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INSTITUTE OF APPLIED TECHNOLOGY

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# **AutoCAD 2D I**

Module 9

Circles and Arcs

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PREPARED BY

**IAT Curriculum Unit**

February 2011

**Module 9**

Auto CAD Self-paced Learning Modules

# AutoCAD 2D

## Circles and Arcs

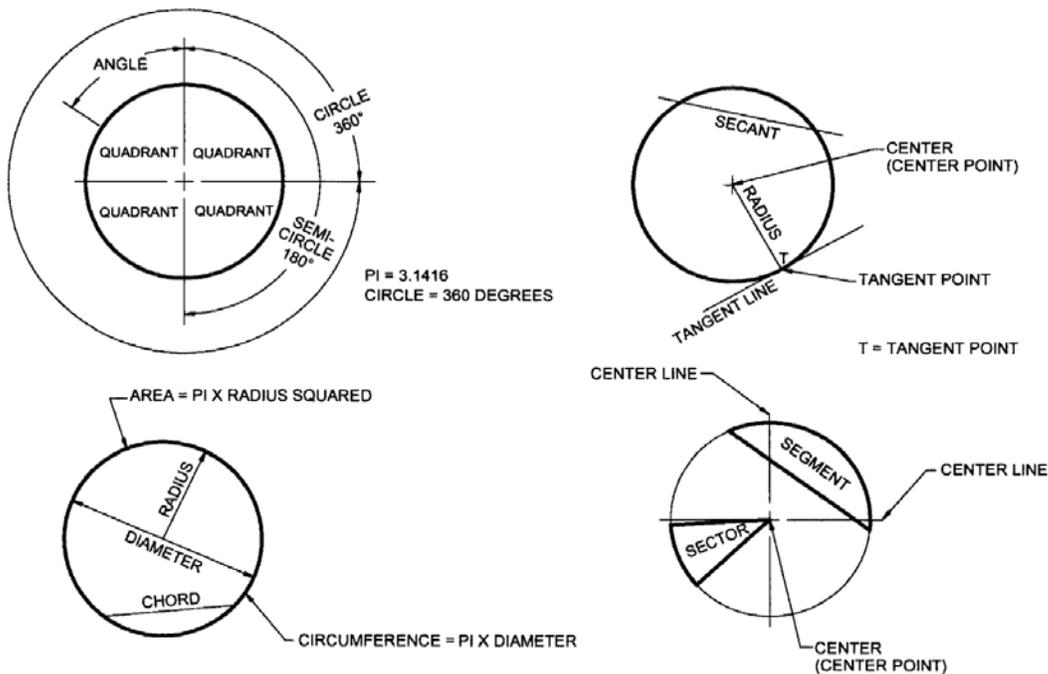
**Learning Outcomes:**

When you have completed the module, you will be able to:

1. Describe a circle and an arc and their characteristics.
2. Describe and use the CIRCLE and ARC commands to draw circles and arcs.

### AutoCAD Geometry Lesson Circles

A *circle* is defined as a closed curve in which all points are the same distance from its center point. The center point is a single XY coordinate. Study the drawing below for a complete description of the characteristics of a circle.



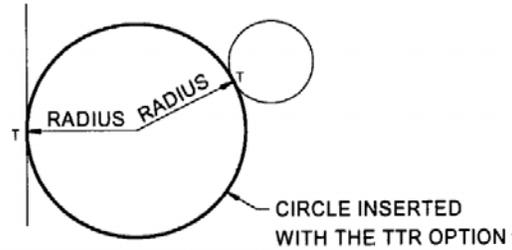
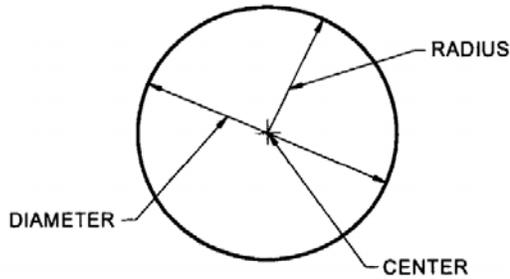
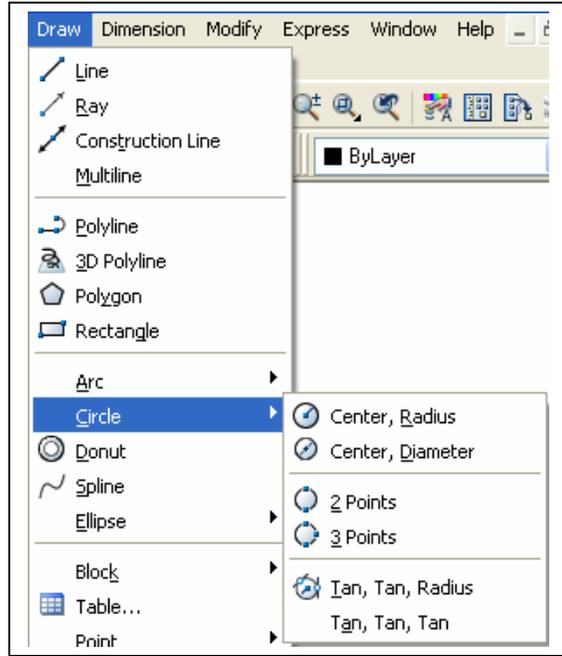
## AutoCAD Command: CIRCLE

Command Line Syntax:  
Command: **CIRCLE** or Command: **C**



2004-2006

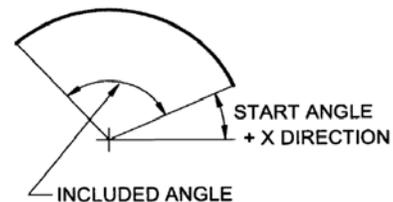
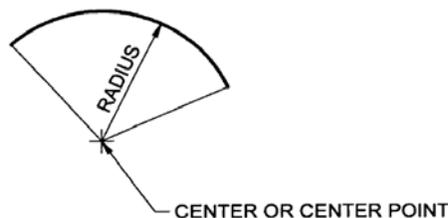
Circle



### A Circle in AutoCAD

## AutoCAD Geometry Lesson Arcs

An arc is defined as an open curve in which all points are the same distance from center point. Study the drawing below for a complete description of the characteristics of an arc.



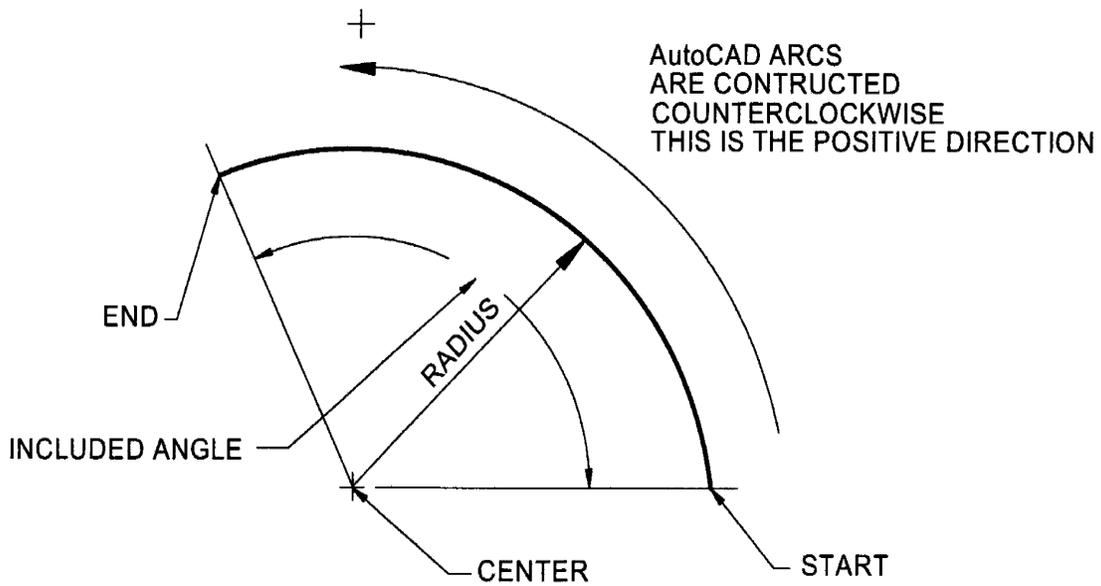
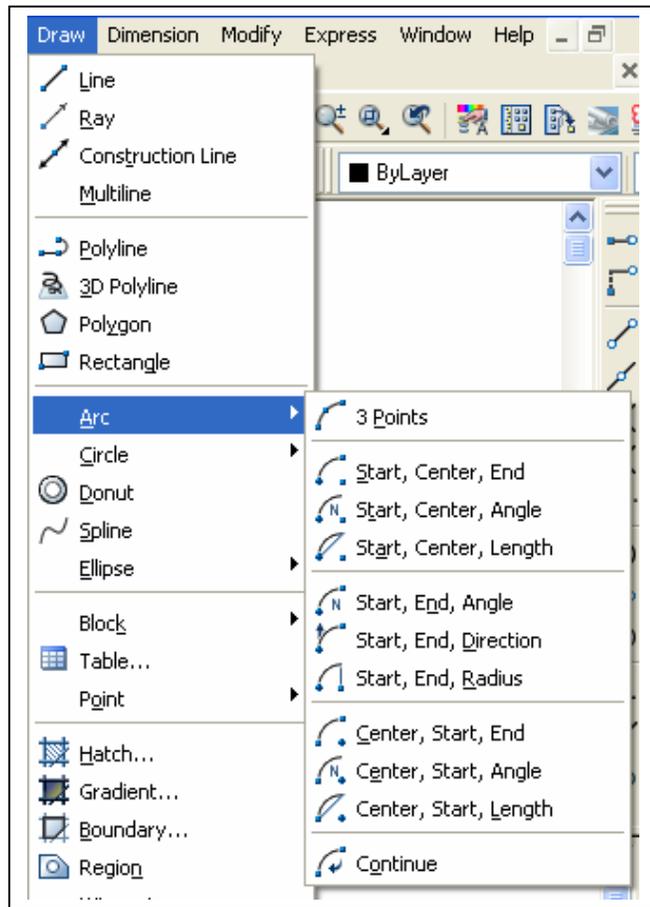
**AutoCAD Command: ARC**

Command Line Syntax:  
Command: **ARC** or Command: **A**



2004-2006

Arc



**An Arc in AutoCAD**

## Using the CIRCLE and ARC Commands

Command: **LINE**

Specify first point: **2.5,5**

Specify next point or [Undo]: **@4,0**

Specify next point or [Undo]:

Command: **ARC**

Specify start point of arc or [Center]: **C**

*(If possible, always try to build arcs starting with the center point first.)*

Specify center point of arc: **2.5,5**

*(Enter the center point.)*

Specify next point or [Undo]: **@4,0**

*(Enter the start point. Here the trick is to give AutoCAD the start point and the radius of the Arc at the same time.)*

Specify end point of arc or [Angle/chord Length]: **A**

Specify included angle: **90**

*(Enter the angle of the arc)*

Command: **LINE**

Specify first point: **2.5,5**

Specify next point or [Undo]: **@4,0**

Specify next point or [Undo]:

Command: **CIRCLE**

Specify center point for circle or[3P/2P/Ttr (tan tan radius): **3.5,6**

*(Since this is the first circle inserted, enter an absolute coordinate for the center point.)*

Specify radius of circle or [Diameter]: **D**

*(Circles are usually dimensioned with diameters, use the diameter rather than dividing it in half.)*

Specify diameter of circle: **.65**

Command: **CIRCLE**

Specify center point for circle or[3P/2P/Ttr (tan tan radius): **@1,0**

*(Notice here, since AutoCAD always remembers the lastpoint, use an @. The lastpoint was the center of the first circle placed.)*

Specify radius of circle or [Diameter] <0.3250>: **D**

Specify diameter of circle<0.6500>: **.75**

Command: **CIRCLE**

Specify center point for circle or[3P/2P/Ttr (tan tan radius): **@0,1.5**

*(Again use an @ which is from the center of the last circle placed.)*

Specify radius of circle or [Diameter] <0.3750>: **D**

Specify diameter of circle<0.7500>: **1**

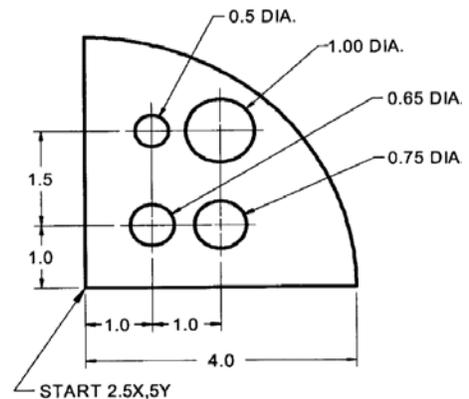
Command: **CIRCLE**

Specify center point for circle or[3P/2P/Ttr (tan tan radius): **@-1,0**

Specify radius of circle or [Diameter] <0.5000>: **D**

Specify diameter of circle<1.0000>: **.5**

Command:



### AutoCAD User “Must Know” No. 4-1

When you are drawing arcs, you should know that AutoCAD wants to draw arcs counterclockwise. To AutoCAD, this is the positive arc angle. When you use the Center-Start-End options to draw arcs, there is no way to draw the arc clockwise or in the negative arc angle. If you use the Angle option, AutoCAD does allow you to enter a negative angle and it will draw the arc for you.

### AutoCAD User Tip 4-1

When you are drawing arcs, it is best to specify the center point first then the start point. When you give the location of the start point, you can specify the radius and the direction at the same time, then enter the angle or the end point whichever is easier.  
For example:

Command: **ARC**

Specify start point of arc or [Center]: **C**

Specify center point of arc: **3,4**

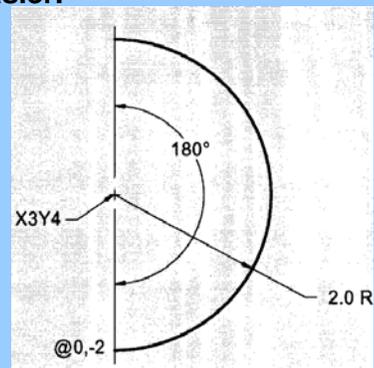
Specify next point or [Undo]: **@0,2**

*(Specifying the radius and the direction for the start point.)*

Specify end point of arc or [Angle/chord Length]: **A**

Specify included angle: **180**

Command:



## Using the CIRCLE and ARC Commands - Continued

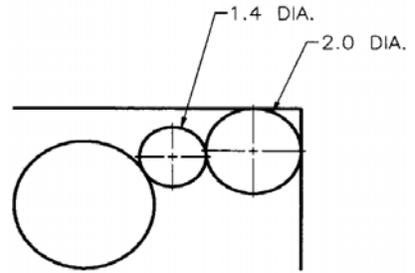
Command: **CIRCLE**

Specify center point for circle or[3P/2P/Ttr (tan tan radius):

**TTR**

Specify point on object for first tangent of circle: **PICK 1**

*(Using the graphic cursor, pick one of the lines the circle is tangent to. Notice the symbol that automatically appears.)*



Object - Large Circle and Lines exist.

Specify point on object for second tangent of circle: **PICK 2**

*(Picking the other line.)*

Specify radius of circle <0.7000>: **1**

*(Enter the radius of the circle. Be careful since circles are usually dimensioned in diameters.)*

Command: **CIRCLE**

Specify center point for circle or[3P/2P/Ttr (tan tan radius):

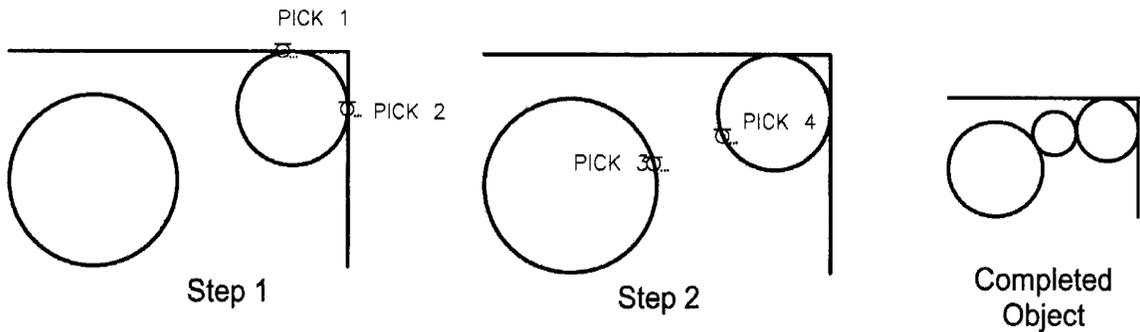
**TTR**

Specify point on object for first tangent of circle: **PICK 3**

Specify point on object for second tangent of circle: **PICK 4**

Specify radius of circle <0.7000>: **.7**

Command:

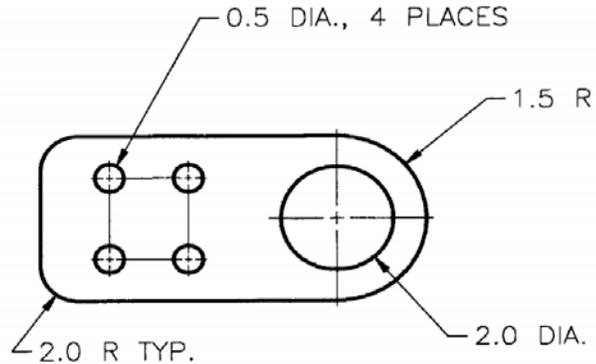


## AutoCAD Drafting Lesson Reading Dimensions for Circles and Arcs

When you are reading the dimensions for circles and arcs, consider the following:

Circles are dimensioned as diameter. For example: 2.0 DIA.

Arcs are dimensioned as radiuses. For example: 1.5 R



When there is more than one circle of the same diameter, they are only dimensioned once. For example: 0.5 DIA, 4 PLACES

Sometimes multiple arcs are dimensioned as typical (TYP.). For example: 2.0 R TYP.

This simply means that there is at least one more arc of the same size.

### AutoCAD User Tip 4-2

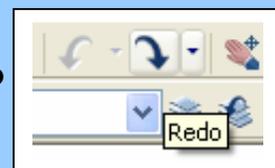
A useful feature in AutoCAD is the Undo/Redo feature. You can undo all the commands in the current drawing session. You can also reverse an undo with a redo. To undo the last command, use the U command and to redo an undo, use the REDO command. There are icons on the Standard toolbar to help you undo and redo.

Command: **U**

Line

Command: **REDO**

Line



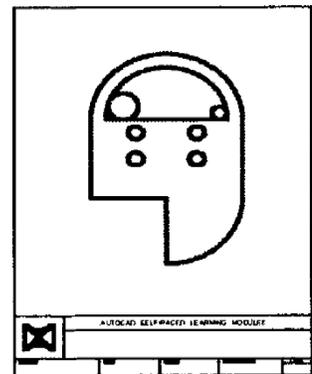


Lab Exercise 4-2		Time Allotted: 30 min.		
Drawing Specifications				
Name	Template	Units	Text Style	Font
AutoCAD 2D Lab 05-2	Module Template A4	Millimeters	N/A	N/A
Note: Color, Linetype and Lineweight are all 'ByLayer' unless otherwise instructed.				
Layering Scheme				
Objects on Layer	Name	Color	Linetype	Lineweight
All Lines	Object	Red	Continuous	Default

**Instruction:**

1. Setup the layers using the Layering Scheme above.
2. Draw the object shown below.
3. Check your drawing with the key.
4. When drawing the 4-10 DIA, circles, study the module to see how the @ is used to do this.

**Hint:** The circles located inside the arc are drawn with the TTR option.



Completed Drawing

