

## **LEARNING OBJECTIVES**

*After completing this lesson, you will be able to:*

1. Create multiple copies in a rectangular or circular pattern or Path.
2. Understand how to Array objects

# **LESSON 13**

# ARRAY

The ARRAY command allows you to make multiple copies in a **RECTANGULAR** or Circular (**POLAR**) pattern and even on a **PATH**. The maximum limit of copies per array is 100,000. This limit can be changed but should accommodate most users. (Refer to Help menu if you choose to change the limit)

## RECTANGULAR ARRAY

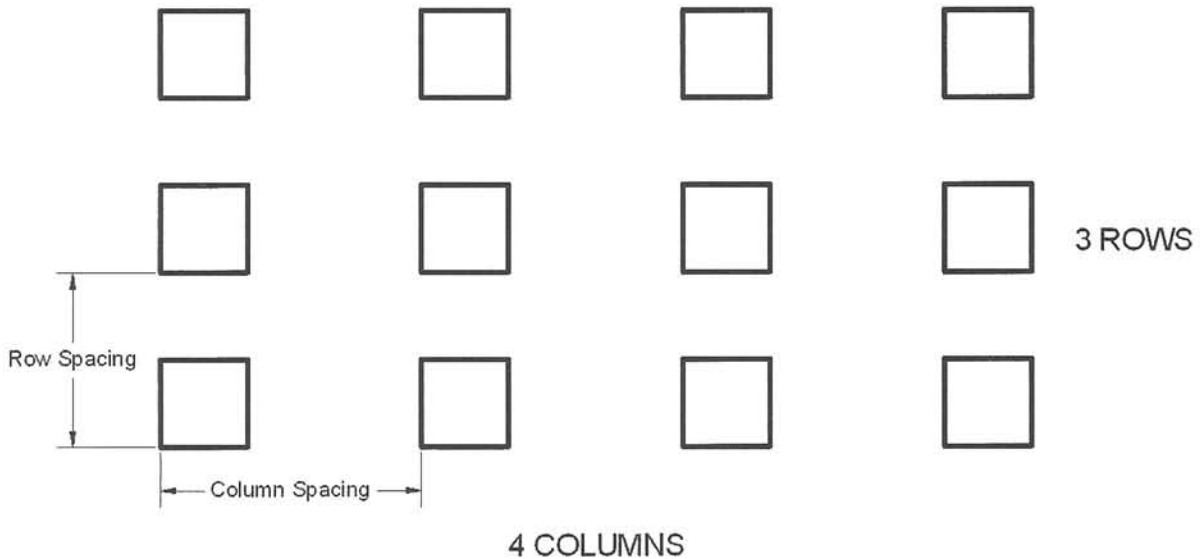
This method allows you to make multiple copies of object(s) in a **rectangular pattern**. You specify the number of rows (horizontal), columns (vertical) and the spacing between the rows and columns. The spacing will be equally spaced between copies.

Spacing is sometimes tricky to understand. **Read this carefully.** The spacing is the distance from a specific location on the original to that same location on the future copy. It is not just the space in between the two. Refer to the example below.

To use the rectangular array command you will select the object(s), specify how many rows and columns desired and the spacing for the rows and the columns.


**Refer to step by step instructions on page 13-3.**

### Example of Rectangular Array:

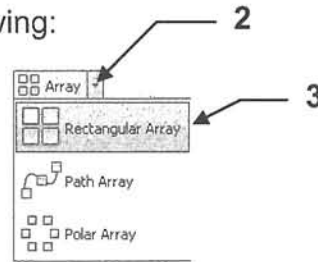


# ARRAY....continued

## How to create a RECTANGULAR ARRAY

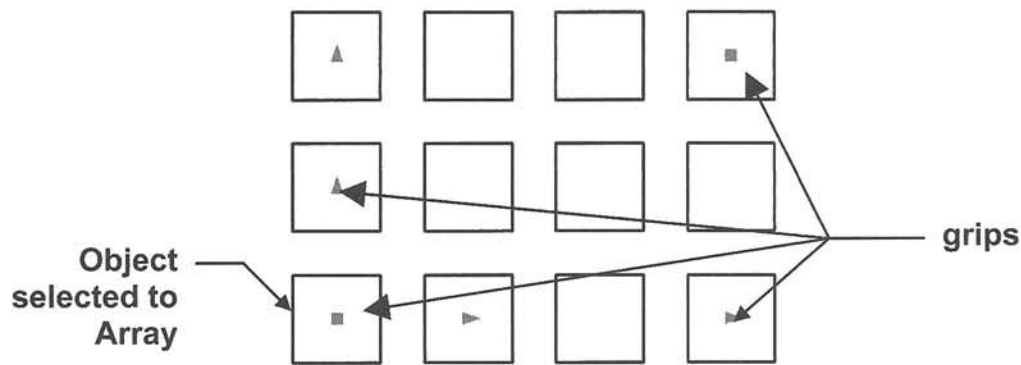
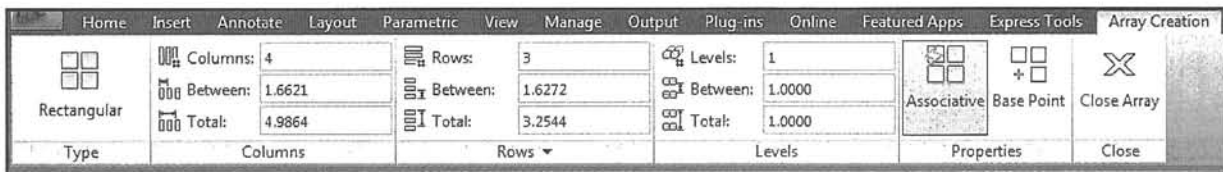
1. Draw a 1" square Rectangle. 
2. Select the **ARRAY** command using one of the following:

**Ribbon = Home tab / Modify panel / Array ▼**  
**or**  
**Keyboard = Array <enter>**



3. Select **Rectangular Array**.
4. Select Objects: **Select the Object to be Arrayed.**
5. Select Objects: **Select more objects or <enter> to stop**

The **Array Creation** tab appears and a 3 by 4 default grid array of the object selected.



6. Make the selections and press <enter> to display.
7. If the display is correct select **Close Array**.

# ARRAY....continued

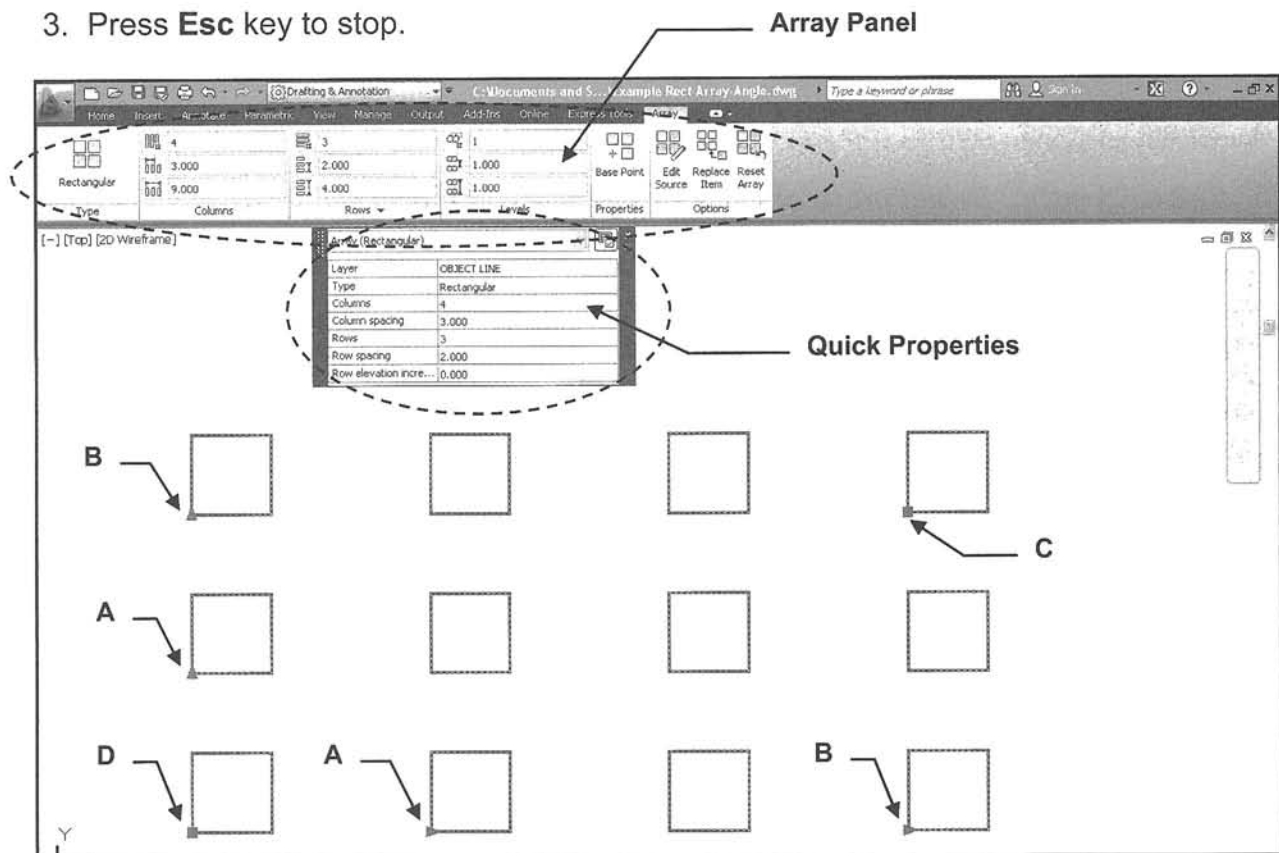
## How to edit a RECTANGULAR ARRAY

1. Select the Array to edit.

The **Array** panel is displayed. (The **Quick Properties** will also be displayed if you have the **QP** button ON in the Status bar.)

2. Enter the desired rows, columns, spacing etc. and **<enter>**.

3. Press **Esc** key to stop.



### Using Grips to edit.

You may also use the Grips to edit the spacing. Just click on a grip and drag.

**A.** The first ► or ▲ allows you to change the spacing between the rows or columns.

**B.** The last ► or ▲ allows you to change the total spacing between the base point and the last ► or ▲

**C.** The ■ allows you to change the total row and column spacing simultaneously.

**D.** Use the Base Point grip to **MOVE** the entire Array.

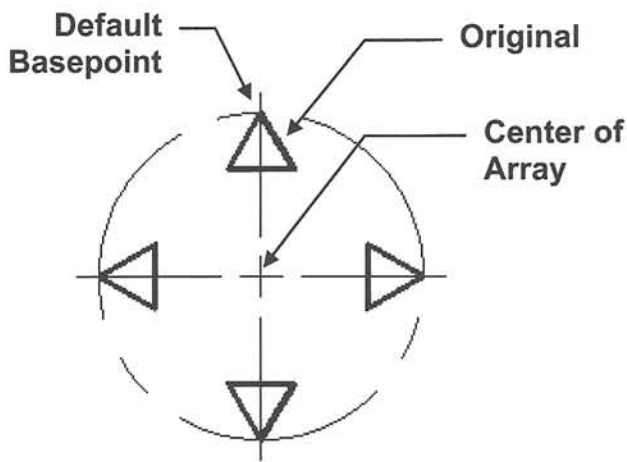
# ARRAY....continued

## POLAR ARRAY

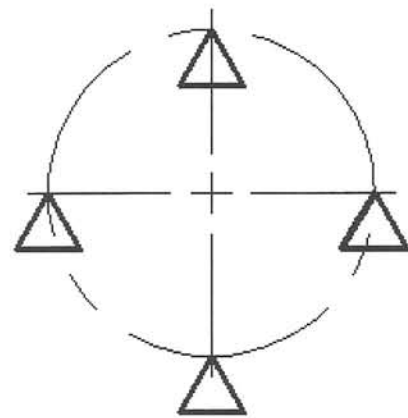
This method allows you to make multiple copies in a circular pattern. You specify the total number of copies to fill a specific Angle or specify the angle between each copy and angle to fill.

To use the polar array command you select the object(s) to array, specify the center of the array, specify the number of copies or the angle between the copies, the angle to fill and if you would like the copies to rotate as they are copied.

### Example of Polar Array

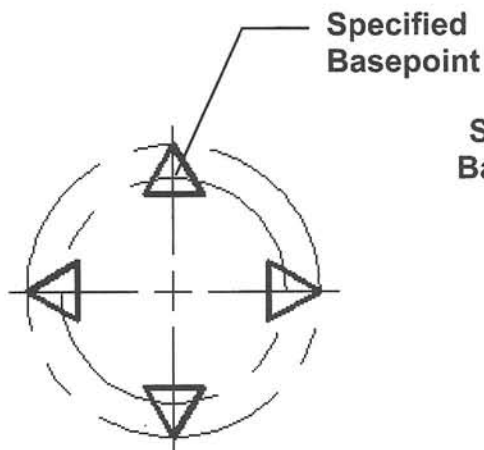


Copies Rotated

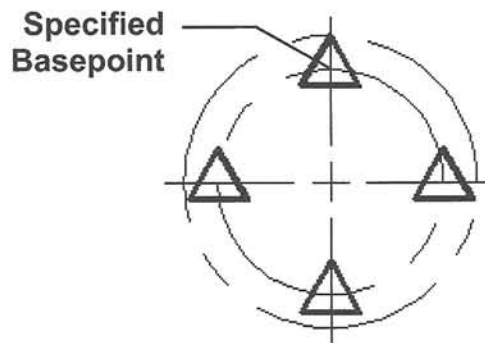


Copies Not Rotated

**Note:** the two examples shown above use the **objects default base point**. The examples below displays what happens if you specify a basepoint.



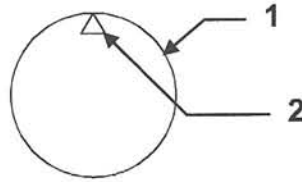
Rotated



Not Rotated

# ARRAY....continued

## How to create a POLAR ARRAY Using "Number of Items".

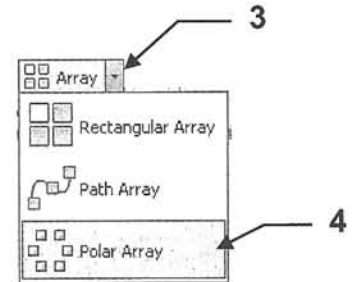


1. Draw a 3" Radius circle.
2. Add a .50 Radius 3 sided Polygon and place as shown.
3. Select the **ARRAY** command using one of the following:

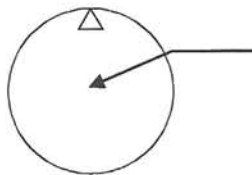
**Ribbon = Home tab / Modify panel / Array ▼**

**or**

**Keyboard = Array <enter>**



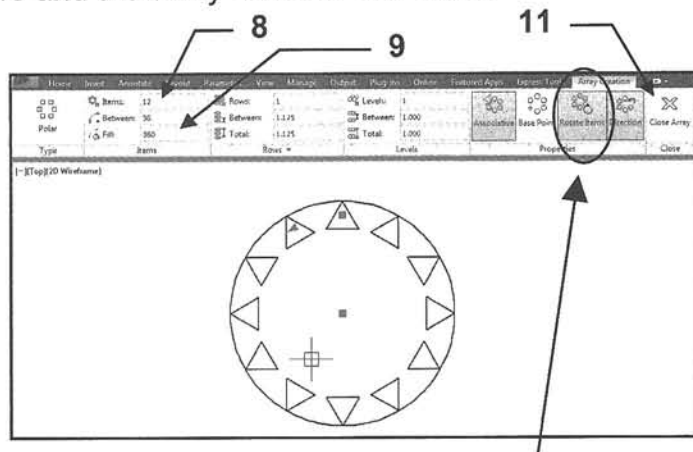
4. Select **Polar Array**.
5. Select Objects: **Select the Object to be Arrayed. (Polygon)**
6. Select Objects: **Select more objects or <enter> to stop**
7. Specify center point of array or [Base point / Axis of Rotation] **Select the Center Point**



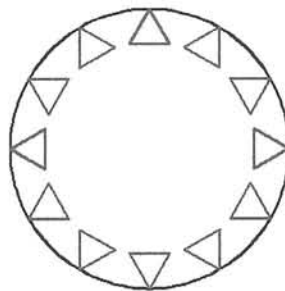
**7. Snap to the center to select the Center of the Array**

The **Array Creation** tab appears and the array defaults to 6 items.

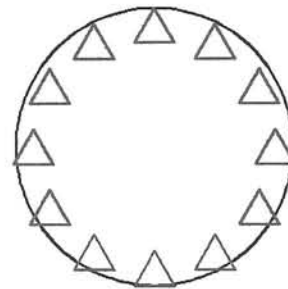
8. Enter items: **12**
9. Enter Between: **360**
10. Press <enter> to display the selections.
11. Select **Close Array** if display is correct



**Note:**  
**12 items were evenly distributed within 360 degrees**



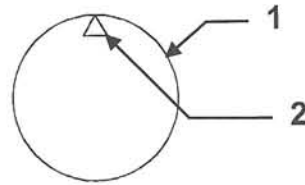
Items Rotated when Polar Arrayed



Items not Rotated when Polar Arrayed

# ARRAY....continued

## How to create a POLAR ARRAY Using "Angle Between".

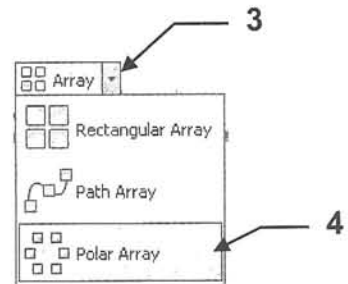


1. Draw a 3" Radius circle.
2. Add a .50 Radius 3 sided Polygon and place as shown.
3. Select the **ARRAY** command using one of the following:

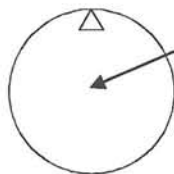
**Ribbon = Home tab / Modify panel / Array ▼**

**or**

**Keyboard = Array <enter>**



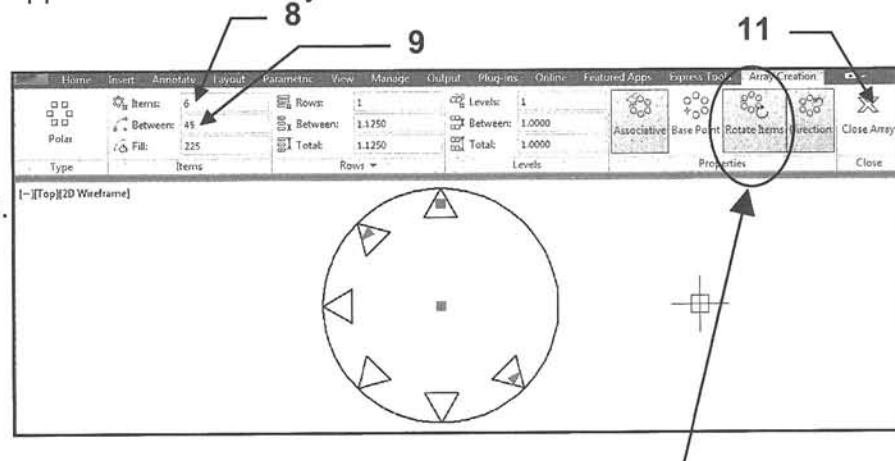
4. Select **Polar Array**.
5. Select Objects: **Select the Object to be Arrayed. (Polygon)**
6. Select Objects: **Select more objects or <enter> to stop**
7. Specify center point of array or [Base point / Axis of Rotation] **Select the Center Point**



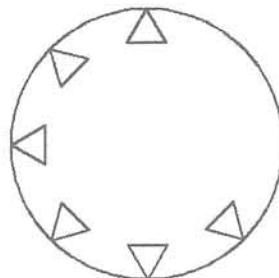
**7. Snap to the center to select the Center of the Array**

The **Array Creation** tab appears and the array defaults to 6 items.

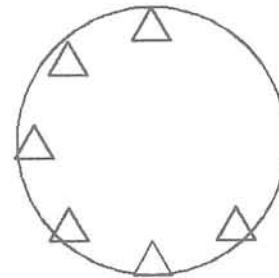
8. Enter items: **6**
9. Enter Between: **45**
10. Press <enter> to display the selections.
11. Select **Close Array** if display is correct



**Note:**  
**6 items were copied at each 45 degree ccw.**



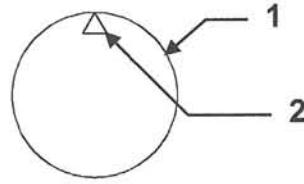
Items Rotated when Polar Arrayed



Items not Rotated when Polar Arrayed

# ARRAY....continued

## How to create a POLAR ARRAY Using "Fill Angle".

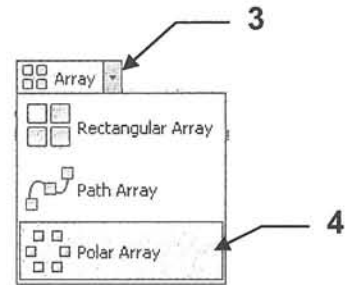


1. Draw a 3" Radius circle.
2. Add a .50 Radius 3 sided Polygon and place as shown.
3. Select the **ARRAY** command using one of the following:

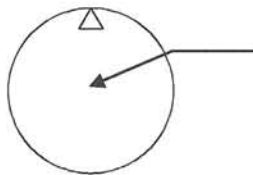
**Ribbon = Home tab / Modify panel / Array ▼**

**or**

**Keyboard = Array <enter>**



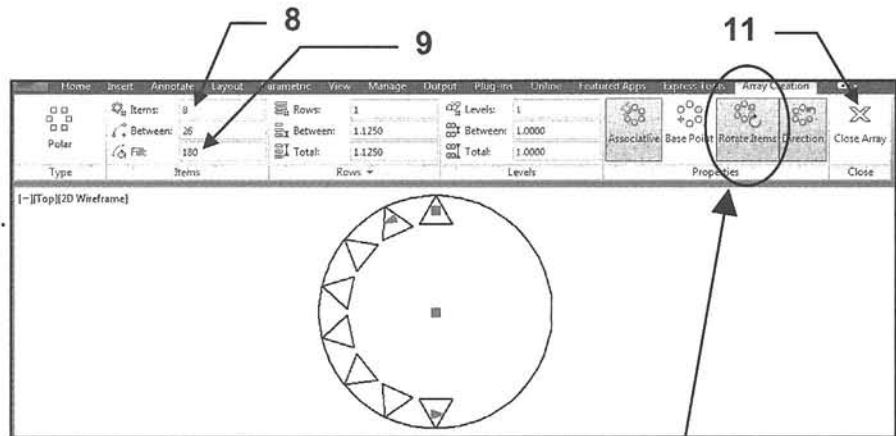
4. Select **Polar Array**.
5. Select Objects: **Select the Object to be Arrayed. (Polygon)**
6. Select Objects: **Select more objects or <enter> to stop**
7. Specify center point of array or [Base point / Axis of Rotation] **Select the Center Point**



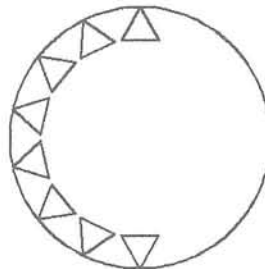
**7. Snap to the center to select the Center of the Array**

The **Array Creation** tab appears and the array defaults to 6 items.

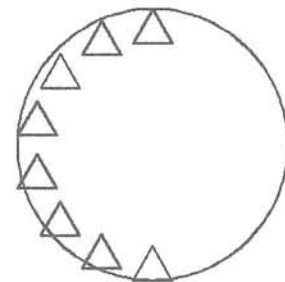
8. Enter items: **8**
9. Enter Fill: **180**
10. Press <enter> to display the selections.
11. Select **Close Array** if display is correct



**Note:**  
**8 items were evenly distributed within 180 degrees ccw.**



Items Rotated when Polar Arrayed



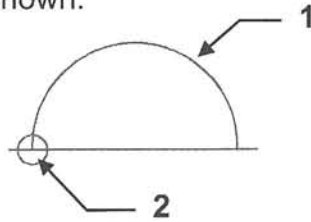
Items not Rotated when Polar Arrayed



# ARRAY....continued

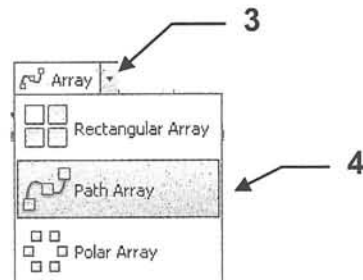
## How to create a PATH ARRAY

1. Draw half a circle.
2. Add a small circle as shown.



3. Select the **ARRAY** command using one of the following:

**Ribbon = Home tab / Modify panel / Array ▼**  
**or**  
**Keyboard = Array <enter>**

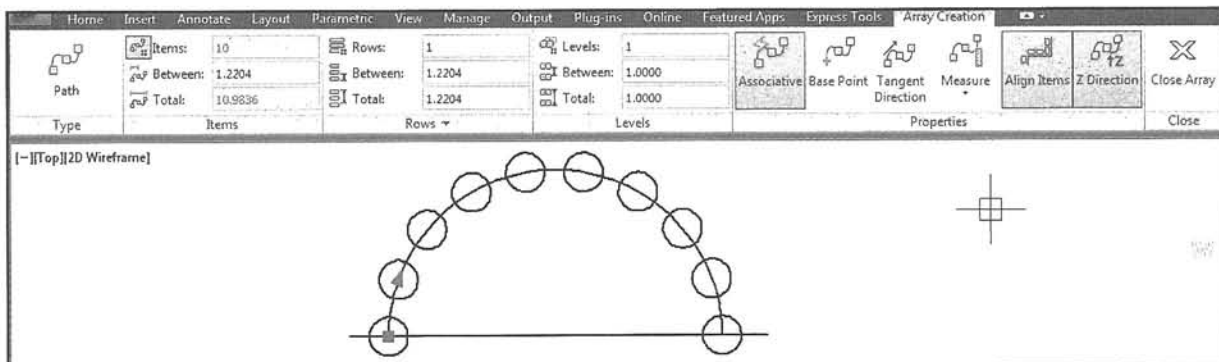


4. Select **PathArray**.
5. Select Objects: **Select the Object to be Arrayed. (Little Circle)**
6. Select Objects: **Select more objects or <enter> to stop**
7. Select Path Curve: **Select the Path**

**Note:** The Path can be a line, polyline, spline, helix, arc, circle or ellipse.

The **Array Creation** tab appears and the array defaults to 10 items.

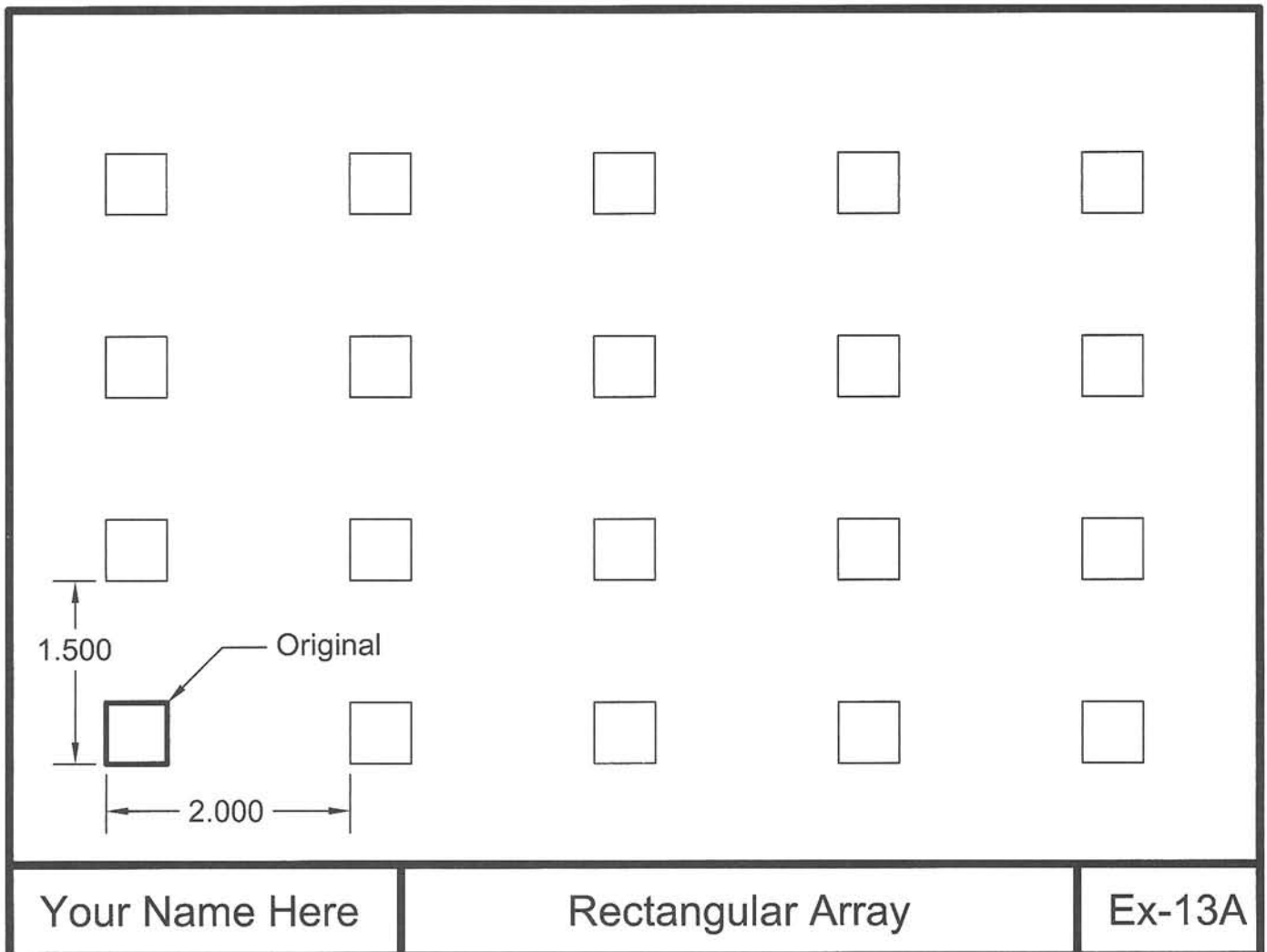
8. Make the selections and press <enter> to display.
9. If correct select **Close Array**



# EXERCISE 13A

## INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the original .500 square on Layer Object.
3. Array the original square as shown.
4. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
5. Do not dimension
6. Save as **EX13A**
7. Plot using Page Setup **Class Model A**



Your Name Here

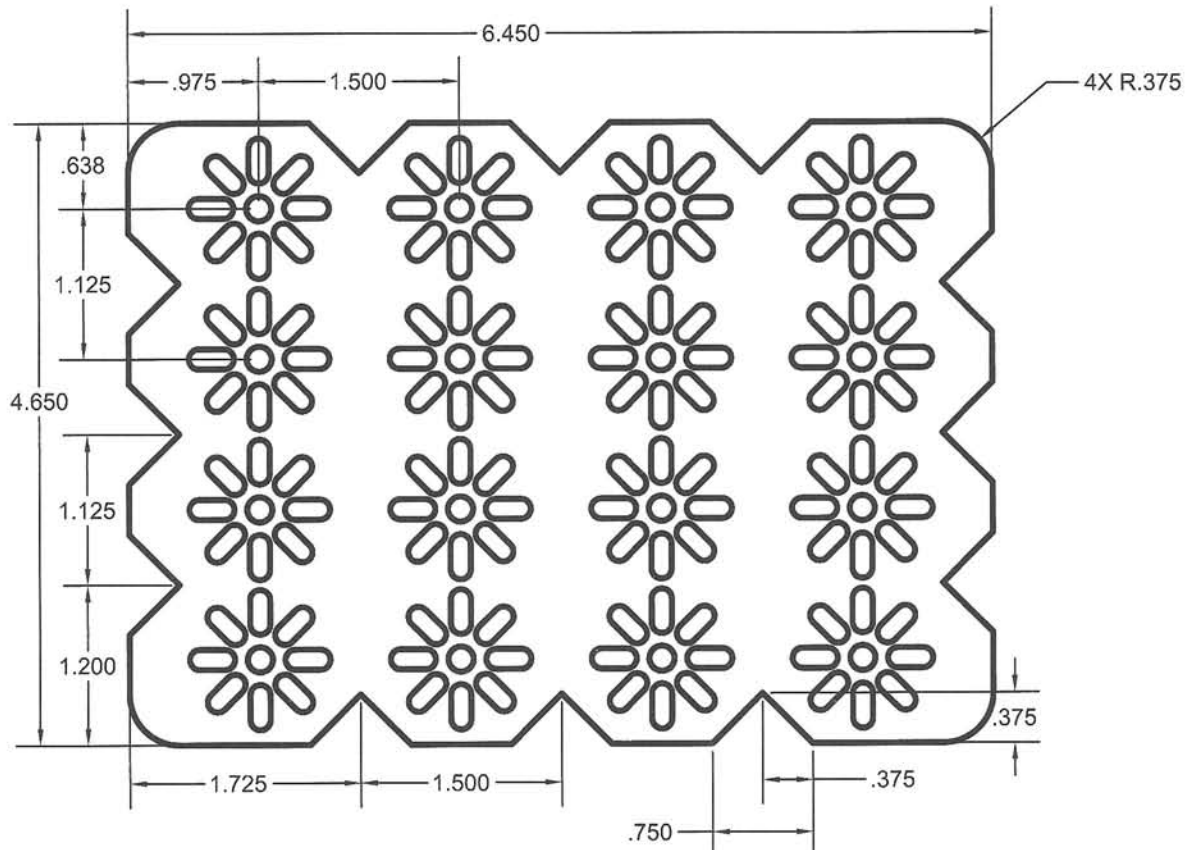
Rectangular Array

Ex-13A

# EXERCISE 13B

## INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the objects shown below using the most efficient methods.
3. **Refer to the next page for more dimensions and helpful hints.**
4. Use Layers = Object line.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Do not dimension
7. Save as **EX13B**
8. Plot using Page Setup **Class Model A**



Refer to the next page for helpful hints and more dimensions.

Your Name Here

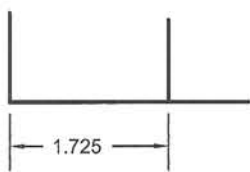
Place mat

Ex-13B

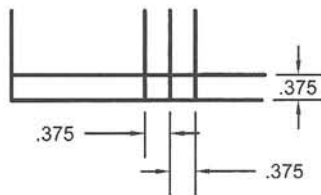
# EXERCISE 13B

## Helper

### Notches



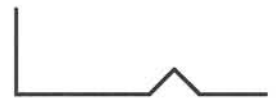
Step 1.  
Draw the outside rectangle  
then offset the location for  
the center of the notches.



Step 2. Use Offset to frame  
the .50 width and height.

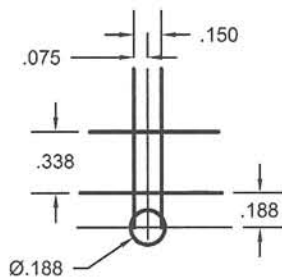


Step 3.  
Snap to  
intersections

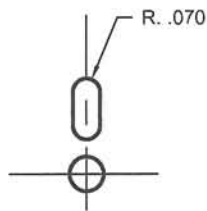


Step 4. Trim and erase.

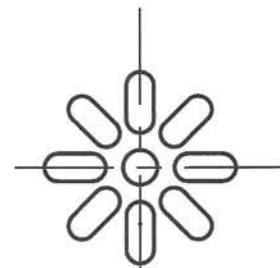
### Flower



Step 1.  
Offset



Step 2.  
Fillet



Step 3.  
Array

Your Name Here

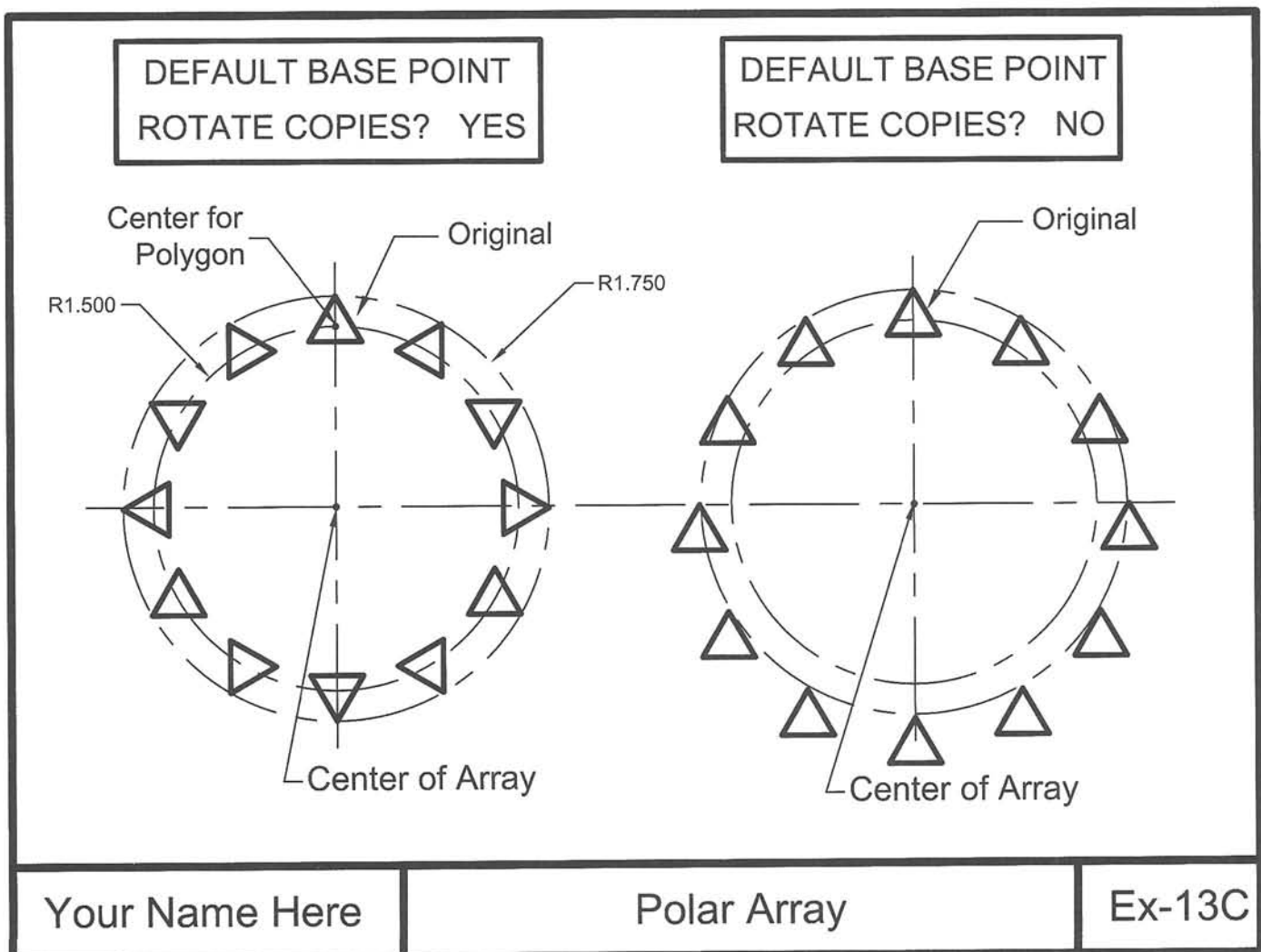
13B HELPER

Ex-13B

# EXERCISE 13C

## INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the centerlines and circles first.
3. Draw one Polygon at the 12:00 location.
4. Array the original Polygon as shown.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Do not dimension
7. Save as **EX13C**
8. Plot using Page Setup **Class Model A**



# EXERCISE 13D

## INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw Line first. (9.00 Long, 30 degree)
3. Draw one Circle (Radius .50) at lower left end.
4. Array 8 Circles along the Path (Line) evenly divided.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Do not dimension
7. Save as **EX13D**
8. Plot using Page Setup **Class Model A**

