

## Creating 2D Objects

### Objectives:

- To recognise the Draw toolbar.
- To use different methods of calling draw commands.
- To understand the functions of the draw tools.
- To create 2D objects by commonly used draw tools: line, polyline, polygon, rectangle, arc, circle, ellipse, and point.

---

---

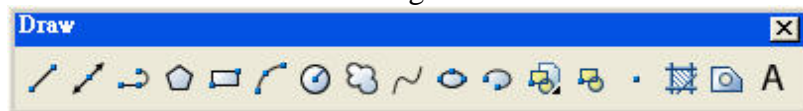
### Subject Matters:

---

---

#### The Draw toolbar

When AutoCAD starts, the **Draw** toolbar usually docks against the left-hand side of the drawing window.



This toolbar shows most of the drawing tools including:

Line	Construction Line
Polyline	Polygon
Rectangle	Arc
Circle	Revcloud
Spline	Ellipse
Ellipse Arc	Insert Block
Make Block	Point
Hatch	Region
Multiline Text	

#### Calling draw tools (commands)

Draw tools (commands) can be called for into action by different methods:

##### 1. Using the Draw toolbar

Left-click on a draw tool icon from the **Draw** toolbar to start the command and then respond to the prompts displayed on the command line or choose options in a dialogue box.

##### 2. Using the Draw pull-down menu

Left-click **Draw** on the **Menu** bar to display the pull-down menu, click the appropriate draw command and then respond to the prompts displayed on the command line or choose options in a dialogue box.

##### 3. Using the command line

Enter the required draw command or its abbreviation on the command line, AutoCAD responds either a set of options or a dialogue box. Respond to the prompts displayed on the command line or choose options in the dialogue box.

## Command options

Most draw commands have additional choices or options that are displayed in the command window or in a dialogue box. These options can be selected by typing at least the capitalised portion of the option name and then pressing **ENTER** ↵. The last-used settings of most command options are stored and assigned as the default values for the command options when it is called for use next time. Default values are denoted by angle brackets <>.

E.g. When **Polygon** tool is selected, the command window displays the default as follows:

**Command: \_polygon Enter number of sides <4>:**  
where <4> is the default value.

E.g. When **Circle** tool is selected, the command window displays the options as follows:

**Command: \_circle Specify center point for circle or [3P/2P/Ttr (tan tan radius)]:**  
where you specify the centre of the circle or choose one of the options in the square brackets [3P/2P/Ttr (tan tan radius)]

## Draw toolbar commands

### Line



**Function:** It creates a straight line segment or a series of connected line segments, but each line segment is a separate object and can be edited individually.

**Options:** Nil

**Action:** Specify a point or press **Enter** ↵ to continue from the last drawn line or arc

**Tips:** Pressing **Enter** ↵ to continue a line from the endpoint of the most recently drawn line.  
Entering **c** (close) to end the last line segment at the beginning of the first line segment.  
Entering **u** (undo) to erase the most recent segment of a line sequence.

### Construction Line



**Function:** It creates a line that extends to infinity in both directions. Construction lines are used as reference lines for creating drawing objects.

**Options:** **Hor/Ver/Ang/Bisect/Offset**

**Action:** Specify a point or enter an option

## Polyline



Draw menu: Polyline

Command line: **pline**

**Function:** It creates a connected sequence of line or arc segments, but the segments are edited as a single object. The width of individual segments can be set and segments taper can be made using this tool.

**Options:** **Arc/Halfwidth/Length/Undo/Width**  
(displayed after specifying the start point)

**Action:** Specify the start point, then the next point or enter an option.

## Polygon



Draw menu: Polygon

Command line: **polygon**

**Function:** It creates closed polylines of equal length. The number of polylines shall be between 3 and 1024.

**Options:** Specify “**number of sides**”, then specify **center of polygon or [edge]**

**Action:** Enter the number of sides of the polygon, then specify a point for the centre of the polygon or enter **e** for the option **[edge]**.

## Rectangle



Draw menu: Rectangle

Command line: **rectang** or **rectangle**

**Function:** It creates a rectangular polyline. Parameters of the rectangle: chamfer distance, fillet radius, thickness of rectangle and width of polyline can be set.

**Options:** **Chamfer/Elevation/Fillet/Thickness/Width**

**Action:** Specify a point or enter an option

## Arc




Draw menu: Arc

Command line: **arc**

**Function:** It creates an arc in an anti-clockwise direction. An arc can be created in many ways. Included angle, radius, direction and chord length can be specified.

**Options:** **Center**  
(Further options to be selected to specify the method of construction)

**Action:** Specify the start point of the arc, or enter **C** (center) for the option, or press **Enter**  to start tangent to last line, arc, or polyline.

**Tips:** Arc is created in a **counter-clockwise** direction (except the 3P option).  
When using the **Continue** option (**Draw menu**) for arc, the next arc will automatically begin where the last arc or line ended.

## Circle



**Draw toolbar:**

**Draw menu:** Circle

**Command line:** circle

**Function:** It creates a circle. A circle can be created in many ways. Radius or diameter of the circle can be specified. Circle tangent to three existing objects or circle with given radius tangent to two objects can also be created.

**Options:** **3P/2P/Ttr (tan tan radius)**

**Action:** Specify a point for the centre of the circle or enter an option.

**Tips:** The **Circle** command invoked from the **Draw** menu provides six pre-selected methods for drawing circles.

## Revcloud



**Draw toolbar:**

**Draw menu:** Revision Cloud

**Command line:** revcloud

**Function:** It creates a polyline of sequential arcs to form a cloud shape.

**Options:** **Arc length/Object**

**Action:** Specify start point or enter an option.

**Tips:** After specifying the start point, guide the crosshairs along the cloud path to create a cloud shape object. When the start and end lines meet, a message "**Revision cloud finished**" is displayed and the command is automatically finished. The resulting object is a polyline.

## Spline



**Draw toolbar:**

**Draw menu:** Spline

**Command line:** spline

**Function:** It creates a smooth curve passing through a given set of points. Spline is useful for creating irregular-shaped curves.

**Options:** **Object**

**Action:** Specify a point or enter **o** (object) for the option.

## Ellipse



**Draw menu:** Ellipse

**Command line:** **ellipse**

**Function:** It creates a full ellipse or an elliptical arc.

**Options:** **Arc/Center**

**Action:** Specify axis endpoint of ellipse or enter an option

## Ellipse Arc



**Draw menu:** Ellipse

**Command line:** **ellipse**

**Function:** It creates an elliptical arc or a full ellipse.

**Options:** **Center**

**Action:** Specify axis endpoint of the elliptical arc or enter **c** for the option.

## Insert Block



**Insert menu:** Block

**Command line:** **insert**

**Function:** It places a named block or drawing into the current drawing.

To be discussed in “Blocks and Attributes”

## Make Block



**Draw menu:** Block > Make

**Command line:** **block**

**Function:** It defines a block using a dialogue box.

To be discussed in “Blocks and Attributes”

## Point



**Draw menu:** Point

**Command line:** **point**

**Function:** It creates a point object. Points can act as nodes to which object snapping can be made. The appearance and size of a point can be controlled using the **Point Style** dialogue box called on screen from the **Menu** bar (**Format** ⇒ **Point Style...**)

**Options:** Nil

**Action:** Specify a point.

**Tips:** Press **Esc** to end the command.

## Hatch



Draw toolbar:

Draw menu: Hatch

Command line: bhatch

**Function:** It fills a specified boundary with a pattern.  
To be discussed in “Text and Hatching”

## Region



Draw toolbar:

Draw menu: Region

Command line: region

**Function:** It creates a region object from a selection set of existing objects. Regions created from closed shapes called loops are two-dimensional enclosed areas. Open objects that intersect to form a closed area cannot form regions.

**Options:** Nil

**Action:** Use an object selection method to select object.  
Press **Enter** ↵ when you finish picking objects.

## Multiline Text



Draw toolbar:

Draw menu: Text > Multiline Text

Command line: mtext

**Function:** It creates text in the **Multiline Text Editor (Text Formatting)** after specifying a text window.  
To be discussed in “Text and Hatching”

### Other draw commands

## Ray



Draw menu: Ray

Command line: ray

**Function:** It creates a line that starts at a specified point and extends to infinity. Unlike construction lines, rays extend in one direction.

**Options:** Nil

**Action:** Specify a point (start point) for the ray to pass through another point (through point).

## Multiline

 Draw menu: Multiline

 Command line: **m**line

**Function:** It creates multiple parallel lines (or elements). A multiline style is created to control the number of line elements and the colour, line type and offset from the multiline origin of each element.

**Options:** **Justification/Scale/STyle**

**Action:** Specify a point or enter an option

## Donut

 Draw menu: Donut

 Command line: **d**onut

**Function:** It creates filled rings or solid-filled circles.

**Options:** Nil

**Action:** Specify a diameter value or press **Enter** ↵.

**Tips:** If an inside diameter of 0 is specified, the donut is a filled circle.

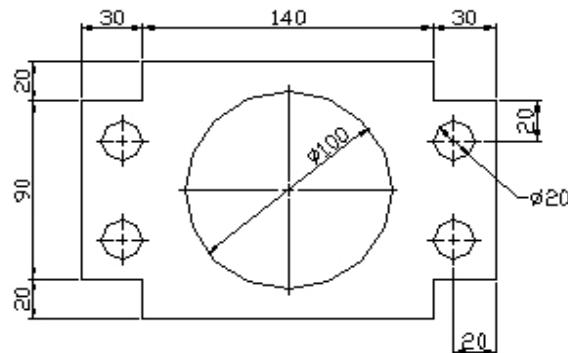
### Drawing hints

1. For convenience, always dock the draw toolbar on the left-hand side of the drawing window.
2. When creating objects, always use relative co-ordinates method in locating points to avoid calculating co-ordinates from the origin.
3. Always use object snap tools to construct drawings, allowing accurately snapping objects to various parts of other objects.
4. When drawing horizontal or vertical lines, always locate co-ordinates by direct distance entry and use drawing aids – grid, snap, ortho and polar.
5. AutoCAD2004 **Help** and **Active Assistance** provide complete information for using AutoCAD. Always refer to the **User Documentation** to get the most out of AutoCAD.
6. Practise more and do not hesitate to ask your tutor if you have questions.

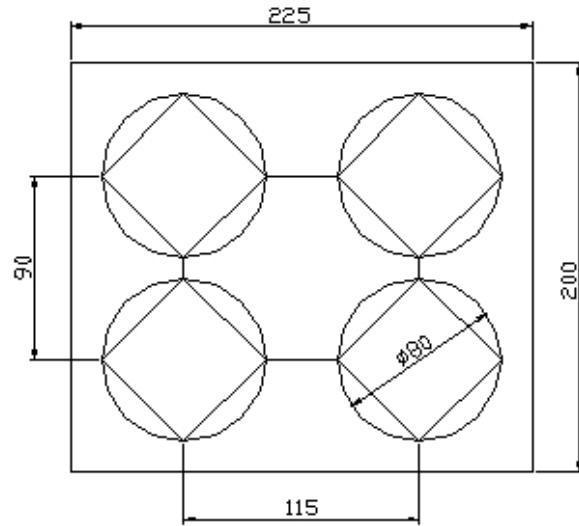
### Hands on practice

Use the appropriate draw tools to construct the following figures. Do not include any of the dimensions.

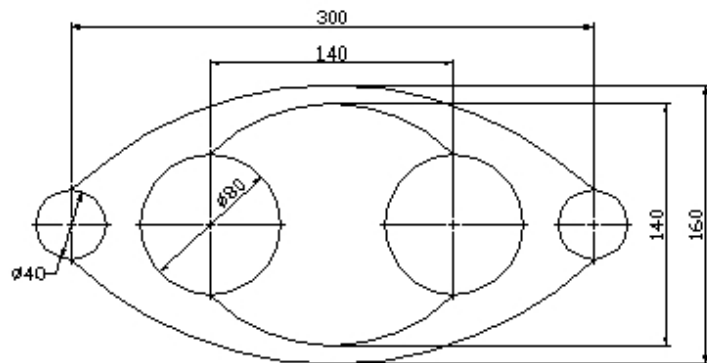
1.



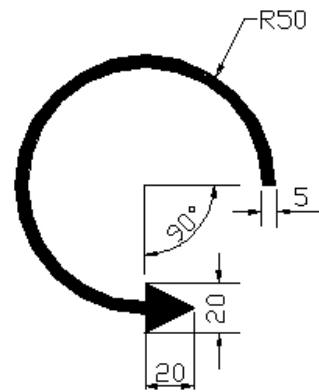
2.



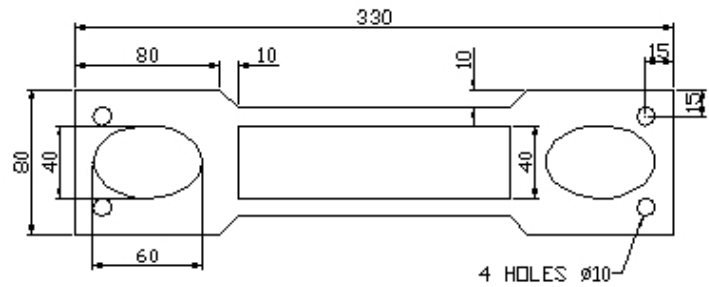
3.



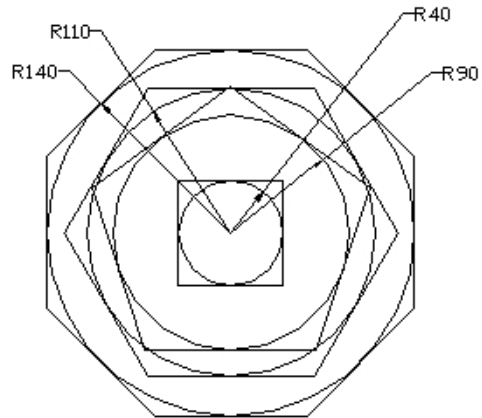
4.



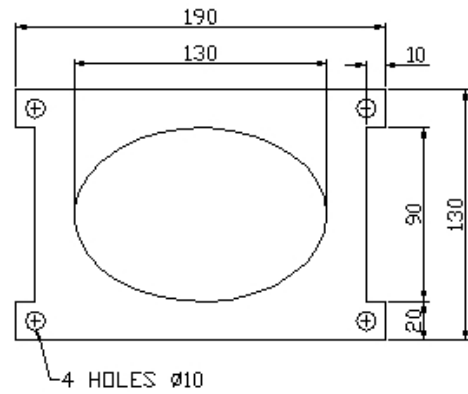
5.



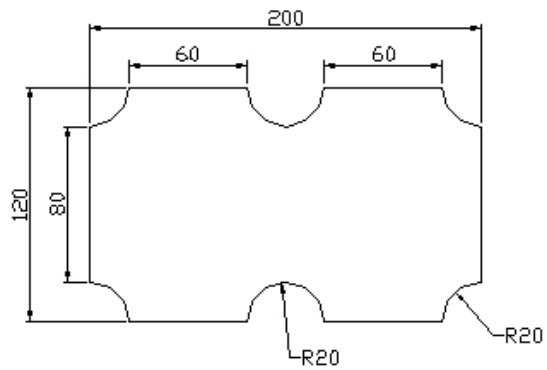
6.



7.



8.



9.

