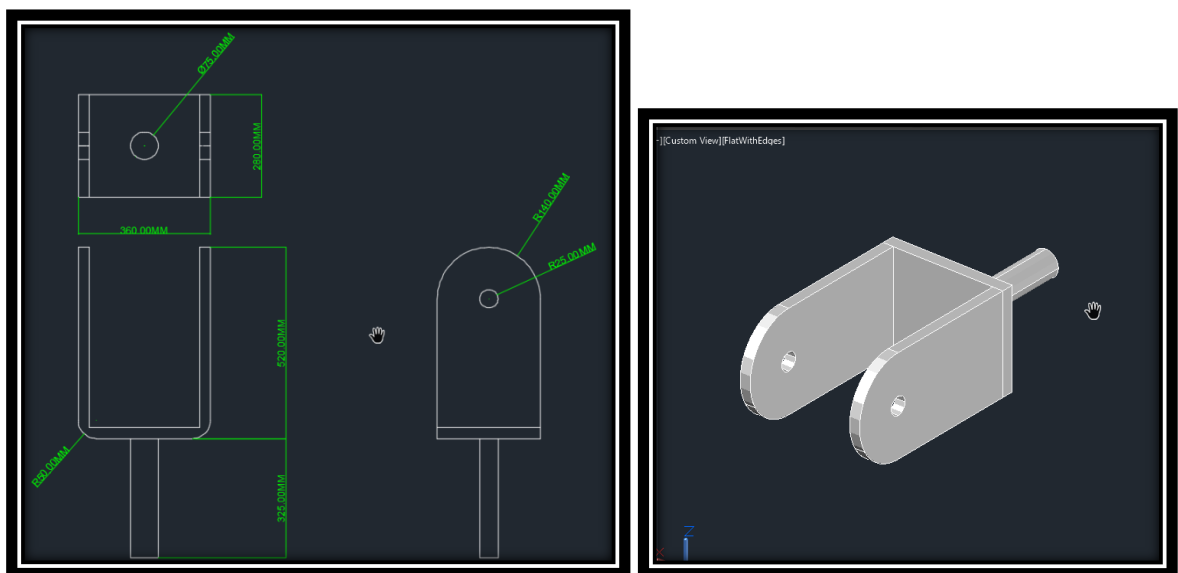
Read information Sheet 1.1 very well then find out how much you can remember and how much you learned by doing Self-check 1.1

Information Sheet 1.1

Working Drawings in AutoCAD

Most designs consist of more than a single part. Usually there are a several or many parts that must fit and work together. When we are creating the drawings of a design, we must create dimensioned drawings of each part so that they can be manufactured correctly and we must also show how the parts fit together so they can be assembled correctly.

The drawing of a single part is called a detailed drawing. It contains one or more orthographic views of the object, dimensions and possibly sectional and isometric views. An example of a detailed drawing is shown below.

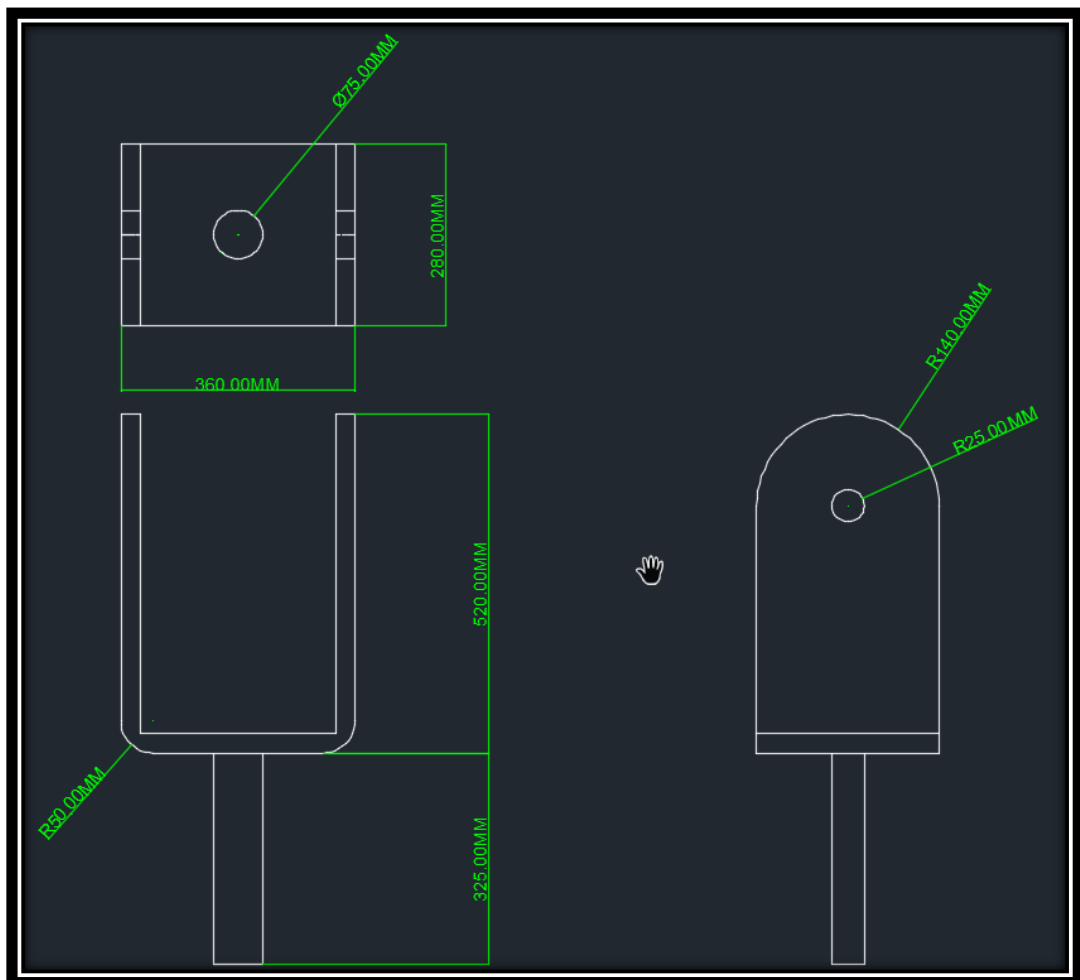




How Do You Apply What You Have Learned?

It is not enough that you learned. Be sure that you are also being able to demonstrate skills.

Activity 1.1



Note: All the measurements are in millimeter.

Find out by accomplishing the Scoring Rubric honestly and sincerely, remember it is your learning stake!

Criteria for Assessment: Analytic Rubrics Scoring

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Rating Scales

POINTS EARNED	NUMERICAL	DESCRIPTIVE
15-20	90-100	VERY GOOD
10-14	86-90	GOOD
5-9	81-85	FAIR
1-4	75-80	NEEDS IMPROVEMENT

LEARNING OUTCOME 2

1. Discuss the Cartesian plane and joints.

PERFORMANCE STANDARDS

1. The learner modifies and creates simple 3D parts and imports into 2D.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Need to Know?

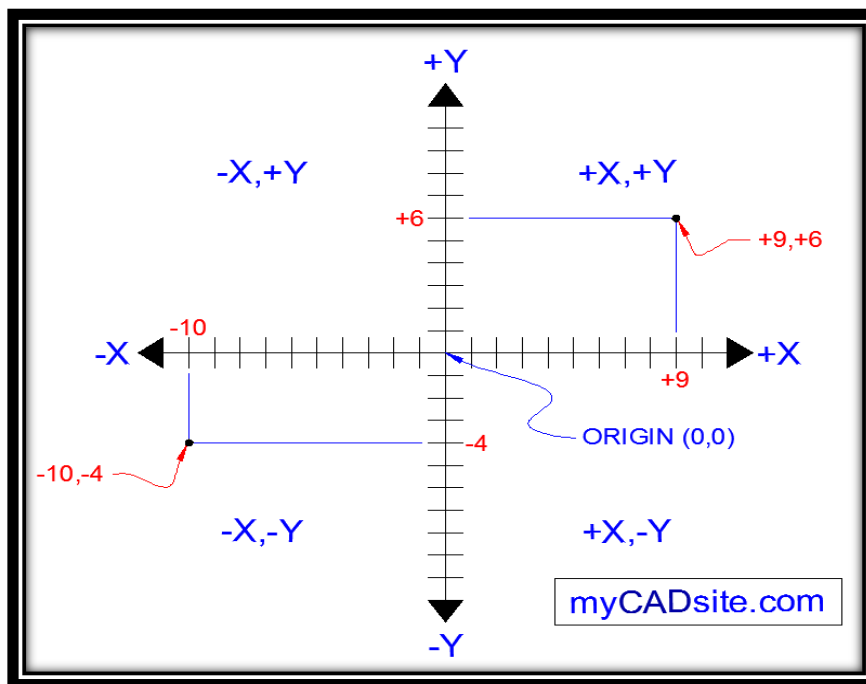
Read information Sheet 1.2 very well then find out how much you can remember and how much you learned by doing Self-check 1.2

Information Sheet 1.2

Cartesian Plane and Joints

The X,Y coordinate system

Everything that you draw in AutoCAD is **exact**. It will be more accurate than you will ever need it to be. We're talking 14 decimal points accurate. All objects drawn on the screen are placed there based on a simple X,Y coordinate system. In AutoCAD this is known as the **World Coordinate System** (WCS). You must understand this to know how to put things where you want them. (3-D work has an added axis, the Z-axis, but this is not covered in this lesson.) Below is a diagram showing you how this system works (place your mouse on the diagram for more info).



Here is how it works:

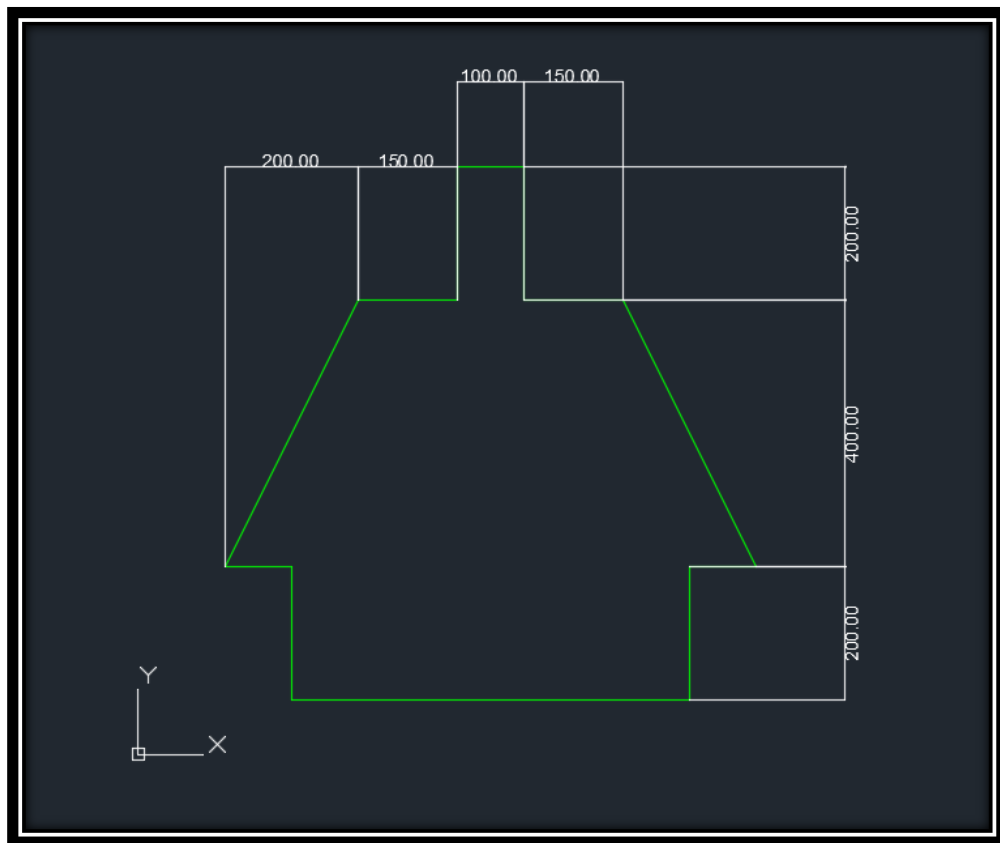
- AutoCAD uses points to determine where an object is located. There is an origin where it begins counting from.
- This point is (0,0). Every object is located in relation to the origin. If you were to draw a line straight out to the right from the origin, this would be considered the positive X-axis.
- If you were to draw a line straight up, this would be the positive Y-axis. The picture above shows a point located at (9,6).
- This means that the point is 9 units over in the X-axis and 6 units up in the Y-axis.
- When you are working with points, X **always** comes first. The other point shown is (-10,-4).
- This means that the point is 10 units in the negative X-axis (left) and 4 units in the negative Y-axis (down).
- A line has two points, a start point and an end point. AutoCAD works with the points to display the line on the screen.
- Move your cursor over the picture above and you will see line drawn from the **absolute** points of (-10,-4) to (9,6).
- Most of the time you will not have an indication of where the origin is. You may need to draw a line from the endpoint of an existing line.
- To do this you use **relative** points. These work the same way, but you have to add the @ symbol (shift+2) to tell AutoCAD that this next point is relative from the last point entered.



How Do You Apply What You Have Learned?

It is not enough that you learned. Be sure that you are also being able to demonstrate skills.

Activity 1.2



Find out by accomplishing the Scoring Rubric honestly and sincerely, remember it is your learning stake!

Criteria for Assessment: Analytic Rubrics Scoring

CRITERIA	5 POINTS	3 POINTS	1 POINT
Accuracy	The output is accurately done without any help from the teacher.	The output is satisfactorily done with some guidance of the teacher.	The output is done under the supervision of the teacher.
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Rating Scales

POINTS EARNED	NUMERICAL	DESCRIPTIVE
15-20	90-100	VERY GOOD
10-14	86-90	GOOD
5-9	81-85	FAIR
1-4	75-80	NEEDS IMPROVEMENT

LEARNING OUTCOME 3

1. Create simple 3D parts for a 2D technical drawing using software.

PERFORMANCE STANDARDS

1. The learner modifies and creates simple 3D parts and imports into 2D.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 3

Direction: Select the AutoCAD command most applicable to a specific job.

1. What is rendering?
 - A. Is the process involved in the generation of a two-dimensional or three-dimensional image from a model by means of application program?
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.
2. What is Orthographic projection
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.

3. What is Sketch?
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
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4. What is Perspective drawing?
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5. What is 3D?
 - A. It describes an image that provides the perception of depth.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.



What Do You Need to Know?

Read information Sheet 1.4 very well then find out how much you can remember and how much you learned by doing Self-check 1.4

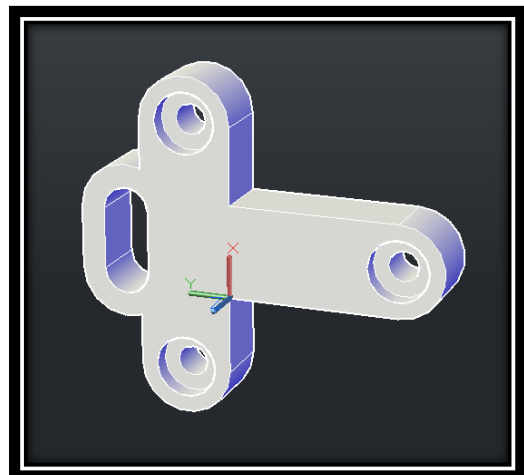
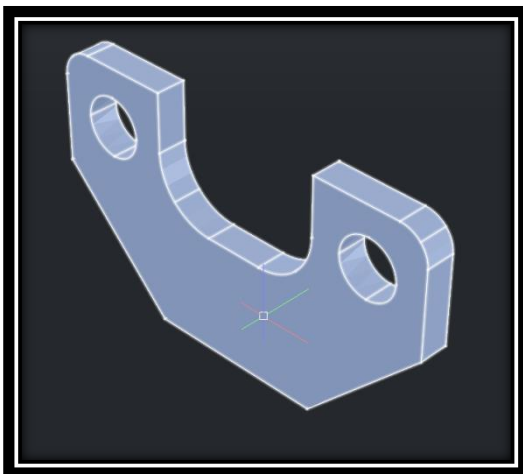
Information Sheet 1.3

3D for 2D Technical Drawing

In computers, 3-D (three dimensions or three-dimensional) describes an image that provides the perception of depth. When 3-D images are made interactive so that users feel involved with the scene, the experience is called virtual reality.

3-D image creation can be viewed as a three-phase process of: tessellation, geometry and rendering. In the first phase, models are created of individual objects using linked points that are made into a number of individual polygons (tiles). In the next stage, the polygons are transformed in various ways and lighting effects are applied. In the third stage of 3D modeling, the transformed images are rendered into objects with very fine detail.

Example:

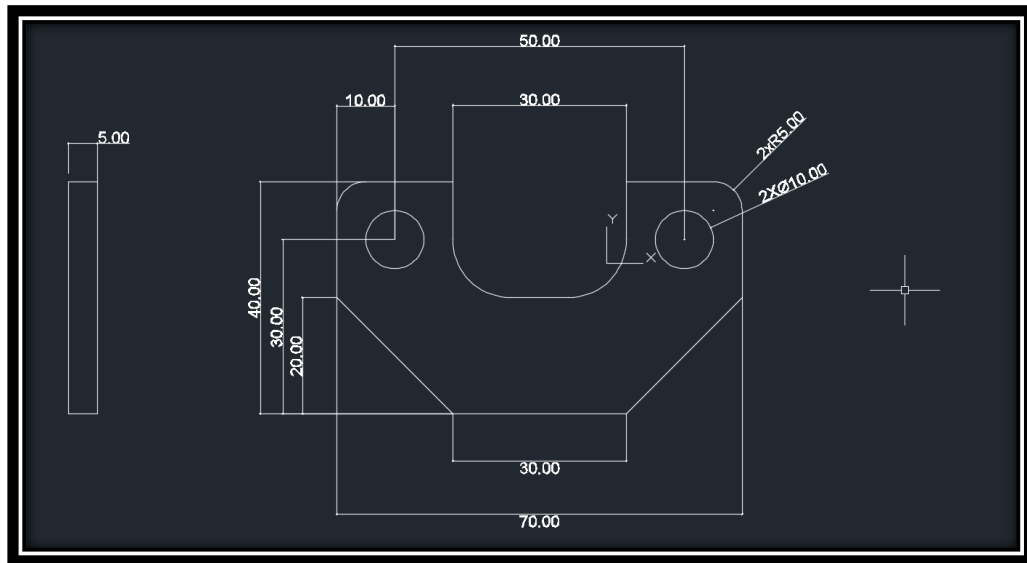




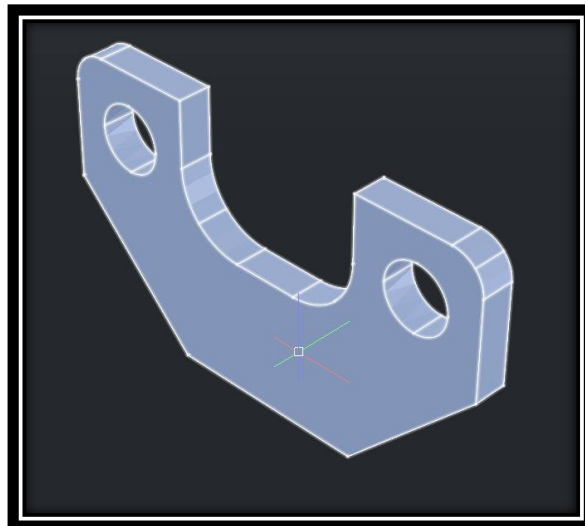
How Much Have You Learned?

Self-Check 1.3

Directions: Plot this using the 2D to 3D.



2D Model



3D Model

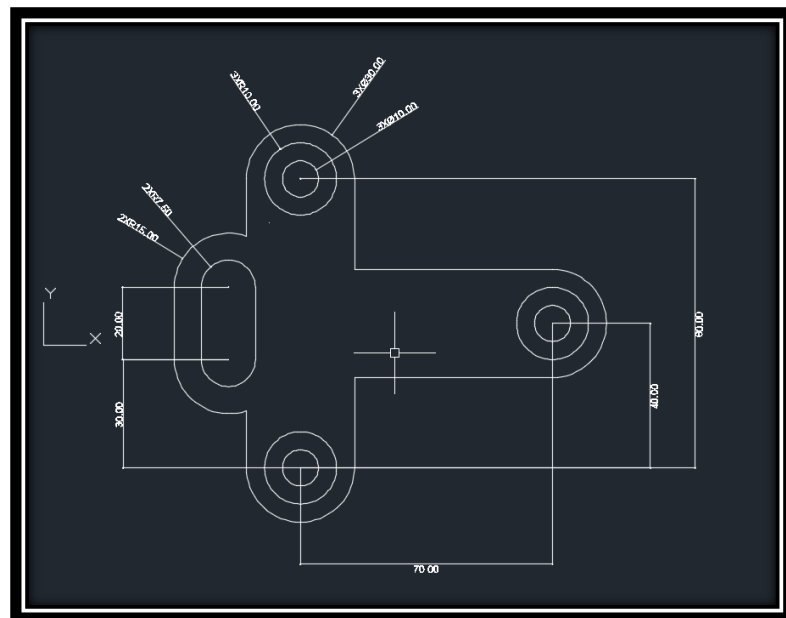


How Do You Apply What You Have Learned?

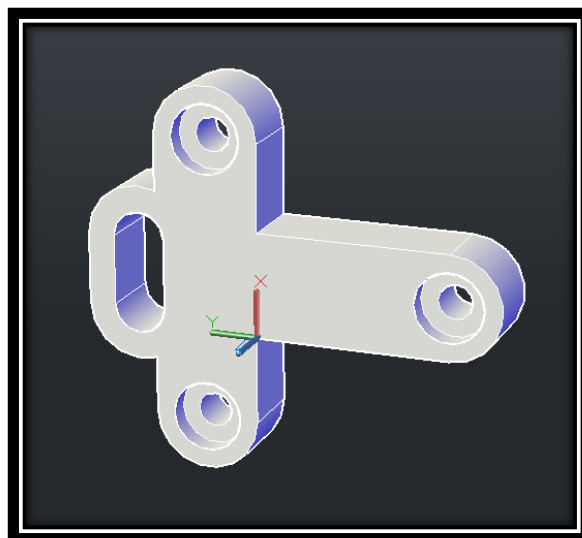
It is not enough that you learned. Be sure that you are also being able to demonstrate skills.

Activity 1.3

Directions: Try to plot this using the 2D to 3D.



2D Model



Find out by accomplishing the Scoring Rubric honestly and sincerely, remember it is your learning stake!

Criteria for Assessment: Analytic Rubrics Scoring

CRITERIA	5 POINTS	3 POINTS	1 POINT
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Rating Scales

POINTS EARNED	NUMERICAL	DESCRIPTIVE
15-20	90-100	VERY GOOD
10-14	86-90	GOOD
5-9	81-85	FAIR
1-4	75-80	NEEDS IMPROVEMENT

LEARNING OUTCOME 4

1. Create simple 3D parts for a 2D technical drawing using a software.

PERFORMANCE STANDARDS

1. The learner modifies and creates simple 3D parts and imports into 2D.

Materials

1. Computer
2. 2D Software Application (AutoCAD)



What Do You Already Know?

Determine how much you already know about 2D & 3D software application.
Take this test.

Pretest LO 4

Direction: Select the AutoCAD command most applicable to a specific job.

1. What is rendering?
 - A. Is the process involved in the generation of a two-dimensional or three-dimensional image from a model by means of application program?
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
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 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.

3. What is 2 Dimensional?
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. Is an object with just height and width, and without depth; therefore, two dimensional objects are flat.
4. What is Perspective drawing?
 - A. A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.
5. What is 3D?
 - A. It describes an image that provides the perception of depth.
 - B. It refers to a 2-D representation of an object in a view that shows only one side at a time.
 - C. Is what gives a three-dimensional feeling to a flat image such as a drawing or a painting?
 - D. A rapidly executed freehand drawing that is not usually intended as a finished work.



What Do You Need to Know?

Read information Sheet 1.5 very well then find out how much you can remember and how much you learned by doing Self-check 1.5

Information Sheet 1.4

Importing 3D to 2D

When you start AutoCAD 2007 a workspaces dialog is launched that enables you

to choose how you would like to work. If you select AutoCAD Classic it will start a 2d

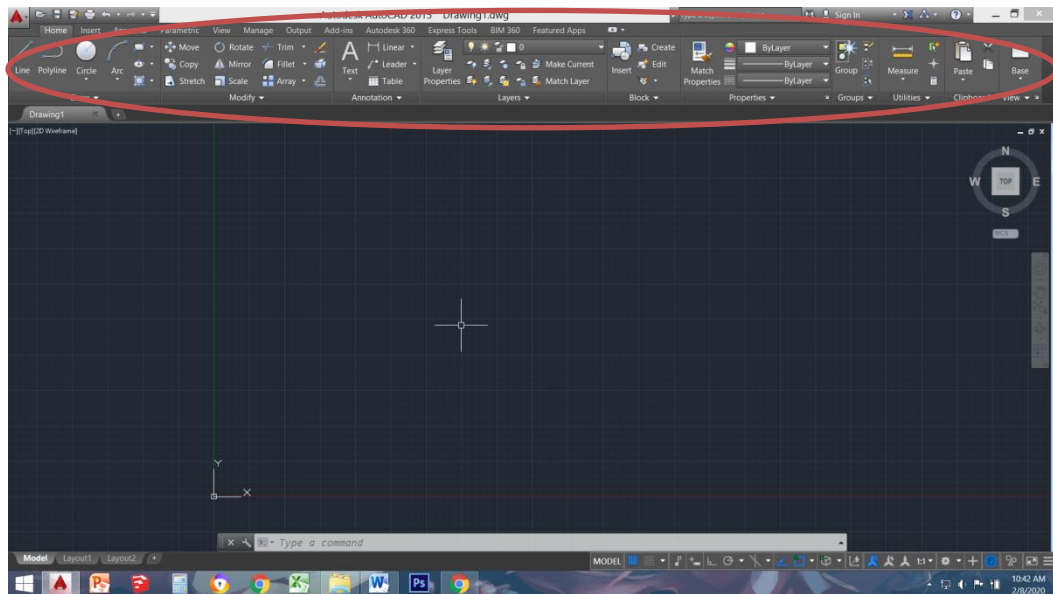
drawing template and setup 2d related toolbars. If you select 3D Modeling, you will open a 3D drawing template and setup the 3D Dashboard and 3D related toolbars. Once you select one, it will load the next time you start AutoCAD.

You can also change your workspace from the workspace toolbar. Just select "AutoCAD Classic"

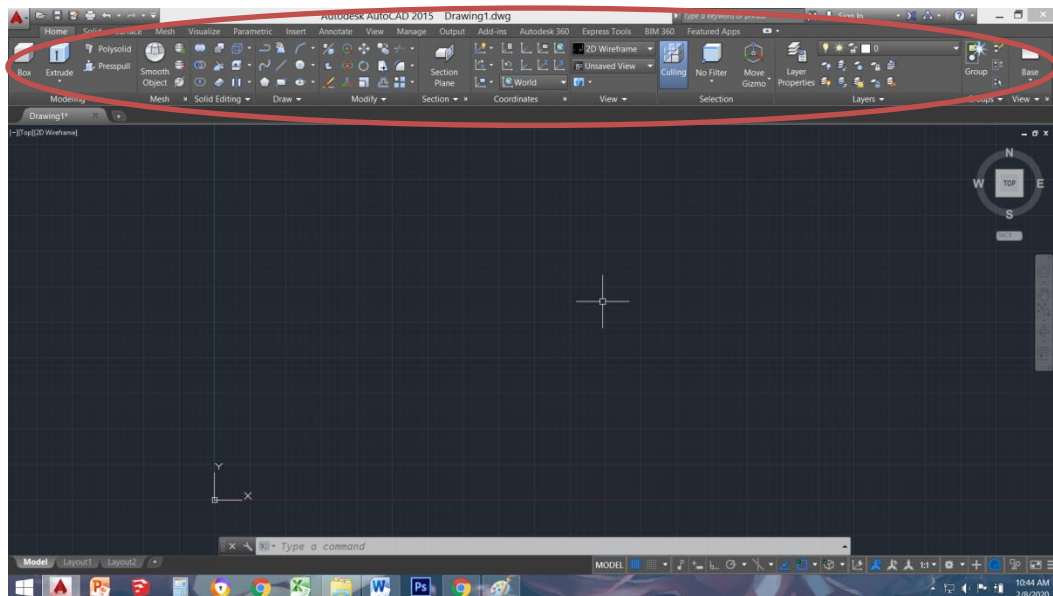
The fastest way to the 2D view is using the plan command. Just type "plan" then "w" for world view.

If you checked the "don't show me this dialog again" check box and want to get the workspaces dialog back. Go to Options, System Tab, General options on the right, and select "Show all warning messages"

2D Workspace in AutoCAD



3D Workspace in AutoCAD



Congratulations! You did a great job!

Rest and relax a while then move on to the next lesson. Good luck!

REFERENCES

LESSON 2

- Ernesto A. Arellano, AutoCAD 2D for All
- Esguerra and Molino, Exploratory Drafting; Abiva Publishing
- Randy Shih, Introduction to Autodesk

ANSWER KEY LESSON 1

LO1. Identify sources of information and relevant ideas to enrich one's own concept of 2D technical drawings.

Pretest

1. B
2. A
3. A
4. D
5. D

Self-Check 1.1

1. Application
2. Ribbon
3. Drawing Title
4. Info Center
5. Drawing Area
6. View Cube
7. Drawing Tools
8. Command Window
9. Scale
10. Workspace

LO2. Draw preference setup using 2D software application AutoCAD

Pretest

1. B
2. C
3. D
4. D
5. D

Self-Check 1.2

1. ANNOTATE
2. DIMENSION
3. LAYERS
4. LAYER PROPERTIES
5. UNITS

LO3. Create simple parts by sketching outlines

Pretest

1. C
2. R
3. D
4. A
5. C

Self-Check 1.3

P									
	O			C	I	R	C	L	E
		L						I	
			Y					N	
				L				E	
	A				I				
	R	E	C	T	A	N	G	L	E
	C						E		

LO4. Create profile constrain and dimension sketched outlines.

Pretest

1. P
2. A
3. C
4. L
5. R

LO5. Extrude profiles into parts.

Pretest

1. B
2. C
3. D
4. D
5. A

LO6. View models from different viewpoints, revolve a profile into a part and sweep a profile into a part.

Pretest

1. A
2. A
3. A
4. A
5. A

LO7. View models from different viewpoints, revolve a profile into a part and sweep a profile into a part.

Pretest

1. D
2. D
3. A
4. B
5. C

ANSWER KEY LESSON 2

LO1. Identify the parts of the object to be assembled.

Pretest

1. A
2. B
3. D
4. C
5. C

LO2.

Pretest

1. A
2. A
3. A
4. A
5. A

LO3. Create simple 3D parts for 2D technical drawing using software.

Pretest

1. A
2. B
3. D
4. C
5. A

LO4. The learner modifies and creates simple 3D parts and imports into 2D.

1. A
2. A
3. D
4. C
5. A

LIST MATERIALS/TOOLS/EQUIPMENT/COMSUMABLES FOR THIS MODULE

Materials

- Drawing Paper
- Pencil
- Masking Tape

Drafting Tools/Instruments

- Triangle
- Scales

Equipment's

- Computer
- AutoCAD software application

Learning Materials

- Multimedia Materials (print, video, audio)
- Bibliography

Acknowledgement

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