ROAD CIVIL WORKS

Level II

Learning Guide-15

Unit of Competence: -	**Use Computer Aided Drafting Systems to Produce Basic Engineering Drawings**
Module Title:-	**Using Computer Aided Draftin Systems to Produce Basic Engineering Drawings**
LG Code:	**CON RCW2 MO5 LO1-LG-15**
TTLM Code:	**C OCON RCW2 TTLM 1019v1**

LO1:-Prepare the CAD Environment

Instruction Sheet	Learning Guide #13

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Basic computer skill
- Introduction to drawing software and drawing principle
- instructing and operating procedures for the **CAD** software
- booting the CAD software
- Screen display areas and **basic parameters**

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- instruct and operate All relevant manuals, procedures for the **CAD** software are obtained in accordance with workplace procedures.
- bootThe CAD package in accordance with workplace procedures.
- set Screen display areas and **basic parameters** are in accordance with instructions

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 2
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 , and Sheet 4 ,
4. Accomplish the “Self-check 1,Self-check t 2, Self-check 3, Self-check4 , Self-check 5, Self-check 6 and Self-check 7” **in page -17, 27, 31,and50**respectively.

Information Sheet-1	Basic computer skill

1.1Basic computer skills"

is a term that is used to identify the essential skills needed in order to make use of a computer. The scope of skills that are considered basic will vary from one situation to another. For example, one employer may consider the ability to make use of a specific type of word processing software to be among the basic skills required, while a different employer will place more emphasis on the ability to work with electronic spreadsheets. Trade schools and some colleges offer courses that introduce students to basic computer skills most commonly required by employers, making it easy to secure the knowledge needed to identify and hone these skills.

As a basis for making use of a computer, basic computer skills will often start with understanding how a particular operating system functions in terms of the creation and placement of taskbars on the computer desktop, how to make use of a computer mouse to utilize the programs housed on the hard drive, and even how to go about using an email program to create, send, and receive emails. Tasks such as searching for files on a hard drive are often also considered basic skills that any user should know and be able to perform with relative ease. In some cases, training in how to conduct searches using an Internet browser will also come under the heading of basic operational skills, especially if the job position requires frequent research.

OPERATINGSYSTEMS

The Operating System(OS)

Computers without operating systems are exactly like televisions without a signal: Theywill turn on, but you will be looking at a blank screen with no hope of interacting with it (*thelights are on, but nobody's home*)! The most popular operating system is "Microsoft Windows," andit is utilized by most personal computer (PC)

users.It is what you are using today in class.If you thinkof the CPU as the “brains” of the computer, theoperating system **acts as the nervous system of the computer**, connecting the CPU to all the computer programs.The operating system allows you to run other programs, work on projects, and do basically everything else that computers are capableof.There are many differentversions of Microsoft Windows, and a new version is released every couple of years (just like car models).

Fig. 1.1

There are other operating systems as well.Apple manufactures a computercalled a Macintosh, or Mac.Macsuse an operating system called “Mac OS X” which, while it looks very different from Microsoft Windows, runs using the same basic principles. While fewer people use Macs than PCs, schools often use Macs, as well as people who work with graphic design and video and image editing.As a general rule, Macs tend to be more expensive than PCs.

Fig. 1.2

You shouldn’t ever need to messwith the operating system.Itshouldrun correctly and without error for as long as you have your computer.In fact, if you ever take your computer in for a repair, the technician will be looking primarily at your operating system (not your programs), in the same way that a mechanic will look at your car’s engine.

The operating system of your computer is so important, that any computer you buywill be sold with one already installed and ready to go (so outside of choosing between a PC and a Mac, you don’t really need to worry about the operating system except to make sure you get the newest or most appropriate version).In addition, popular software programs are also oftenalreadyinstalled on computers, so all you have to do is plug your computer in and go!

Computer Manufacturer (e.g.Apple Lenovo)Computer is called a **Macintosh**
Computer is called a**PC(Mac)**
Operating System is**Windows**Operating System is**OSX**

Fig. 1.3 Computer Manufacturer (e.g. Apple Lenovo)

Turning On the Computer and Logging On:

Turning the Computer On

Let's get started! As you sit down at your desk, you can assume that your computer system is one of three states:

- •OFF: This is exactly what it sounds like: The computer is off, and no parts are running or working.The monitor is black (no images), there is no "whirring" sound from the CPU, and the computer is unresponsive to mouse movements or pressing keys on the keyboard.The power button (if it lights up) should not belitup.

- •ON: When a computer is on, you should see images on the monitor, possibly heara"whirring"noisecoming from the CPU (hopefully not too loud!), and the pointer on the screen (the small white arrow) should respond when you move the mouse.

- •SLEEPMODE:Most computers have a mode called "Sleep," inwhich the computer is on, but has assumed an energy-efficient, minimal power mode.To "wake"thecomputer, simply move the mouse around or press the space bar onthe keyboard,and it will "wake up" and return to the exact same place that itwas when itwentto sleep.In other words, if you were using a word processing program and the computer went to sleep, it would return to exactly what you wereworking on when it wakes up.

To turn a computer on, simply press the power button once (no need to hold the button—just press and release).We will go over how to turnoffa computerlater in this handout.

Logging On

Once you turn the computer on, the computerwill go through a series of automated tasks before it is ready for you to interact with it; this process is called “startup.” This process will last between one and two minutes. If the computer is notworking correctly, you may see an error message during startup.If the computer is performing as it should, however, you will probably see one of the following screens:

Fig. 1.4 Logging On

This is called a“LogOn” window, and it means that the computer is password protected.If you do not see this window upon starting the computer, you can assume that your computer is NOT password-protected and may be used by anyone.To log on, you simply enter your user name and password.If you are using a public library computer, this could be your library card number.

The Desktop

Fig. 1.5 The Desktop

After you log on, the computer will display what is known as your desktop within a few seconds to a few minutes (if your computer is newer, this will probably go faster).Here you will see a digital representation of something similar to a real-life office space, complete with a workspace, files and file folders, and even a recycling bin!

One of the neatest features about Microsoft Windows is that your desktop may not look anything like the one above! While this may sound confusing, it means thatyou are able to personalize, alter, and change almost everything aboutyour desktop environment.If you do not like the color blue as your background, where the icons are, or even what language it is in, you can change it! Here are some examples:

Fig. 1.6The Desktop

THEKEYBOARDANDMOUSE

Keyboard Commands

Fig. 1.7Keyboard Commands

In order to use your computer effectively, you must interact with it using both the mouse and the keyboard.The above image of a keyboard may closely resemble (if it is not identical to) the keyboard in front of you; learning the function of just a few keys will help you to interact better with your computer and individual programs.The following is a list of commonly used keys that have special functions (keep in mind that key functions can change dependingon which programyouareusing):

1. **Backspace**: This key deletes letters backward (←).
2. **Delete**: This key deletes letters forward (→).
3. **Shift**: This key, when pressed WITH another key, will perform a secondary function.
4. **Spacebar**: This key enters a space between words or letters.
5. **Tab**: This keywill indent what you type, or move the text to the right. The default indent distance is usually ½ inch.
6. **Caps Lock**: Pressing this keywill make every letter you type capitalized.
7. **Control (Ctrl)**: This key, when pressed WITH another key, performs a shortcut.
8. **Enter**: This key either gives you a new line, or executes a command (pressed in a word processing program, it begins a new line).
9. **Number Keypad**: These are exactly the same as the numbers at the top of the keyboard; some people find them easier to use inthis position.
10. **Arrow Keys**: Like the mouse, these keys are used to navigate through a

document or page. 11

The Mouse

While the keyboard is primarily used to insert/input and manipulate text and numbers on a computer, the mouse is used mostly for navigating aroundthe screen.Mice come in a variety of shapes and sizes.Some ofthe strangest-looking mice often look thatway because they are designed to be more ergonomic than traditional mice.

There are traditional mice…unusually shaped mice…

stylish mice…complicated mice…

and real mice!Fig. 1.7The Mouse

The type of mouse that you choose to use is totally based on your preference—If you want a fancy mouse, that's fine; if you prefer a simple mouse, that'sOK too. Each mouse, however differentit may be, has similar functions.As you can see onthe "traditional" model above, a traditional mouse has two buttons with a

wheel betweenthem (gray) that spins, called a “scroll wheel.” Both buttons can perform separate functions, and are referred to by which side of the mouse they are located on.12

Pressing the LEFT mouse button is called“left-clicking,” while pressing the RIGHT mouse button iscalled“right-clicking.”

Left-clicking is used far more often than right clicking.For now,know thatleft-clicking is used to select or click on something, while right-clicking presents additional menu options.

Practice

Keyboarding Practice! http://www.sense-lang.org/typing/tutor/keyboarding.php

Left-Clicking, Double-ClickingandRight-Clicking

One of the most difficult things to learn when first beginning to use a computer, is how to use the mouse.It takes coordination, precision, and patience.Fortunately, **the moreyou practice, the easier it will become**!

The mouse symbol, or **pointer**, that appears on the computer screen will change its look and function depending on what it is near or hovering over.

Your mouse pointer will most often look like an arrow

When your mouse pointer is over an internet link, it will look like apointing hand

When your mouse pointer is over a place where you can type, it will look like an I-beam

When your computer is busy or ‘working,’ your mouse pointer may look like an hourglass or a spinning circle.

There are actually many different pointers (though these are the most common), and theywill change automatically depending on what task you are trying to perform.

The **buttons** on the mouse may also have different functions, depending on which program you are using.If you are working in Microsoft Word, for example, the mouse will offer options related to Microsoft Word.Conversely, if you are working in Microsoft Excel, the mouse will offer options related to Microsoft Excel, and so on.

For now, remember these rules:

1. The LEFT mouse button **SELECTS** items.
2. The RIGHT mouse button **GIVES YOU MORE OPTIONS**.13

Fig. 1.7 The Mouse

3. Double-Clicking the LEFT mouse button **EXECUTES** options (for example, you can open a program by double-clicking an icon on the desktop).
4. Double-Clicking the RIGHT mousebutton ***does not do anything***.

Practice Exercise

Mousing Around! http://www.pbclibrary.org/mousing/intro.htm

This exercise will let you practice a variety of the skills you'll need to use your mouse effectively.Try this practice site from any computer connected to the Internet

NAVIGATINGTHECOMPUTERANDSOFTWARE

The Start Menu

The **Start Menu** is a good place to, well, start! The **Start button** (which opens the menu) is located in the lower left corner of your screen.LEFT-CLICKonceon the Start Button to open the menu.

Fig. 1.8**Start Menu**

This is the Start Menu as it appears in Windows 7.

Notice the options that are available in this menu.Popular**programs**, like the calculator and paint applications are on the left, while folders, the Control Panel, and help features are on the right.

Also note the"**Shut Down**"button at the bottom of the menu.This button is veryimportant.It will allow you to log off or shut down the computer. Logging off a computer islikelockinga car—the computerisina stationary mode and you can't do anythingfrom the outside.Clicking Shut Down is like turning off the engine. WhenyouclickShut Down, the computer has an opportunity to properly "shut down" before the poweris turned off.

We will cover how to log off and turn the computer off in more depth later in this handout.

Fig. 1.8 Start Menu

By LEFT-CLICKING once on "**All Programs**,"another menu will appear.This is a list ofall the programs that

you have installed on your computer.

Nearly everything that you can do with your computer can be found in the Start menu.This includes finding help, using programs, getting on the Internet, e-mailing, playinggames, customizingyour desktop, and more!

You should feel free to experiment with the Start Menu.Go ahead and left-click on something!

Microsoft Windows has undergone many changes over the past few decades. New versions of the operating system are released every couple of years.Itis currently being released in a version called "Microsoft Windows 8." Past versions include: "Windows 95," Windows 98," "Windows ME," "Windows XP," "Windows Vista," and "Windows 7." Many people continue to use Windows Vistaand Windows 7, even though newer versions have been released.It is important to know that there are different versions of Windows, because different features (such as the Start Menu discussed above) may look different in different versions.

Managing "Windows"

Microsoft Windows is called "Windows" for a reason.Programs appear on your screen as "Windows" (rectangular shapes) andare laid 3-dimensionally on top of one another (see image at right), just like on a real desktop.The desktop is your work surface, and all of your open windows appear on top of it.

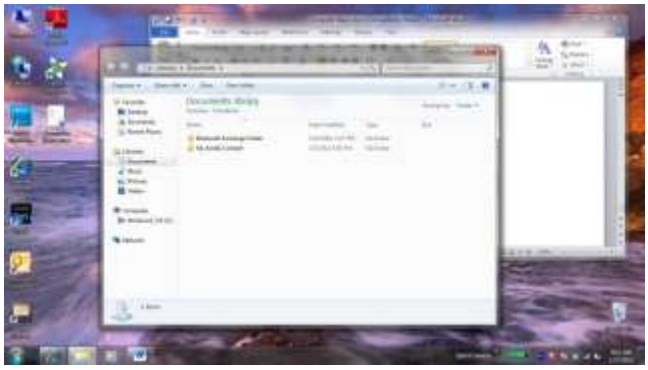


Fig. 1.9 "Windows"

If you can see a window,that means the program is *open*and running.Itis possible to make the window bigger, smaller, or close it using the buttons in the top right corner of any window.

Minimize: Left-button tobutton to makeshrink thewindow to a smallbutton thatappear in thetask bar (seebelow).

Maximize: Left-clickthiswindow asthe window.buttonto make window downlarge as it canbe—it shouldtake up yourentire screen.Makesureyou save your work first!

Close: Left-clickthisbutton to closethe window.The programwill close andwithout stopping it.

Restore Down: Left-click this button to make the window smaller

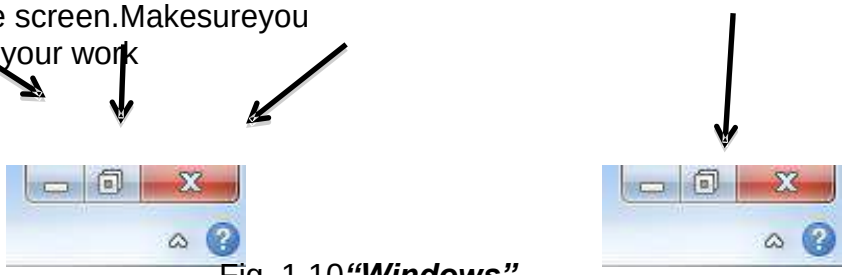


Fig. 1.10***"Windows"***

Microsoft Windows is capable of running more than one program at once.In other words, you can write a letter in Microsoft Word, **while**surfing the Internet **while**using Microsoft Excel **while**checking your e-mail and so on! This is called "multi-tasking" and is a feature of all computers.However, with all of these things going on at once, how do you keep track of them all? The**Taskbar**,which is the bar that spans across the bottom of your screen next to the Start Menu, is designed to help you keep track of all of your programs.It looks like this:

Fig. 1.11

In the illustration above, there are several programs running.Each program that is open is represented by a "button" on the Taskbar.Touse one of the programs thatis"open," simply left-click on it once to bring it up to the top of the screen. The taskbar is modeled after what might happen in real life: You are reading the newspaper, and you put it down to pick up your favorite book.You didn't throw it out or destroy it, you simply**set itaside**.Thisway, you can pick up right where you left off once you are done reading your book.The taskbar works the same way, but with software programs, not books.

Buying a Computer

When considering the merits of a computer, it's important to consider the followingquestions:

- •How fast can the computer perform tasks?
- •How much information (or data) can it store?
- •How many programs (i.e.software) can it run simultaneously?

Buying a computer is a big decision, and can be quite expensive.It is a good

idea to do some research before buying a computer to find out whatwould work best for your needs, what computers have performed well for others, andwhat 16

models are within your price range.Asking for help finding this information at the reference desk of your local library is a good place to start.In addition, here are somewebsites you might want to check out:

- http://www.consumerreports.org/(under electronics, select “Computers”)
- http://www.ehow.com/how_3038_buy-computer.html
- http://www.pcworld.com/article/125649/how_to_buy_a_desktop_pc.html
- Personal computer companies:
  - http://www.dell.com/
  - http://www.lenovo.com/
  - http://www.hp.com/

Other Programs and Software

Although there may be lots of software pre-installed on your computer when you buy it, there are many more programs available for you to download or buy, from educational games for children to photo editing software to professional programming software.If you are interested in a particular type of software,here are some suggested Web sites to check out:

- http://www.pcmag.com/
- http://www.compusa.com/
- http://www.amazon.com/
- http://www.microsoft.com/

Keep in mind that software is often designed for*either* aPC*or*a Mac, so make sure whatever program or game you purchase is compatible with your particular computer.If software is compatible with both types of computers, it will often have a symbol like this:

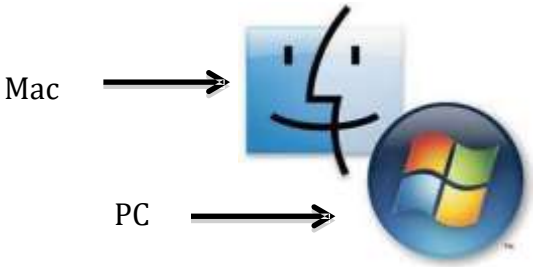


Fig. 1.12

SHUTTINGDOWNTHECOMPUTER

Logging Off vs.Shutting Down

To log off or shut down the computer, click the Start button:

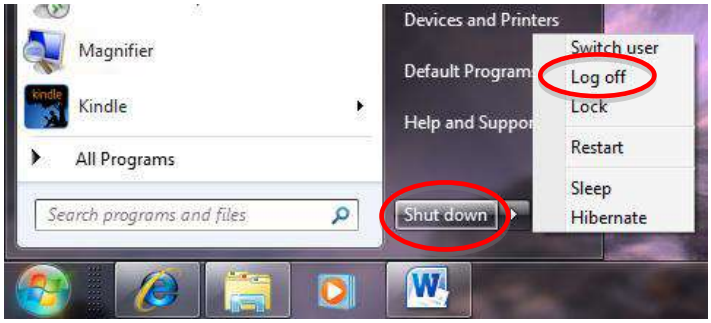


Fig. 1.13Logging Off vs. Shutting Down

Logging off your computer and shutting down your computer are two different things.Remember the analogy of the car:**Logging off** a computer is likelocking the car (the computer ispassword-protected and you can't do anything).When you first log in to a computer, it's like using a key (password) to get in, and when you are done using the computer, you need to log off (the computer will remain on) to make sure no one can make changes while you are away.

By contrast, when you click **Shut Down**, it is like turning a car's ignition off.You need to make sure that processes and programs are properly ended and shut down before pushing the shutdown button, just as with a car you have to turn off the ignition before pulling out the key.Click the Start button, then click Shut Down.***Do not press the power button to turn off your computer!***

After you have clicked Shut Down, your computer willbegina shut-downprocess

in which it saves things you have been working on, and ends all programs that
are running.You may see a window that says, “Windows is shutting down.”
When the computer is done shutting down, the screenwill go black, and the
computer tower will stop making any noise.It is now shut down.Itis*not* necessary to press thepowerbutton—your computer will turn off automatically.

Finding More Help

If you ever find that you need help while using your computer, you can left-click
the**Start** button, and then click “Help and Support.”
In addition, most programs on your computer will also have an individual help feature.The Help function may be available from a 1.14
Finding
More Help
Help menu at the top of thewindow, or by clickingaFig.

button.Help buttons are usually located in the top-right corner of the window, and may look like a question mark.Help menus often have a search 18

function or pre-prepared FAQs.Most programs also have 1-800 numbers to
connect with a technician.

Self-Check -1	Test

Directions: Answer all the questions listedbelow. Use the Answer sheet provided in the next page:

1. What process should be used to recall a document saved previously? (1 point)
   A. Copy
   B. Save
   C. Retrieve
   D. Enter

2. What is most commonly used to enter text into a word processing program? (1 point)
   A. keyboard
   B. mouse
   C. printer
   D. monitor

3. What happens when you press "Ctrl-Alt-Delete"?

   A. The computer will self-destruct.

   B. The program you are using will close.

   C. Your active window will close.

   D. The computer will restart.

   E. A menu of programs available on the computer will pop up on the desktop.

4. How do you properly shut down a computer?

A. Press the power switch on the front of the CPU to turn off the machine.

B. Press the power button on the front of the monitor.

C. Go to the "Start" button and select "Shut Down."

D. Go to the "Start" button and select "Log Off."

E. Press the "Shut Down" key on the keyboard.

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Multiple Chose Test Answer

1._____

2._____

3._____

information Sheet-2	introduction to drawing software and drawing principle

2.1Drawing software

is defined as a computer program for creating art on the computer.
An example of drawing software is the Paint program on many computers.
An example of drawing software are the computer-assisted drawing programs used by engineers and architects.

Software design is the process by which an agent creates a specification of a software artifact, intended to accomplish goals, using a set of primitive components and subject to constraints.[1] Software design may refer to either "all the activity involved in conceptualizing, framing, implementing, commissioning, and ultimately modifying complex systems" or "the activity

following requirements specification and before programming, as ... [in] a stylized software engineering process."[2]

Software design usually involves problem solving and planning a software solution. This includes both a low-level component and algorithm design and a high-level, architecture design.
software drawing is the process of envisioning and defining software solutions to one or more sets of problems. One of the main components of software design is the software requirements analysis (SRA). SRA is a part of the software development process that lists specifications used in software engineering. If the software is "semi-automated" or user centered, software design may involve user experience design yielding a storyboard to help determine those specifications. If the software is completely automated (meaning no user or user interface), a software design may be as simple as a flow chart or text describing a planned sequence of events. There are also semi-standard methods like Unified Modeling Language and Fundamental modeling concepts. In either case, some documentation of the plan is usually the product of the design. Furthermore, a software design may be platform-independent or platform-specific, depending upon the availability of the technology used for the design.

The main difference between software analysis and design is that the output of a software analysis consists of smaller problems to solve. Additionally, the analysis should not be designed very differently across different team members or groups. In contrast, the design focuses on capabilities, and thus multiple designs for the same problem can and will exist. Depending on the environment, the design often varies, whether it is created from reliable frameworks or implemented with suitable design patterns. Design examples include operation systems, webpages, mobile devices or even the new cloud computing paradigm.

Software design is both a process and a model. The design process is a sequence of steps that enables the designer to describe all aspects of the software for building. Creative skill, past experience, a sense of what makes "good" software, and an overall commitment to quality are

examples of critical success factors for a competent design. It is important to note, however, that the design process is not always a straightforward procedure; the design model can be compared to an architect's plans for a house. It begins by representing the totality of the thing that is to be built (e.g., a three-dimensional rendering of the house); slowly, the thing is refined to provide guidance for constructing each detail (e.g., the plumbing lay). Similarly, the design model that is created for software provides a variety of different views of the computer software. Basic design principles enable the software engineer to navigate the design process. Davis[3] suggests a set of principles for software design, which have been adapted and extended in the following list:

The design process should not suffer from "tunnel vision." A good designer should consider alternative approaches, judging each based on the requirements of the problem, the resources available to do the job.
The design should be traceable to the analysis model. Because a single element of the design model can often be traced back to multiple requirements, it is necessary to have a means for tracking how requirements have been satisfied by the design model.
The design should not reinvent the wheel. Systems are constructed using a set of design patterns, many of which have likely been encountered before. These patterns should always be chosen as an alternative to reinvention. Time is short and resources are limited; design time should be invested in representing (truly new) ideas by integrating patterns that already exist (when applicable).
The design should "minimize the intellectual distance" between the software and the problem as it exists in the real world. That is, the structure of the software design should, whenever possible, mimic the structure of the problem domain.
The design should exhibit uniformity and integration. A design is uniform if it appears fully coherent. In order to achieve this outcome, rules of style and format should be defined for a design team before design work begins. A design is integrated if care is taken in defining interfaces between design components.
The design should be structured to accommodate change. The design concepts discussed in the next section enable a design to achieve this principle.
The design should be structured to degrade gently, even when aberrant data, events, or operating conditions are encountered. Well-designed software should never "bomb"; it should be designed to accommodate unusual circumstances, and if it must terminate processing, it should do so in a graceful manner.
Design is not coding, coding is not design. Even when detailed procedural designs are created for program components, the level of abstraction of the design model is higher than the source code. The only design decisions made at the coding level should address the small implementation details that enable the procedural design to be coded.
The design should be assessed for quality as it is being created, not after the fact. A variety of design concepts and design measures are available to assist the designer in assessing quality throughout the development process.
The design should be reviewed to minimize conceptual (semantic) errors. There is sometimes a tendency to focus on minutiae when the design is reviewed, missing the forest for the trees. A

design team should ensure that major conceptual elements of the design (omissions, ambiguity, inconsistency) have been addressed before worrying about the syntax of the design model.

2.2 Introduction to CAD

CAD (Computer Aided Design) is the use of computer software to design and document a product's design process.

Engineering drawing entails the use of graphical symbols such as points, lines, curves, planes and shapes. Essentially, it gives detailed description about any component in a graphical form.

Background

Engineering drawings have been in use for more than 2000 years. However, the use of orthographic projections was formally introduced by the French mathematician Gaspard Monge in the eighteenth century.

Since visual objects transcend languages, engineering drawings have evolved and become popular over the years. While earlier engineering drawings were handmade, studies have shown that engineering designs are quite complicated. A solution to many engineering problems requires a combination of organization, analysis, problem solving principles and a graphical representation of the problem. Objects in engineering are represented by a technical drawing (also called as drafting) that represents designs and specifications of the physical object and data relationships. Since a technical drawing is precise and communicates all information of the object clearly, it has to be precise. This is where CAD comes to the fore.

CAD stands for Computer Aided Design. CAD is used to design, develop and optimize products. While it is very versatile, CAD is extensively used in the design of tools and equipment required in the manufacturing process as well as in the construction domain. CAD enables design engineers to layout and to develop their work on a computer screen, print and save it for future editing.

When it was introduced first, CAD was not exactly an economic proposition because the machines at those times were very costly. The increasing computer power in the later part of the twentieth century, with the arrival of minicomputer and subsequently the microprocessor, has allowed engineers to use CAD files that are an accurate representation of the dimensions / properties of the object.

Use of CAD

CAD is used to accomplish preliminary design and layouts, design details and calculations, creating 3-D models, creating and releasing drawings, as well as interfacing with analysis, marketing, manufacturing, and end-user personnel.

CAD facilitates the manufacturing process by transferring detailed information about a product in an automated form that can be universally interpreted by trained personnel. It can be used to produce either two-dimensional or three-dimensional diagrams. The use of CAD software tools allow the object to be viewed from any angle, even from the inside looking out. One of the main advantages of a CAD drawing is that the editing is a fast process as compared to manual method. Apart from detailed engineering of 2D or 3D models, CAD is widely used from conceptual design and layout of products to definition of manufacturing of components. CAD reduces design time by allowing precise simulation rather than build and test physical prototypes. Integrating CAD with CAM (Computer Aided Manufacturing) streamlines the product development even more.

CAD is currently widely used for industrial products, animated movies and other applications. A special printer or plotter is usually required for printing professional design renderings. CAD programs use either vector-based graphics or raster graphics that show how an object will look.

CAD software enables

Efficiency in the quality of design
Increase in the Engineer's productivity
Improve record keeping through better documentation and communication
Today, the use of CAD has permeated almost all industries. From aerospace, electronics to manufacturing, CAD is used in all industry verticals. Since CAD encourages creativity and speeds up productivity, it is becoming more and more useful as an important tool for visualization before actually implementing a manufacturing process. That is also one of the reasons CAD training is gaining more and more importance.

2.2.1Types of CAD Software

Since its introduction in late 1960's, CAD software has improved by leaps and bounds. A broad classification of CAD is:

2D CAD
3D CAD
3D Wireframe and Surface Modeling
Solid Modeling
With more and more companies (if not all) turning to CAD / CAE / CAM to achieve efficiency, accuracy and reduced time-to-market of products, there is a growing demand for CAD software. The industry leaders in this space include AutoCAD, Assault Systems and Altair.

2.3 DRAWING PRINCIPLES:

Balance – can be Symmetrical or Asymmetrical.
Symmetrical = dividing a composition into two equal halves with seemingly identical elements on each side.

Asymmetrical = balance based upon a visual sense of equilibrium that can be felt more than it can be measured. There are no specific rules for asymmetrical balance except that of diversity

Repetition/Rhythm – a repeating visual element (line, shape, pattern, texture, movement); a flowing and regular occurrence. A subcategory of repetition is pattern.

Pattern – any compositionally repeated element or regular repetition of a design or single shape; pattern drawing sin commercial art may serve as models for commercial imitation.
Focus/Emphasis/Dominance – the prime center of visual importance within a composition to which all other visual elements yield; it holds the viewer's attention because of its attractive and dominant influence on its surroundingsRule of Thirds – a compositional tool that makes use of the notion that the most interesting compositions are those in which the primary element is off center. Basically, take any frame of reference and divide it into thirds placing the elements of the composition on the lines in between.

Visual Center – The visual center of any page is just slightly above and to the right of the actual (mathematical) center. This tends to be the natural placement of visual focus, and is also sometimes referred to as museum height.

Golden Rectangle – Another method of arranging a composition.

Unity/Harmony
Scale – The overall size of an object

Proportion – The relative size of different elements of an artwork. An example is the exaggerated proportions in caricatures.

Contrast – When one extreme is pitted against another. Bright vs Dark. Heavy vs Light, Rough vs Soft, etc.

Movement – How the artist leads the viewer's eye around the page
Depth – overlapping forms suggest depth; changes in scale can suggest depth; illusionistic perspective can suggest depth, atmospheric perspective (see images here) can suggest depth

foreshortening also shows depth

OTHER IMPORTANT DEFINITIONS

Picture plane – the size and shape of your paper/drawing surface.
Closed composition – forms seem well contained by the edges of the picture plane
Open composition – the imagery appears unrelated to the size/shape of the paper, creating an impression of extending beyond the picture plane
Gestalt – “The sum of the whole is greater than its parts” is the idea behind the principle of gestalt. It’s the perception of a composition as a whole. While each of the individual parts have meaning on their own, taken together, the meaning may change. Our perception of the piece is based on our understanding of all the bits and pieces working in unison.
Positive and Negative Space –

Point of view – the position from which the composition is seen by the artist (eye level and distance from the subject)

Composition exercise in class by John Ciampoli
3D Design

ELEMENT DEFINITIONS:

Line: The edge of a shape or form or the direction followed by anything in motion.
-Implied Line- is a line that doesn’t really exist, but appears to be present.
-Actual Line- is a line that is actually present.

Value: Shadows from lightness to darkness
-Value variation gives a sense of space and depth to an object—emphasizing its three dimensionality.
-Strong contrast in value can create emphasis.

Color: Color is Light reflected from a surface. It can create emphasis, harmony, emotions, unity, and movement.
-Color has three distinct qualities:
1. Hue- color
2. Value- lightness to darkness of a color
3. Intensity- brightness to dullness of a color
– mixing its complimentary color can dull intensity.

Texture: Quality related closely to our sense of touch. It can create emphasis, movement, pattern, emotion.
-Implied texture- is texture that appears to be present but it is an illusion. It is not really present.

-Actual texture- is texture that really exists and it can be felt.

Shape: Shape encloses a two dimensional area. Shape can create most of the elements and many of the principles.
-Types of shapes: Organic-curved edges, continuous Geometric-sharp edges, angles

Form: Form encloses a volume or three-dimensional area.
-Light and dark value variations and space are used to emphasize form.

Space: Illusion of depth and space.
-Ways to create space:

- Overlapping — Shapes or forms in front of each other
- Holes and cavities

2.3.1PRINCIPLE DEFINITIONS:

Balance: Refers to the equalization of elements in a work of art.
-There are three kinds of balance:

- symmetrical- formal, divided in half same
- asymmetrical- informal, divided in half not same
- radial- circular, design starts from center > out

Unity/Harmony: Relates to the sense of oneness, wholeness, or order in a work of art. Combining similar colors,
shapes, lines, textures, and patterns in an artwork can create harmony. Movement: Refers to the arrangement of parts in a work of art to create a slow to fast action of the eye.
-Pattern, contrast, line can create this.

Rhythm: It is a type of movement in an artwork or design often created by repeated objects.
-There are different types of rhythm:

- Regular-
- Irregular-

Emphasis: refers to placing greater attention to certain areas or objects in a piece of work.
-Emphasis can be created through sudden and abrupt changes in opposing elements.
(Example: bright yellow dot in large black area)

Proportion: Refers to the relationship of certain elements to the whole and to each other.

Pattern: is created by repetition of (not limited to) shape, line, color, or texture

Variety: It is achieved through diversity and change. Using different line types, colors, textures, shapes…..

Gradation: Refers to a way of combining elements by using a series of gradual changes.
-Examples of gradation:
1. gradually from small shapes to large shapes
2. gradually from a dark color to a light color
3. gradually from shadow to highlight

2.4 ELEMENTS OF DRAWING

- ✓ Line – The way we treat our lines establishes a particular/dominant mood/emotion.
- ✓ Shape – Flat, 2D aspects of form, as opposed to volume (think silhouette)
- ✓ Value/Tone – Relative lightness or darkness
- ✓ Texture – Can be actual or implied
- ✓ Space – Positive space is the figure/object you're drawing; Negative space is the area AROUND the figure object you're drawing
- ✓ Color – (we won't use color in Beginning Drawing)

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Which of the following IS NOT drawing principles?

A. Balance
B. Pattern
C. Unity/Harmony
D. Space

2. Which of the following IS TRUE ABOUTCAD (Computer Aided Design)

A. is the use of computer software to design and document a product's design process.
B. symmetrical- formal, divided in half same
C. asymmetrical- informal, divided in half not same
D. radial- circular, design starts from center > out

3. Which of the following IS NOT elements of drawing

A. Line
B. Shape
C. Value
D. All

Note: **Satisfactory rating – 1.5 points** **Unsatisfactory - below 1.5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Multiple Chose Test Answer

1._____

2. _____

3. _____

ɔrmation Sheet-3	**booting the CAD software**

3.1 booting is the processof starting a computer. It can be initiated by hardware such as a button press, or by a software command. After it is switched on, a computer's central processing unit (CPU) has no software in its main memory, so some process must load software into memory before it can be executed. This may be done by hardware or firmware in the CPU, or by a separate processor in the computer system.

Restarting a computer also is called rebooting, which can be "hard", e.g. after electrical power to the CPU is switched from off to on, or "soft", where the power is not cut. On some systems, a soft boot may optionally clear RAM to zero. Both hard and soft booting can be initiated by hardware such as a button press or by software command. Booting is complete when the operative runtime system, typically operating system and some applications is attained.

The process of returning a computer from a state of hibernation or sleep does not involve booting. Minimally, some embedded systems do not require a noticeable boot sequence to begin functioning and when turned on may simply run operational programs that are stored in ROM. All computing systems are state machines, and a reboot may be the only method to return to a designated zero-state from an unintended, locked state.

In addition to loading an operating system or stand-alone utility, the boot process can also load a storage dump program for diagnosing problems in an operating system.

Boot is short for bootstrap[1][2] or bootstrap load and derives from the phrase to pull oneself up by one's bootstraps.[3][4][citation needed] The usage calls attention to the requirement that, if most software is loaded onto a computer by other software already running on the computer, some mechanism must exist to load the initial software onto the computer.[5] Early computers used a variety of ad-hoc methods to get a small program into memory to solve this problem. The invention of read-only memory (ROM) of various types solved this paradox by allowing computers to be shipped with a start up program that could not be erased. Growth in the capacity of ROM has allowed ever more elaborate start up procedures to be implemented.

3.2 How to install AutoCAD 2007

Obtain your purchased copy of the Longbow Converter here Start the Longbow Converter tool Insert your AutoCAD 2007 CD into your CD-ROM drive select the 2nd tab named “Old AutoCAD Installer Reviver“ Using the “…” button, path the to your AutoCAD 2007 CD Click “Run Old Installer “Read and follow all the prompts

Once the AutoCAD 2007 setup starts, stop and read the next step…

In the setup program, navigate through each setup dialog as normal, with these

exceptions…When you click the Install link from your setup you may see a dialog box appear saying – “This program has compatibility issues” – simply check the “Don’t show this message again” and then click the “Run the program without getting help” button When you arrive at the installation folder path setup dialog, **it’s vitally important to make sure you install to c:\acad2007 (not Program Files (x86)\AutoCAD 2007)**.

Once AutoCAD has installed, completely close setup Now go back to the Converter app and make sure it’s completed the final stage of processing using the “Old AutoCAD Program Reviver” tab Finally, reboot your PC and run your AutoCAD as normal

NOTE: When starting AutoCAD, if you see a warning dialog when you run saying “This program has known compatibility issues”, simply click “Don’t show this message again” and then click “Run the Program…”

Installing AutoCAD 2007 Sp1

3.3Starting AutoCAD

Complete Reference / AutoCAD: TCR / Cohn / 222429-0 / Chapter 1

This chapter assumes that you have already installed AutoCAD. If you are going to work in AutoCAD as you follow along in this book, you should install AutoCAD now, before proceeding. Installing AutoCAD 2007 is quite simple, particularly compared to earlier versions of the program. An easy-to-use Setup program guides you through the AutoCAD installation process, transferring the files from the CD-ROM to a folder it creates on your hard disk. The Setup program also creates a menu item on the Windows Start menu, and a shortcut icon on your desktop. If you need additional help installing AutoCAD, see Appendix C.

P:\010Comp\CompRef8\429-0\ch01.vp

Monday, April 08, 2007 5:05:37 PM

Color profile: Generic CMYK printer profile

Composite Default screen

You can start AutoCAD by choosing it in the Start menu or by double-clicking the AutoCAD 2007 icon on the Windows desktop. To start AutoCAD from the Start menu, choose Start | Programs | AutoCAD 2007 | AutoCAD 2007.

The first time you start AutoCAD, the program displays the Authorization wizard, in which you provide the authorization code to unlock your copy of AutoCAD. You register your copy of AutoCAD and obtain this authorization code from Autodesk, either via the Web or by e-mail, phone, fax, or mail. If you elect to authorize AutoCAD at this time, the wizard guides you through the process, offering options such as connecting to Autodesk’s registration web site, automatically generating an e-mail message, displaying the proper phone numbers, or printing a registration form that you can fax or mail to Autodesk. If you decide to defer this process until a later time, you can begin using AutoCAD now. You have 15 days from the first time you start AutoCAD in which to register and

authorize your copy. The Authorization wizard appears every time you start AutoCAD until you have registered your copy and obtained your authorization code. Once you obtain the code, write it down and save it along with your AutoCAD 2007 CD-ROM, in case you ever need to reinstall the software.

When you start AutoCAD, the program displays the AutoCAD 2007 Today window. This window provides tools to help you start a new drawing, load symbol libraries, access an online bulletin board for design collaboration within your company, and use the Autodesk Point A design portal. You'll learn more about this window later in this chapter (see Figure 1-17). For now, click the Close button to dismiss the AutoCAD 2007 Today window.

The AutoCAD 2007 Today window serves as the default startup dialog box whenever you start AutoCAD or begin a new drawing. If you prefer, you can reconfigure AutoCAD to use a more traditional style startup dialog box, similar to the one used in earlier versions, by changing the Startup setting on the System tab of the Options dialog box

3.4Open Existing Drawings

1. Choose File, OPEN.

or

2. Press CTRL + O.

or

3. Click the OPEN icon.

or

4. Type OPEN at the command prompt.

   Command: OPEN

5. Press ENTER
6. Double Click the desired directory to find the drawing to open.
7. Click the drawing name to open.
8. Click The OK button.

-Preview shows a bitmap image of the drawing selected. This image is the view that was last saved in the drawing. It will not show a preview of drawings saved before R13 AutoCAD.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. _____is the processof starting a computer.
   A. AutoCAD 2007 **C**. booting
   B. Compass D. Options dialog box

2. Which one Explain Starting AutoCAD

   A. double-clicking the AutoCAD 2007 icon on the Windows desktop
   B. Close button to dismiss
   C. appears every time you start
   D. All

Note: **Satisfactory rating – 1.5 points** **Unsatisfactory - below 1.5 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Multiple Chose Test Answer

1._____2._____

Information Sheet-4	Screen display areas and basic parameters

4.1 Screen display areas

is the physical size of the area where pictures and videos are displayed. The size of a screen is usually described by the length of its diagonal, which is the distance between opposite corners, usually in inches. It is also sometimes called the **physical image size** to distinguish it from the "logical image size," which describes a screen's display resolution and is measured in pixels

4.1.1Getting Familiar with the AutoCAD User Interface

Before you can start drawing you need to get familiar with the AutoCAD window. The window below is called AutoCAD User Interface.

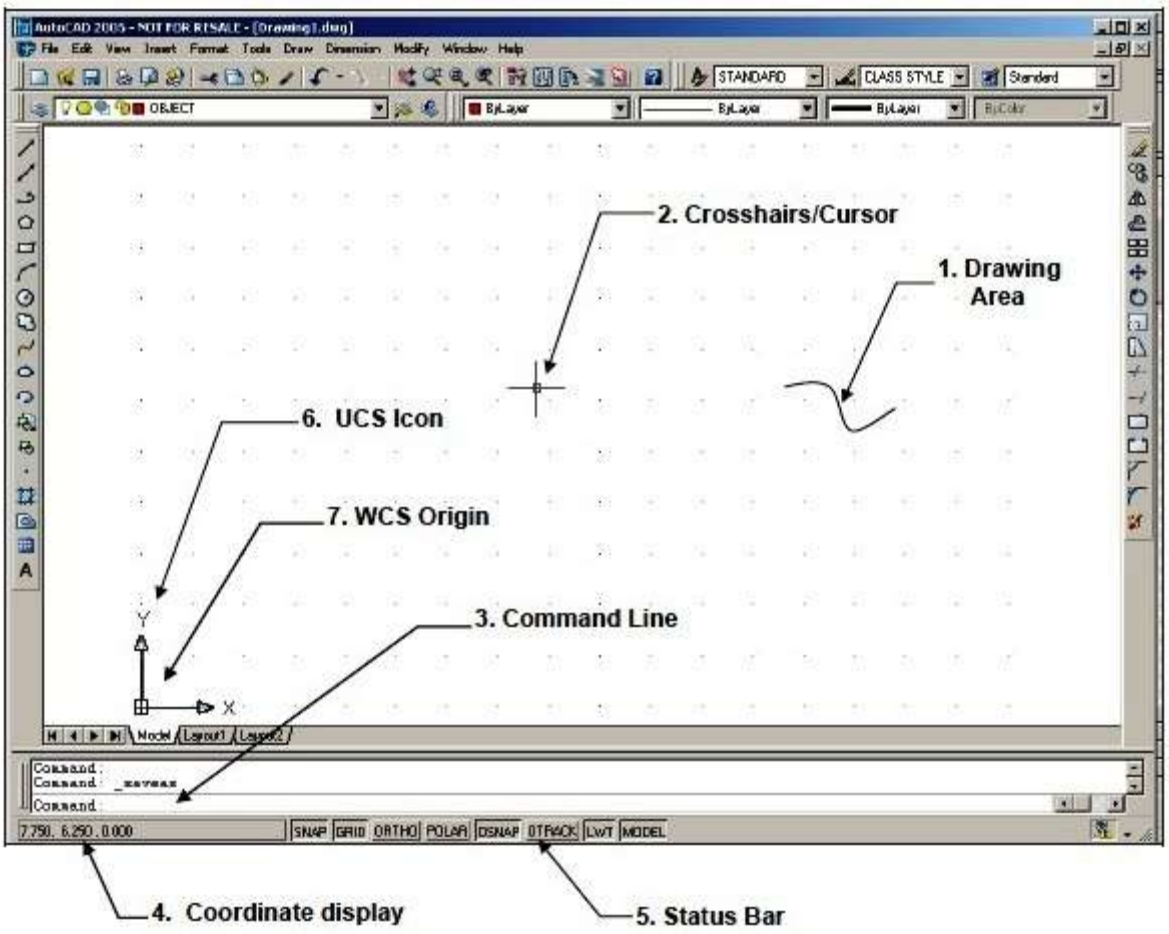


Fig. 4.1 the AutoCAD User Interface

1, DRAWING AREA

Location: The large area in the center of the screen.

This is where you will draw. This area represents a piece of paper. The color of this area can be changed using Tools / Option / Display / Color. The default color for 2007 is white.

2. CROSSHAIRS / CURSOR

Location: Can be anywhere in the Drawing Area.

The movement of the cursor is controlled by the movement of the pointing device such as a mouse. You will use the cursor to locate points, make selections and draw objects. The size can be changed using Tools / Options / Display / Crosshair Size.

3. COMMAND LINE

Location: The three lines at the bottom of the screen.

This is where you enter commands and AutoCAD will prompt you to input information.

4. COORDINATE DISPLAY (F6)

Location: Lower left corner

In the **Absolute mode (coords = 1)**: displays the location of the crosshairs / cursor in reference to the Origin. The first number represents the horizontal movement (X-axis), the second number represents the vertical movement (Y-axis) and the third number is the Zaxis which is used for 3D.

In the **Relative Polar mode (coords = 2)**: displays the distance and angle of the cursor from the last point entered. (Distance<Angle)

5. STATUS BAR

Location: Below the Command Line.

Displays your current settings. These settings can be turned on and off by clicking on the word (Snap, Grid, Ortho, etc.) or by pressing the function keys, F1, F2, etc. See button descriptions below.

[SNAP] (F9)

Increment Snap controls the movement of the cursor. If it is off, the cursor will move smoothly. If it is ON, the cursor will jump in an incremental movement. The increment spacing can be changed at any time using **Tools / Drafting Settings/ Snap and Grid**. The default spacing is .250.

- ✓ **[GRID]** (F7)

The grid (dots) is merely a visual "drawing aid". The default spacing is 1 unit. You may change the grid spacing at any time using: **Tools / Drafting Settings /Snap and Grid.**

- ✓ **[ORTHO]** (F8)

When Ortho is ON, cursor movement is restricted to horizontal or vertical. When Ortho is OFF, the cursor moves freely.

- ✓ **[POLAR]** (F10)

POLAR TRACKING creates “Alignment Paths” at specified angles.

- ✓ **[OSNAP]** (F3)

RUNNING OBJECT SNAP

Specific Object Snaps can be set to stay active until you turn them off.

- ✓ **[OTRACK]** (F11)

OBJECT SNAP TRACKING Creates “Alignment Paths” at precise positions using object snap locations.

- ✓ **[LWT]**

LINEWEIGHT. Displays the width assigned to each object.

MODEL

Switches your drawing between paper space and model space.

6. UCS ICON (User Coordinate System)

Location: Lower left corner of the screen. The UCS icon indicates the location of the

Origin. The UCS icon appearance can be changed using: **View / Display / Icon / Properties**.

7. ORIGIN

The location where the X, Y and Z axes intersect. 0,0,0

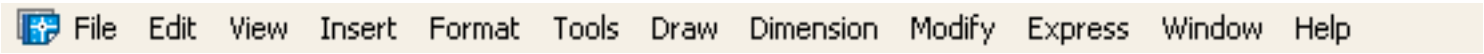
FUNCTION KEYS

- **F1** Help Explanations of Commands.
- **F2** Flip screen Toggles from Text Screen to Graphics Screen.
- **F3** Osnap Toggles Osnap On and Off.
- **F4** Tablet Toggles the Tablet On and Off.
- **F5** Is plane Changes the is plane from Top to Right to Left.
- **F6** Coordinate Display Changes the display from ON / Off /.
- **F7** Grid Toggles the Grid On or Off.
- **F8** Ortho Toggles Ortho On or Off.
- **F9** Snap Toggles Increment Snap on or off.
- **F10** Polar Toggles Polar Tracking On or Off.
- **F11** Otrack Toggles Object Snap Tracking On and Off.

4.2 SPECIAL KEY FUNCTIONS

- **Escape Key** Cancels the current command, menu or Dialog Box.
- **Enter Key** Ends a command, or will repeat the previous command if the command line is blank.
- **Space Bar** Same as the Enter Key, except when entering text.
- **Pull-down "menu bar"**

(1) The pull-down "**MENU BAR"** is located at the top of the screen.



By selecting any of the words in the MENU BAR, a (**2) Pull-down menu** appears. If you select a word from the pull-down menu that has an (**3) Arrow**, a **(4) Sub Menu** will appear. (Example: Draw / Circle). If you select a word with **(5) Ellipsis ...** , a dialog box will appear. (Example: Draw / Boundary…)

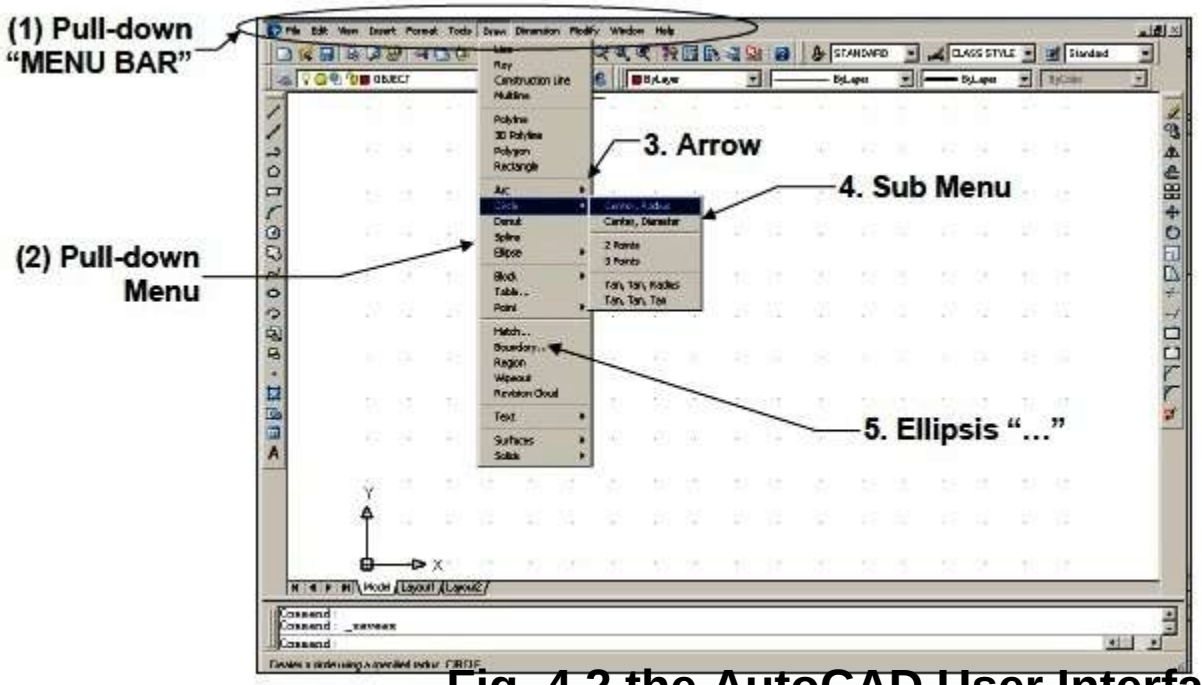
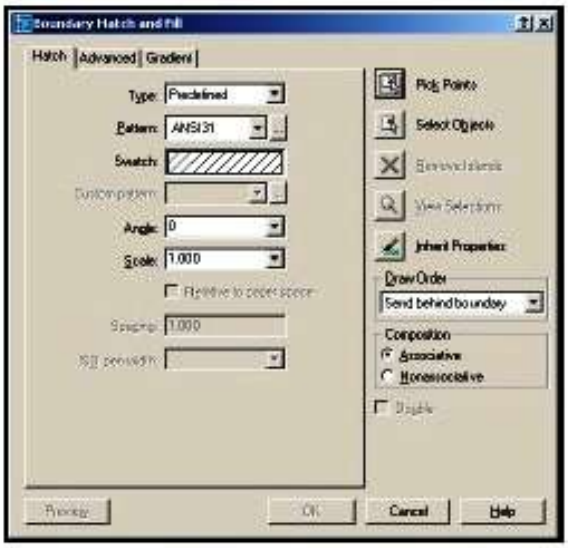


Fig. 4.2 the AutoCAD User Interface

- **Dialog Box**

Many commands have **multiple options** and require you to make selections. These commands will display a dialog box. Dialog boxes, such as the **Hatch** dialog box shown here, make selecting and setting options easy.



- **Fig. 4.3 Dialog Box**

Toolbars

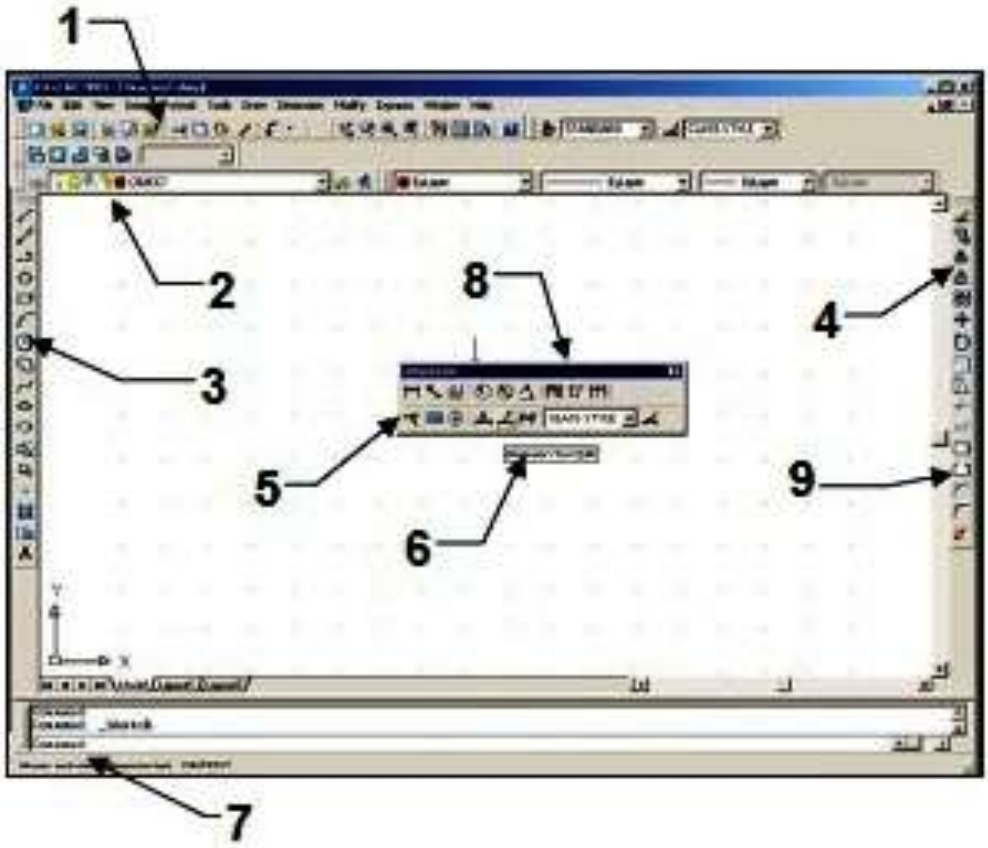


Fig. 4.4 the Toolbars

AutoCAD provides several toolbars to access frequently used commands.

The **(1) Standard**, **(2) Object Properties, (3) Draw, and (4) Modify** toolbars are displayed by default. Toolbars contain **icon buttons (5).**These icon buttons can be selected to Draw or Edit objects and manage files. If you place the pointer on any icon and wait a second, a **tool tip (6)** will appear and a **help message (7)** will appear at the bottom of the screen. Toolbars can be **"floated"** or **"docked". Floating toolbars (8)** move freely in the drawing area and can be resized. **To move,** place the pointer on the toolbar title then hold the left mouse button down, drag to the new location and release the mouse button. **To resize,** place the pointer on the right or bottom edge of the toolbar. When the pointer changes to a double ended arrow, hold the left mouse button down and drag. When desired size is achieved, release the mouse button. **Docked toolbars (9)** are locked

into place along the top, bottom or sides of the AutoCAD Window. **To dock,** place the pointer on the toolbar title, hold the left mouse button down and drag to the top, bottom, or either side of the AutoCAD window. When the outline of the toolbar appears, release the mouse button

Open or Close Toolbars

Many other toolbars are available by selecting **View / Toolbars** from the Pull-down menu. Select the "Toolbars" tab. A list of available toolbars will appear. (A check mark indicates the toolbars that are **"open"**.)

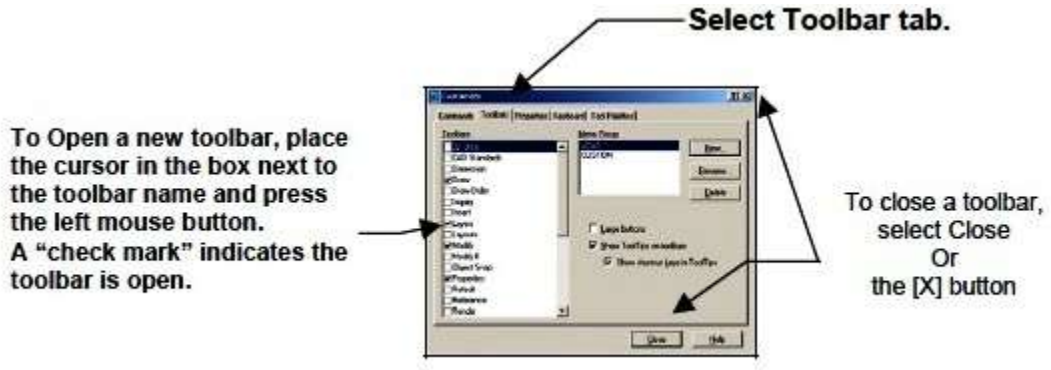


Fig. 4.5 Open or Close Toolbars

- **Palettes**

There are two types of **Palettes** within AutoCAD. The first type has been pre-designed by AutoCAD. An example of a pre-designed palette would be the Properties Palette shown below. This palette will appear automatically when you select the Properties command. The second type is a customizable Palette that you may create to hold frequently used commands, hatch patterns, symbols, etc. (Customizing is in the Advanced Workbook) Palettes may be resized and moved to any location on the screen. They can be docked or float. The Auto-Hide function allows you to collapse the palette when the cursor is away from the palette. When you move the cursor over the Title Bar the Palette will reappear.

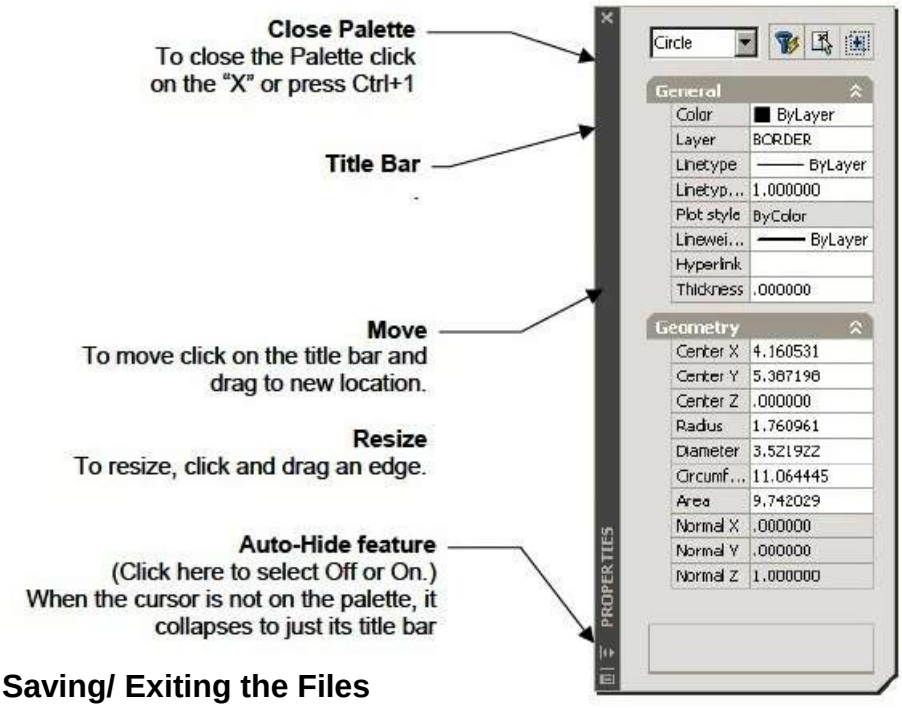


Fig. 4.6Palettes

4.3Opening/ Saving/ Exiting the Files

- ✓ **Saving the template file**

1. Left-click **Save As …** in the **File** drop-down menu or the **Save** icon in the **Quick Access Toolbar** .
2. In the **Save Drawing As** dialog which comes on screen (Fig. 4.21), click the arrow to the right of the **Files of type** fi eld and in the pop-up list associated with the fi eldclickon **AutoCAD Drawing Template (*.dwt)** . The list of template fi les in the **AutoCAD 2009/Template** directory appears in the fi le list.

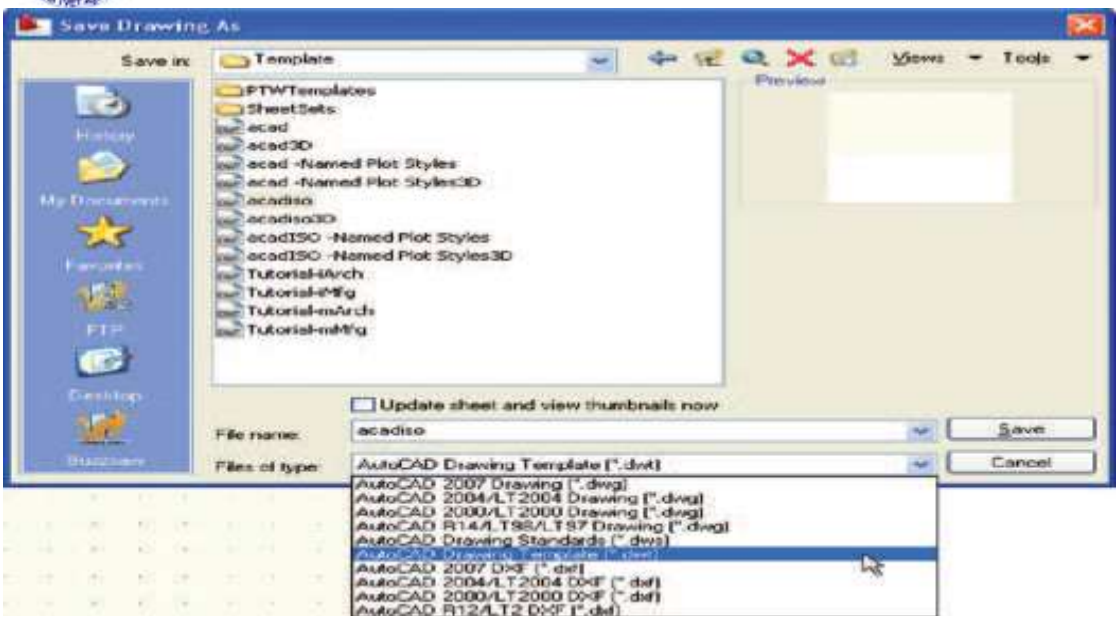


Fig. 4.7Saving the template to the name a cadiso.dwt

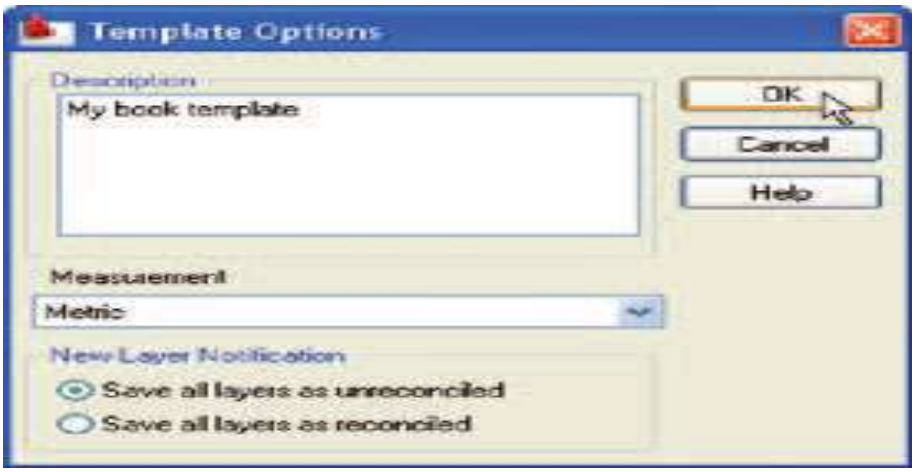


Fig. 4.8 The Template Description dialog

The template can now save to be opened for the construction of drawings as needed.

Now when AutoCAD 2009 is opened again the template **acadiso.dwt**appears on screen.

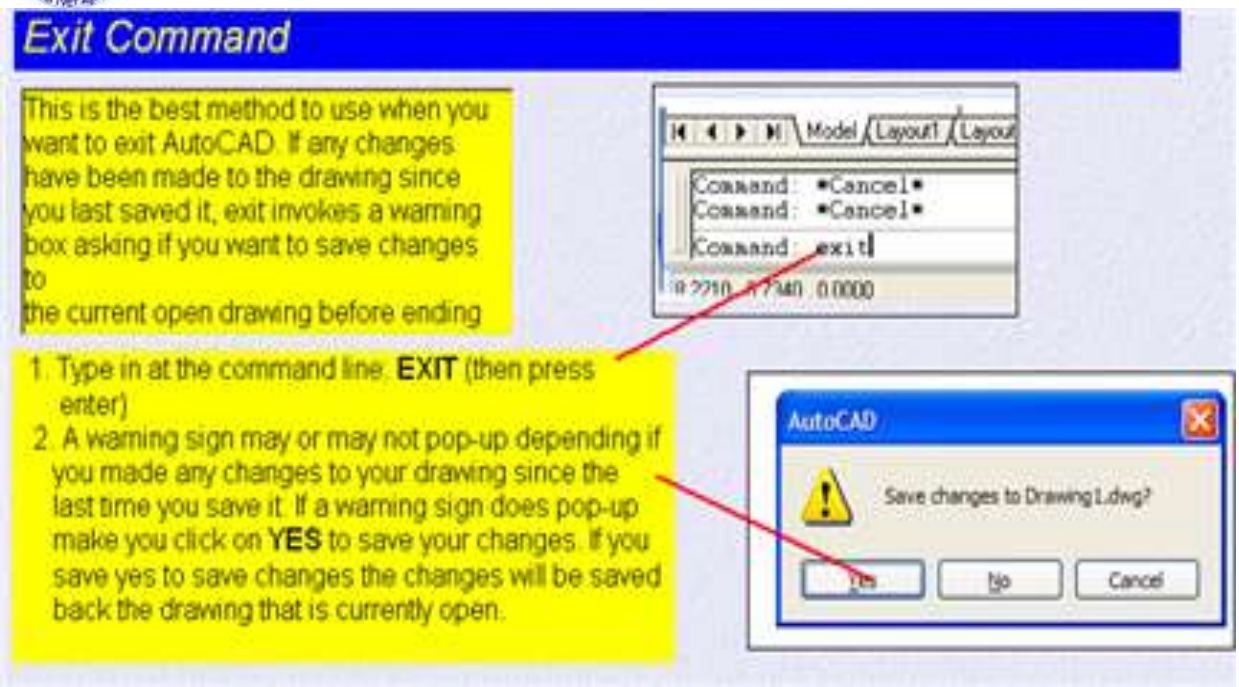


Fig. 4.8 exiting command

ZOOM COMMANDS

COMMAND OPTION	ICON	DESCRIPTION
Zoom All		This option causes AutoCAD to display the whole drawing as far as its drawing limits or drawing extents (whichever is the greater of the two).
Zoom Previous		This option restores the displayed view prior to the current one. For the purpose of this option, up to 10 views are saved so that the last ten views can be recalled. This option includes every time you use the scroll bar, which is one reason to **avoid the scroll bars** for panning a lot in your drawing.
PAN		Panning allows you to quickly move around the drawing area at the same magnification you currently have set. Type in **PAN** (or **P**) <ENTER> and a hand will appear on the screen. Left click and hold to move around your drawing.

Zoom Window		This option (also a 'hidden' default) prompts the user to pick two corners of a box on the existing view in order to enlarge that area to fill the display.
Zoom Realtime		Zoom Realtime provides interactive zooming capability. Pressing <ENTER> (after entering zoom) on the command line automatically places you in Realtime mode. Hold the left mouse button down at the midpoint of the drawing and move the cursor vertically to the top (positive direction) of the window to zoom in up to 100% (2x magnification). Hold the left mouse button down at the midpoint of the drawing and move the cursor vertically to the bottom (negative direction) of the window to zoom out to100% (.5x magnification). *You cannot zoom out beyond the extents of the current view.* When you release the pick button, zooming stops. You can release the pick button, move the cursor to another location in the drawing, and then press the pick button again and continue zooming from that location. To exit Realtime Zoom mode, press <ENTER> or (ESC).

Zoom Object		This option asks you to select an object or objects, then press <ENTER> and the screen will zoom to those objects only. This is great for when you want to work on object.
Zoom In		Clicking this icon will zoom in to the drawing by about 50%. This option is only available as an icon and cannot be invoked by the command line.
Zoom Out		Similar to 'Zoom In' - this icon will zoom out of your drawing and allow you to see about 50% more of your drawing space.
Mouse Scroll	-	If you have a scrolling wheel on your mouse, you can use it to zoom in and out of your drawing. Scroll towards you to zoom out and away from you to zoom in. You have the option to change the amount of zoom per wheel click with the Zoomfactor system variable. Keep in mind that you will zoom in and out using your mouse location as a 'centre point'.

Fig. 4.9 ZOOM COMMANDS

4.4Undo and Redo

Reversesthelastaction.

1. Choose**Edit,Undo**. or
2. Click the Undo icon.  or
3. Press**CTRL+Z**.
4. Type U at the command prompttoundothelastcommand.

   Command:**U**

Redo

Reverses the effects of a single UNDO or U command.

1. Choose**Edit, Redo**. or
2. ClicktheRedoicon.  or
3. TypeREDOatthecommandprompt toredothelastundocommand.

   Command:**REDO**

TIPS:

-UNDO has no effect on some commands and system variables, including those that open, close, orsave a window or a drawing, display information, changethegraphicsdisplay,regeneratethe drawing, or export the drawing in a different format.

-REDOmustimmediatelyfollowtheUorUNDOcommand

DRAW TOOLS

The majority of tools in AutoCAD 2009 can be called into use by any one of the following five methods:

1. Placing the cursor on the tool's icon in the appropriate panel. Figure 3.2 shows the **Polygon** tool selected from the **Home/Draw** panel;
2. With a click on the tool's name in a toolbar. Figure 3.3 shows the **Draw** toolbar. Placing the cursor on the **Polygon** tool icon in this toolbarshows the same tooltip as that shown in Fig. 3.2 ;
3. byclickingon the tool's name in an appropriate drop-down menu. Figure 3.4 shows the tool names and icons displayed in the **Draw** dropdown menu. It is necessary to fi rst bring the menu bar to screen with a click on **Show Menu Bar** in the right-click menu of the **Quick Access Toolbar** (Fig. 3.1);

Fig. 3.1 bringing the menu bar on screen

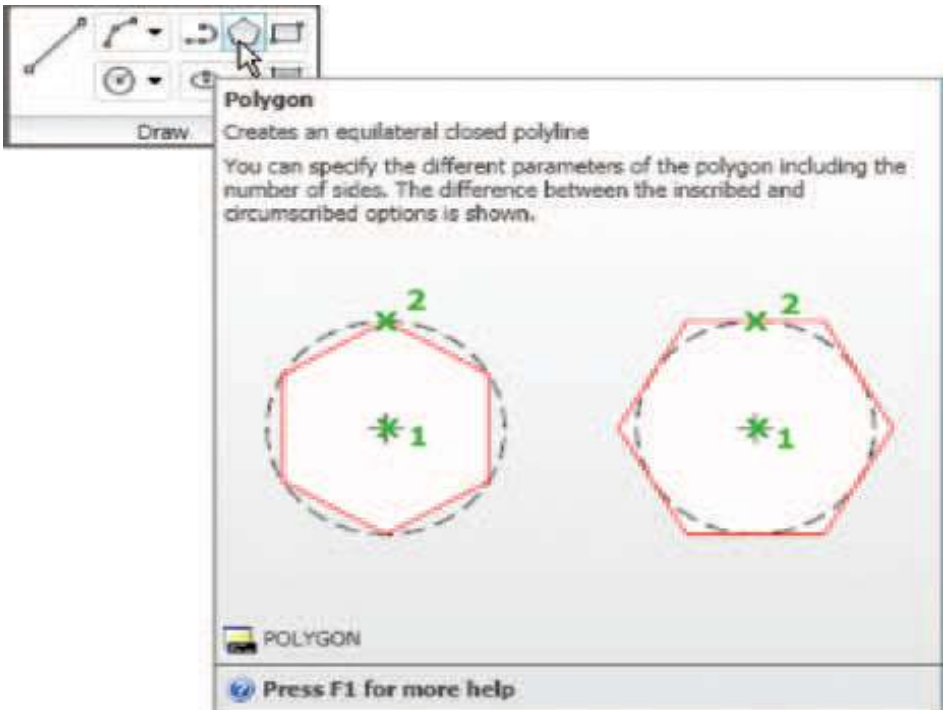


Fig. 4.10The Polygon tool and its tooltip selected from the Home / Draw panel

Fig. 3.3 The tool icons in the D raw toolbar

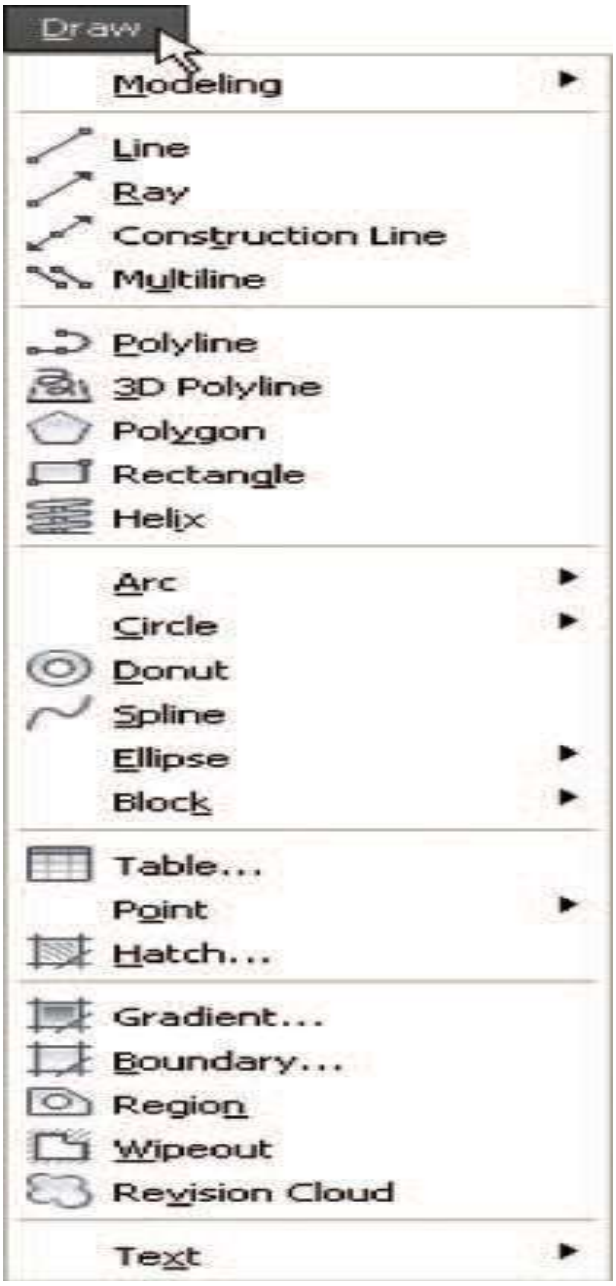


Fig. 4.11the D raw drop-down menu

4. by enteringan abbreviation for the tool name at the command line in the command palette. For example the abbreviation for the **Line** tool is **l** , for the **Polyline** tool it is **pl**and for the **Circle** tool it is **c** ;
5. by enteringthe full name of the tool at the command line.

In practice, operators constructing drawings in AutoCAD 2009 may well use a combination of these five methods.

1.5 Basic parameters

The Basic Parameters rollouts for Standard materials contain controls that let you set the color of your material, the shininess, the transparency, and so on, and specify maps to use for the various components of the material

The first part of the Basic Parameters rollout contains controls for overall material components. They are described in the following topics:

Color Controls let you choose the material's color components, or replace them with maps.

Self-Illumination makes a material appear lit from within.

Self-illumination is not available for the Strauss shader.

Opacity controls how opaque or transparent a material is.

Diffuse Level controls the brightness of the diffuse color component.

Diffuse Level is available only for the Anisotropic, Multi-Layer, and Oren-layer-Blind shades

Roughness controls how quickly the diffuse component blends into the ambient component.

Roughness is available only for the Multi-Layer.

Now that you've learned a lot of the drawing and modifying commands, it's time to go to the next level. This lesson will introduce you to text, dimensioning and the concept of layers. What you will do is take one of your previous assignments, save it to a new name and then add text and dimensions to it. These are the commands you'll be learning.

Command	Keystroke	Icon	Menu	Result
Layer	Layer / LA		Format >Layer	Starts the Layer and Linetype property dialog box
Text	Text	No Icon	Draw > Single Line Text	Creates a single line of text
Dimension	Dim	Many	Dimension > (pick one)	Dimensions previously drawn objects
Scale	Scale / SC		Modify > Scale	Proportionately resizes (or scales) objects

Fig. 4.12 LAYERING

- The first thing you want to do is create three **layers**. Layers are used to organize drawings. Imagine a large project for a high-rise tower. The designers would create layers for the electrical, plumbing, landscape and more. It is necessary to control the drawing and turn some layers off and view only the ones you want. This is one reason why layers are needed.

- You will be creating a layer for the dimensions, one for the lines (objects that were drawn) and another for the text. Start the LAYER command (LA). This will bring up the Layer Properties Manager (shown below). We'll cover the things that are used most often in this lesson.

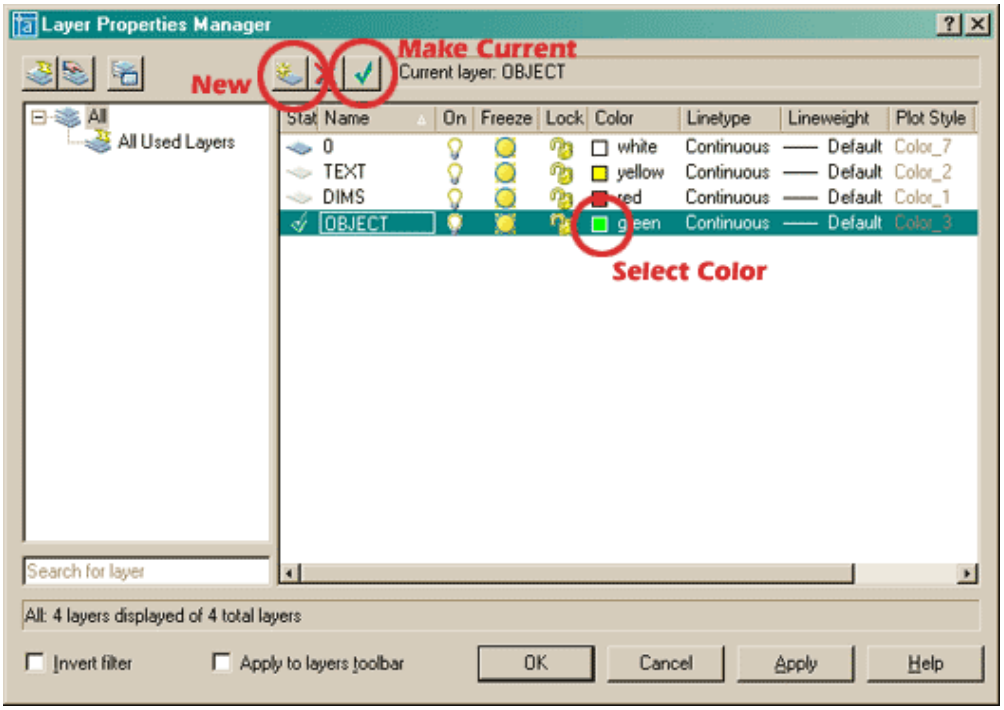


Fig. 4.12This will bring up the Layer

- Looking at the Dialog Box, you will see a lot of information. Notice the button beside **Make Current** on it. Below it is the name of the current layer you are drawing on. The main window gives you information about each particular layer. At this point, you want to be concerned with the 'Name', 'On' (light bulb) and 'Color' (colored square) columns as well as the 'New' button.

More about Layers

In the Layer Properties Manager, you will notice that each layer can have a number of specific properties.

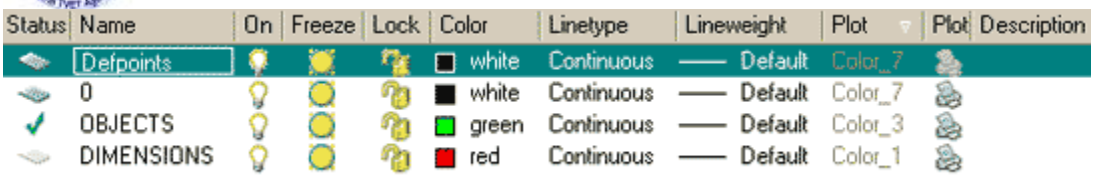


Fig. 4.12 This will bring up the Layer

- **Status**: Displays the current state of the layer. In this example, the green check means that Objects is the current layer.
- **Name**: The name of the layer. Give layers understandable names.
- **On**: If a layer is 'On' it means that it is visible (but objects can still be erased when the 'Select > All option is used).
- **Freeze**: A layer is not visible and cannot be deleted.
- **Lock**: Layer is visible, but cannot be modified.
- **Color**: A specific color for everything on that layer.
- **Line type**: A specific line type (hidden, center, etc) for the layer.
- **Line weight**: The visible width of the objects on that layer.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. One of the following commands is used to return the current deleted drawing /object/.
   a. Undo
   b. Redo
   c. zoom
   d. Save
2. Which one of the following command is used to stored the prepared drawing.
   a. Save
   b. Move
   c. Undo
   d. Zoom
3. The toolbar at the top of the AutoCAD 2008 window is:
   (a) The Draw toolbar
   (b) The Modify toolbar
   (c) The Standard toolbar
   (d) The Properties toolbar
4. The Design Center palette can be opened from the:
   (a) Layer toolbar (b) Properties toolbar
   (c) Modify toolbar **(d)** Standard toolbar
5. Press the F9 key of the keyboard for:
   (a) Grid on/off
   (b**)** Snap on/off

(c) Ortho on/off

(d) Osnap on/off

Note: **Satisfactory rating – 1.5 points** **Unsatisfactory - below 1.5 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Multiple Chose Test Answer

1._____2_____
3_____4_____

Reference

• Prepared by Kathleen Lockhart
• http://www.clker.com/clipart-1912.html
• http://www.psdgraphics.com/psd-icons/psd-mouse-cursor-and-hand-pointer-icons/
• http://weblogs.asp.net/sfeldman/archive/2012/09/10/windows-8-start-menu-button.aspx
• http://en.wikipedia.org/wiki/Computer_file
• https://www.google.com/search?q=computer&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a&channel=fflb#hl=en&client=firefox-a&hs=KOS&rls=org.mozilla:en-US:official&channel=fflb&q=computer&tbs=dfn:1&tbo=u&sa=X&ei=5cFXUPuFILOEygGf1YC4DQ&ved=0CBwQkQ4&bav=on.2,or.r_gc.r_pw.r_qf.&fp=2f3cf7745a05d274&biw=1366&bih=620

ROAD CIVIL WORKS

Level II

NTQF

Learning Guide-16

Unit of Competence: -	**Use Computer Aided Drafting Systems to Produce Basic Engineering Drawings**
Module Title:-	**Using Computer Aided Draft (CAD) Systems to Produce E Engineering Drawings**
LG Code:	**CON RCW2 MO5 LO2-LG-16**
TTLM Code:	**CON RCW2 TTLM 1019v1**

LO2:-Produce a basic Drawing

Instruction Sheet	Learning Guide #16

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Creating and guiding Basic CAD drawings
- Prepare standard Drawings
- reviewing CAD drawings

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- Create and guide Basic CAD drawings are is sought as required.
- prepare Drawings are in accordance with standard operating procedures.
- review As required, CAD drawings are with supervisor and/or other designated staff in accordance with company procedures

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 41.
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet
4. Accomplish the “Self-check 1,Self-check t 2, and Self-check 3” **in page 65, 74, and 101**respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” **in page -75,51,63,and 85**
6. Do the “LAP test” **in page – 102** (if you are ready).

Information Sheet-1	Creating and guiding Basic CAD drawings

1.1 CAD standards matter. We are aware of this. Yet so few of us have taken the time to develop, document, and deploy the CAD standards we desperately need. We have the best intentions—we say we will “get to it when things slow down.” But it just doesn’t happen. The reason is simple—developing CAD standards is hard work.

Never fear. This article gives you the skills to confidently create a full set of CAD standards and help your team of CAD professionals be their best. It outlines the process of installing CAD standards in your company, including knowing when it’s right for you to create standards and identifying which standards are needed. CAD managers, coordinators, and office leaders: learn tried-and-true steps that everyone can put to use, regardless of how busy you are. Looking for an overview of the process? Check out the related article, "The Stages of Developing CAD Standards."

Start at the Beginning
It may seem like an obvious thing to say, “We begin at the beginning,” but exactly where is “the beginning”? Some firms feel that CAD standards rest entirely on the integrity of the DWG and therefore “the beginning” is a point in the drawing. Other believe that a valid standard revolves around the proper application of company processes and therefore work should start with a collection of Best Practice documents.

While both of these approaches are valid, I feel there are only one logical way to begin at “the beginning” and it is not in the drawing or in best practice documents. I believe that the beginning is a point that can only be identified by communicating with a firm’s CAD leaders.

Ask the Tough Questions
Taking time in the beginning to meet with as many available leaders of a firm’s CAD staff is a fantastic starting point for your CAD standard creation efforts. However, while it may be instinctive to meet and discuss the new standard, I recommend these initial meetings revolve around current efforts. Specifically, I think that only by having open communications with CAD leaders can you properly identify the pain points of the current CAD production process. You must meet with the people doing the work to find out what does not work.

Once you have met with the full range of available CAD leaders in your firm and identified a wide collection of pain points you have the beginnings of a road map to your new CAD standard. These are the high points that require immediate, or added, attention in the creation process.

Distilling this information will allow you to identify the single greatest pain point that is hindering production for your CAD staff. This is an ideal point to refer to as “the beginning.” But, just a bit more reflection is required before you can begin work.

What's Beneath “the Beginning”?
For the sake of this example let’s set a hypothetical situation in which you have determined that a common difficulty in your firm is time wasted due to plots with incorrect line weights. You may have decided that the starting point for your CAD standard is the following:

“Standardize plot styles and practices to produce identical plan set plots.”

While this is a very valid thought, you must take a moment to think whether or not plot styles are in fact the cause of lost time. In researching DWG files, you may learn that the actual cause has nothing to do with plot styles, but rather with the colors associated with entities. This could lead to the secondary assumption that “layering standards” are an ideal starting point. However, further examination of several representative projects could determine that while layer configurations are consistent with an existing drawing template, your CAD staff has been modifying individual entities to change the color “by object” rather than “by layer.” This revelation points to an entirely different starting point for your standard, that being a “best practice” issue.

This single example is just one way in which research, reflection, and further examination is absolutely necessary in order to best determine the actual cause of an inefficiency.

Considering the myriad of aspects that could comprise your new CAD standard, it quickly becomes obvious that this communication and examination is essential to the return on investment in the development process. Without this initial hashing and analysis, it is incredibly easy to become derailed and focus effort, and costs, on areas of a CAD standard that will yield reduced, or ineffective, results.

Take the time to properly identify the areas of your new standard that will yield the greatest impact in the shortest amount of time!

The First Milestone
If you have properly identified your first pain point of production, then you are at a very enviable stage where you can confidently report to your management, or supporters, the following:

A full listing of management stakeholders who will oversee what aspects of the new standard
A wide list of areas that require focus in the development of your standard
A general breakdown, or roadmap, of how your standard will be developed so initial efforts have the greatest impact
The area identified as the cause of the greatest hindrance to CAD production
This report to your stakeholders marks your first milestone and cements the effort to properly begin the process of creating a new CAD standard for your organization. It is also a major step in building confidence in your stakeholders that the efforts to develop a new standard are not aimless or misguided. Once apprised of your progress, your stakeholders may have input to add. Once everyone aware of the direction the work is going, it is time to move on.

Beyond the Beginning

Due to the nearly endless aspects of CAD work, and therefore CAD standards, it would be impossible to identify ALL the possible directions that a new CAD standard can go. The possibilities are almost infinite. In addition, I feel that any person selected as the coordinator of an organization's standard should have extensive CAD experience from which they can draw on to know the minutia making changes such as layer color in order to set up an ideal drawing.

That being said, there is no reason that a helpful (but by no means "complete") list of possible items to include might not be helpful! The following is a list of the most common items included in general CAD standards and therefore will probably show up on your roadmap to a new standard:

File Structure—Too many organizations do not take the structure and integrity of their data seriously enough. A standard file structure for CAD drawings that categorizes existing, proposed, survey, and record drawing files is essential. This reduces the time it takes to find needed files. This is especially true after long periods of time pass between project phases.

File Naming Standard—A standard convention for CAD naming is essentially to easily and confidently identify drawings in large drawing sets. Mistakenly opened drawings files require rendering time to initially "open," and that time does add up! Remember, time is money!

Layering Standard—Layering is essential to drawing files, both large and small. Establishing conventions for nomenclature, color, and visibility are just a few ways to create a standard that can be relied on throughout your organization. And do not forget the layer descriptions!

Annotation Standard—Codifying the specifics of text in drawings is essential to the continuity of a plan set. Plan sheets with varied font styles, orientations, colors, dimension styles, and leader callouts rob your organization of the professional impression it deserves!

External Reference Standard—While external references and data shortcuts can be huge timesavers, improperly applying them could cause issues. The most common issue being "circular references" in which external references have multiple, nested, entries in a single drawing file. Establishing a best practice of inserting external references as "overlay" objects is a quick and reliable fix.

Plot Standard—No matter how detailed and thorough a drawing file may be, until it is shared with building or manufacturing professionals it is just so many lines on a screen. Since most plan sets are still shared in print, it is very important that any organization have a single or standardized set of plot files that can be relied on to accurately produce reliable and prints with accurate lineweights and colors.

Again, this is by no means a complete list. Nor is it a detailed direction of "how to change layer colors" or other minutia. The wealth and depth of information on the Internet and in resources available for purchase more than covers those deep, detail needs.

The Shape of Standards

Since a CAD standard has a variety of aspects that require attention and different approaches, it only makes sense that the standard itself would be comprised of various forms of documentation. These can take several forms that include:

Drawing Templates—“Seed” files that are used to set initial, standardized configurations, of CAD drawings that speed production
Best Practice Documents—Written documents that catalog and detail an organization’s approved method for CAD production
Detail Libraries—Standardized, reusable CAD drawings that represent water, paving, structural, and other design details that are used across multiple projects for greater design information
Drawing Templates
Drawing templates are CAD drawing files that end in the file extension “DWT” and are used to store preferred settings for DWG files. When beginning a new DWG file, a template can be selected as a “seed” that AutoCAD and other CAD products will use to create a new file with all of the DWTs pre-defined aspects. These can include layer standards, plot configurations, annotation styles, and many other details.

Obviously this can be a great time saver, but more importantly it creates a method of standardizing these drawing features with little to no effort. Therefore, DWT files are essential for inclusion in any CAD standard.

As fantastically helpful as the DWT file can be, it does not have to be difficult to create. The process is as simple as taking a drawing based on the existing DWT in use, making the desired changes, and saving the file as a “Drawing Template” for future use.

Once created, drawing templates should be stored in a designated location accessible to all production CAD staff. This highlights the importance of document file locations and file structures so all involved parties can be confident that they can find the needed template. A template that can’t be found won’t be used!

Best Practice Documents
Along with drawing templates, best practice documents are essential to the successful creation of any CAD standard. It is not enough to “set things up” if you do not properly document the steps involved in the approved production process for an organization.

Essentially, a “best practice” is a well-thought-out “how to” document. It should take a single process and distill it into the individual steps required to take the selected task from beginning to end.

Best practice documentation can take the form of something as simple as a bullet list of steps, consisting of just a few words each. However, truly effective documents will present a single task in a way that explains not only the steps involved in the process, but also its concepts. In addition, the process information should be presented in a manner that is equally useful for both novice and experienced production staff.

The best practice example presents a sample document that has sections that explain the concept, the step-by-step process, a checklist, and a workflow diagram. While more effort is required for this type of approach, such a document is universally applicable for both new and experienced users.

The result is that, when correctly, a best practice document should only have to be created once, then maintained routinely. The cost savings should be obvious to anyone questioning time spent creating these assets.

Detail Libraries
Standardized detail libraries, in addition to drawing templates and best practice documents, are key to the success of any nascent CAD standard. This single, simple innovation in your production practice can yield a massive return on investment in terms of wasted billable hours, resulting in increased effectiveness for your team.

The reason it is necessary to create a standardized detail library which is, in turn, made available to all production staff is a matter of multiplication, rather than simplification. If a company has even the simplest detail, for example a fire hydrant, and has 10 offices then there is a strong likelihood of duplicated effort. Why would anyone reinvent the wheel, let alone do it 10 times? Even if the duplicated effort were assumed to be half, that is still 4x the additional billable hours to recreate a single detail.

Now multiply that wasted time by the number of details in any given design firm. The scope of wasted time quickly becomes staggering. Still, the waste does not end there. The practice of maintaining multiple instances of detail drawings creates an ecosystem that all but guarantees errors in maintenance. Multiple instances of details that differ from one another are not very standard. Standardizing the full set of details across all office locations is the only sure way to put an end to all of this waste.

As with most aspects of any CAD standard, the exact details of how you choose to organize the detail library for your organization will vary. However, there are some basic steps involved with standardizing any existing collection of CAD details:

Collect all multiple instances of existing details
Review the full collection and select the best, most suitable file
Check the line work
Eliminate duplicate line work
Convert connected lines into single polylines
Check hatches
Check the text
Check font styles and sizes
Convert all existing text to Mtext and spell check
Check all callouts and dimensions for accuracy
Verify layering
Verify justification
Check the layers
Reduce existing layers to bare minimum
Normalize layer settings and nomenclature
Enter layer descriptions

Check the detail's insertion point
By following the above checklist, you can quickly reduce the intimidation factor of such a daunting task. Soon you will have a collection of similarly formatted detail drawings that will work in your projects.

As a final tip, examine the physical size of the detail in relation to the intended sheet size and adjust the size accordingly to insure it will fit with the standard border in use. Also, I deeply recommend a separate title block with a detail grid to avoid cluttered detail sheets. This grid should have standardized spacing for details and all details should be set to fit into one or more grid spaces, but never more than one detail per space.

Deploying the CAD Standard
Whatever route and specifics you choose to follow in the quest to develop a CAD standard for your organization, eventually there comes a time to release the standard into the wild. And to do that, you need to have a plan.

The Deployment "Meta-Standard"
But first, you should be prepared to document the process that you follow to release your standard. Think of this as either a best practice, or a "meta-standard" for releasing standards.

Your release process, or best practice, does not have to be elaborate. In fact, a single page, or electronic document could satisfy your entire need here. Naturally, the more detail that is included, the better. Still, since this best practice is intended only for your own use, being sparse is acceptable.

Things to document in your deployment notes include:

Server directory location(s) to be deployed to or updated
Necessary support paths to be added to workstation installations
List of deployed standards and / or detail libraries
Last update date
Contact information for CAD leaders to be notified on updates
Any special log-in credential required
Date of next schedule update
See, that isn't so bad. Now, store that sheet of information in a safe place where it can be easily found.

Releasing the Standard
Now that you have all your notes collected to one sheet, it is time to deploy the CAD standard files. This can happen in one of two ways based on the material that you are releasing.

If the material being released is a document, such as an actual best practice PDF, then it would be best to post that information to an intranet page. SharePoint or a password-protected site operated by your organization will serve well for this. If you do not have access to such a resource, then post

your PDF files to a server location available to everyone who needs access to the documents. Follow that placement with an email message to your team of CAD leaders and all CAD production staff.

If the material being release is a library of detail drawings, then these must be saved to a server location that is accessible to everyone who will use them for production. This process should include you deleting the previous detail library directory and replacing it with a fresh instance copied from a safe, reliable seed source. This will ensure that any files that may have been altered, or “improved,” by well-meaning staff are reset to their approved release versions.

Following the copying of the detail files to the server locations, an announcement should be posted. This can either be made on an intranet site, like SharePoint, or via email. The announcement should include a full list of details identifying any new or altered detail drawings. In the case of alterations to files, it should be noted what changes were made

Self-Check -1	Written Test

1. CAD standard has a variety of aspects that require attention and different approaches
(a) true
(b) false

2. Standardized detail libraries, in addition to drawing templates and best practice documents, are key to the success of any nascent CAD standard

(a) true
(b) false
.

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**
You can ask you teacher for the copy of the correct answers.

Multiple Chose Test Answer

Score = _____
Rating: _____

Name: _____
Date: _____

Short Answer
.1_____
2._____

Information Sheet-2	Prepare standard Drawings

Drawing entity line

Lines can be constrained to horizontal/ vertical by the ORTHO commands. CLOSE option uses the starting point of the first line segment in the current LINE command as the next point.

For more information watch on internet
https://www.youtube.com/watch?v=Swxy-ZOtunI

1. Absolute Co-ordinate system Lines can be drawn using co-ordinate system (rectangular Cartesian co-ordinates). To draw a rectangle (Fig. 21.4a):

Command : LINE
From point: 10, 20 ↲
To point: 40, 20 ↲
To point: 40, 60 ↲
To point: 10, 60 ↲
To point:↲

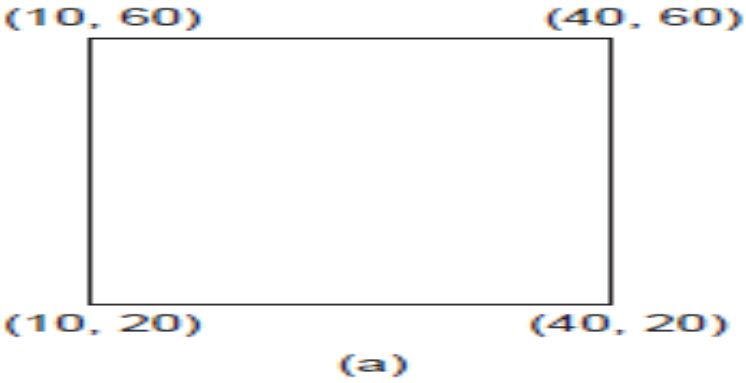


Fig. 2.1 Absolute Co-ordinate system

2. Relative co-ordinate system It is also possible to specify the co-ordinates in the incremental format as the distances from the current cursor position in the drawing area. The distance is specified by using the @ parameter before the actual value. To construct a triangle of given altitude (30) and base (40) (Fig. 21.4b):

Command : LINE
From Point: 10, 20 ↲
To point: @ 40, 0 ↲
To point: @ – 20, 30 ↲
To point: ↲

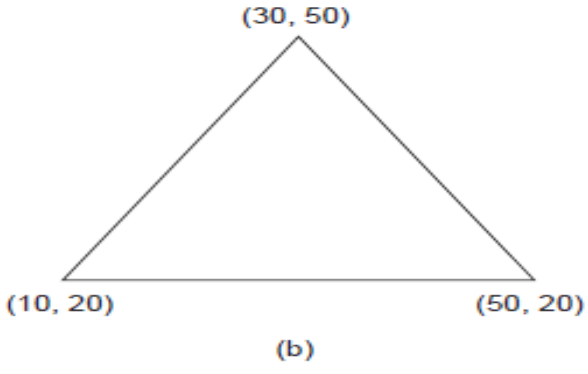


Fig. 2.2 Relative co-ordinate

3. Polar Co-ordinate System It is also possible to specify the point co-ordinate using the ploar co-ordinate format. To construct a hexagon (Fig. 21.4c) of side 30:
   Command : LINE
   From point: 10, 20 ↵□(A)
   To point: @ 30<0 ↵□(B)
   To point: @ 30<60 ↵□(C)
   To point: @ 30<120 ↵□(D)
   To point: @ 30<180 ↵□(E)
   To point: @ 30<240 ↵□(F)
   To point: close

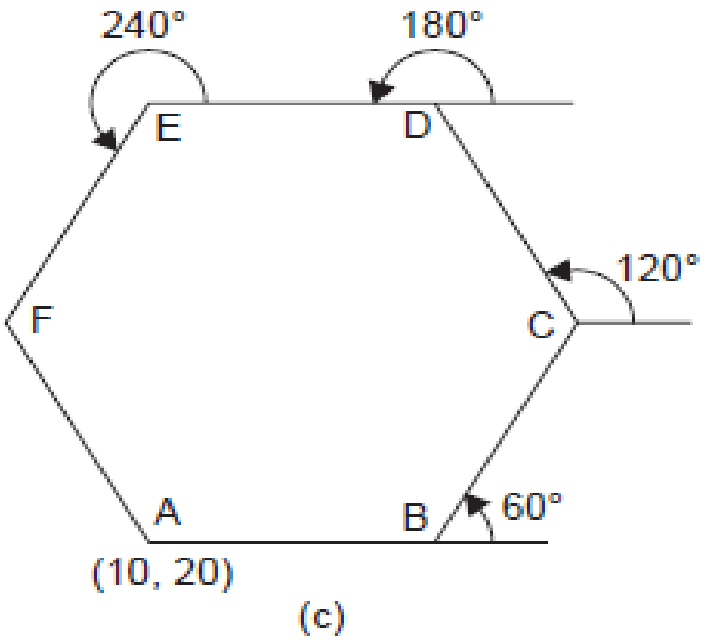


Fig. 2.3 Polar co-ordinate

4. Direct distance entry
   In this method, the points are located to draw a line using the distance entry in the direction of the cursor. Consider the following example to generate the drawing given.
   Command : LINE [ortho on]
   Specify the first point : 20,20 move mouse horizontally right
   Specify next point or [undo] : 60 move mouse vertically up
   Specify next point or [undo] : 30 move mouse horizontally left
   Specify next point or [undo] : 40 move mouse vertically up
   Specify next point or [undo] : 20 move mouse horizontally left

Specify next point or [undo] : 50 move mouse vertically down
Specify next point or [undo] : press enter to complete the drawing

Drawing entity ellipse

This command allows one to draw ellipses or egg shaped objects. From Release 13 onwards, ellipse is treated as a separate entity. The methods available for making ellipses are:

1. By means of axis end points: (Fig. 21.5a)

Command : ELLIPSE <axis end point 1>/ center: point ↵
Axis end point 2 : (point) <other axis distance>/ Rotation:

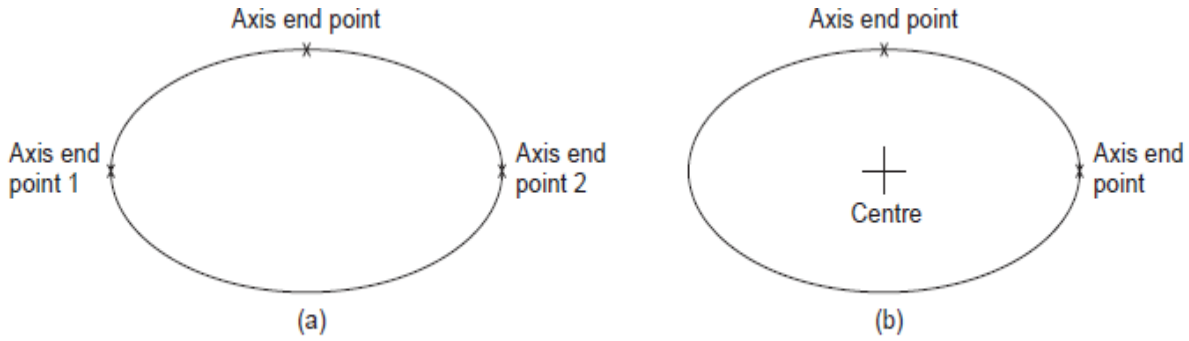


Fig. 21.5

Now, if the distance is entered, AutoCAD interprets it as half the length of the other axis.

2. By means of centre, axis end points (Fig. 21.5b)

Command : ELLIPSE <axis end point 1>/ centre: C ↵
Centre point and one end point of each axis should be provided for the response of the AutoCAD.

Drawing entity polygon

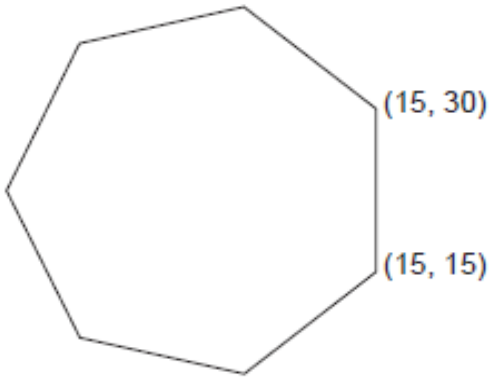
This option permits to make/draw polygons from 3 to 24 sides in a number of ways:

1. For making inscribed/circumscribed polygon with a side parallel to x-axis: (Fig. 21.6a, b)
   a. Inscribed
   b. Circumscribed

Command : POLYGON
Number of sides : 8
Edge/ <centre of polygon> : 100, 200 ↵
Inscribed / circumscribed about a circle (I/C) : I or C ↵
Radius of circle : 80

2. With edge option, specifying the size of the edge and orientation: (Fig. 21.7)

Command : POLYGON
Number of sides :



7
Edge/<center of polygon> :
First end point of edge :
Second end point of edge :

Fig. 21.7

The above and various other entities that can be used for making an AutoCAD drawing may also be selected from the tool bar.

Drawing entity rectangle

A rectangle is a polygon based on two opposite corner points, known as diagonal points (Fig. 21. 8).

Command : RECTANGLE
First corner: 10, 15 ↲
Second corner: 60, 50 ↲

Or from the tool bar menu icon, the pointing device can drag the rectangle and the rectangle can be completed.

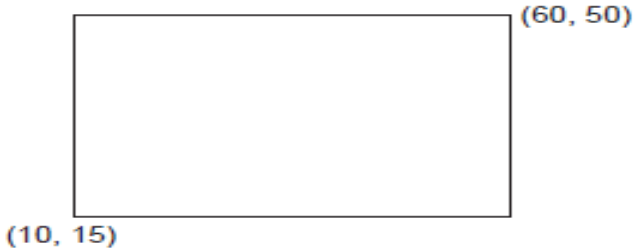


Fig. 21.8

Drawing circles

Circle command offers several methods for drawing circles, the default being to choose a centre point and enter or pick a diameter or radius (Fig. 21. 9).

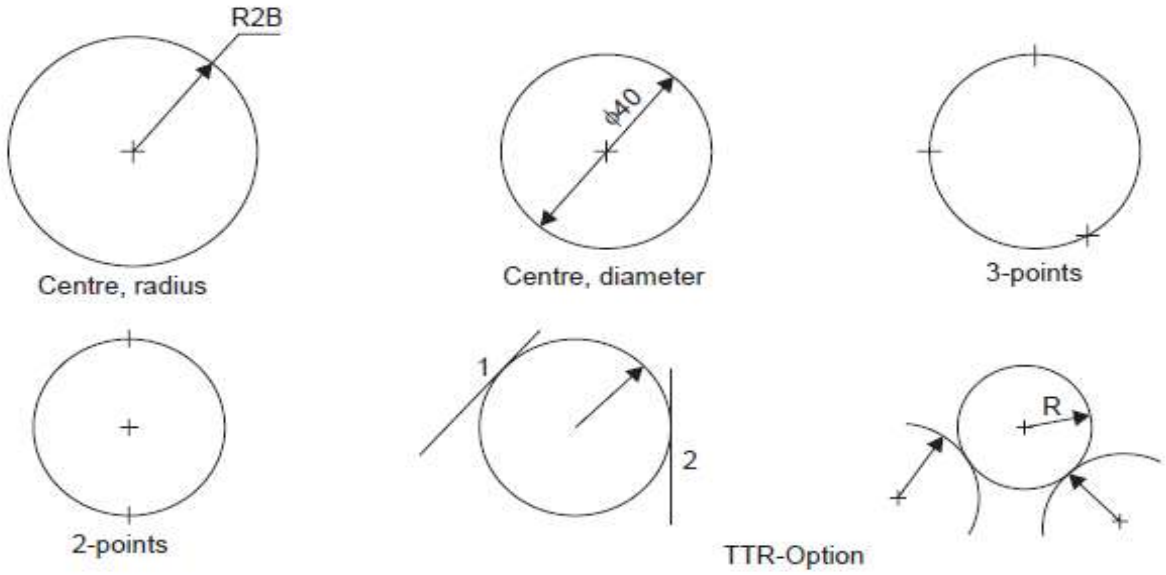


Fig. 21.9

Command : CIRCLE

1. 3P/ 2P/ TTR/ <center point> : Pick a center point or enter an option
2. Diameter/ <Radius><current default> : select D or R
3. 3P (3 point) option: one is prompted for a first, second and third point. The circle will be drawn to pass through these points.
4. 2p (2 point) option: one is prompted for the selection of two points which form the opposite ends of the diameter.
5. TTR option: allows one to define a circle based on two tangent points and a radius. The tangent points can be on lines, arcs or circles.

Drawing entity Arc

Arc command permits to draw an arc, using a variety of methods.

Command : ARC

1. Centre/ <start point>: pick a start point using mouse or select C for more options.
2. Centre/End/ <second point>: pick a second point of the arc or select C, if option is C.
3. Angle/length of chord/end point: pick end point of the arc, if option is E.
4. Angle/Direction/Radius/ <center point>: pick end point of the arc or specify the option. Options (Fig. 21. 10.)

✓ Angle — “included angle” prompt appears, to enter the value.

✓ Centre — enter the location of an arc’s center point-at the prompt center-pick a point,

- ✓ Direction - enter a tangent direction from the starting point of an arc. At this prompt, pick a point with cursor.
- ✓ End — at this prompt, pick the end point of the arc.
- ✓ Length — enter the length of a arc's chord. At this prompt, enter a length or drag and pick a length with cursor.
- ✓ Radius — at the prompt "radius", enter a radius value.
- ✓ Start point — enter the beginning point of an arc.

Object selection

Editing capabilities are the most useful part of AutoCAD system, by making use of the already existing drawing. For the purpose of editing an object, it is necessary to make selection of the objects in the drawing. There are various options available for the selection of an object:

1. Pick box—the cursor is converted to a small box/square, called pick box. By pressing the left button of the mouse when the pick box touches an entity, the object can be selected for editing.
2. Window option—a single or group entities can be selected by bringing them fully inside a rectangular window. Entities, which lie only partially inside the boundaries of window, will not be selected. Rectangular window may be created by picking the first corner, by pressing the left button and then moving the mouse to the desired position of diagonally opposite corner. Selection of the object is complete, by pressing the button again.

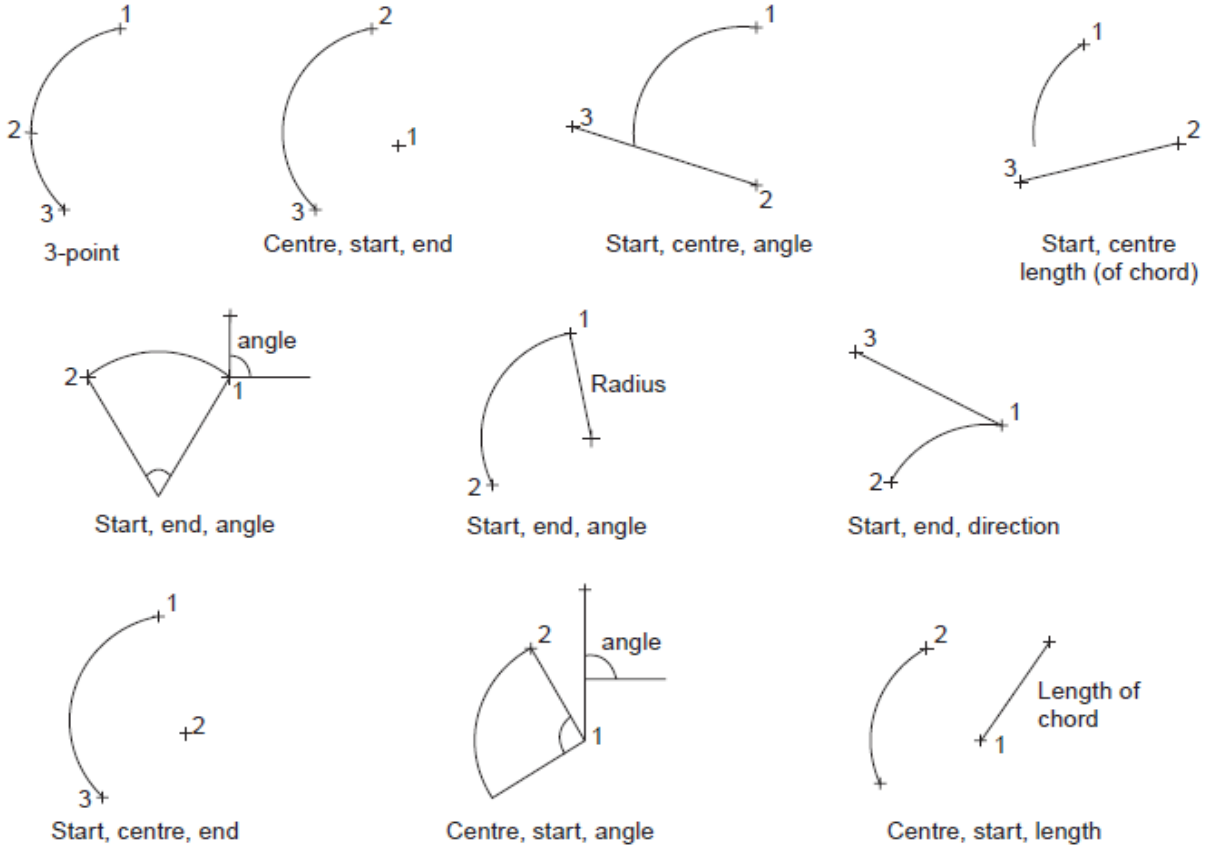


Fig. 21.10

HATCHING

There are a large number of hatch patterns available when hatching drawings in AutoCAD 2009. Some examples from the Other Predefined set of hatch patterns (Fig. 8.2) in the Hatch Pattern Palette Other hatch patterns can be selected from the ISO or ANSI hatch pattern palettes, or the operator can design his/her own hatch patterns and save them to the Custom hatch palette.

First Example – hatching a sectional view (Fig. 8.3)

Figure 8.3 shows a two-view orthographic projection which includes a sectional end view. Note the following in the drawing:

1. The section plane line, consisting of a centre line with its ends marked A and arrows showing the direction of viewing to obtain the sectional view.
2. The sectional view labeled with the letters of the section plane line.
3. The cut surfaces of the sectional view hatched with the ANSI31 hatch pattern, which is in general use for the hatching of engineering drawing sections.

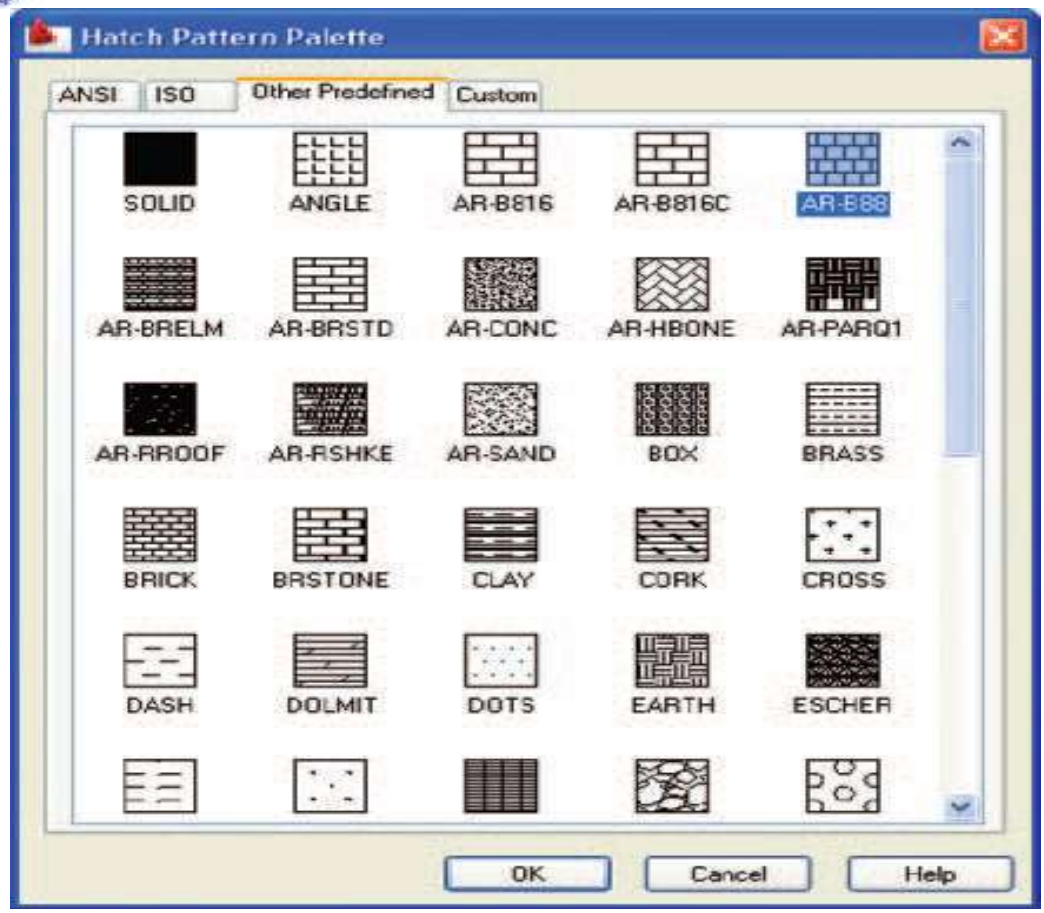


Fig. 2.6 the Other Predefined Hatch Pattern Palette

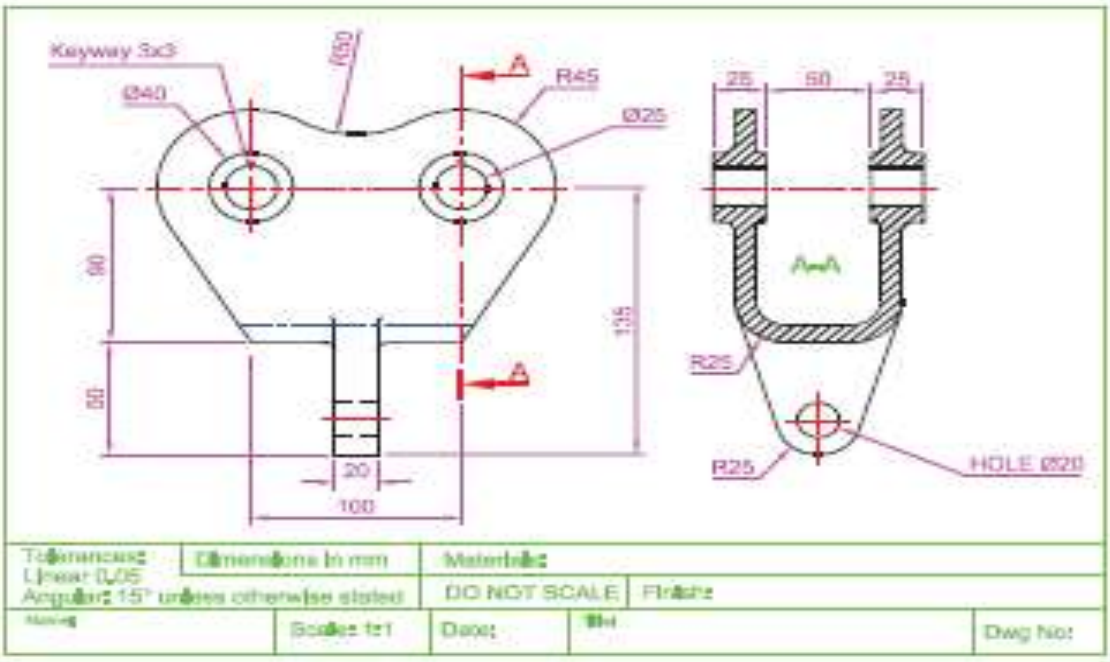


Fig. 8.3 First example – **Hatching**

Self-Check 2	Written Test

Short Answer Questions

1. When entering absolute coordinate numbers at the command line, the coordinates are preceded by:

   (a) The letter a

   (b) The symbol @

   (c) The letters ab

   (d) There is no need to enter anything in front of the coordinate numbers

2. The command line abbreviation for the Circle tool is:

   (a) cir

   (b) c

   (c) ci

   (d) cl.

3. Associative hatching is a term given to:

   (a) Types of hatching which can be joined together

   (b) Hatching which is associated with the colour of the area being hatched

   (c) Hatching which is associated with objects which are moved within a hatched area

   (d) Hatching which is associated with a hatched area from another part of a drawing.

4. The Hatch and Gradient dialog can be called to screen:

   (a) By clicking the Hatch tool icon in the Draw toolbar

   (b) By entering the abbreviation h at the command line

   (c) By entering hatch at the command line

   (d) By any one of the choices as given in a., b. or c.

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**
You can ask you teacher for the copy of the correct answers.

Multiple Chose Test Answer

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer

.1_____

2. _____

_____

Operation Sheet 1	**Detail drawing**

Procedures for ----------

Procedure:

Step 1- Start auto CAD

a. Start--- all program----auto desk---auto CAD. Or
b. Double click on CAD icon on the desk top. Or
c. Right click on CAD icon ---- open

Step 2- Display the necessary tool bars

d. Draw tool bar
e. Modify tool bar
f. Standard tool bar

Step 3- Make adjustment the necessary information

g. units,
h. drawing limits,
i. dimension style,
j. layers, etc...

Step 4- Prepare the given drawing or project.

Step 5- Stored your drawing /save/

Step 6- Print the prepared drawing /out put/

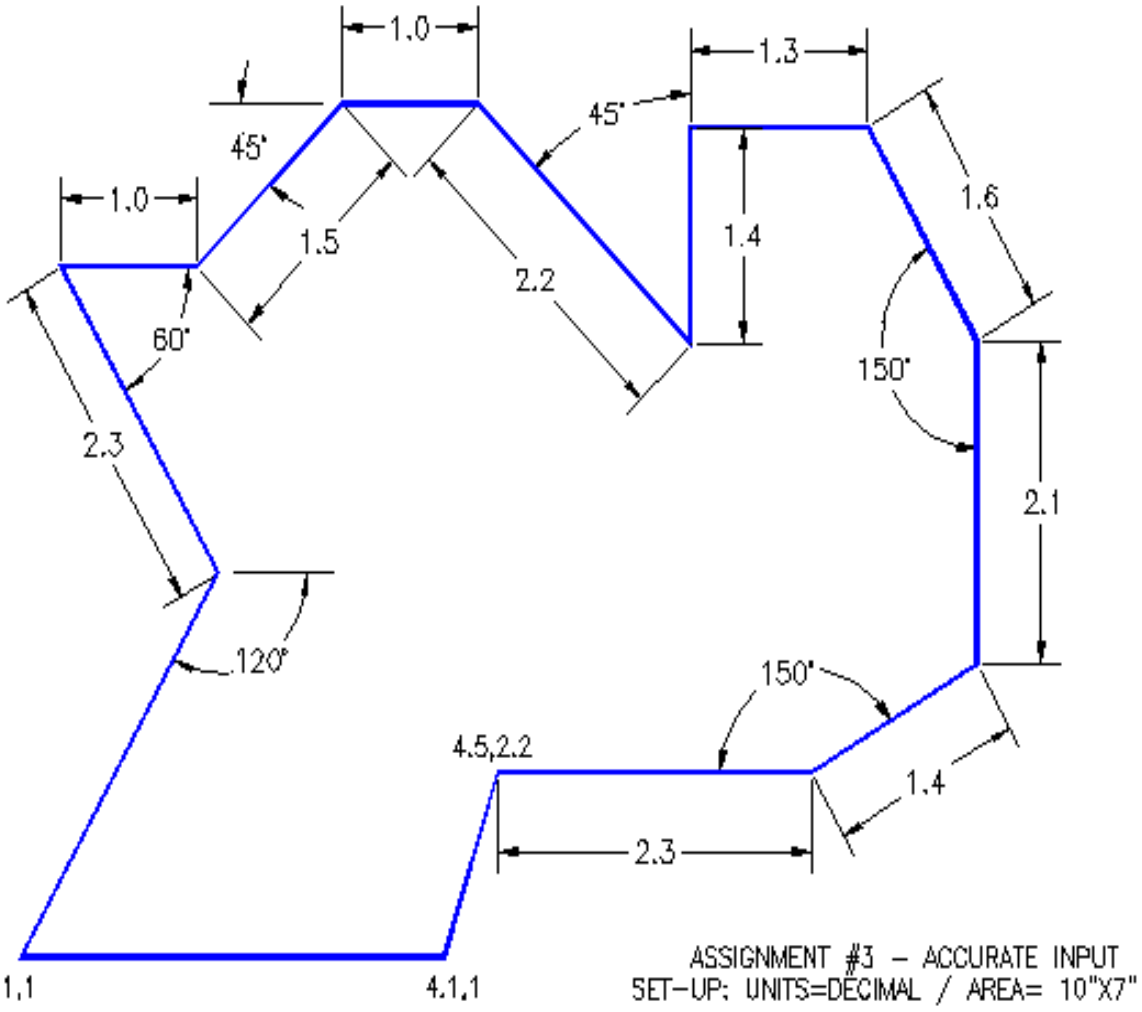


Fig. 2.7engineering drawing

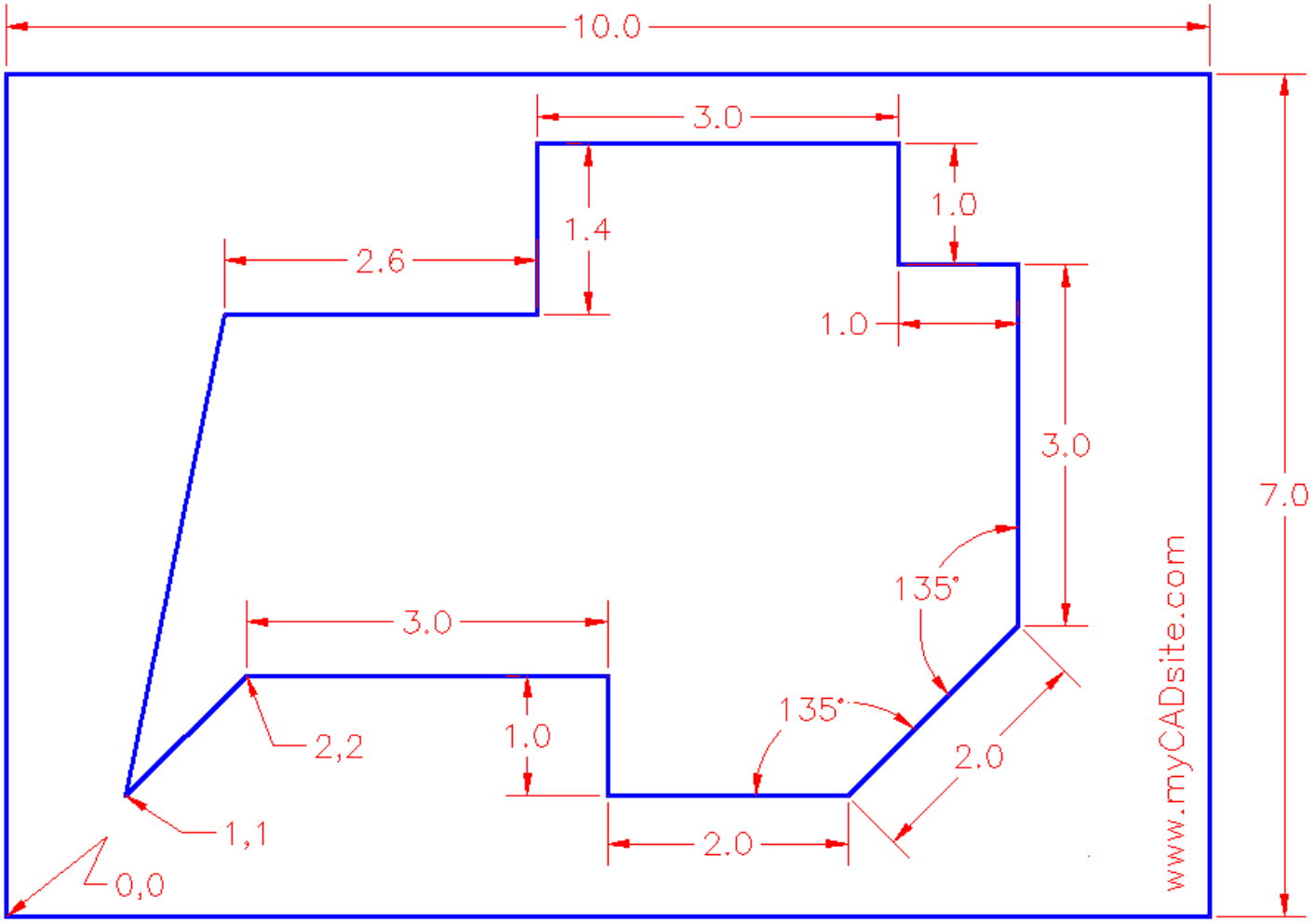


Fig. 2.8 engineering drawing

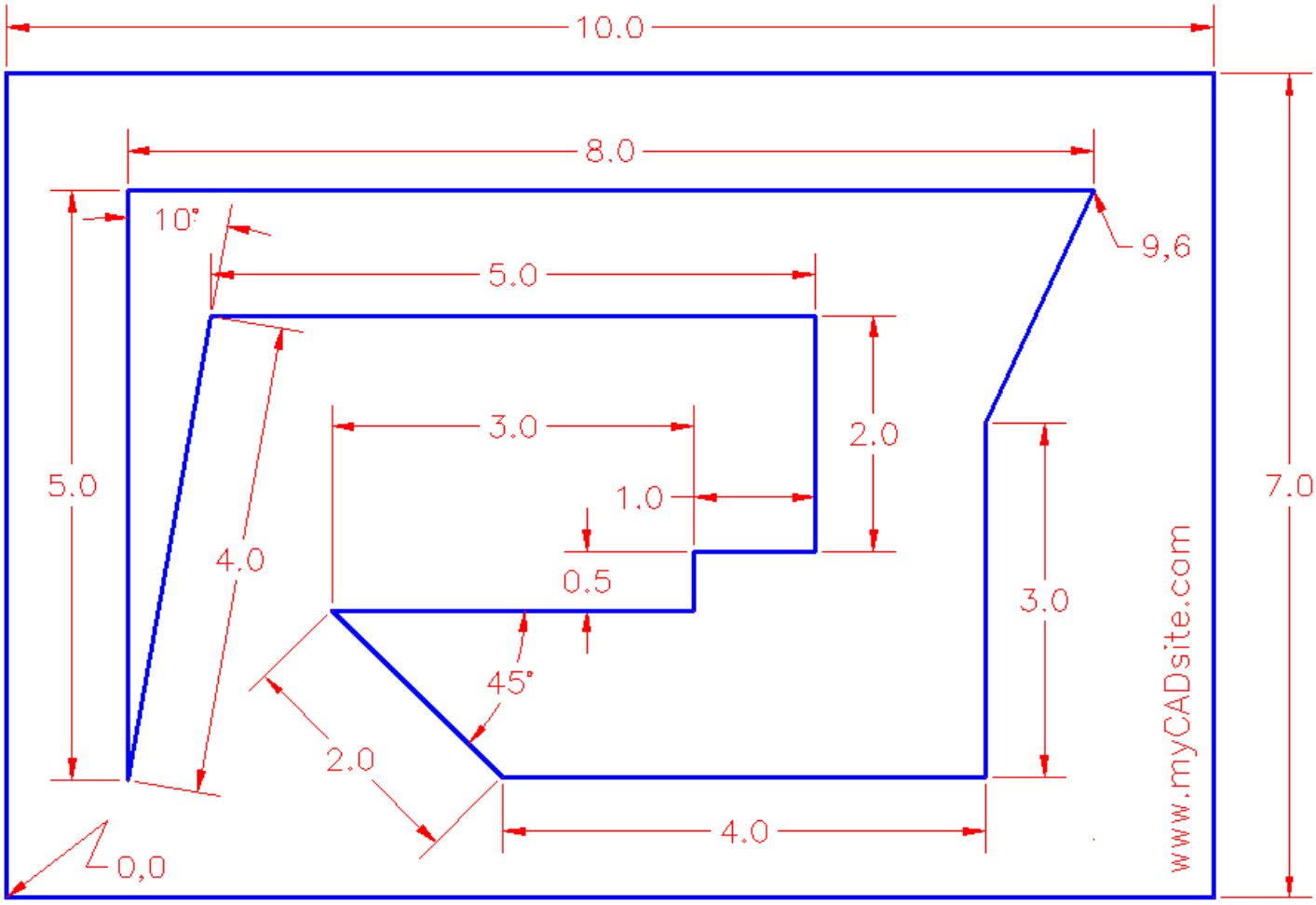


Fig. 2.9 engineering drawing

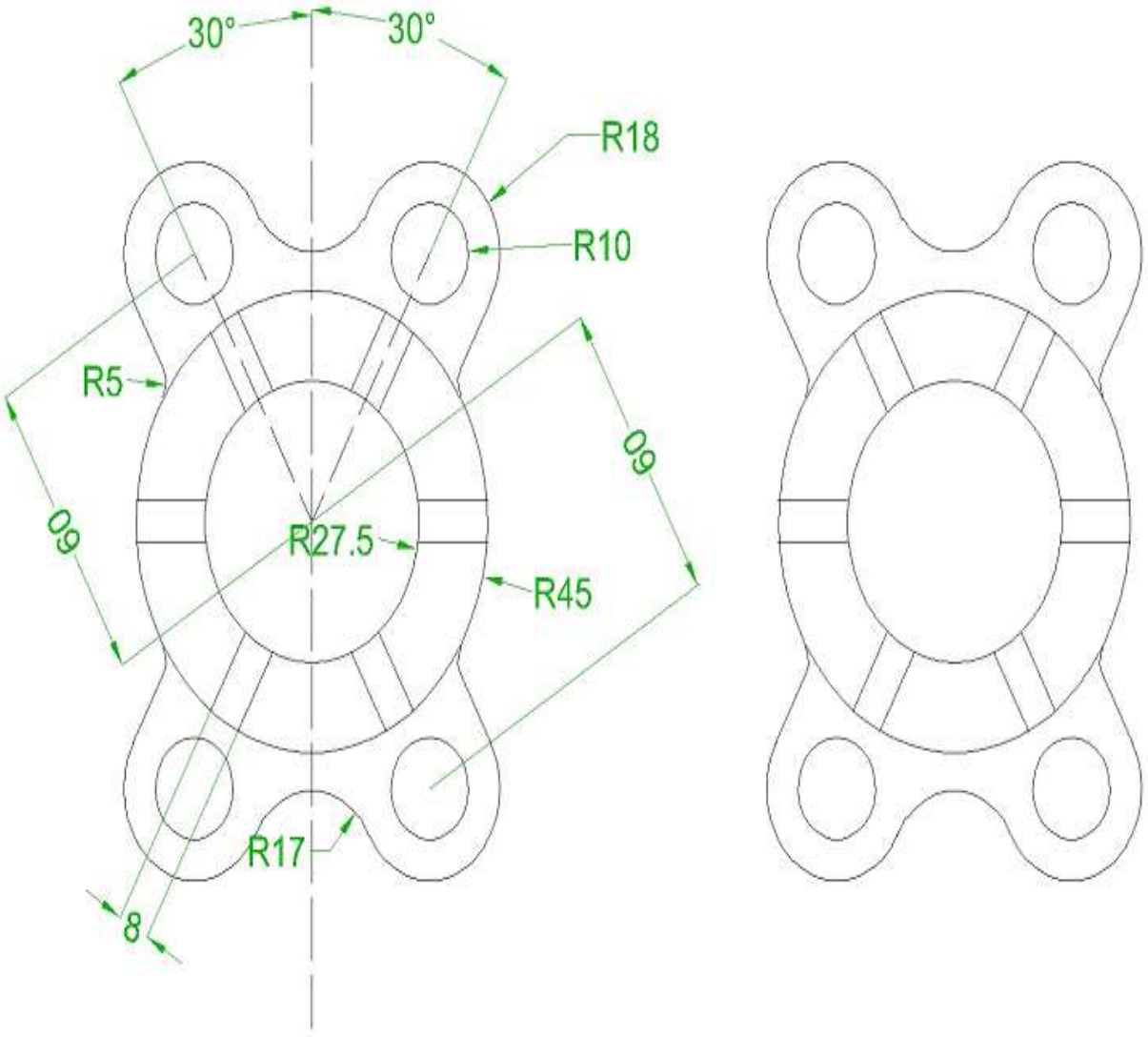


Fig. 2.10 engineering drawing

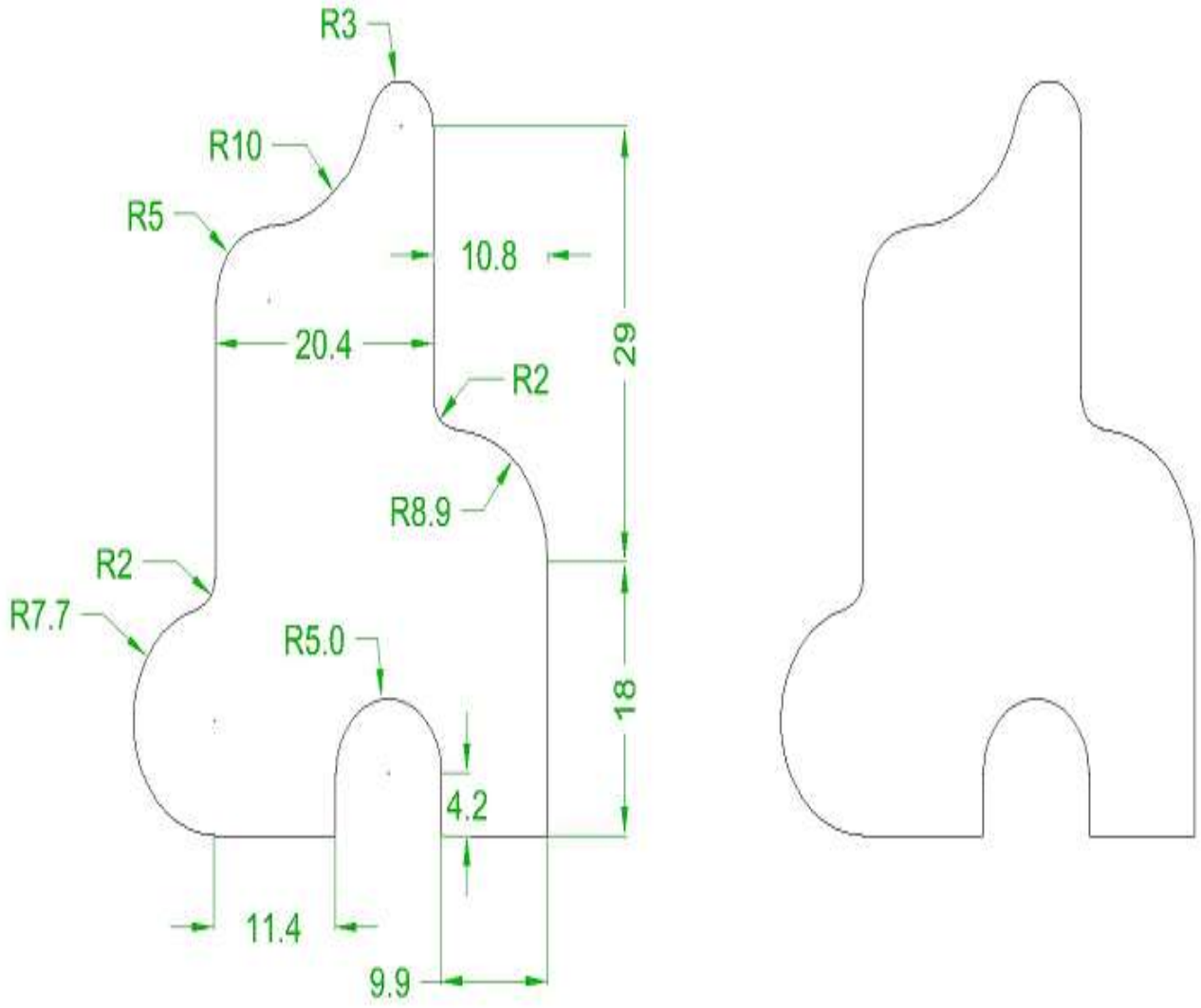


Fig. 2.11 engineering drawing

2.2 StartingUpAutoCAD®2007

.Selectthe **AutoCAD2007** option on the Programmenuor select the **AutoCAD2007** icon on the Desktop.Once the program is loaded into Memory,the**AutoCAD®2007**drawing screen will appear on the screen.

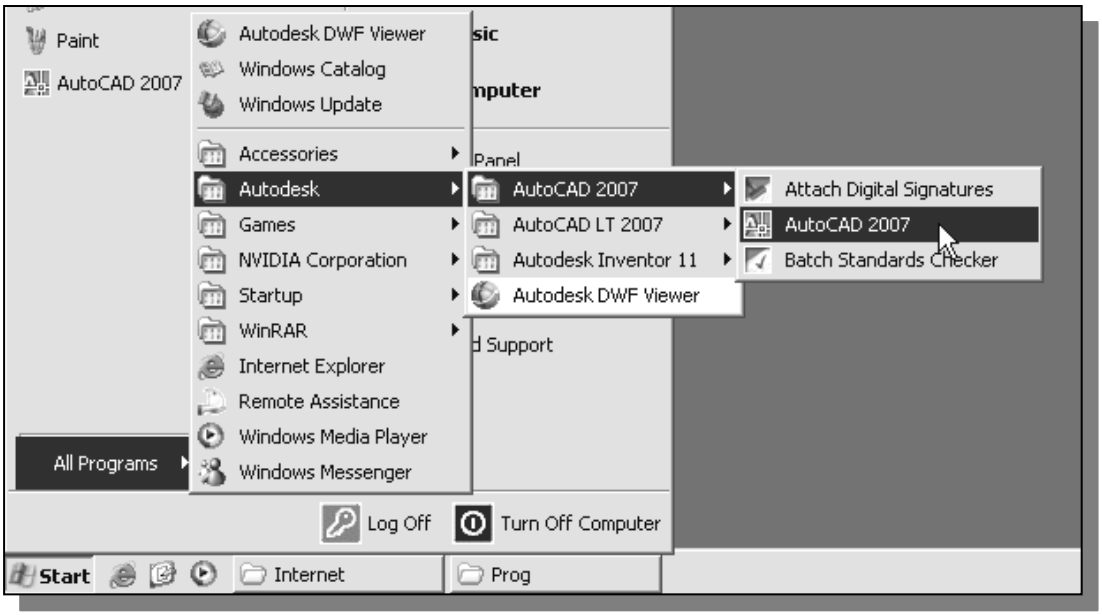
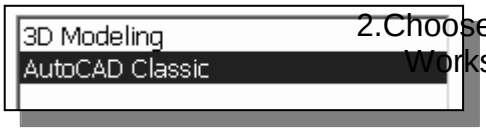
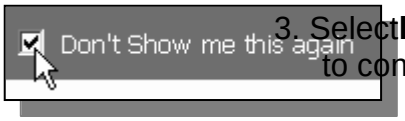


Fig. 3.1 Select the AutoCAD2007 option



2.Choose**AutoCADClassic**as the initial Workspace.



3. Select**Don't Show me this again** and click **OK** to continue.

Note that AutoCAD®automatically assigns generic name, DrawingX,asnew Drawingsarecreated. Inourexample,AutoCAD®openedthegraphicswindow using the default system units and assigned the drawing nameDrawing1.

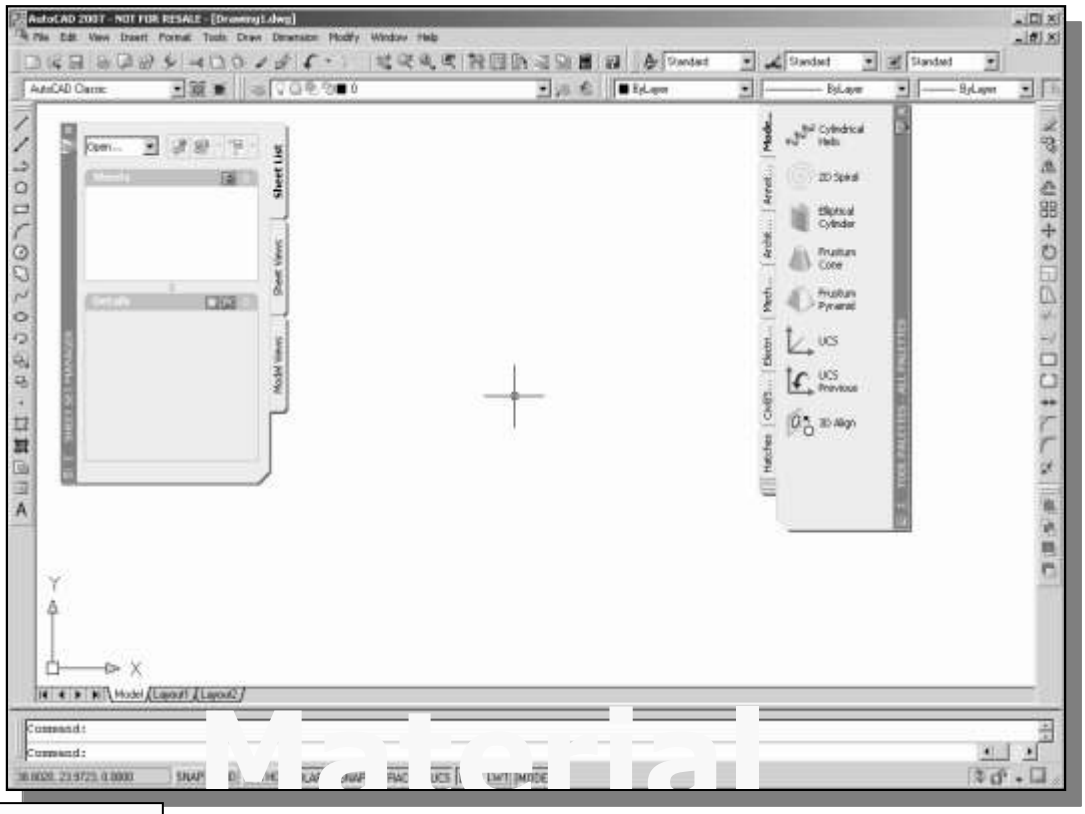
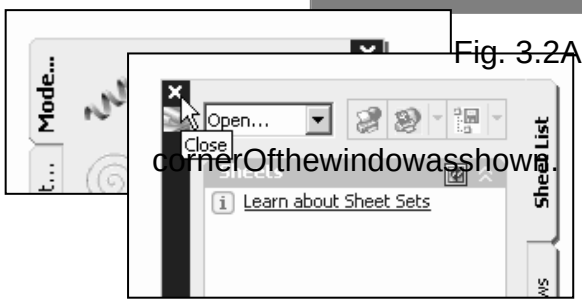


Fig. 3.2AutoCAD® automatically assigns generic

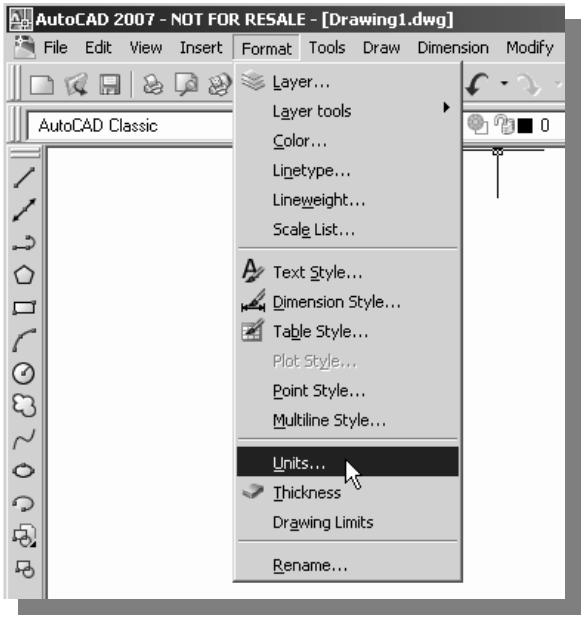


4.Close the Tool Palettes by clicking once on **Close** button located at the upper right cornerOfthewindowasshown.

5.Close the *Sheet Set Manager*byclickin gone
On the **Close**button located at the upper right cornerofthewindowasshown.

DrawingUnitsSetup

Every object we construct in a CAD system is measured in **units**. Weshouldd determine
Thevalue of the units within the CAD system before creating the first geometric entities.



1.Inthe pull-down menus, select:

[Format][Units]

Fig. 3.3Drawing Units Setup

2. TheDrawingUnitsdialog box, set theLength Typeto**Decimal**. This will set the measurement to the default English units, inches.

Set the Precision to**two digits** after the decimal point as shown in the above
figure.

3.

4.Pick**OK** to exitthe DrawingUnitdialogbox

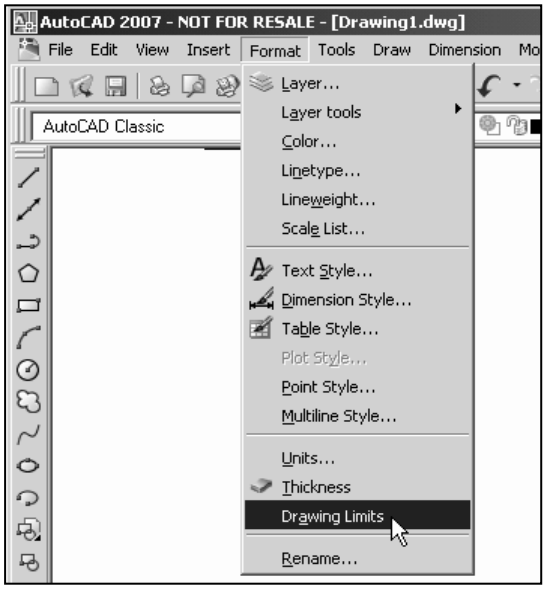


Fig. 3.4 Drawing Unit dialog box

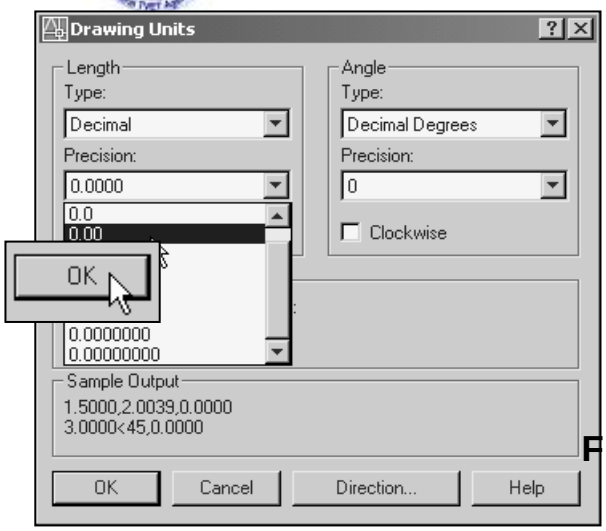


Fig. 3.4 Drawing Unit dialog box

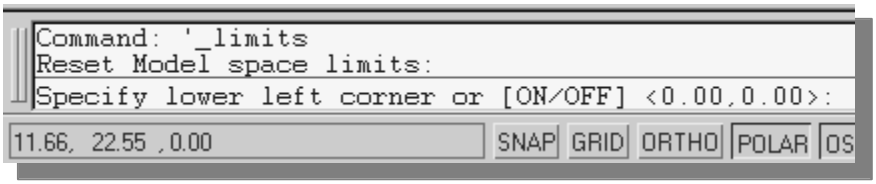
DrawingAreaSetup

Next, we will set up the**DrawingLimits**; setting theDrawingLimits controls the extents of the display of the grid.It also serves as a visual reference that marks the
workingarea. Itcan also be used to prevent construction outside the grid limits and as a
plot option that defines an area to be plotted/printed. Note that this setting does notlimit
theregion for geometry construction.

1.Inthe pull-down menus,select:

[Format][Drawing Limits]

2.Inthecommandpromptarea,nearthe bottomoftheAutoCAD® drawing screen,the message“Reset Model Space Limits:Specify lower left corner or [On/Off] <0.00,0.00>:” is displayed. Press the **ENTER**key once to accept the Defaultcoordinates <**0.00,0.00**>.



3.In the command prompt area, the message “Specify upper right corner <0.00,0.00>:” is displayed. Press the **ENTER**keyonce to accept the default coordinates<**12.00,9.00**>.

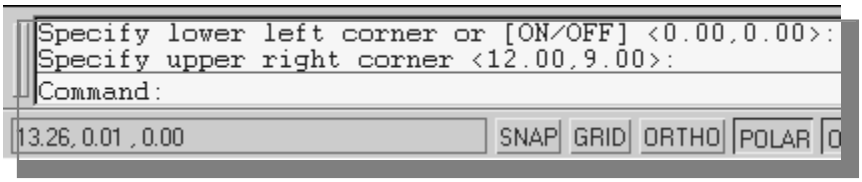


Fig. 3.4 Drawing Unit dialog box

4.On your own, move the graphic cursor near theupper-rightcomerinside the drawing area and note that the drawing area is unchanged. (TheDrawing Limits command is used to set the drawing area; but the display will not be adjusteduntil display commandis used.) 1-6

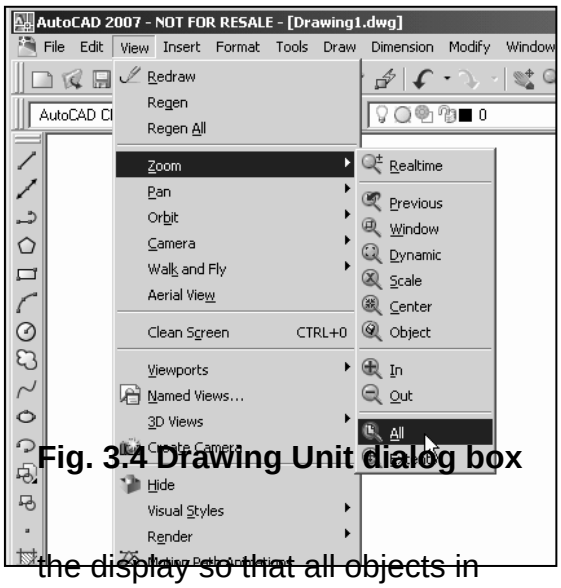


Fig. 3.4 Drawing Unit dialog box

5.Inthe pull-down menus, select:

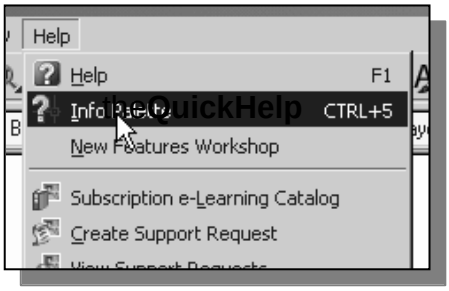
[View][Zoom][All]

The**Zoom All** command will adjust the display so that all objects in thedrawing are displayed to be as large as possible. If no objects are constructed, theDrawing Limits are used to

adjustthecurrent viewport.

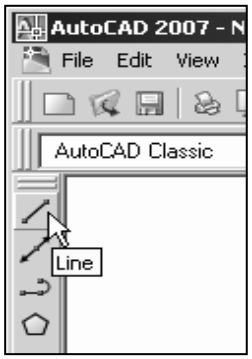
6.Move the graphic cursor near the upper-right comer insidethedrawingarea and note that the display area is updated.

UsingtheLineCommand



1.Clickonthe**InfoPalette**optionin the **Help** pull-down menu to activate

option.



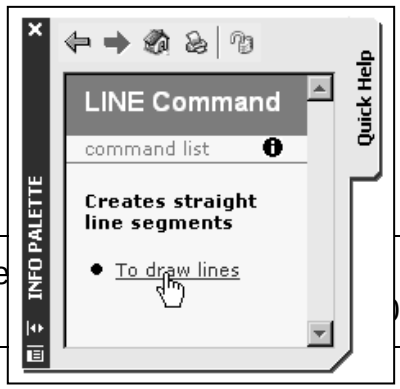
2.Move the graphics cursor to the first icon in theDrawtoolbar.

This icon isthe**Line**icon. Ahles-tip box appears next to the cursor and a brief description of the icon is displayed at the bottomoftheAutoCAD®drawing screen: “CreatesStraight linesegments: LINE.”

3.Select the icon by clicking once with the **left-mouse-button**,

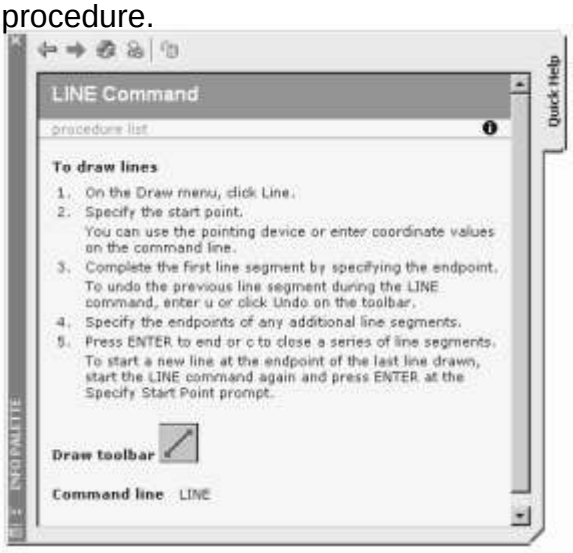
which will activate the Line command.

Notice brief explanation of the selected



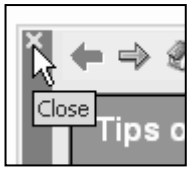
command is displayed in the Info Palette window. Itishigh lyrecommendedthatyou read theexplanations to gain some insights on the generalprocedureofusingAutoCAD®.

4.In the Info Palettewindow, click **To draw Lines**toopentheAutoCAD® Help windowand geta more detailed explanation on the procedure.

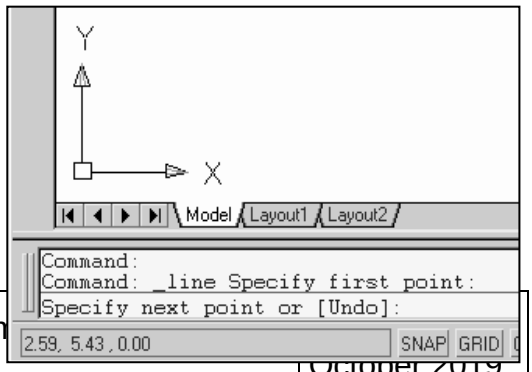


The general procedure to create a line inAutoCAD® is displayed in the Info Palette window.

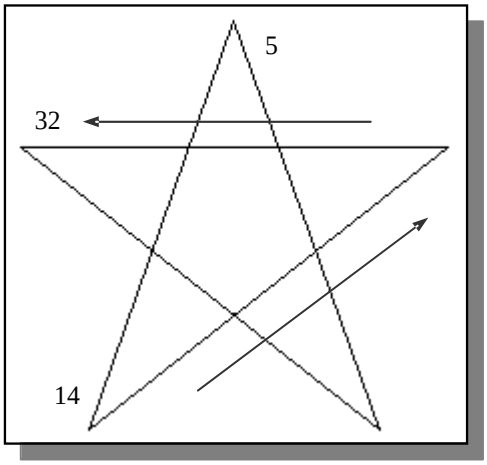
5.Click on **Close** button located at the upper left corner of the **Info Palette** windowasshown.



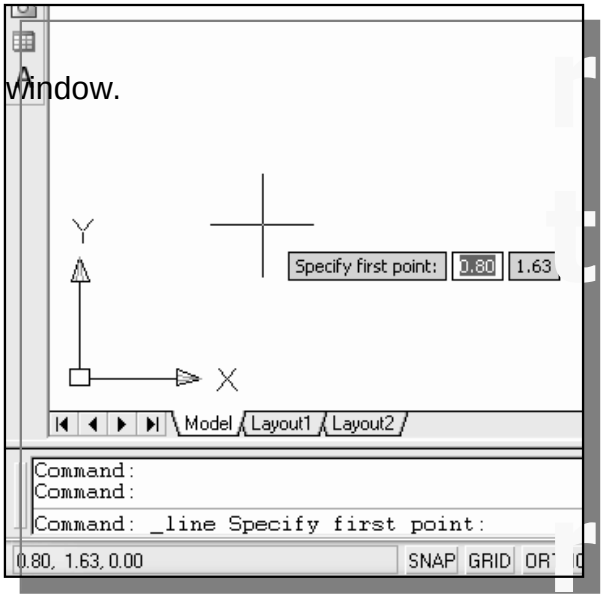
6.Inthecommandpromptarea,nearthebottomoftheAutoCAD®drawing screen, the message "_line Specify first point:" is displayed. AutoCAD® expects us to identify the starting location of a straight line. Move the graphics cursor inside the graphics window and watch the display of the coordinates of the graphics cursor the bottomoftheAutoCAD®drawing screen. The threenumbers represent the location of the cursor in the X, Y, and Z directions. Wecan treat the graphics window as if it was a piece of paper and we are using the graphics cursors if it were a pencil with which to draw.



Coordinates of the location ofthegraphicscursor.



We will create a freehand sketch of a five-point star using theLinecommand. Donot be overly concerned with the actual size or theaccuracy of your freehand sketch.This exercise is to give you a feel for the **AutoCAD® 2007** user interface.

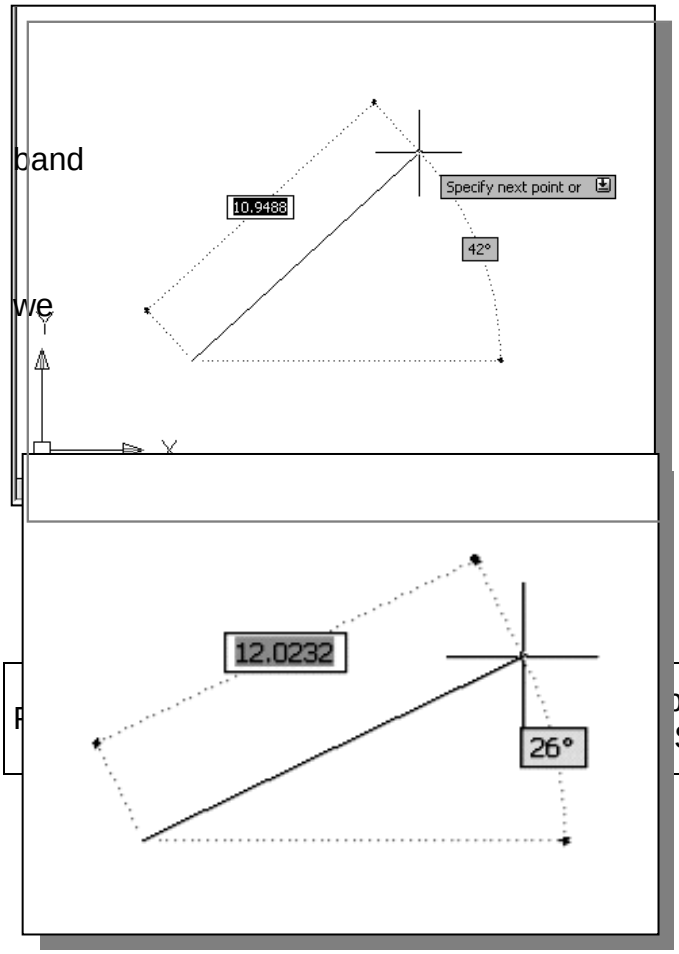


window.

7.We will start at a location near the bottom of the graphics

Left-clickonce to position the starting point of our first line. This will be point 1 of our sketch.

The two numbers, displayed next to
the cursor, represent the current cursor position. Note that the same
two numbers are also displayed at the
lower left corner of theAutoCAD main window. Thedisplayingof tooltips is known as the**Dynamic Input** option. Tooltinsure displayed
Nearthe cursor, which are Dynamicallyupdatedas the cursor
moves.



band

we

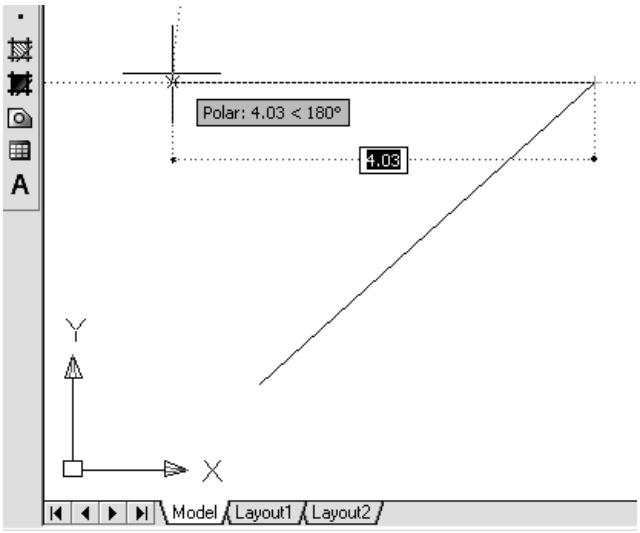
8.Next move the cursor upward and toward the right side of point 1.Notice the rubber-

line that follows the graphics cursor inthegraphicswindow. Left-click again (point 2) and

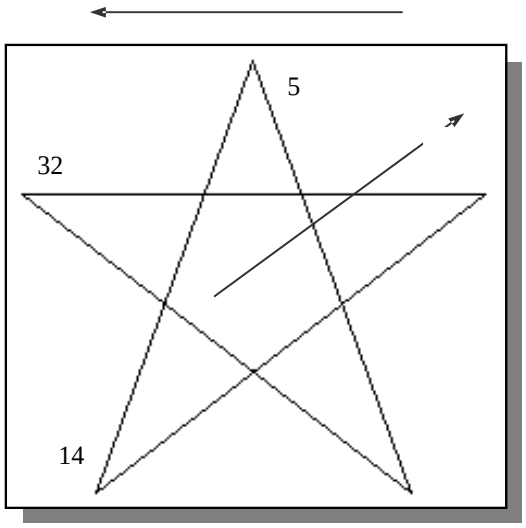
Havecreated the
First lineof our sketch.

•The two numbers, displayed

next
to the cursor, represent the distanceand angleofthecurrent cursor position relative to the previously selected location on the screen. This feature is also part of the **Dynamic Input** option. Amor detailed discussion on how to utilize this feature is presented in of this text.

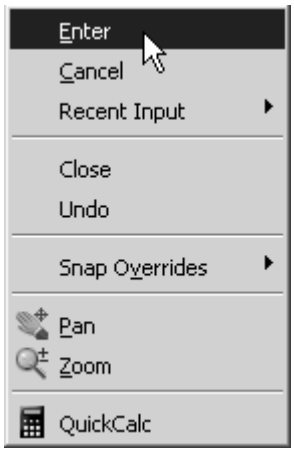


9.Move the cursor to theleftof *point2* and create a horizontal line roughly about the same length as the first line on the screen.



10. Repeat the above steps and complete the freehand sketch by adding three more lines (from *point 3* to *point 4*, *point 4* to *point 5*, and then connect to *point 5* back to *point 1*).

11. Notice that the Line command remains activated even after



We connected the last segment of the line to the starting point (point 1) of our sketch. Inside the graphics window, **click once with the right-mouse-button** and popup menu appears on the screen.

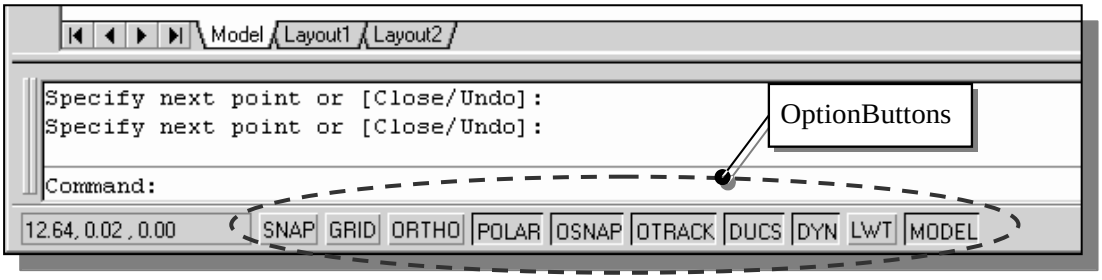
12. Select **Enter** with the left-mouse-button to end the Line command. (This is equivalent to hitting the [**ENTER**] key on the keyboard.)

13. On your own, move the cursor near *point 2* and *point 3*, and estimate the length of the horizontal line by watching the displayed coordinates for each point at the bottom of the screen.

VisualReference

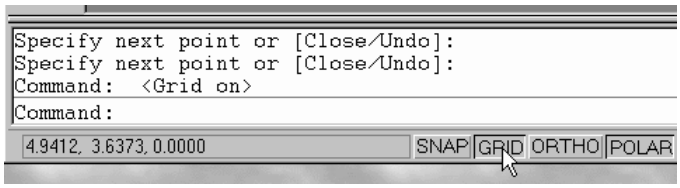
The method we just used to create the freehand sketch is known as the**interactive method**, where we use the cursor to specify locations on the screen. Thismethods perhapsthe fastest way to specify locations on the screen. However, it is rather difficult to try to create a line of a specific length by watching the displayed coordinates. It would be helpful to know what one inch or one meter looks like on the screen while we are creating entities.**AutoCAD®2007**provides us with many tools to aid the construction of our designs. We will use the**GRID**and**SNAP** options to get a visual reference as to the size of objects and learn to restrict the movement of the cursor to a set increment on the screen.

TheStatusBarareais located at the bottom of theAutoCADdrawing screen.The words SNAP, GRID, ORTHO, POLAR, OSNAP, OTRACK,DUCS,LWTandMODEL appearing Tothe right of the coordinates are buttons that we can left-click to turn these special OptionsONandOFF.When the corresponding button is highlighted, the specific option is turned ON. These buttons act as toggle switches; each click of the button will toggle theoptionON or OFF. Usingthebuttons is a quick and easy way to make changes to thesedrawing aidoptions. We can toggle the options on and off in the middle of another command.



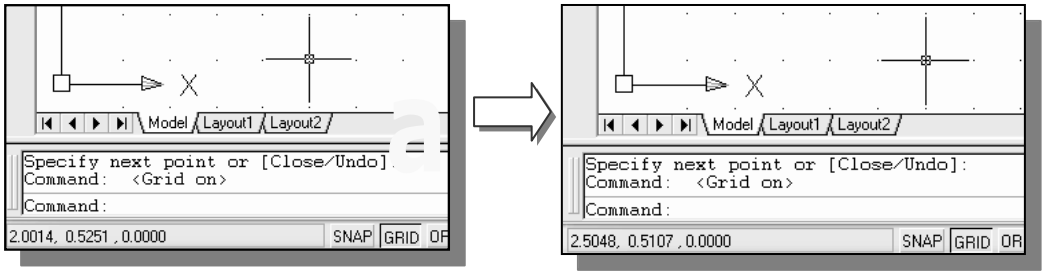
GRID On

1.Left-click the ***GRID*** button in the *Status Bar* to turn ***On*** the *GRID* option.(Notice in the command prompt area, the message *"<Gridon>"* is also displayed.)

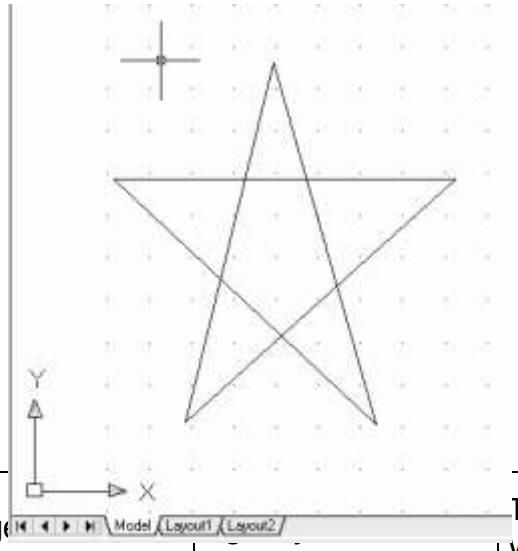


2.Movethecursor inside the graphics window, and estimate the distance in between

the grid points by watching the coordinates display at the bottom of the screen.



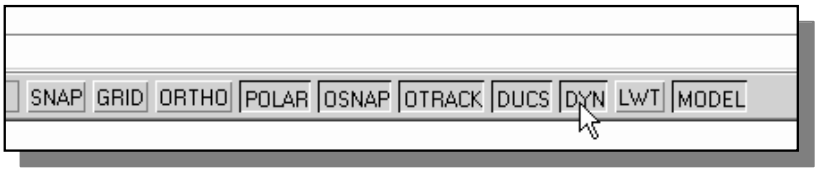
TheGRIDoption creates a pattern of dots
that extends over an area on the screen.
Using the grid is similar to placing a sheet
of grid paper under a drawing. The grid helps you align objects and visualize the
distance between them. The grid is not displayed in the plotted drawing. The default grid spacing, which means the distance in between two dots on the screen,
is 0.5 inches.
Wecanseethatthesketched



horizontal line in the sketch is about4.0 inches long.

DYNOff

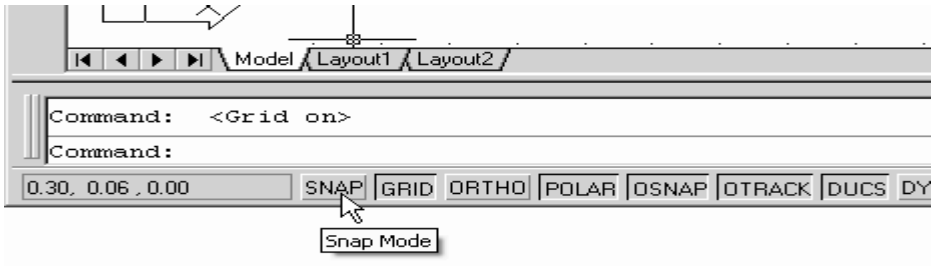
1.Left-click the**DYN**button in the StatusBar to turn **Off** theDynamic Inputoption.



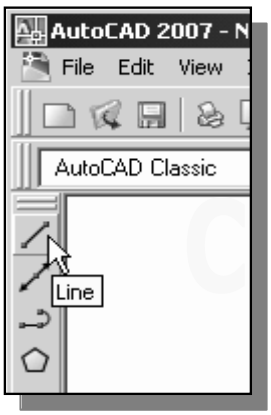
The**DYN**button allows the quick toggle of the **Dynamic Input**option. We will switch off this option to discuss the basic input options available in AutoCAD®.Amore detailed discussion on this feature is presented in Chapter three.

SNAPOn

1.Left-click the**SNAP**buttonin the Status Bar to turn **On**theSNAP option



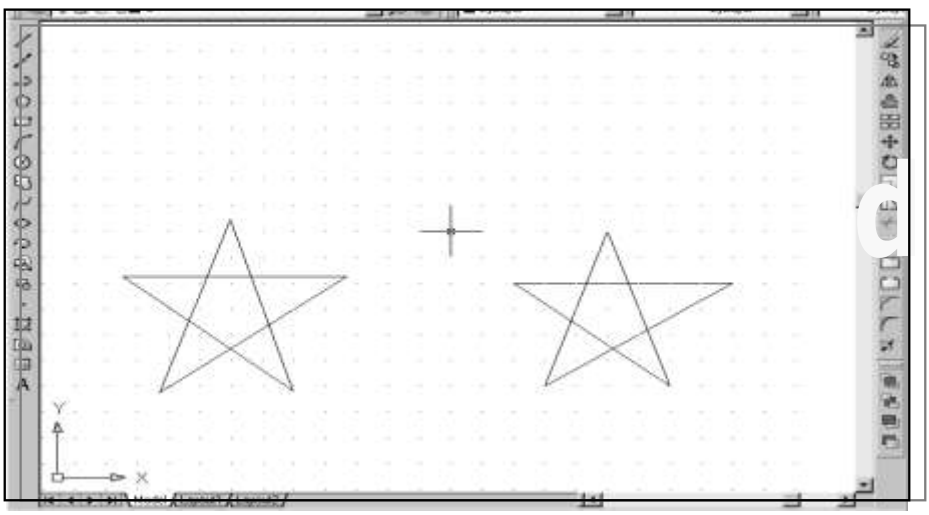
TheSNAPoption controls an invisible rectangular grid that restricts cursor movement to specified intervals. WhenSNAPmode is on, the screen cursorand allinputcoordinates are snapped to the nearest point on the grid. Thedefault snap
intervalis 0.5 inches, and aligned to the grid points on the screen.

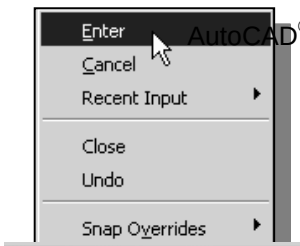


3.Clickonthe**Line**iconintheDrawtoolbar.Inthe command

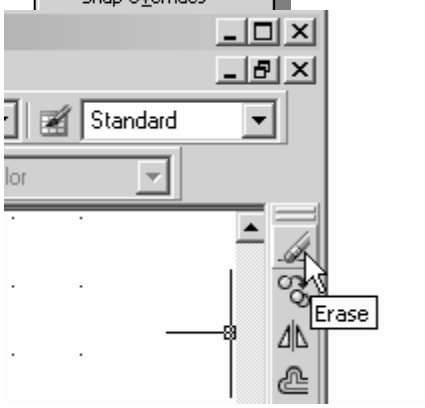
Prompt area, the message "_line Specify first Point:" is
Displayed.

4.On your own, create another sketch of the five-point star with theGRIDand SNAP options switched ON.





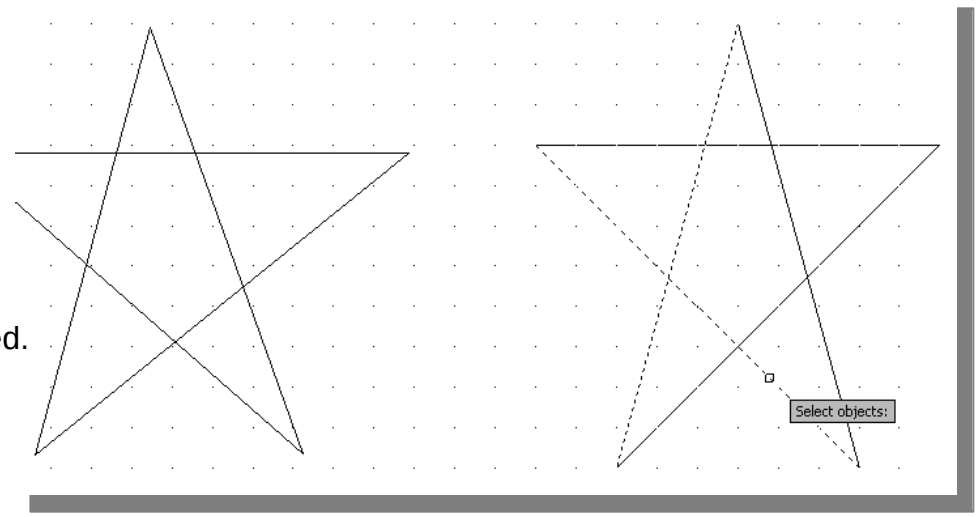
5. Use the **right-mouse-button** and select **Enter** in the popup menu to end the Line command if you have not done so.



1. Pick **Erase** in the Modify toolbar. (The icon is the first icon in the Modify toolbar. Their on is A picture of an eraser at the end of a pencil.)
   The message "Select objects" is displayed in the command prompt area and AutoCAD® awe its us to weled the objects to erase.

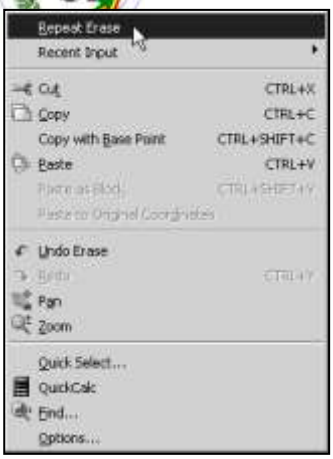
2.Left-click the**SNAP**button on the StatusBartoturn**off** the SNAP option so that we can more easily move the cursor on top of objects. We can toggle the
Status Bar optionsONorOFFinthemiddlefanothercommand.

3.Right-mouse-clickonce to accept the selections. The selected two lines are erased.



RepeattheLastCommand

1.Insidethe graphics window, click once with

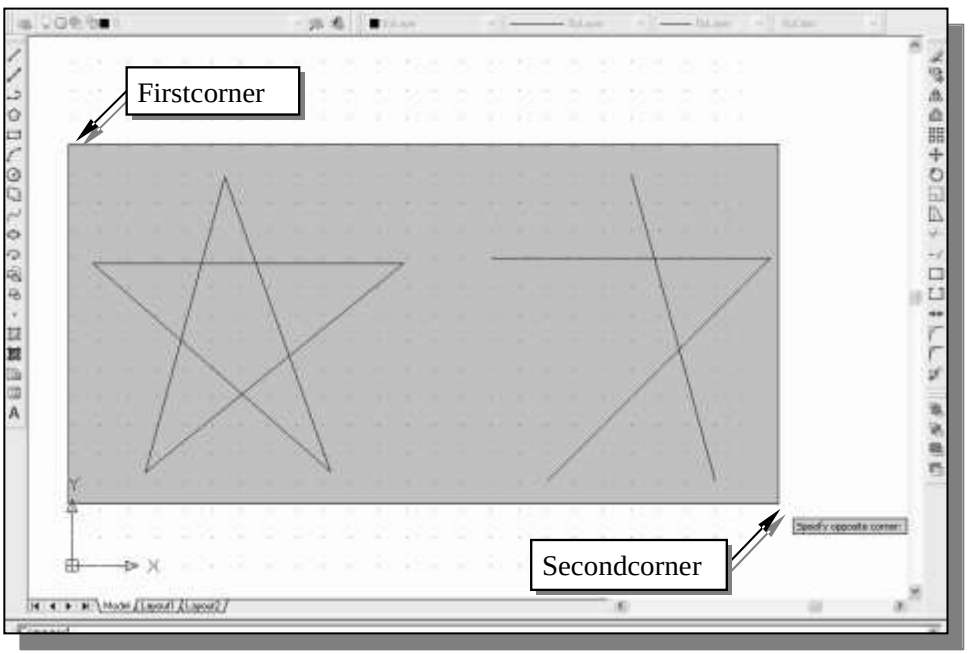


the right-
mouse-button to bring up the popup
option menu.

2.Pick**RepeatErase**,with the left-mouse-button, in the
popup menu to repeat the last command. Notice the other
options available in the popup menu.

AutoCAD®2007offers many options to accomplish the
same task. Throughout this text, we willemphasize the use of the**AutoCADHeads-upDesign**sinterface, which means we focus on the screen, not on the
keyboard.

3.Movethecursor to a location that is above and toward the left side of the Entitiesonthe screen.Left-mouse-click once to start a corner of a rubber-band window.



4.Move the cursor toward the right andbelow the entities, and then left-

mouse-

Clickto enclose all the entities inside the**selection window**.

Noticeallentities

Thatare inside the window are selected.

5.Inside the graphics window, right-mouse-click once to proceed with erasing

What is Supervision?

Supervision is a widely misunderstood term. Many people believe it applies only to people who oversee the productivity and development of entry-level workers. That's not true.

The term "supervisor" typically refers to one's immediate superior in the workplace, that is, the person whom you report directly to in the organization. For example, a middle manager's supervisor typically would be a top manager. A first-line manager's supervisor would be a middle manager. A worker's supervisor typically would be a first-line manager.

Supervisors typically are responsible for their direct reports' progress and productivity in the organization. Supervision often includes conducting basic management skills (decision making, problem solving, planning, delegation and meeting management), organizing teams, noticing the need for and designing new job roles in the group, hiring new employees, training new employees, employee performance management (setting goals, observing and giving feedback, addressing performance issues, firing employees, etc.) and ensuring conformance to personnel policies and other internal regulations. Supervisors typically have strong working knowledge of the activities in their group, e.g., how to develop their product, carry out their service, etc.

Computer Aided Design (CAD) Supervising

Supervise CAD Designers, creating schedules, assigning tasks and resources, and ensuring team members receive training.

Identify issues and recommend solutions and improvements for CAD procedures.

Assist CAD management with customer and/or vendor design reviews, meetings, and/or consultations.

Provide technical support to CAD Designers and Engineers, Sales teams, and Production teams.

Perform duties as a CAD Designer, translating specifications into designs, models, and products

Self-Check 3	Written Test

Short Answer Questions

- 1. Every object we construct in a CAD system is measured in **units**
  A. TRUE
  B. FOLSE

2. SupervisionWho oversee the productivity and development of entry-level workers

A. TRUE
B. FOLSE

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Multiple Chose Test Answer
1._____
2._____

LAP Test	

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, workshop, tools and materials you are required to perform the following tasks within 3 hours.

Task 1: Clean the given tools and equipment.

Task 2: list the different modify/editing/ tools and their functions.

Task 3: Using the given template, prepare a computer lab schedule for the specific area in the workshop. In preparing the CAD schedule -

- identify the:
  - ✓ Required soft ware
  - ✓ Type of drawing and steep drawing
  - ✓ Computer lab.
- consider the:
  - ✓ procedures and standards
  - ✓ frequency of maintenance activities

Task 4: Perform the auto-CAD software in the assigned computer lab.

Plate Number 5

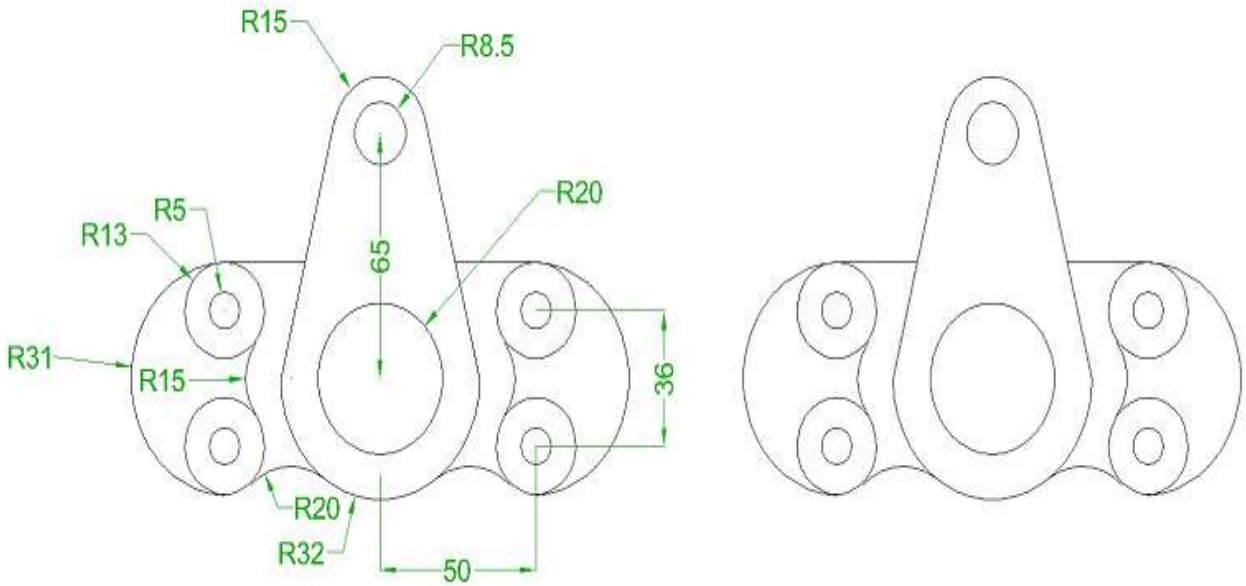


Plate Number 1

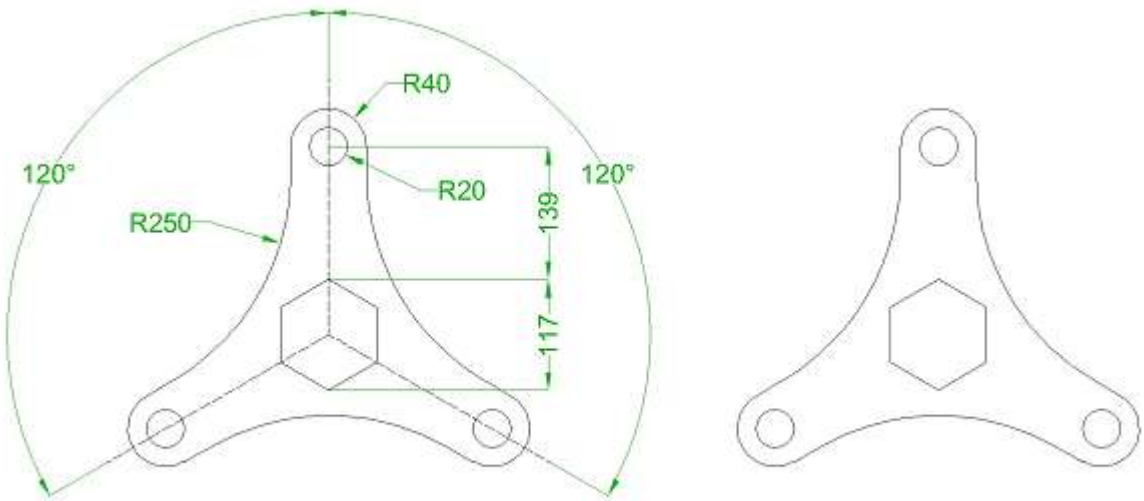


Plate Number 2

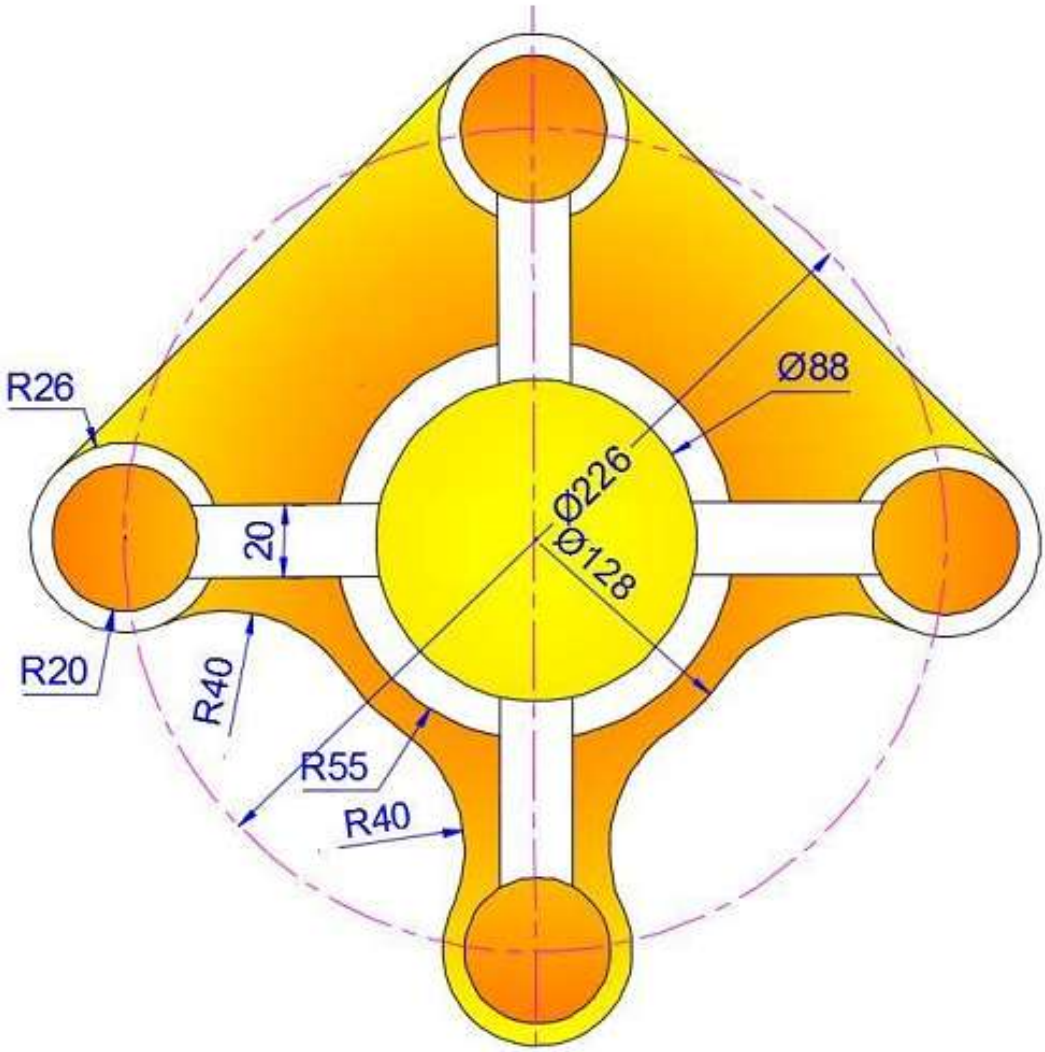


Plate Number 3

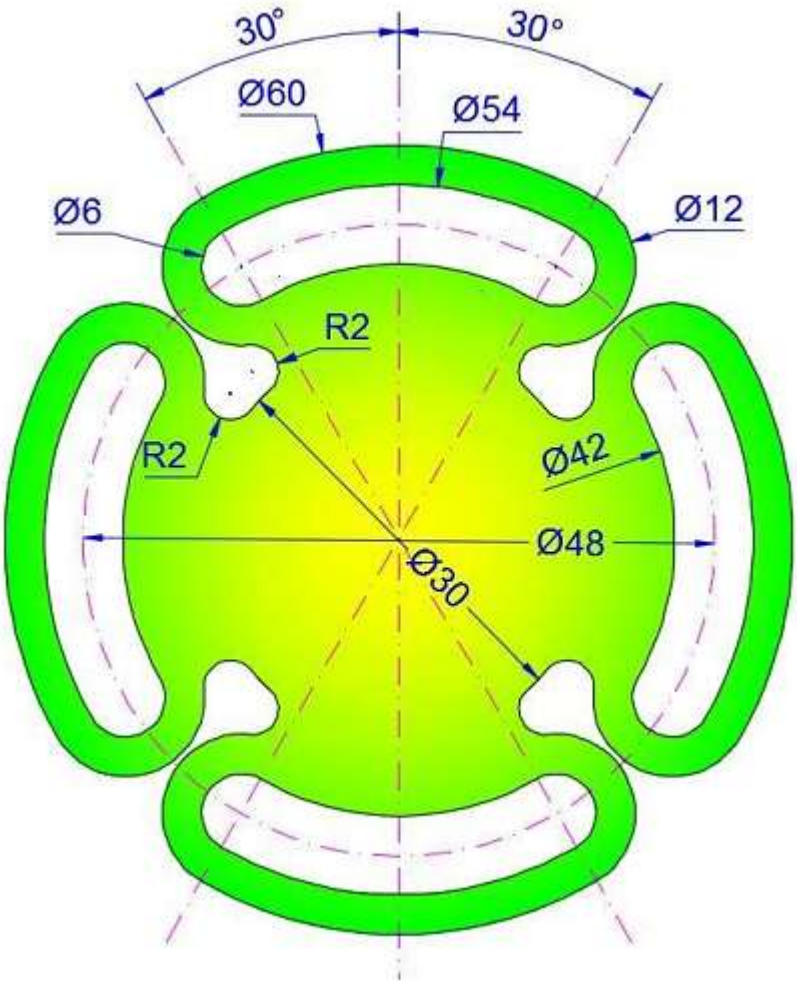


Plate Number 4

•

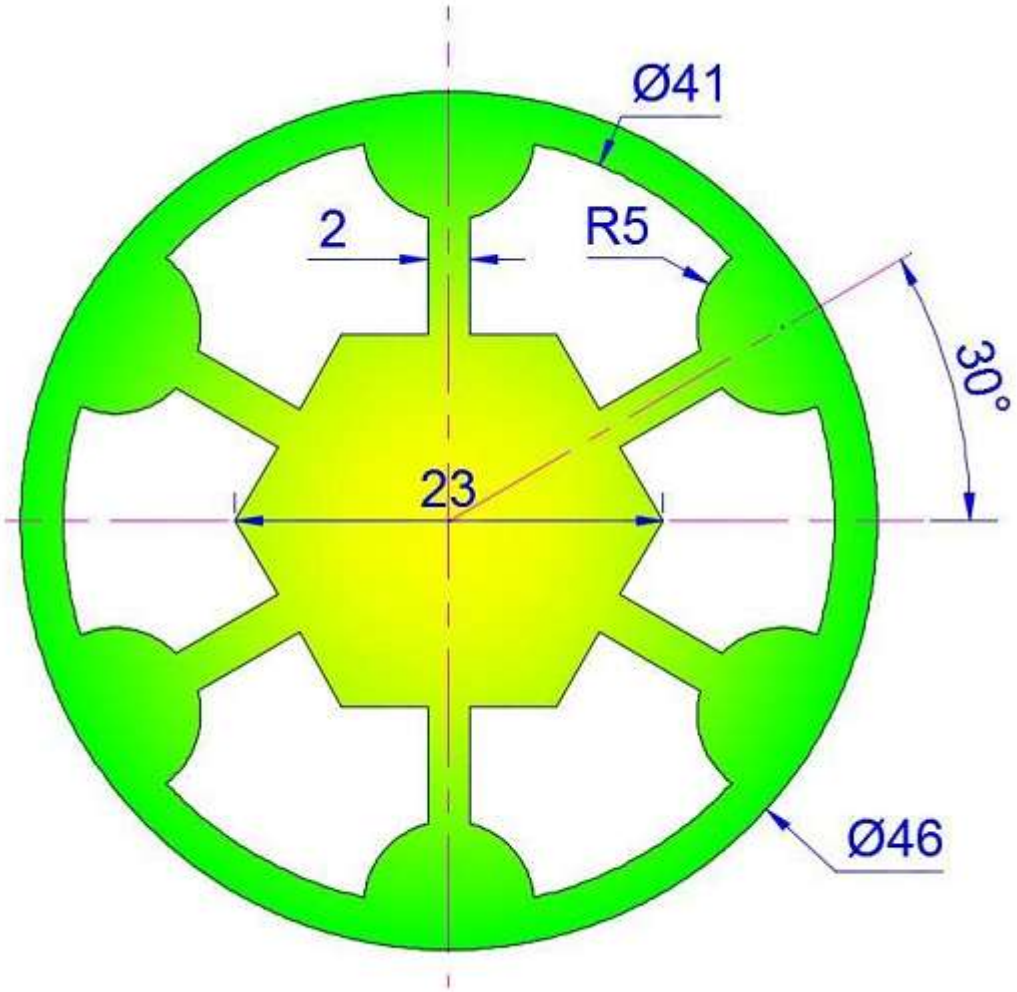
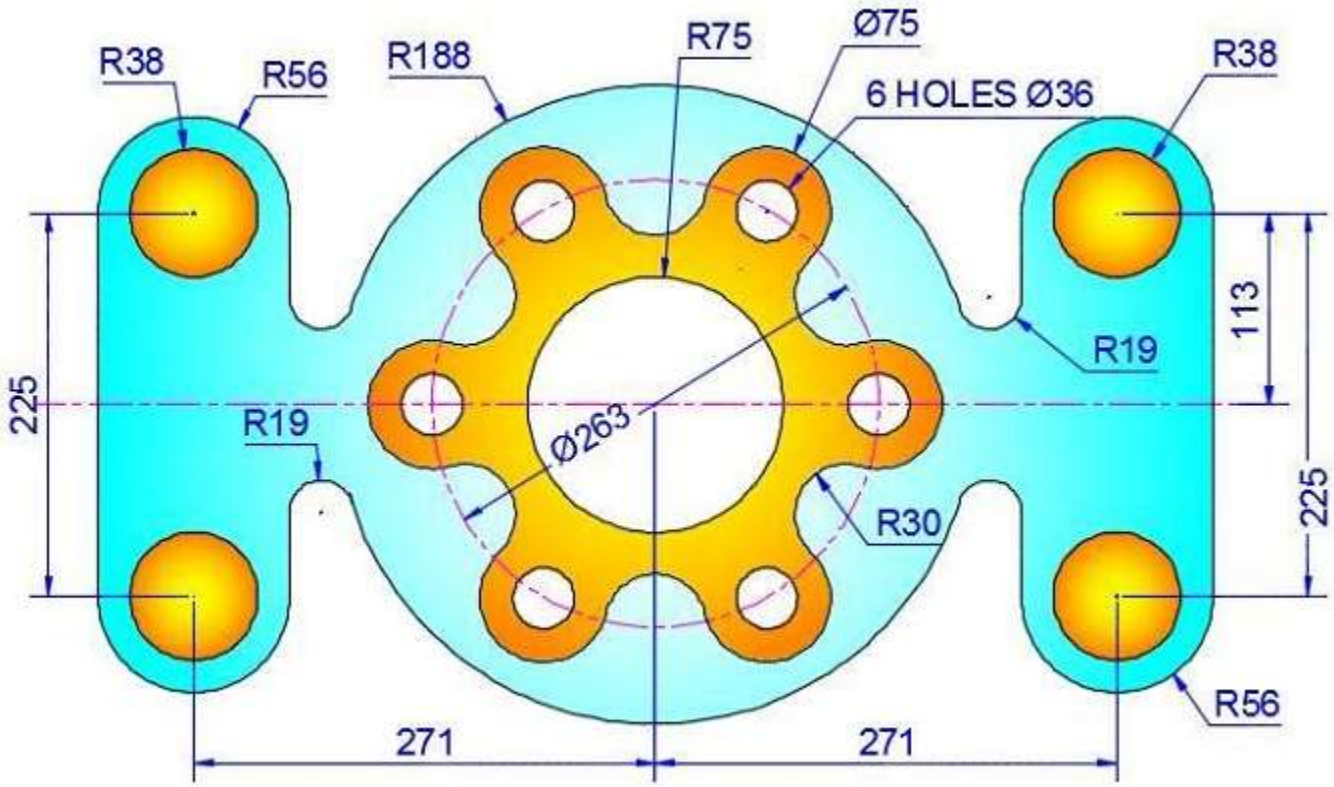


Plate Number 5



Reference

- Beginning AutoCAD 2018: Exercise Workbook
- AutoCAD 2018 Tutorial First Level 2D Fundamentals
- AutoCAD 2018 For Beginners
- AutoCAD 2017 For Beginners
- Beginning AutoCAD 2017: Exercise Workbook
- AutoCAD 2018 For Beginners
- AutoCAD Plant 3D 2018 for Designers
- AutoCAD For Dummies
- Mastering AutoCAD 2019 and AutoCAD LT 2019
- Beginning AutoCAD 2016
- Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press
- AutoCAD 2018 For Architectural Design

ROAD CIVIL WORKS

Level II

NTQF

Learning Guide-17

Unit of Competence: - Use Computer Aided Drafting (CAD) Systems to Produce Basic Engineering Drawings

Module Title:- Using Computer Aided Drafting (CAD) Systems to Produce Basic Engineering Drawings

LG Code: CON RCW2 MO5 LO3-LG-17

TTLM Code: CON RCW2 TTLM 1019v1

LO3:-Modify existing CAD drawings

Instruction Sheet	Learning Guide #14

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Creating and guiding BasicCAD drawings
- CAD drawings oprating procedures
- Supervising CAD drawing
- preparing simple drawings

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- Basic CAD drawings are created and guidance is sought as required.
- Drawings are prepared in accordance with standard operating procedures.
- As required, CAD drawings are reviewed with supervisor and/or other designated staff in accordance with company procedures
- Detailed drawing is produced in third angle projection, including auxiliary views, sections and assemblies

Learning Instructions:

1, Read the specific objectives of this Learning Guide.

Follow the instructions described below 41.

3, Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 Sheet 4 Sheet 5 Sheet 6 and Sheet 7”.

4, Accomplish the “Self-check 1,Self-check t 2, Self-check 3 Self-check 4 Self-check 5 Self-check 6 and Self-check 7” **in page 138, 139, and 140**respectively.

5, If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, **in page -141,**

6, Do the “LAP test” **in page – 144** (if you are ready).

Information Sheet-1	locatting and modifing Existing CAD drawings

Introduction

The **Modify** tools are among those most frequently used. The tools are found in the **Home/Modify** panel. A click on the arrow in the **Home/Modify** panel brings down a further set of tool icons (Fig. 5.1). They can also be selected from the **Modify** toolbar (Fig. 5.2) or from the **Modify** drop-down menu. Using the **Erase** tool from **Home/Modify** was described in Chapter 2. Examples of tools other than the **Explode** follow. See also Chapter 10 for **Explode.**

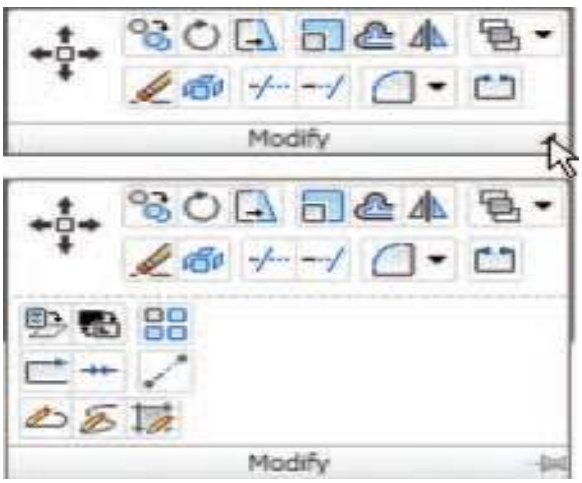


Fig. 3.1 The Modify tool icons in the Home / Modify panel

Fig. 3.2 the Modify toolbar

The copy tool

First example – **Copy** (Fig. 5.5)

1. Construct Fig. 5.3 using **Polyline**. Do not include the dimensions.
2. Call the **Copy** tool – left-click on its tool icon in the **Home/Modify** panel (Fig. 5.4), pick **Copy** from the **Modify** toolbar, or enter **cp**or **copy**at the command line.

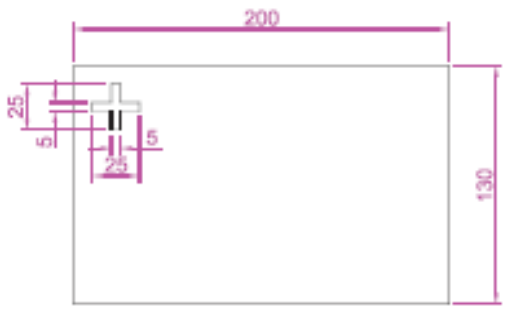


Fig. 3.3 First example – Copy Objec**t** – outlines

The command line shows:

Command: _copy

Select objects: pick the cross 1 found

Select objects: right-click

Current settings: Copy mode _ Multiple

Specify base point or [Displacement/mode/Multiple] _ Displacement _ : pick

Specify second point or _ use first point as displacement _ : pick

The result is given in Fig. 5.5 .

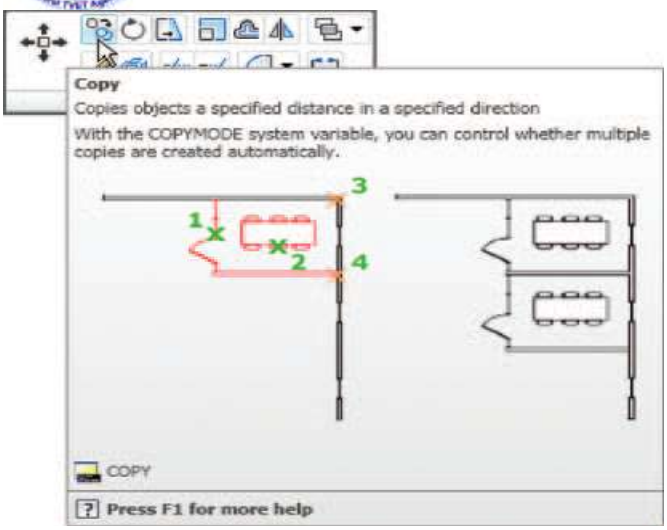


Fig. 3.4 The Copy tool from the Home / Modify panel

Fig. 3.5 First example – Copy

Second example – Copy – Multiple copy (Fig. 5.6)

1. Erase the copied object.

2. Call the **Copy** tool. The command line shows:

Command: _copy

Select objects: pick the cross 1 found

Select objects: right-click

Current settings: Copy mode _ Multiple

Specify base point or [Displacement/mode] _ Displacement _ : pick

Specify second point or _ use first point as displacement _ : pick

Specify second point or [Exit/Undo] _ Exit _ : pick

Specify second point or [Exit/Undo] _ Exit _ : pick

Specify second point or [Exit/Undo] _ Exit _ : e (Exit) Command :

The result is shown in Fig. 5.6 .

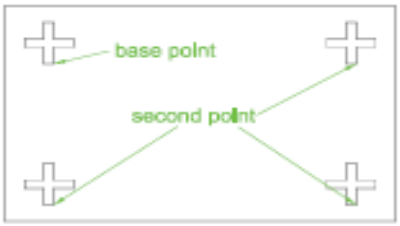


Fig. 3.6 Second example – Copy – Mutiple – Multiple copy

The mirror tool

First example – **Mirror** (Fig. 5.9)

1. Construct the outline shown in Fig. 5.8 using the **Line** and **Arc** tools.

2. Call the **Mirror** tool – left-click on its tool icon in the **Home/Modify** panel (Fig. 5.7), p ick the **Mirror** tool icon from the **Modify** toolbar,

pick**Mirror** from the **Modify** drop-down menu, or enter **mi** or **mirror** at the command line. The command line shows:

Command: _mirror

Select objects: pick first corner Specify opposite corner: pick 7 found

Select objects: right-click

Specify first point of mirror line: end of pick

Specify second point of mirror line: end of pick

Erase source objects [Yes/No] _ N _ : right-click

Command:

The result is shown in Fig. 5.9.

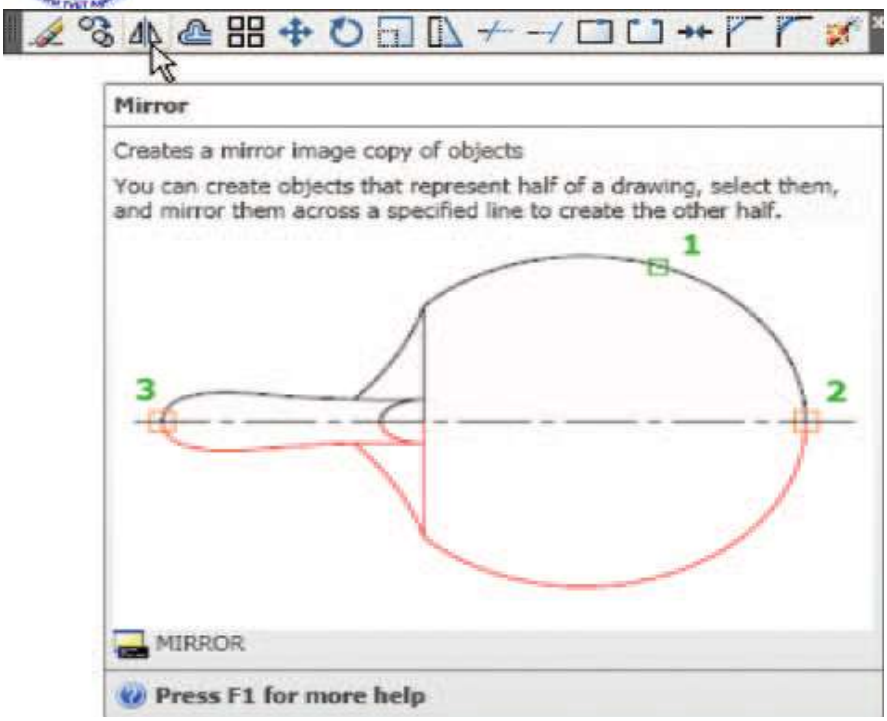


Fig. 3.7 The Mirror tool from the Modify toolbar

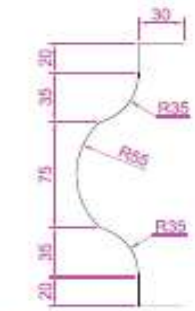


Fig. 5.8 First example – **Mirror** – outline

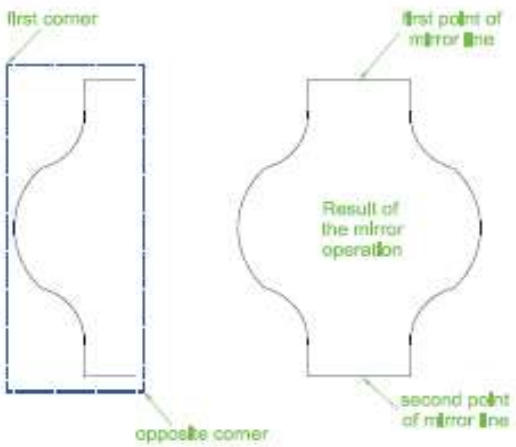


Fig. 5.9 First example – **Mirror**

Second example – **Mirror** (Fig. 5.10)

1. Construct the outline shown in the dimensioned polyline in the upper drawing of Fig. 5.10 .

2. Call **Mirror** and using the tool three times complete the given outline.

The two points shown in Fig. 5.10 are to mirror the right-hand side of the outline.

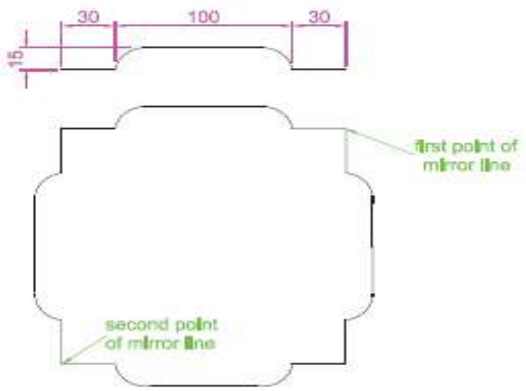


Fig. 5.10 Second example – **Mirror**

The offset tool

Examples – **Off set** (Fig. 5.14)

1. Construct the four outlines shown in Fig. 5.13 .

2. Call the **Offset** tool – left-click its tool icon in the **Home/Modify** panel (Fig. 5.12), pick the tool from the **Modify** toolbar, pick the tool name in the **Modify** drop-down menu, or enter **o** or **offset** at the command line.

The command line shows:

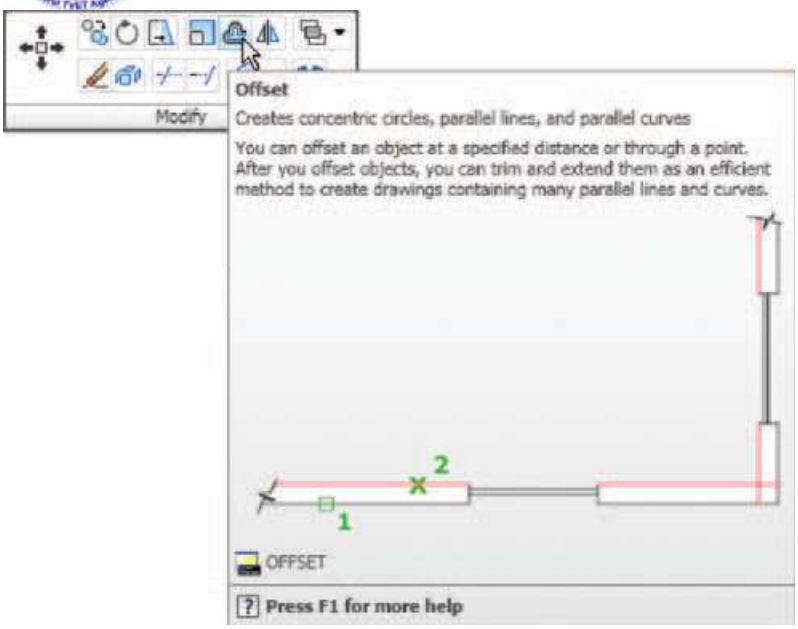


Fig. 3.12 The Offset tool from the Home / Modify panel

Command: _offset

Current settings: Erase source _ No Layer _

Source OFFSETGAPTYPE _ 0

Specify offset distance or [Through/Erase/Layer] _ Through _ : 10

Select object to offset or [Exit/Undo] _ Exit _ : pick drawing 1

Specify point on side to offset or [Exit/Multiple/

Undo] _ Exit _ : pick inside the rectangle

Select object to offset or [Exit/Undo] _ Exit _ : e (Exit)

Command:

3. Repeat for drawings **2** ,**3** and **4** in Fig. 5.13 as shown in Fig. 5.14 .

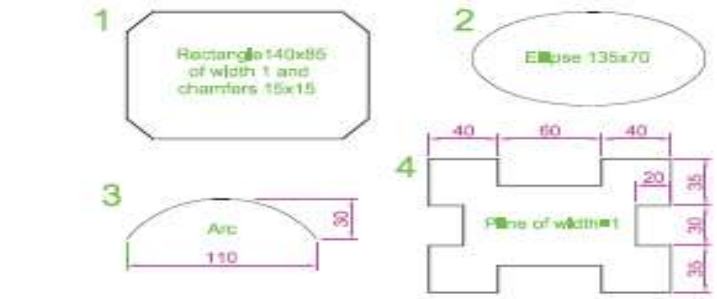


Fig. 5.13 Examples – **Offset** – outlines

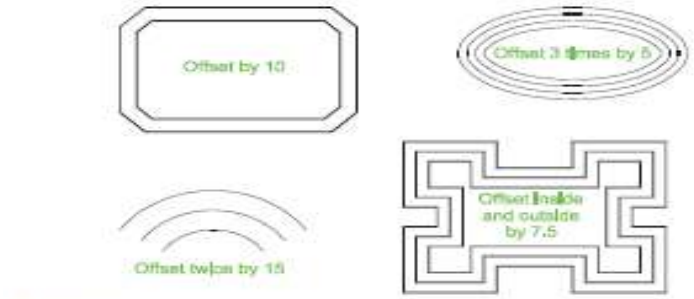


Fig. 5.14 Examples – **Offset**

The Array tool

Arrays can be either in a **Rectangular** form or in a **Polar** form as shown in the examples below.

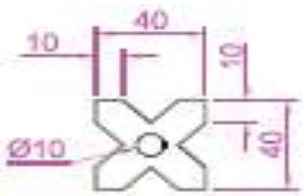


Fig. 5.15 First example – **Array** – drawing to be arrayed

First example – **Rectangular Array** (Fig. 5.17)

1. Construct the drawing as shown in Fig. 5.15 .

2. Call the **Array** tool – either click **Array** in the **Modify** drop-down menu (Fig. 5.16), from the **Home/Modify** panel, pick the **Array** tool icon from the **Modify** toolbar, or enter **ar**or **array** at the command line. The **Array** dialog appears (Fig. 5.17).

3. Make settings in the dialog:

- **Rectangular Array** radio button set on (dot in button)
- **Row** field – enter **5**

Fig. 3.16 S electing Array from the M odify drop-down menu

- **Column** fi eld – enter **6**
- **Row offset** fi eld – enter _ **50** (note the minus sign)
- **Column offset** fi eld – enter **50** .

4. Click the **Select objects** button and the dialog disappears. Window the drawing. A second dialog appears which includes a **Preview** _ button.

5. Click the **Preview** _ button. The dialog disappears and the following prompt appears at the command line:

Pick or press Esc to return to drawing or _ Right-click to accept drawing _ :

6. If satisfiedright-click. If not, press the **Esc** key and make revisions to the **Array** dialog fi elds as necessary.

The resulting array is shown in Fig. 5.18 .

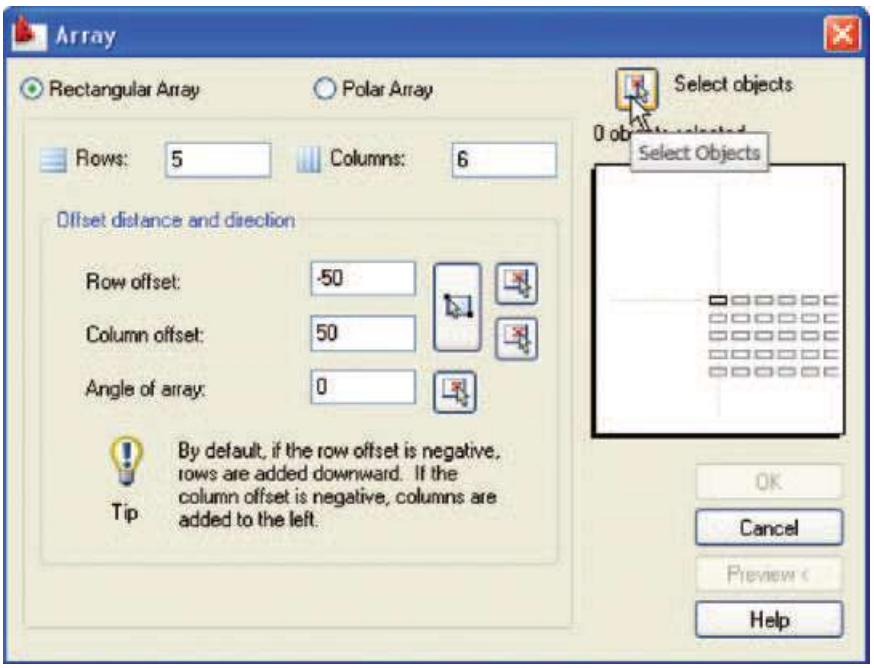
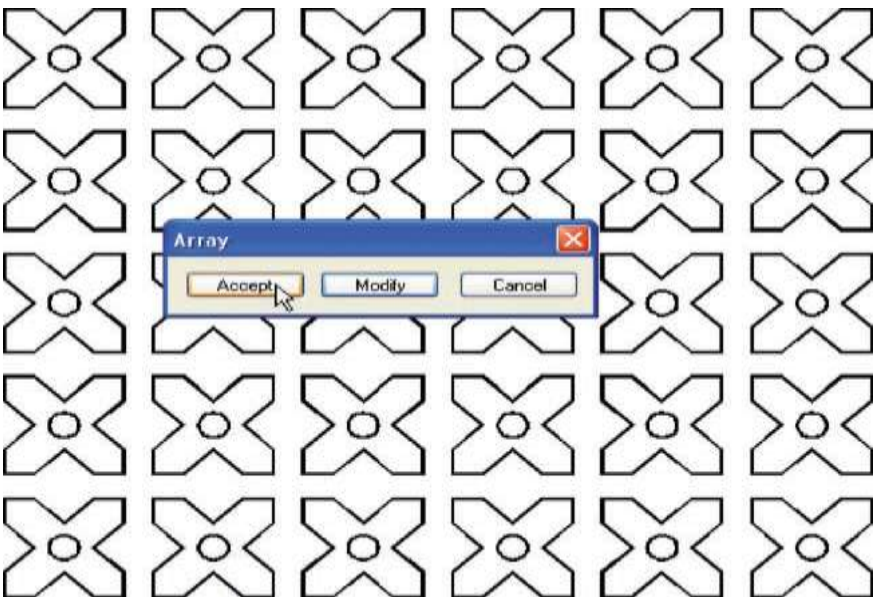


Fig. 3.17 First example – the Array dialog



Second example – **Polar Array** (Fig. 3.18)

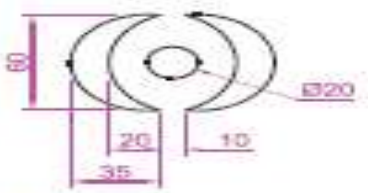


Fig. 5.19 Second example – the setting in the **Array** dialog

1. Construct the drawing shown in Fig. 5.19 .

2. Call **Array**. The **Array** dialog appears. Make settings as shown in Fig. 5.20 .

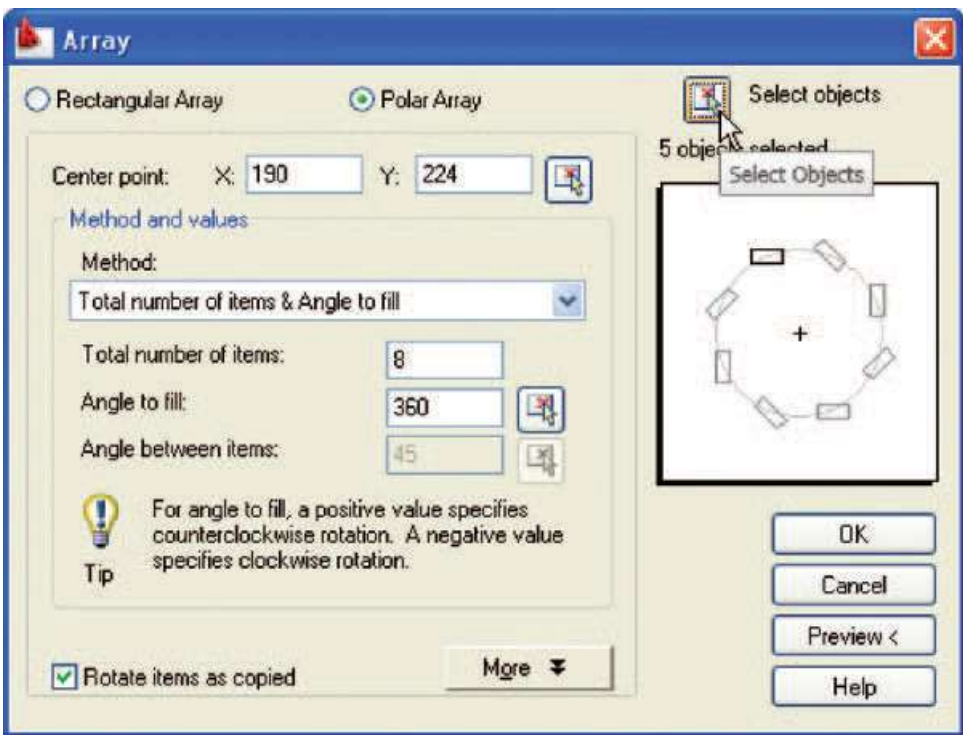


Fig. 3.19Second example – Array – settings in the dialog

3. Click the **Select objects** button of the dialog and window the drawing.

The dialog returns to screen. Click the **Pick center point** button (Fig. 5.21) and when the dialog disappears, pick a center point for the array.

4. The dialog reappears. Click its **Preview** _ button. The array appears and the command line shows:

Pick or press Esc to return to drawing or _ Right-click to accept drawing _ :

5. If satisfied right-click If not, press the **Esc** key and make revisions to the **Array** dialog fields as necessary.

The resulting array is shown in Fig. 5.22 .

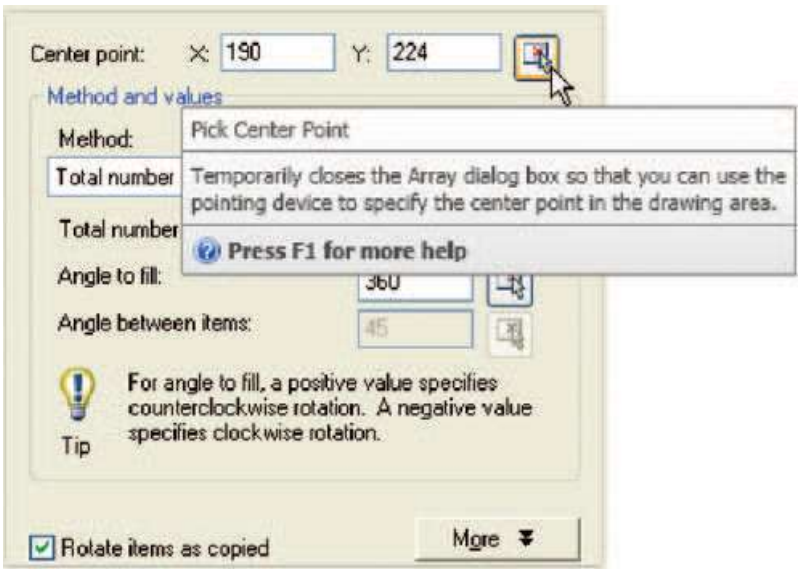


Fig. 3.20Second example – Array – the P ick Center point button

Fig. 5.22 Second example – **Array**

The move tool

Example – **Move** (Fig. 5.25)

1. Construct the drawing shown in Fig. 5.23 .

2. Call **Move** – click the **Move** tool icon in the **Home/Modify** toolbar (Fig. 5.24), pick **Move** from the **Modify** panel, pick **Move** from the

Modify drop-down menu, or enter **m** or **move** at the command line, which shows:

Command: _move

Select objects: pick .the middle shape in the drawing 1 found

Select objects: right-click

Specify base point or [Displacement] _ Displacement _ : pick

Specify second point or _ use first point as displacement _ : pick

Command:

The result is given in Fig. 5.25 .

Fig. 5.23 Example – **Move** – drawing

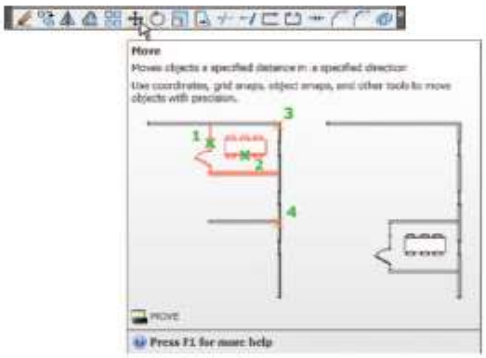


Fig. 5.24 The **Move** tool from the **Home/Modify** toolbar

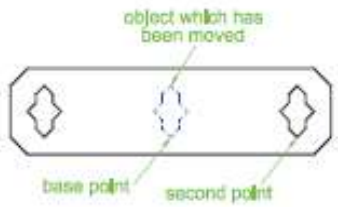


Fig. 5.25 Example – **Move**

The Rotate tool

When using the **Rotate**tool remember the default rotation of objects within AutoCAD 2009 is counterclockwise (anticlockwise).

Example – **Rotate** (Fig. 5.27)

1. Construct drawing **1** of Fig. 5.27 with **Polyline** . Copy the drawing **1** three times (Fig. 5.27).

2. Call **Rotate** – left-click its tool icon in the **Home/Modify** panel (Fig. 5.26), pick its tool icon from the **Modify** toolbar, pick **Rotate**from the **Modify** drop-down menu, or enter **ro**or **rotate** at the command line. The command line shows:

Command: _rotate

Current positive angle in UCS: ANGDIR _ counterclockwise ANGBASE _ 0

Select objects: window the drawing 3 found

Select objects: right-click

Specify base point: pick

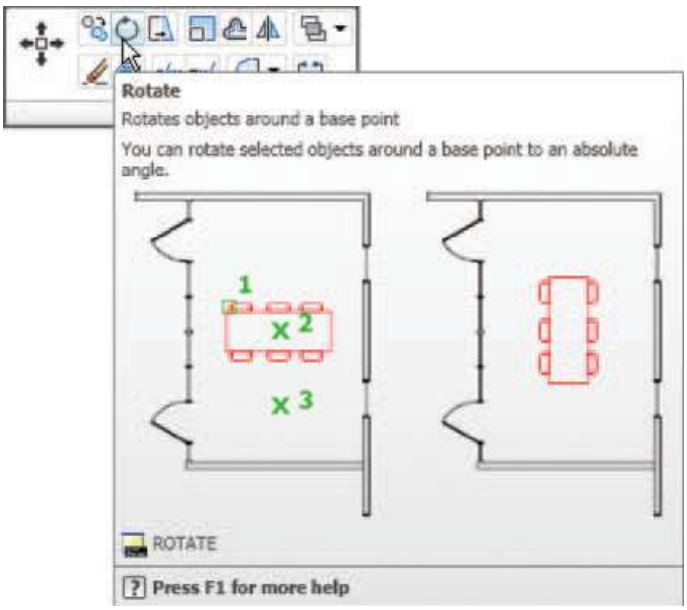


Fig.3.22The Rotate tool icon from the Home/Modify panel

Specify rotation angle or [Copy/Reference] _0 _ : 45

Command: and the first copy rotates through the specified angle.

3. Repeat for drawings **3** and **4** rotating as shown in Fig. 5.27 .

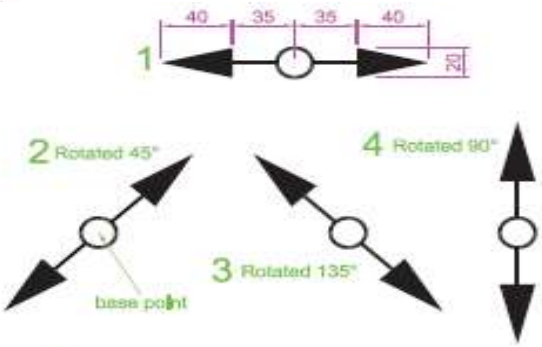


Fig. 5.27 Example – **Rotate**

The scale tool

Examples – **Scale** (Fig. 5.29)

1. Using the **Rectangle and** Polyline tools, construct drawing **1** of Fig. 5.29 . The **Rectangle** fi lets are R10. The line width of all parts is **1** . Copy the drawing 3 times to give drawings **2** ,**3** and **4** .

2. Call **Scale** – left-click its tool icon in the **Home/Draw** panel (Fig. 5.28), pick its tool icon in the **Modify** toolbar, pick **Scale** from the **Modify** drop-down-menu or, click its tool in the **Modify** toolbar or, enter **sc**or **scale** at the command line which then shows:

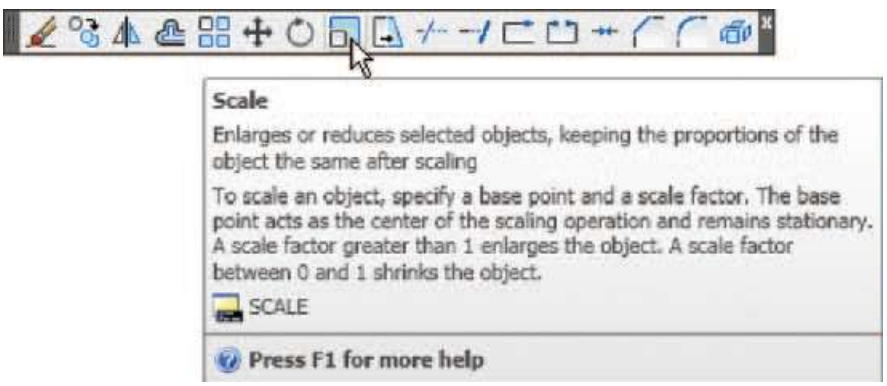


Fig. 3.25The Scale tool icon from the Home / Modify toolbar

Command: _scale

Select objects: window drawing 2 5 found

Select objects: right-click

Specify base point: pick

Specify scale factor or [Copy/Reference] _1 _ : 0.75

Command:

3. Repeat for the other two drawings **3** and **4** scaling to the scales given with the drawings.

The results are shown in Fig. 5.29 .

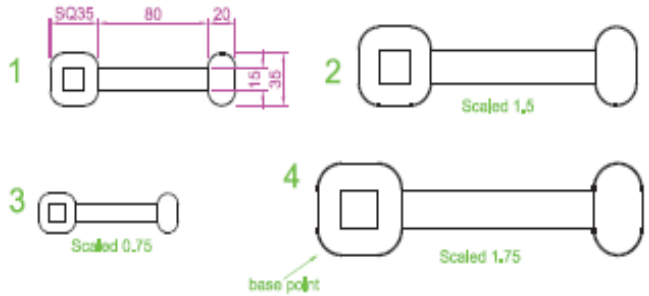


Fig. 5.29 Examples – Scale

The trim tool

This tool is one which will be in frequent use when constructing drawings.

First example – **Trim** (Fig. 5.31)

1. Construct the drawing **Original drawing** shown in Fig. 5.31 .

2. Call **Trim** – left-click its tool icon in the **Home/Modify** panel, pick its tool icon in the **Modify** toolbar Fig. 5.30), pick **Trim** from the **Modify** drop-down menu, or enter **tr**or **trim** at the command line, which then shows:

Command: _trim

Current settings: Projection UCS. Edge _ None

Select cutting edges: pick the left-hand circle 1 found

Select objects: right-click

Select objects to trim or shift-select to extend or [Fence/Project/Crossing/Edge/erase//Undo]: pick one of the objects

Select objects to trim or shift-select to extend or [Fence/Crossing/Project/Edge/erase/Undo]: pick the second of the objects

Select objects to trim or shift-select to extend or [Project/Edge/Undo]: right-click

Command:

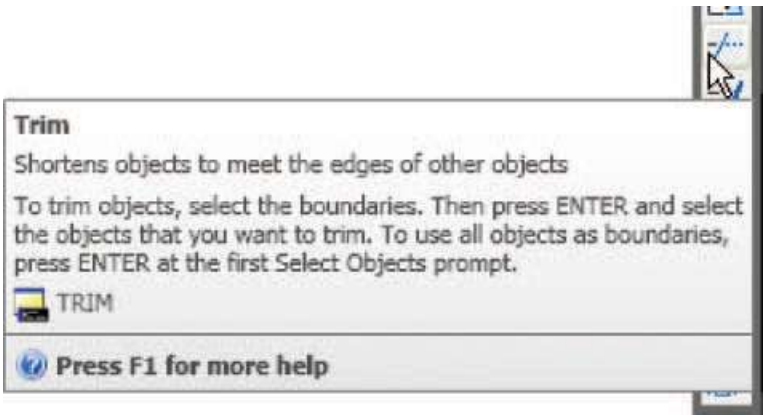


Fig. 3.26The T rim tool icon from the Modify toolbar in the AutoCAD Classic workspace

3. This completes the **First stage** as shown in Fig. 5.31. Repeat the **Trim** sequence for the **Second stage**.

4. The **Third stage** drawing of Fig. 5.31 shows the result of the trims at the left-hand end of the drawing.

5. Repeat for the right-hand end. The fi nil result is shown in the drawing labelled **Result** in Fig. 5.31 .

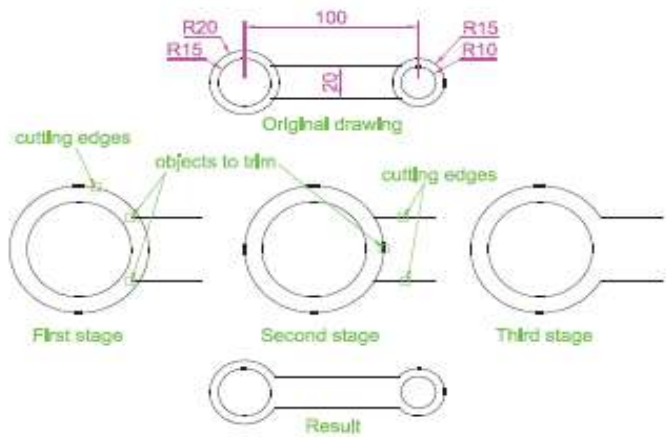


Fig. 5.31 First example – **Trim**

Second example – **Trim** (Fig. 5.32)

1. Construct the left-hand drawing of Fig. 5.32 .

2. Call **Trim**. The command line shows:

Command: _trim

Current settings: Projection UCS. Edge _ None

Select cutting edges …

Select objects or _ select all _ : pick the left-hand arc 1 found

Select objects: right-click

Select objects to trim or shift-select to extend or

[Fence/Crossing/Project/Edge/erase/Undo]: e (Edge)

Enter an implied edge extension mode [Extend/No extend] _ No extend _ : e (Extend)

Select objects to trim: pick

Select objects to trim: pick

Select objects to trim: right-click

Command:

3. Repeat for the other required trims. The result is given in Fig. 5.32 .

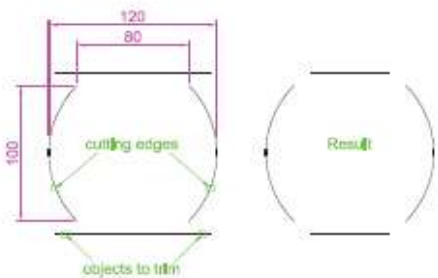


Fig. 5.32 Second example – Trim

The stretch tool

Examples – **Stretch** (Fig. 5.34)

As its name implies, the **Stretch** tool is for stretching drawings or parts of drawings. The action of the tool prevents it from altering the shape of circles in any way. Only **crossing** or **polygonal** windows can be used to determine the part of a drawing which is to be stretched.

1. Construct the drawing labelled **Original** in Fig. 5.34 , but do not include the dimensions. Use the **Circle** ,**Arc** , **Trim** and **Polyline Edit** tools.

The resulting outlines are plines of width _ 1. With the **Copy** tool make two copies of the drawing.

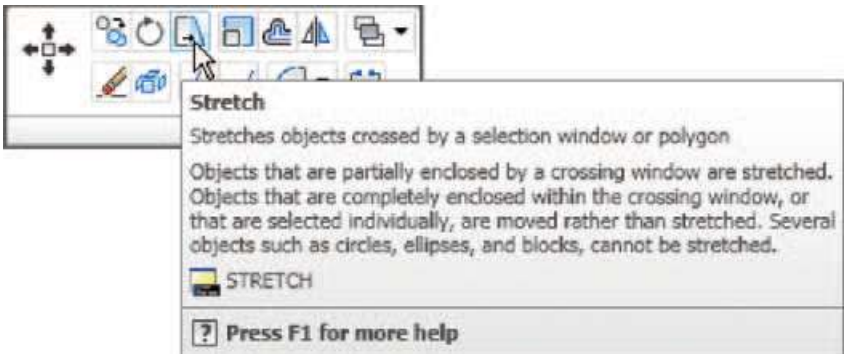


Fig. 5.33 The Stretch tool icon from the Home / Modify panel

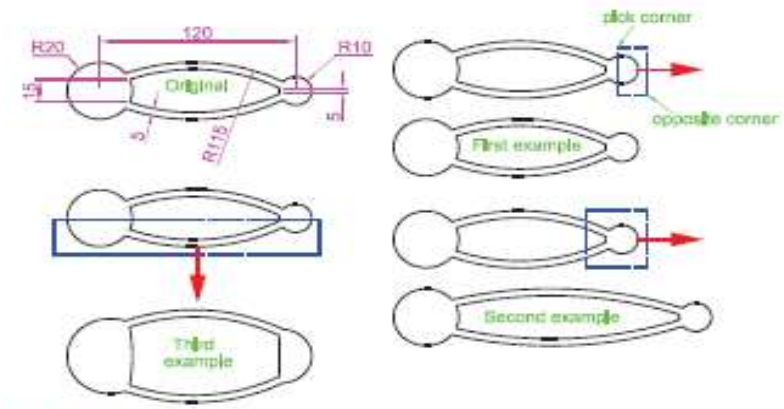


Fig. 5.34 Examples – **Stretch**

Note

In each of the three examples in Fig. 5.34 , the broken lines represent the crossing windows required when **Stretch** is used.

2. Call the **Stretch** tool – click on its tool icon in the **Home/Modify** panel (Fig. 5.33), left-click on its tool icon in the **Modify** toolbar, pickets name in the **Modify** drop-down menu or enter **s** or **stretch** at the command line, which shows:

Command: _stretch

Select objects to stretch by crossing-window or crossing-polygon...

Select objects: enter c right-click

Specify first corner: pick Specify opposite corner: pick 1 found

Select objects: right-click

Specify base point or [Displacement] , _Displacement_ : pick beginning of arrow

Specify second point of displacement or _ use first point as displacement _ : drag in the direction of the arrow to the required second point and right-click

Note

1. When circles are windowed with the crossing window no stretching can take place. This is why, in the case of the fi rest example in

Fig. 5.33 , when the **second point of displacement** was picked , there was no result – the outline did not stretch.

2. Care must be taken when using this tool as unwanted stretching can occur.

The break tool

Examples – **Break** (Fig. 5.36)

1. Construct the rectangle, arc and circle (Fig. 5.36).

2. Call **Break** – click its tool icon in the **Home/Modify** panel (Fig. 5.35), pick its tool icon in the **Modify** toolbar, click **Break** in the **Modify** drop-down menu, or enter **br**or **break** at the command line, which shows:

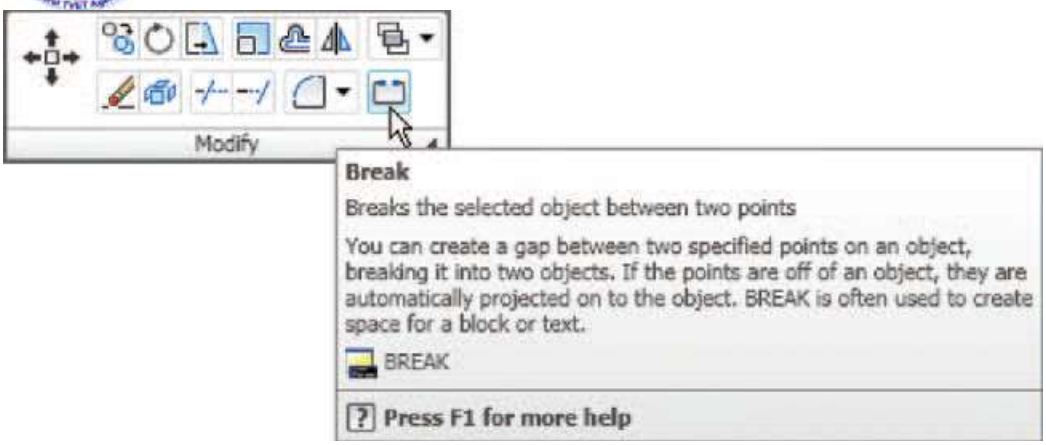


Fig. 3.30The Break tool icon from the Home / Modify panel

For drawings 1 and 2

Command: _break Select object: pick at the point

Specify second break point or [First point]: pick

Command:

For drawing 3

Command: _break Select object pick at the point

Specify second break point or [First point]: enter f right-click

Specify first break point: pick

Specify second break point: pick

Command:

The results are shown in Fig. 5.36 .

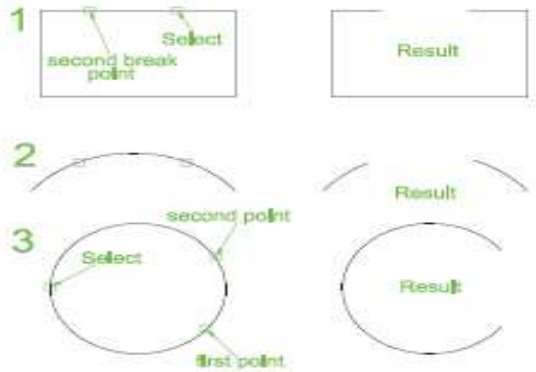


Fig. 5.36 Examples – **Break**

Note

Remember the default rotation of AutoCAD 2009 is counterclockwise.

This applies to the use of the **Break** tool.

The join tool

The **Join** tool can be used to join planes provided their ends are touching;

to join lines which are in line with each other; to join arcs and convert arcs

to circles.

Examples – **Join** (Fig. 5.38)

1. Construct a rectangle from four separate planes – drawing **1** of Fig. 5.38 ; construct two lines – drawing **2** of Fig. 5.38 and an arc – drawing **3** of Fig. 5.38 .
2. Call the **Join** tool – click the **Join** tool icon in the **Home/Modify** panel(Fig. 5.37), left-click its tool icon in the **Modify** toolbar, select **Join** from the **Modify** drop-down menu or enter **join** or **j** at the command line. The command line shows:

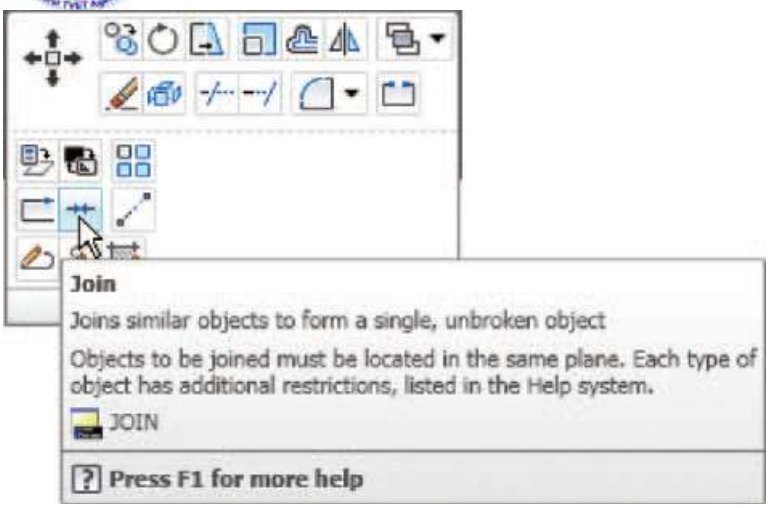


Fig. 3.32The Join tool icon from the Home / Modify panel

Command: _join Select source object:

Select objects to join to source: pick a plane

1 found

Select objects to join to source: pick another

1 found, 2 total

Select objects to join to source: pick another

1 found, 3 total

Select objects to join to source: right-click

3 segments added to polyline

Command: right-click

JOIN Select source object: pick one of the lines

Select lines to join to source: pick the other

1 found

Select lines to join to source: right-click

1 line joined to source

Command: right-click

JOIN Select source object: pick the arc

Select arcs to join to source or [close]: enter l right-click

Arc converted to a circle.

Command:

The results are shown in Fig. 5.38 .

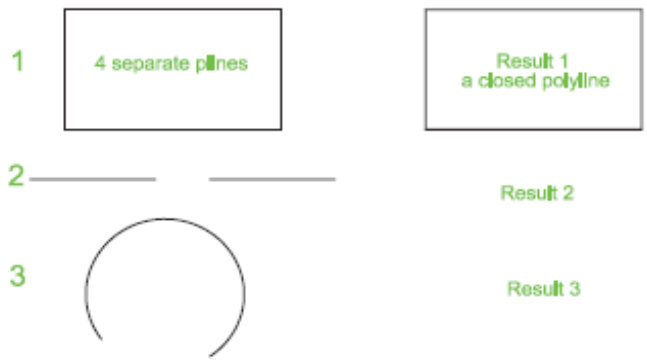


Fig. 5.38 Examples – **Join**

The extend tool

Examples – **Extend** (Fig. 5.40)

1. Construct planes and a circle as shown in the left-hand drawings of Fig. 5.40 .

2. Call **Extend** – click the **Extend** tool in the **Home/Draw** panel, click its tool icon in the **Modify** toolbar (Fig. 5.39), pick **Extend** from the**Modify**drop-down menu, or enter **ex** or **extend** at the command linewhich then shows:

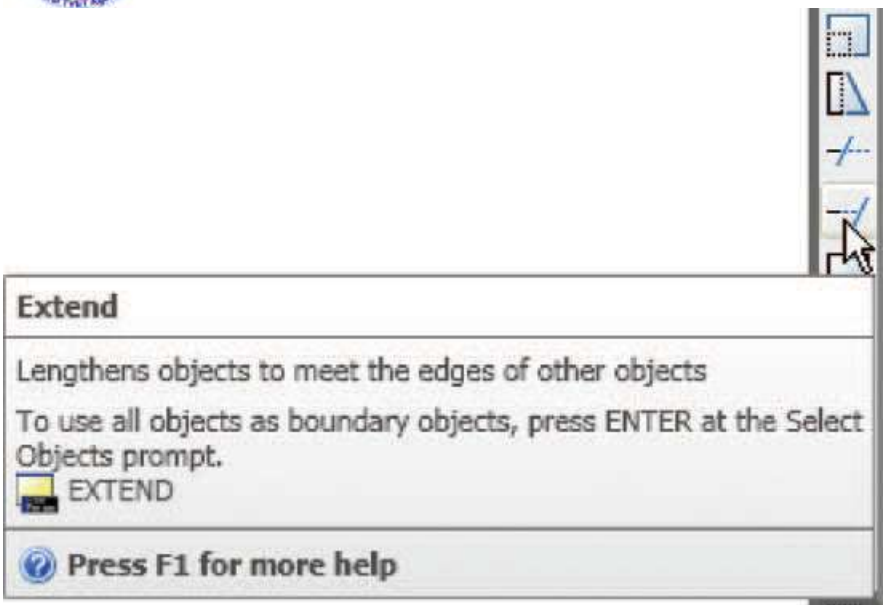


Fig. 3.35The Extend tool icon from the Modify toolbar in the AutoCAD Classic workspace

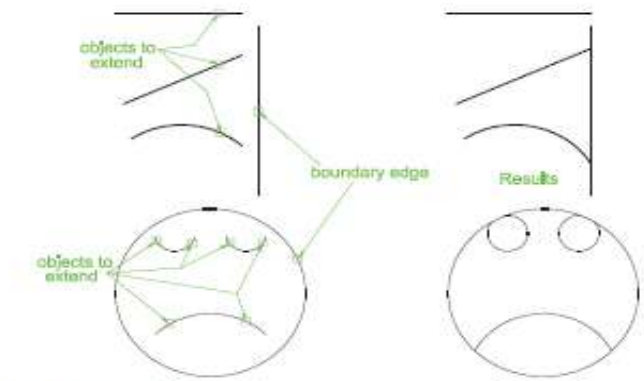


Fig. 5.40 Examples – **Extend**

Command: _extend

Current settings: Projection _ UCS Edge _ Extend

Select boundary edges …

Select objects or _ select all _ : pick 1 found

Select objects: right-click

Select object to extend or shift-select to trim or[Fence/Crossing/Project/Edge/Undo]: pick

Repeat for each object to be extended. Then:

Select object to extend or shift-select to trim or [Fence/Crossing/Project/Edge/Undo]: right-click

Command:

Note

Observe the similarity of the **Extend** and **No extend** prompts with those of the **Trim** tool.

The fillet and chamfer tools

These two tools can be called from the **Home/Modify** panel. There are similarities in the prompt sequences for these two tools. The major differences are that only one (**Radius**) setting is required for a fi llet, but two (**Dist1** and **Dist2**) are required for a chamfer. The basic prompts for both are:

Fillet

Command: _fillet

Current settings: Mode _ TRIM, Radius _ 1

Select first object or [Polyline/Radius/Trim/multiple]: enter r (Radius) right-click

Specify fillet radius _ 1 _ : 15

Chamfer

Command: _chamfer

(TRIM mode) Current chamfer Dist1 _ 1, Dist2 _ 1

Select first line or [Undo/Polyline/Distance/Angle/

Trim/method/Multiple]: enter d (Distance) right-click

Specify first chamfer distance _ 1 _ : 10

Specify second chamfer distance _ 10 _ : right-click

Examples – Fillet (Fig. 5.42)

1. Construct three rectangles 100 by 60 using either the **Line** or the **Polyline** tool (Fig. 5.42).
2. **Call** Fillet – click the arrow to the right of the tool icon in the **Home/**

Modify panel and select **Fillet** from the menu which appears

(Fig. 5.41), pick its tool icon in the **Modify** toolbar, pick **Fillet** from the

Modify drop-down menu, or enter **f** or **fi llet**at the command line which then shows:

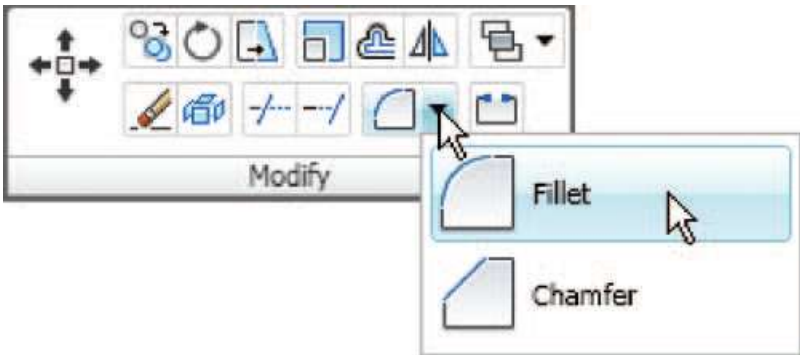


Fig. 3.39Select Fillet from the menu in the Home / Modify panel

Fig. 5.42 Examples – **Fillet**

Examples – **Chamfer** (Fig. 5.44)

1. Construct three rectangles 100 by 60 using either the **Line** or the **Polyline** tool.

2. Call **Chamfer** – click the arrow to the right of the tool icon in the **Home/Modify** panel and select **Chamfer** from the menu which appears (Fig. 5.43), c lick on its tool icon in the **Modify** toolbar, pick

Chamfer from the **Modify** drop-down menu, or enter **cha** or **chamfer**at the command line which then shows:

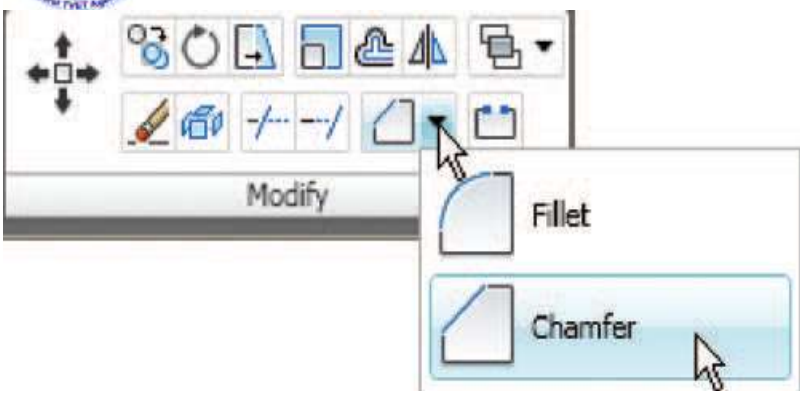


Fig. 3.43 S elect Chamfer from the Modify panel

Command: _chamfer

(TRIM mode) Current chamfer Dist1 _ 1, Dist2 _ 1

Select first line or [Undo/Polyline/Distance/

Angle/Trim/

Me thod/Multiple]: d

Specify first chamfer distance _ 1 _ : 10

Specify second chamfer distance _ 10 _ : right-click

Select first line or [Undo/Polyline/Distance/Angle/

Trim/ Me thod/Multiple]: pick the first line for the chamfer

Select second line or shift-select to apply corner: pick

Command:

The other two rectangles are chamfered in a similar manner except that the **No trim** prompt is brought into operation with the bottom left-hand

example.

Fig. 5.44 Examples – **Chamfer**

Edit command

The commands used for modifying the drawings fall under this category. Using these commands,the objects may be erased, retrieved, moved to another location, made into multiple copies, rotated, enlarged, mirror imaged, part of a drawing may be moved and the above effects can also be reversed (undo).

ERASE Command—this lets the entities to be permanently removed from the drawing.

The command format is

Command: ERASE

Select objects: (desired objects) once it is entered, the objects/portion of the object is erased/ deleted.

OFFSET Command—this constructs an entity parallel to another entity at either a specified distance or through a specified point.

MIRROR Command—this allows to mirror the selected entities in the drawing. The original objects can be deleted (like a move)/retained (like a copy).

MOVE Command—the move command is used to move one/more existing drawing entities from one location in the drawing to another.

COPY Command—this is used to duplicate one or more existing drawing elements at another location without erasing the original.

BASIC DIMENSIONING

In many applications, a drawing should contain annotations showing lengths or distances or angles between objects to convey the desired information. Dimensioning is the process of adding these annotations to a drawing. AutoCAD provides four basic types of dimensioning; linear, angular, diameter and radius.

DIM and DIMI Commands—DIMI command allows executing one dimensioning command and then returns to the normal command mode. If several dimensioning commands are to be executed, DIM command should be used. In this mode, the normal set of AutoCAD commands is replaced by a special set of dimensioning commands. To end the process of dimensioning,

EXIT command has to be used.

The dimensioning commands can be grouped into six categories:

1. **Linear** — is done with a horizontal, vertical, aligned and rotated command. However, rotated command requires specifying the dimension line angle explicitly.

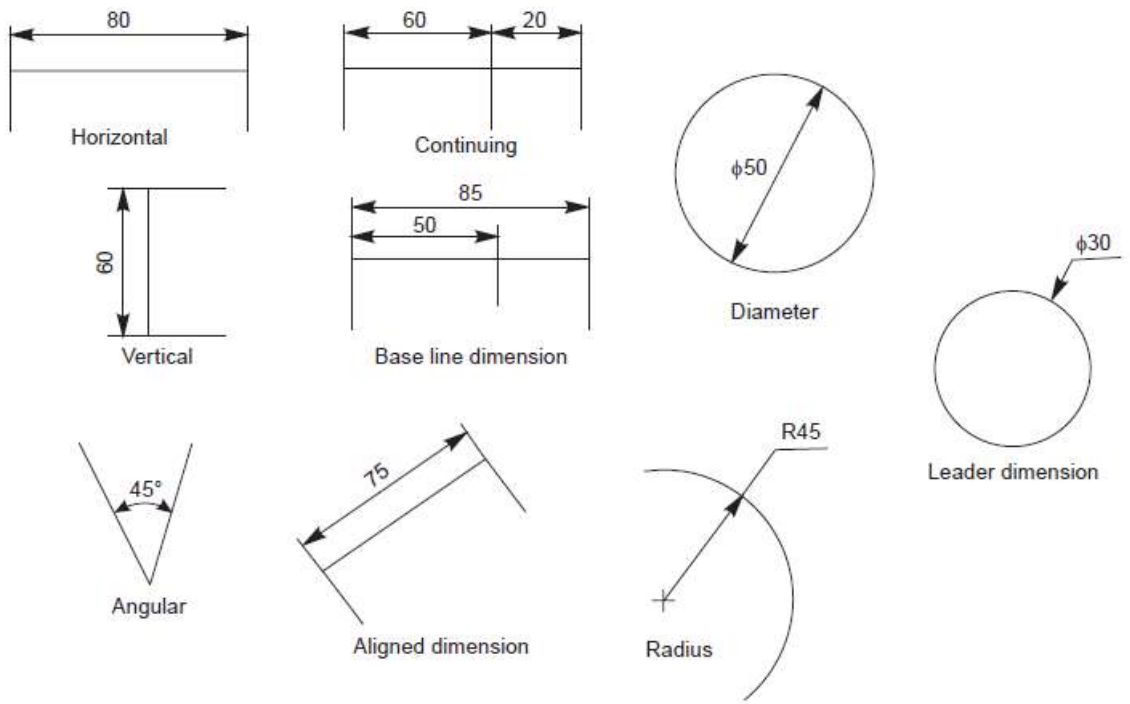


Fig. 21.19

2. **Angular** — is used to dimension angles. Here, one has to select two non-parallel lines to introduce the angular dimension.
3. **Diameter** — this can be invoked for dimensioning arcs and circles.
4. **Radius** — it is almost identical to diameter dimensioning, except that only a radius line is drawn. This line has only one arrow.
5. **Dimensioning utility commands**— to draw a center line or center mark for a circle/arc, this command issued.

AutoCAD generally uses same type of dimensions and dimension label components as standarddraughting. Figure 21.19 gives examples of types of dimensions possible: linear, angular, diametric, radial and aligned. A number of variables such as extension lines, text location, tolerance specifications, arrow styles and sizes, etc., actually control the way in which the dimensions may appear in the drawings.

Self-Check 1	Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part one: Choose the best answer from the given alternatives.

1. Which one of the following draw tool is used to draw polygon.
    a. Line
    b. Circle
    c. Polygon
    d. Polyline
2. One of the following modify tool is used to duplicate the given object.
    a. Mirror
    b. Copy
    c. Move
    d. Erase
3. One of the following is true.
    a. CAD mean computer Aided Drafting
    b. Mirror is used to draw a symmetrical objects
    c. Erase is used to remove or delete the drawing
    d. None of the above

e. All are correct

4. A modify tool which is used to cut the unnecessary part of the drawing.
   a. Trim
   b. Extend
   c. Scale
   d. Erase
5. A dimension tool used to make the angle of an inclined line.
   a. Linear dimension
   b. Aligned dimension
   c. Diametric dimension
   d. Angular dimension

Part two: MATCHING

"A"	"B"
1. Erase	A. used to draw the symmetrical objects
2. Copy	B. used to enlarge or reduce the size of the object.
3. Move	C. used to enlarge the short lines
4. Offset	D. used to cut the extended lines
5. Mirror	E. used to separate the group of lines
6. Scale	F. used to move the object
7. Trim	G. used tooffset with known interval
8. Extend	H. used to break a line
9. Break	I used to delete the unnecessary drawing
10. Explode	J. used to duplicate the objects

Part three: Short answer

Note: **Satisfactory rating - _10_ points** **Unsatisfactory - below 10points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one: multiple choices

1. _____
2. _____
3. _____
4. _____
5. _____

Part two: matching

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

7. _____
8. _____
9. _____
10. _____

Part three: short answer questions

1. _____
   _____
2. _____
   _____
3. _____

Operation Sheet 1	locatting and modifing Existing CAD drawings

Procedures:

2. Start auto CAD
   a. Start--- all program----auto desk---auto CAD. Or
   b. Double click on CAD icon on the desk top. Or
   c. Right click on CAD icon ---- open
3. Display the necessary tool bars
   a. Draw tool bar
   b. Modify tool bar
   c. Standard tool bar
4. Make adjustment the necessary information

a. units,
b. drawing limits,
c. dimension style,
d. Layers, etc...

5. Prepare the given drawing or project.
6. Edit or modify the drawing by adding or removing or....
7. Stored your drawing /save/
8. Print the prepared drawing /output/

Exercise

Methods of constructing answers to the following exercises can be found in the free website:

http://books.elsevier.com/companions/9780750689830

1. Construct the drawing given in Fig. 5.46. All parts are plines of width = 0.7 with corners filleted R10. The long strips have been constructed using **Circle**, **Polyline**, **Trim** and **Polyline Edit**. Construct one strip and then copy it using **Copy**.

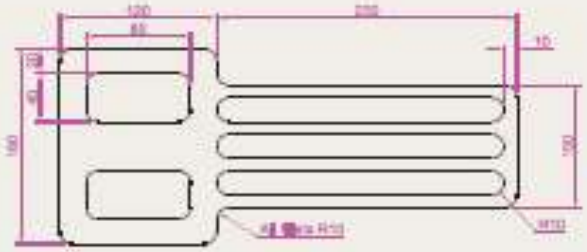


Fig. 5.46 Exercise 1

2. Construct the drawing given in Fig. 5.47. All parts of the drawing are plines of width = 0.7. The setting in the **Array** dialog is to be **180** in the **Angle of array** field.

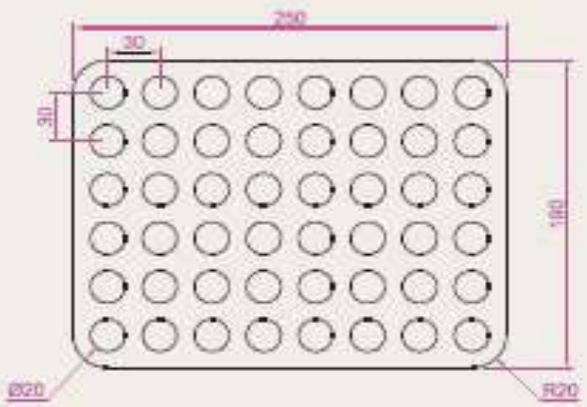


Fig. 5.47 Exercise 2

3. Using the tools **Polyline**, **Circle**, **Trim**, **Polyline Edit**, **Mirror** and **Fillet** construct the drawing given in Fig. 5.48.

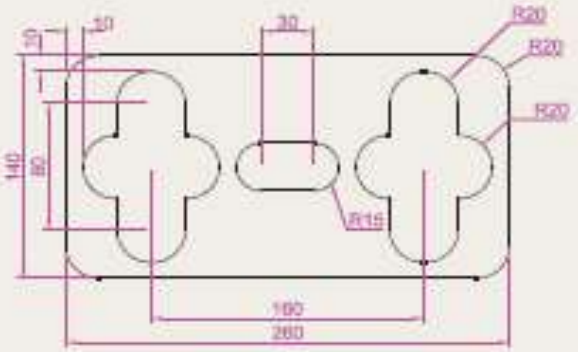


Fig. 5.48 Exercise 3

4. Construct the circles and lines shown in Fig. 5.49. Using **Offset** and the **Ttr** prompt of the **Circle** tool followed by **Trim**, construct one of the outlines arrayed within the outer circle. Then, with **Polyline Edit**, change the lines and arcs into a pline of width = 0.3. Finally, array the outline twelve times around the centre of the circles (Fig. 5.50).

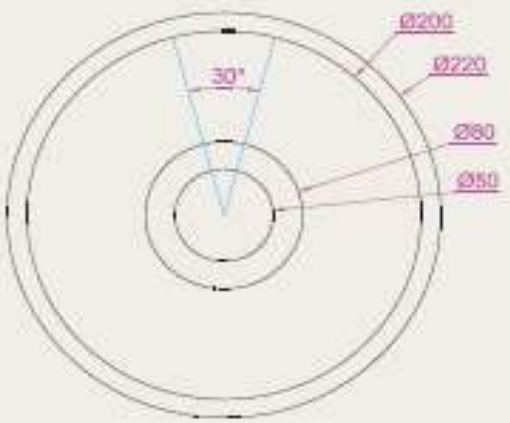


Fig. 5.49 Exercise 4 – circles and lines on which the exercise is based

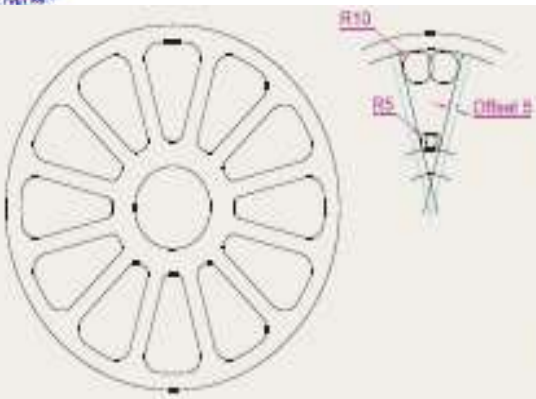


Fig. 5.50 Exercise 4

5. Construct the arrow shown in Fig. 5.51. Array the arrow around the centre of its circle 8 times to produce the right-hand drawing of Fig. 5.51.

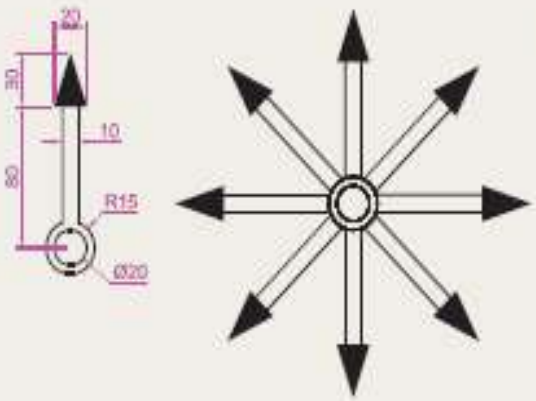


Fig. 5.51 Exercise 5

6. Construct the left-hand drawing of Fig. 5.52. Then with **Move**, move the central outline to the top left-hand corner of the outer outline. Then with **Copy** make copies to the other corners.

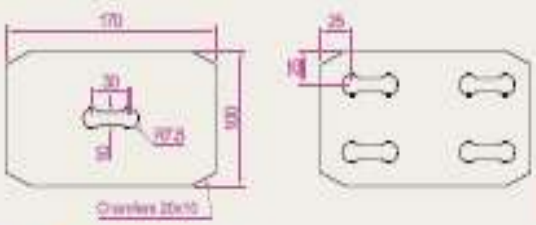


Fig. 5.52 Exercise 6

7. Construct the drawing shown in Fig. 5.53 and make two copies using **Copy**. With **Rotate** rotated each of the copies to the angles as shown.

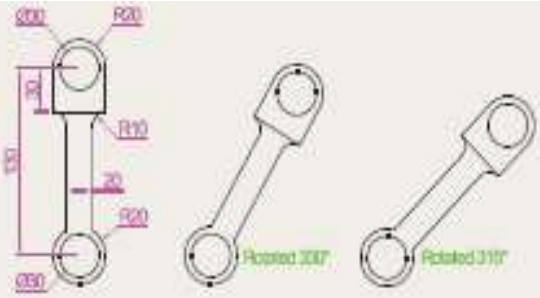
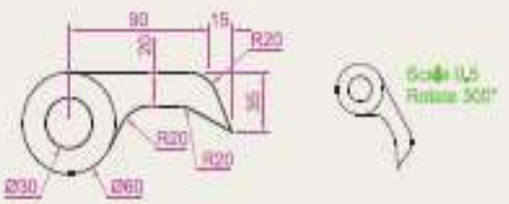


Fig. 5.53 Exercise 7

8. Construct the dimensioned drawing of Fig. 5.54. With **Copy** copy the drawing. Then with **Scale** scale the drawing to a scale of **0.5**, followed by using **Rotate** to rotate the drawing through an angle of as shown. Finally, scale the original drawing to a scale of **2:1**.

9. Construct the left-hand drawing of Fig. 5.55. Include the dimensions in your drawing. Then, using the **Stretch** tool, stretch the drawing, including its dimensions to the sizes as shown in the right-hand drawing. The dimensions are said to be **associative** (see Chapter 6).



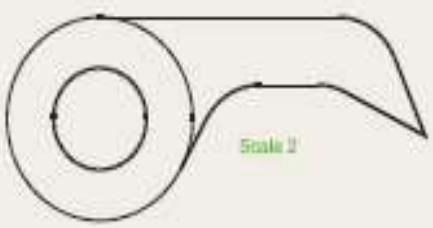


Fig. 5.54 Exercise 8

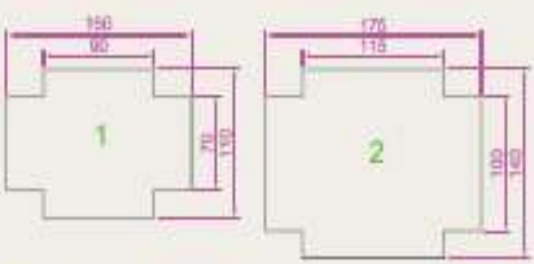


Fig. 5.55 Exercise 9

LAP Test	

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, workshop, tools and materials you are required to perform the following tasks within 3 hours.

Task 1: Clean the given tools and equipment.

Task 2: list the different modify/editing/ tools and their functions.

Task 3: Using the given template, prepare a computer lab schedule for the specific area in the workshop. In preparing the CAD schedule -

- ❖ identify the:
  - ✓ Required soft ware
  - ✓ Type of drawing and modifying/editing/ of drawing
  - ✓ Computer lab.
- ❖ consider the:
  - ✓ procedures and standards
  - ✓ frequency of maintenance activities

Task 4: Perform the auto-CAD software in the assigned computer lab.

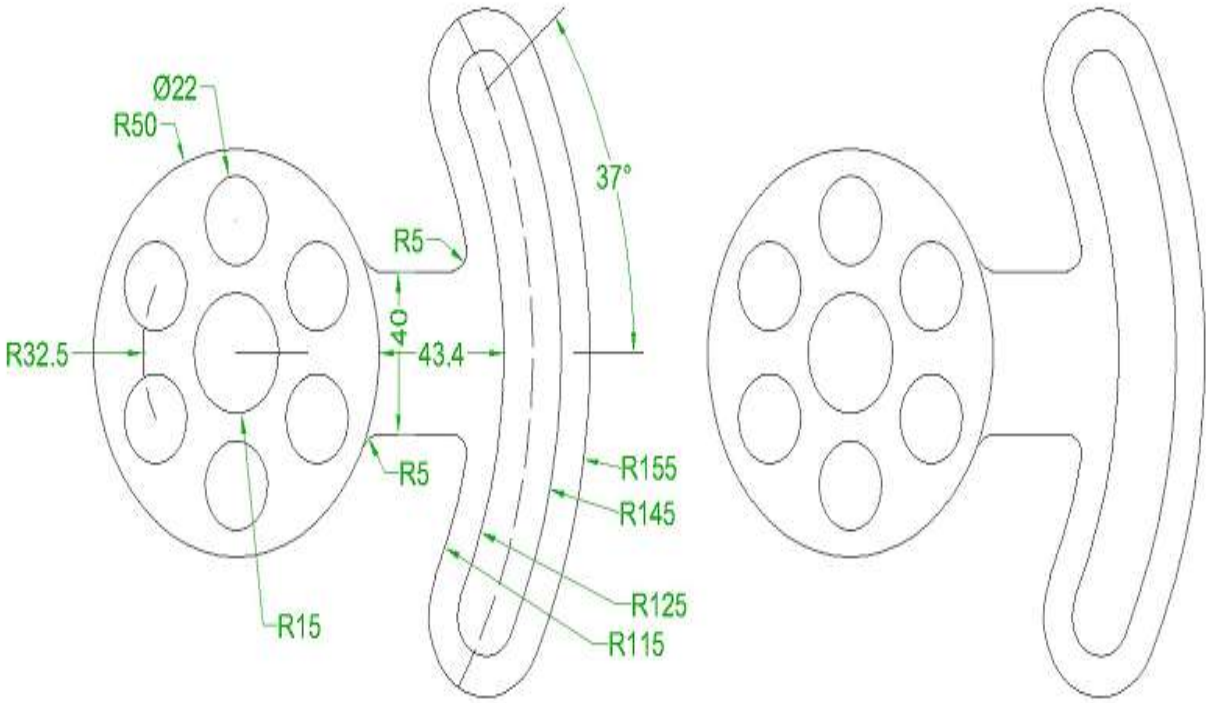


Plate Number 1

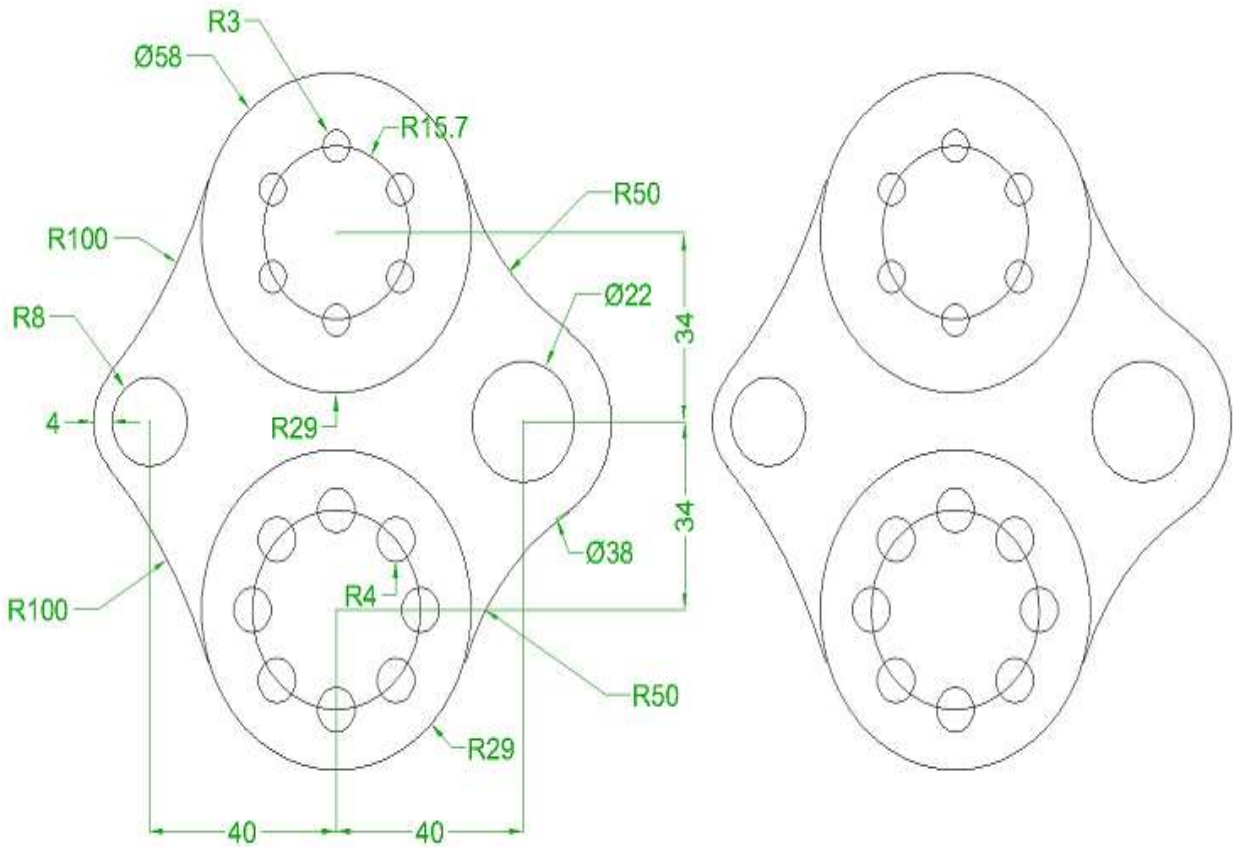


Plate Number 2

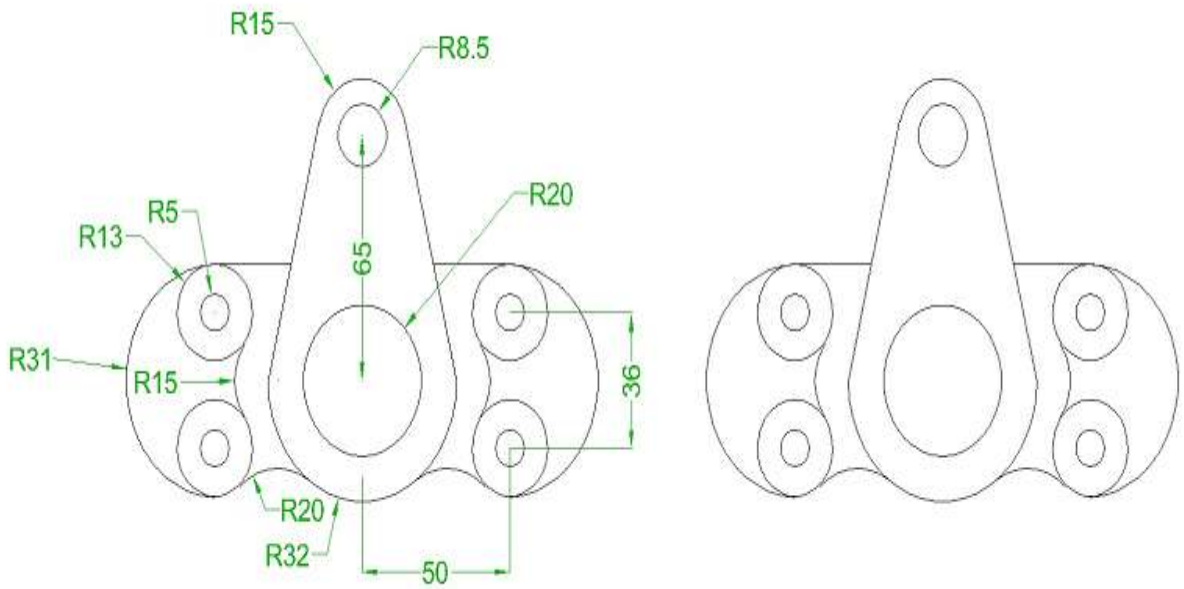


Plate Number 3

Reference

- Beginning AutoCAD 2018: Exercise Workbook
- AutoCAD 2018 Tutorial First Level 2D Fundamentals
- AutoCAD 2018 For Beginners
- AutoCAD 2017 For Beginners
- Beginning AutoCAD 2017: Exercise Workbook
- AutoCAD 2018 For Beginners
- AutoCAD Plant 3D 2018 for Designers
- AutoCAD For Dummies
- Mastering AutoCAD 2019 and AutoCAD LT 2019
- Beginning AutoCAD 2016
- Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press
- AutoCAD 2018 For Architectural Design

ROAD CIVIL WORKS

Level II
NTQF

Learning Guide-18

Unit of Competence: -	**Use Computer Aided Drafting (CAD) Systems to Produce Basic Engineering Drawings**
Module Title:-	**Using Computer Aided Draftin (CAD) Systems to Produce Basic Engineering Drawings**
LG Code:	**CON RCW2 MO5 LO4-LG-18**
TTLM Code:	**CON RCW2 TTLM 1019v1**

LO4:-Produce output

Instruction Sheet	Learning Guide #14

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Saving Drawing files
- printing drawing files using plotter or **equivalent devices**

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- Drawing files are saved in the appropriate format in accordance with standard operating procedures.
- Drawing files are printed out using plotter or equivalent devices.

Learning Instructions:

3. Read the specific objectives of this Learning Guide.
4. Follow the instructions described below 41.
5. Read the information written in the information “Sheet 1, and Sheet 2,
6. Accomplish the “Self-check 1, and Self-check 2, **in page 152, and 155**respectively.

Information Sheet-1	Saving Drawing files

1.1How to set AutoCAD save version

1.) Right click on the command line and select Options (or Launch Options as desired)
2.) Go to the Open and Save tab
3.) In the top left you will see a drop down under the Save as Section This is the version it is currently saving as.
4.) select the version you want AutoCAD to save to and select OK
Now your AutoCAD is set to save to the version you selected in the Options Dialog Box

Note:
- Objects that were created in newer versions and were not available in the version you are saving to will be lost in most cases
- Vertical programs such as Civil 3D , Architecture, etc have their own custom Objects and in most cases are not backwards compatible and the

vertical Options will be disabled (You will not be able to use the commands for that program in the earlier version)
Quick Save
The QSAVE command is equivalent to clicking Save on the File menu.
If the drawing is named, AutoCAD saves the drawing using the file format specified on the Open and Save tab of the Options dialog box and does not request a file name. If the drawing is unnamed, AutoCAD displays the Save Drawing As dialog box (see SAVEAS) and saves the drawing with the file name and format you specify.

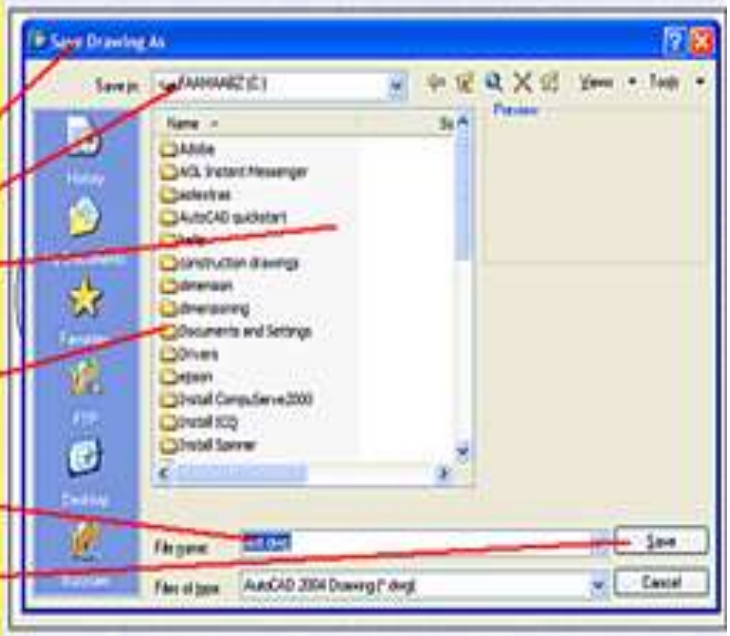
1. Press CTRL + S.
   or
2. Click the Save icon.
   or
3. Type QSAVE at the command prompt,
   Command: QSAVE

TIPS: Drawings can be saved as different versions of AutoCAD (e.g. R13, R14, R 2000, etc.)

Save Command

The save command is used to save the current open drawing. Use this command to save your drawing when you are ready to close your current drawing secession or start a new one.

1. Start a new drawing from scratch
2. Draw a circle and a line any length any diameter
3. Click on the **SAVE** icon in the upper left corner of your screen in the standard toolbar. The **SAVE DRAWING AS** dialog box opens.
4. Click here next to **SAVE IN** scroll down the list of drives on your computer and click on the drive you wish to save your drawing on. **(Example: A:,B:,C:,D:, etc).**
   NOTE: Once you have click on the drive you wish to save your drawing on, you may get a list of directory's you can click on a specified directory of your choice to save your drawing in.
   REMEMBER WHERE YOU SAVED YOU DRAWING
5. Click on this area next to **FILE NAME** then type in a name for your drawing **(Example: TEST)**
6. Click on **SAVE**, the drawing file will then be saved to the drive and directory that you chose in **step 4**



Self-Check _1_	Written Test

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part one: Choose the best answer from the given alternatives.

1. Press CTRL + S. do not save on auto cad processes
   a. TRUE
   b. FALSE

2. The QSAVE command is equivalent to clicking Save on the File menu.
   a. TRUE
   b. FALSE

Note: **Satisfactory rating - _10_ points** **Unsatisfactory - below 10points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one: multiple choices

1. _____

2. _____

Information Sheet-2	printing drawing files using plotter or equivalent devices

Plotting the drawing

AutoCAD drawing may be plotted either by a pen plotter or a printer plotter. Pen plotters are very accurate and multiple colors may be obtained. Printer plotters have limited resolution and smaller paper sizes and produce monochrome output. However, printer plotters are usually faster than pen plotters. For pen plotter, PLOT command is used, whereas for a printer plotter, PRPLOT command is used.

While beginning a plot from the main menu, tell AutoCAD, which portion of the drawing to be plotted. Specify the part of the drawing to be plotted by entering: Display, Extents, Limits, View or window: the response specifies a rectangular area of the drawing.

By Specifying:

D (Display) — this option plots the view that was displayed in the current view port just prior to the last SAVE or END command for that drawing.

E (Extents) — this option is similar to ZOOM extents. The extents are updated automatically as one draws new entities.

L (Limits) — plots the entire drawing area as defined by the drawing limits.

V (View) — plots a view that was previously saved, using the drawing editor's view command.

W (Window) — plots any portion of the drawing. Specify the lower left corner and upper right corner of the area to be plotted.

Basics of operating system

Operating system falls in the category of system software. An operating system is a set of programs designed to manage the entire operations of computer system. Basically the operating system performs two fundamental tasks for the computer:

(i) managerial task (ii) interface task

The operating system does not do any specific task, but it is a general program which assists the user by doing the following operations:

— Controlling all the operations including input/output operations, arithmetic operations and internal transfer of information.

— Communicating with peripheral devices (printer, disk and tape device).

— Supporting the running of other software.

One can say that the computer system without an operating system is like an office with out a manager.

SAVE Command—AutoCAD provides the following commands to save the work/drawing on the hard disk/ floppy diskette:

SAVE SAVEAS QSAVE

Command: SAVE

Self-Check __	**Written Test**

Name: _____ **Date:** _____

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Part one: Choose the best answer from the given alternatives.

1, AutoCAD drawing may be plotted either by a pen plotter or a printer plotter

A, TRUE

B, FALSE

2, An operating system is a set of programs designed to manage the entire operations of computer system.

A, TRUE

B, FALSE

Note: **Satisfactory rating - _10_ points** **Unsatisfactory - below 10points**
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Part one: multiple choices

3. _____

4. _____

Reference

- Beginning AutoCAD 2018: Exercise Workbook
- AutoCAD 2018 Tutorial First Level 2D Fundamentals
- AutoCAD 2018 For Beginners
- AutoCAD 2017 For Beginners
- Beginning AutoCAD 2017: Exercise Workbook
- AutoCAD 2018 For Beginners
- AutoCAD Plant 3D 2018 for Designers
- AutoCAD For Dummies
- Mastering AutoCAD 2019 and AutoCAD LT 2019
- Beginning AutoCAD 2016
- Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press
- AutoCAD 2018 For Architectural Design

ROAD CIVIL WORKS

Level II

NTQF

Learning Guide-19

Unit of Competence: - Use Computer Aided Drafting Systems to Produce Basic Engineering Drawings

Module Title:- Using Computer Aided Drafting (CAD) Systems to Produce Basic Engineering Drawings

LG Code: CON RCW2 MO5 LO5-LG-98

TTLM Code: CON RCW2 TTLM 1019v1

LO5:-Perform exit and shut-down procedures

Instruction Sheet	Learning Guide #14

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- shut down Programs and computer

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- Basic CAD drawings are created and guidance is sought as required.

- Drawings are prepared in accordance with standard operating procedures.
- As required, CAD drawings are reviewed with supervisor and/or other designated staff in accordance with company procedures
- Detailed drawing is produced in third angle projection, including auxiliary views, sections and assemblies

Learning Instructions:

7. Read the specific objectives of this Learning Guide.
8. Follow the instructions described below 41.
9. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 Sheet 4 Sheet 5 Sheet 6 and Sheet 7”.
10. Accomplish the “Self-check 1, **in page 161**respectively.

Information Sheet-1	**shut down Programs and computer**

1.1**shut down Programs**

The current drawing is closed. If you modified the drawing since it was last saved, you are prompted to save or discard the changes. To save changes to a read-only file, you must use the SAVEAS command and you should close the saved AutoCAD file by clicking the top right corner of the screen .

1.2Shutting Down the computer

At the bottom of the right pane is the Shut down button. Click the Shut down button to turn off your computer.
Clicking the arrow next to the Shut down button displays a menu with additional options for switching users, logging off, restarting, or shutting down.

• Switch user: If you have more than one user account on your computer, Fast User Switching is an easy way for another person to log on to the computer without logging you off or closing your programs and files.

• Log off: When you log off from Windows, all of the programs you were using are closed, but the computer is not turned off.

• Lock: Locking your PC is a good option if you'll be back soon. You'll have to enter your password when you come back, which helps keep your work more secure.

5

• Restart: The Restart button "reboots" your computer (it is sometimes called a "warm boot" or "soft boot.") That means it saves your information to the hard drive, turns off the computer for a moment, and then turns it back on again.

• Sleep: Clicking on Sleep puts your computer in a low-power state, but doesn't turn it off. The main advantage is that it allows you to get back to work quickly, without having to wait for the computer to do a full reboot

Unlike most electrical appliances, a computer shouldn't be turned off by pressing the same button that you pressed to turn it 'on'. If you do that, you can actually lose data or damage some of the processes in the machine. Think of turning off the computer properly as letting it fall asleep – just pushing the 'on' button or unplugging the computer would be like knocking it out with a punch!

Follow these step-by-step instructions to help you turn off your computer

These instructions are for Windows 7, but earlier versions are very similar.

For Windows 8, see our guide 'How to shut down Windows 8'.

Step 1: Click the 'Windows' button at the bottom left-hand corner of your screen.

Step 2: Click Shut down.

Step 3: If you've left any programs running or documents open, you'll get a message similar to this:

You have two options now:

Click Cancel and then close everything that had been listed in the message, saving when necessary. Then try closing again.

or

Click Force shut down. The computer will automatically close all your documents, programs and so on without saving anything. As a result, you may lose some data

Press the Windows key on the keyboard or click Start.

Click the Shut down button.

-or-

Press Ctrl+Alt+Del and click the power button in the bottom-right corner of the screen.

-or-

From the Windows desktop, press Alt+F4 to get the Shut down Windows screen and select Shut down.

Tip

If you have no mouse, use the Tab key and arrow keys to switch between fields and the Enter key or the spacebar to select what is highlighted.

Self-Check 1	**Written Test**

Short Answer Questions

1. The Restart button "reboots" your computer

   a.Restart:

   b**.** shutdown

   c**.** booting

   d**.** All

2. Press Ctrl+Alt+Del and click the power button in the bottom-right corner of the screen.

a.Restart:

b**.** shutdown

c**.** booting

d**.** All

Note: **Satisfactory rating – 2 points** **Unsatisfactory - below 2 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Multiple Chose Test Answer

Name: _____ Date: _____

Short Answer

1._____

2._____

Reference

- Beginning AutoCAD 2018: Exercise Workbook
- AutoCAD 2018 Tutorial First Level 2D Fundamentals
- AutoCAD 2018 For Beginners
- AutoCAD 2017 For Beginners
- Beginning AutoCAD 2017: Exercise Workbook
- AutoCAD 2018 For Beginners

- AutoCAD Plant 3D 2018 for Designers
- AutoCAD For Dummies
- Mastering AutoCAD 2019 and AutoCAD LT 2019
- Beginning AutoCAD 2016
- Mastering AutoCAD 2016 and AutoCAD LT 2016: Autodesk Official Press
- AutoCAD 2018 For Architectural Design

Answer kay

Lo, 1 self check 1

1, B
2, A
3, E
4, C

self check 2

1. D

2. A
3. D

- SELF CHECK 3
  1. C
  2. A
- SELF CHECK 4
  1. A
  2. A
  3. D
  4. B
  5. B

Lo, 2self check 1

1, D
2, B
3, C
4, A

self check 1

1. A
2. A

Lo, 3self check 1

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

MATCHING

1. I
2. J
3. F
4. G
5. A

6. B
7. D
8. C
9. H
10. E

Lo, 4self check 1

1. B
2. A

self check 2

1. A
2. A

Lo, 5self check

1. A
2. A

The trainers (who developed the LEARNING GIDE)

No	Name	Qualification level	TVET College
1	ABRHAM GEREMEW	B	(BAHIR DAR Polly Technique College)
2	TEMESGEN DESSE	B	(HARAR Polly Technique College)

3	HABTAMU SHIMELS	B	(NIFAS SILK Polly Technique College)
4	HABIB SURUR	B	(HAWASA Polly Technique College)

The facilitator (who approved the LEARNING GIDE)

No	Name	Qualification level	TVET Bureau
1	AYELE	A	(ADIS ABABA TVET Bureau)