

LEARNING OBJECTIVES

After completing this lesson, you will be able to:

1. Draw an Arc using 10 different methods
2. Dimension a Arc segments

LESSON 22

ARC

There are 10 ways to draw an ARC in AutoCAD. Not all of the ARCS options are easy to create so you may find it is often easier to **trim a Circle** or use the **Fillet** command.

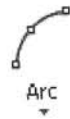
On the job, you will probably only use 2 of these methods. Which 2 depends on the application.

An **ARC** is a segment of a circle and must be less than 360 degrees.

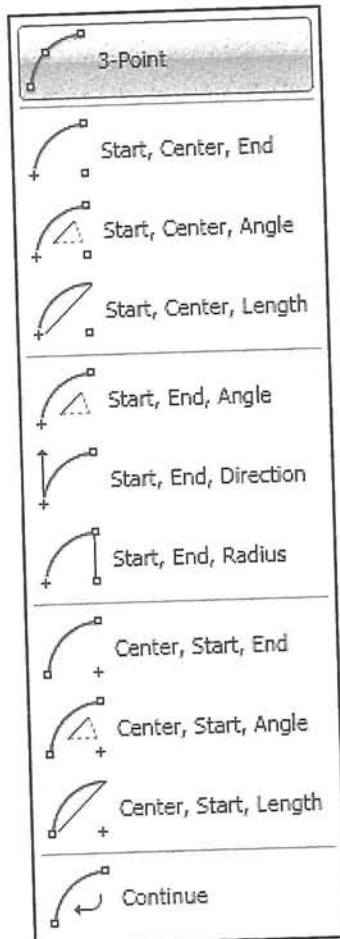
Most ARCS are drawn counter-clockwise but some may be drawn clockwise by entering a negative input.

1. Select the Arc Command using one of the following:

Ribbon = Home tab / Draw panel /
or
Keyboard = A <enter>



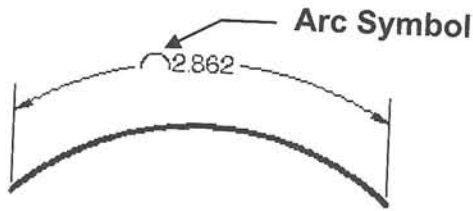
2. Refer to Exercises 22A through 22J for examples of each method listed below.



DIMENSIONING ARC LENGTHS

You may dimension the distance along an Arc. This is known as the **Arc length**. **Arc length** is an associative dimension.

Example:

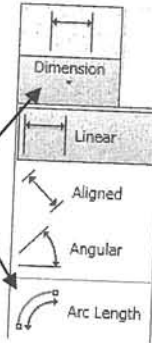


1. Select the Arc length dimension command using one of the following:

Ribbon = Annotate tab / Dimension panel /
or
Keyboard = dimarc <enter>



Select ▾



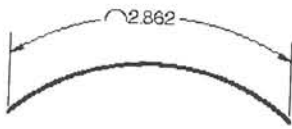
2. Select arc or polyline arc segment: **select the Arc**
3. Specify arc length dimension location, or [Mtext/Text/Angle/Partial/Leader]:
place the dimension line and text location

Dimension text = **dimension value will be shown here**

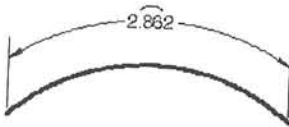
To differentiate the Arc length dimensions from Linear or Angular dimensions, arc length dimensions display an arc (⌒) symbol by default. (Also called a “hat” or “cap”)

The arc symbol may be displayed either above, or preceding the dimension text. You may also choose not to display the arc symbol.

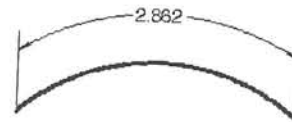
Example:



PRECEDING

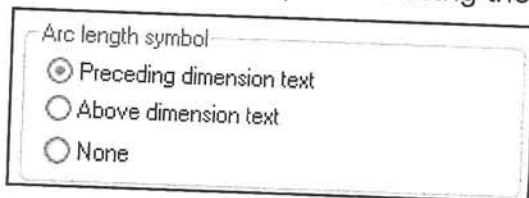


ABOVE



NONE

Specify the placement of the arc symbol in the **Dimension Style / Symbols and Arrows** tab or you may edit its position using the Properties Palette.

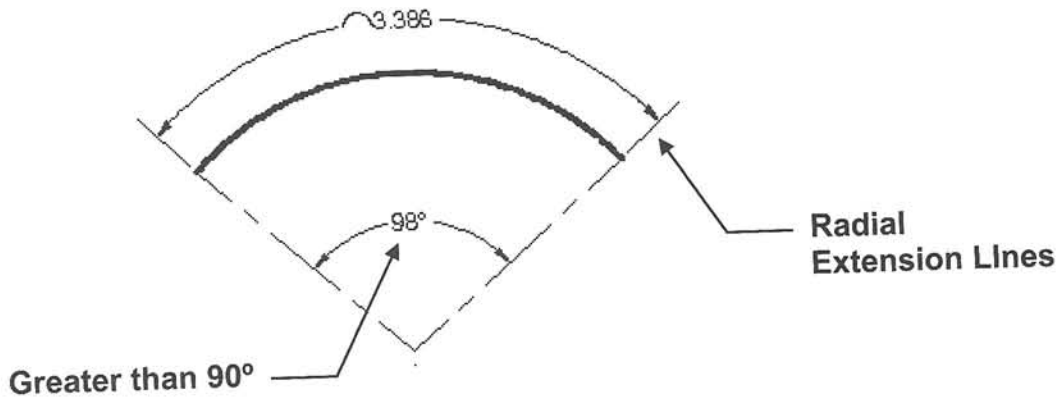


Continued on the next page...

DIMENSIONING ARC LENGTHS....continued

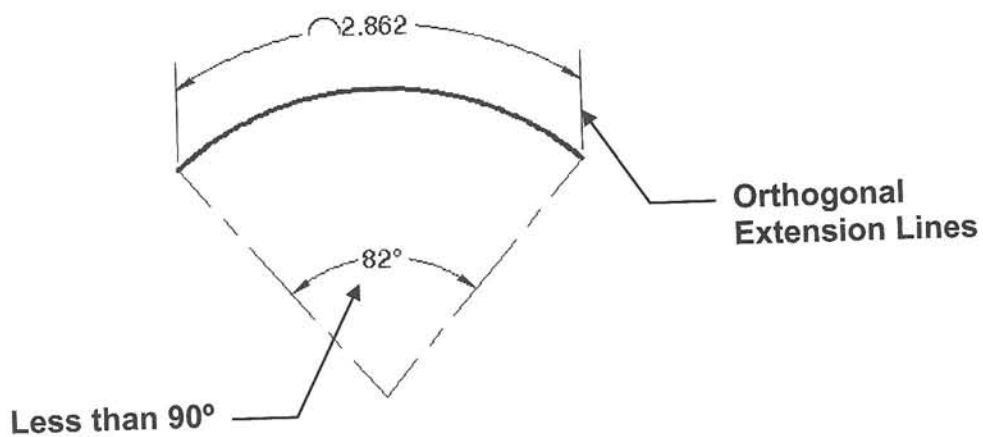
The extension lines of an Arc length dimension are displayed as radial if the included angle is greater than 90 degrees.

Example:



The extension lines of an Arc length dimension are displayed as orthogonal if the included angle is less than 90 degrees.

Example:

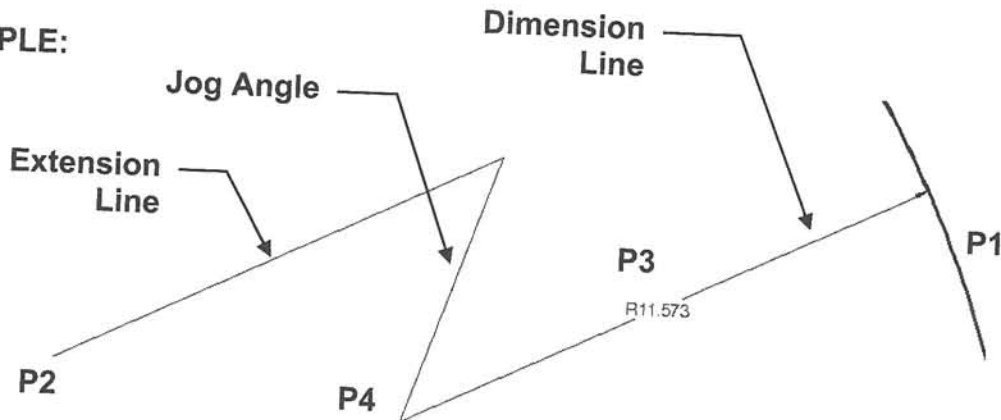


DIMENSIONING A LARGE CURVE

When dimensioning an arc the dimension line should pass through the center of the arc. However, for large curves, the true center of the arc could be very far away, even off the sheet.

When the true center location cannot be displayed you can create a "Jogged" radius dimension.

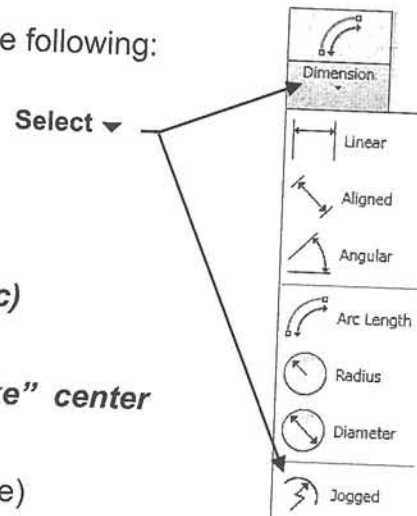
EXAMPLE:



You can specify the jog angle in the Dimension Style / Symbols and Arrows tab.

1. Select the Jogged radius dimension using one of the following:

Ribbon = Annotate / Dimension panel /  or
Keyboard = dimjogged <enter>



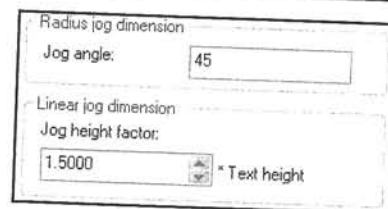
2. Select arc or circle:
select the large arc or circle (P1 anywhere on arc)
3. Specify center location override:
move the cursor and left click to specify the "fake" center location (P2).

Dimension text = (actual radius will be displayed here)

4. Specify dimension line location or [Mtext/Text/Angle]: **move the cursor and left click to specify the location for the dimension text (P3).**
5. Specify jog location: **move the cursor and left click to specify the location for the jog (P4).**

CONTROLLING THE JOG

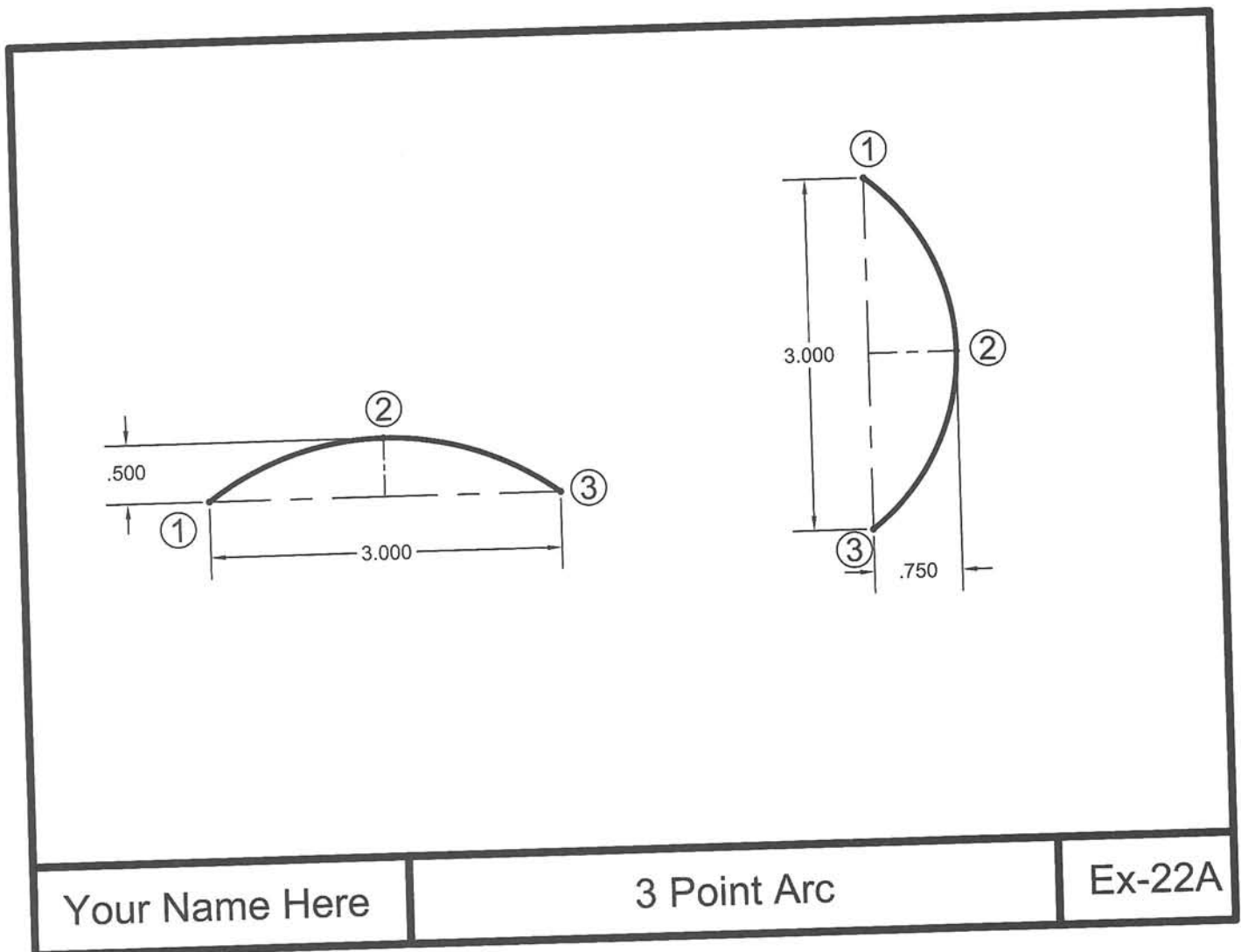
You can set the Jog Angle and Height factor in:
Dimension Style / Symbols and Arrows tab



EXERCISE 22A

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the **3 Point Arcs** using Layer Object Line.
Place the **1st point** at location ① **2nd point** at location ② and **3rd point** at location ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22A**
7. Plot using Page Setup **Class Model A**



Your Name Here

3 Point Arc

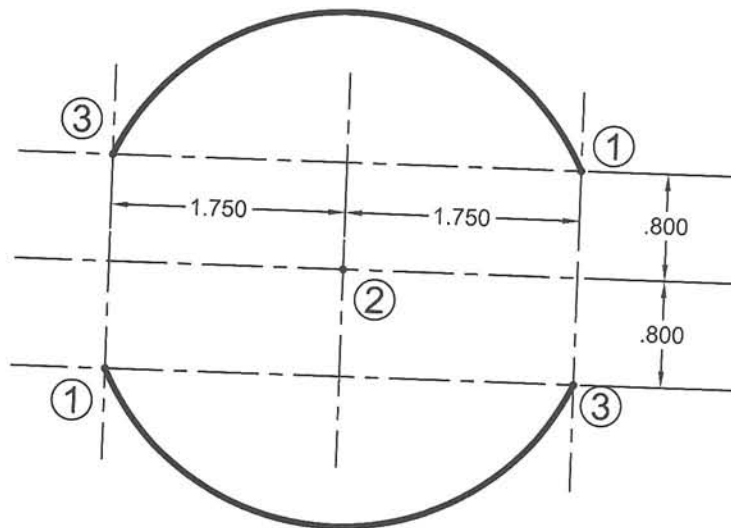
Ex-22A

EXERCISE 22B

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Start, Center, End** on Layer Object Line.
Place the **Start** at location ①, **Center** at location ② and **End** at location ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22B**
7. Plot using Page Setup **Class Model A**

Note: These arcs are always drawn counter clockwise from Start point.



Your Name Here

Start, Center, End

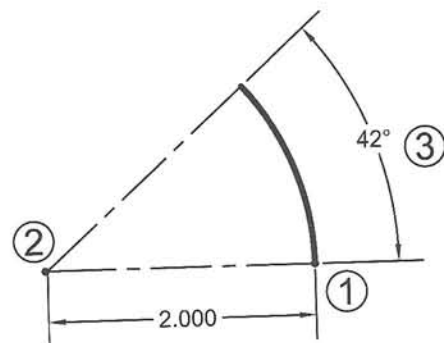
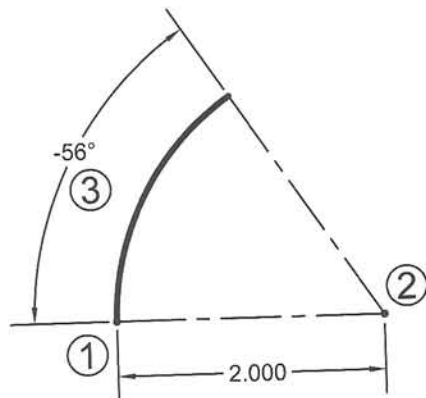
Ex-22B

EXERCISE 22C

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Start, Center, Angle** on Layer Object Line.
Place the **Start** at location (1), **Center** at location (2) and enter **Angle** (3).
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22C**
7. Plot using Page Setup **Class Model A**

*Note: Positive angles are drawn Counter Clockwise.
Negative angles are drawn Clockwise.*



Your Name Here

Start, Center, Angle

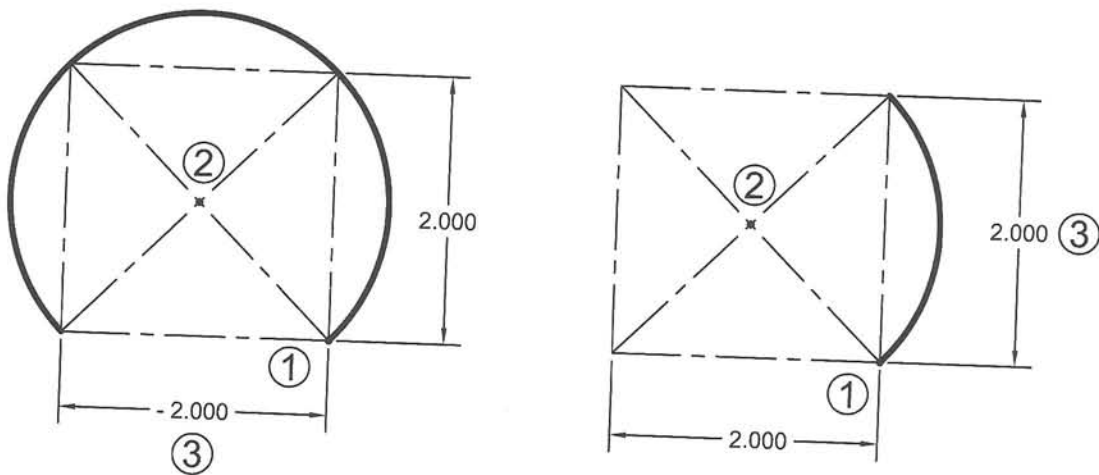
Ex-22C

EXERCISE 22D

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Start, Center, Length** on Layer Object Line.
Place the **Start** at location (1), **Center** at location (2) and enter **Length** of Chord (3).
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22D**
7. Plot using Page Setup **Class Model A**

*Note: Positive Chord length draws the small segment counter clockwise.
Negative Chord length draws the large segment counter clockwise.*



Your Name Here

Start, Center, Length

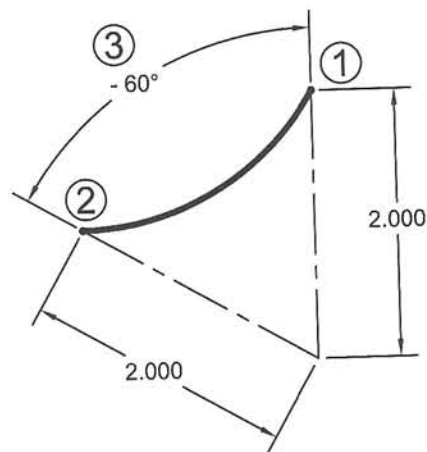
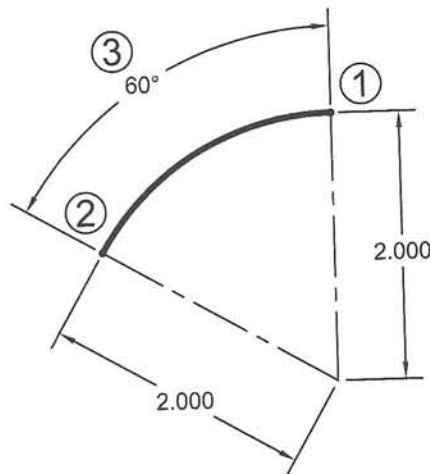
Ex-22D

EXERCISE 22E

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Start, End, Angle** on Layer Object Line.
Place the **Start** at location ①, **End** at location ② and enter **Angle** ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22E**
7. Plot using Page Setup **Class Model A**

*Note: Positive Angle draws the arc counter clockwise.
Negative Angle draws the arc clockwise.*



Your Name Here

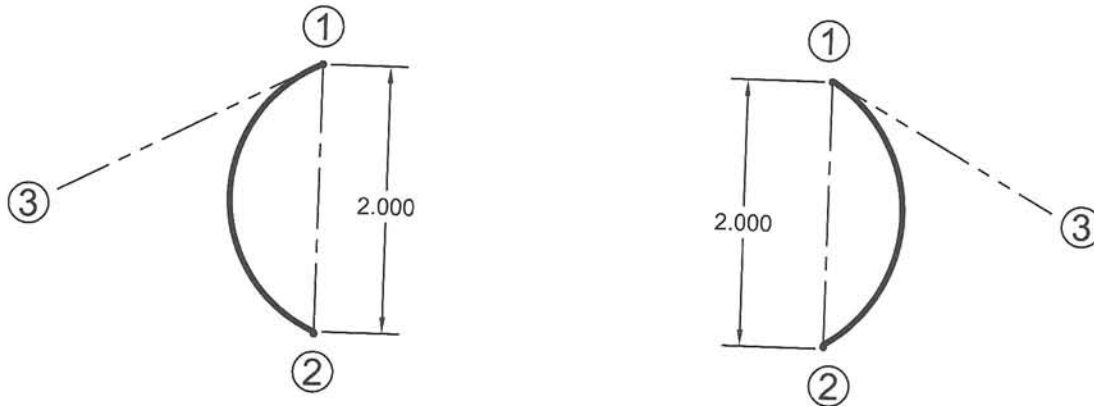
Start, End, Angle

Ex-22E

EXERCISE 22F

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Start, End, Direction** on Layer Object Line.
Place the **Start** at location ①, **End** at location ② and move your cursor in the **Direction** of ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22F**
7. Plot using Page Setup **Class Model A**



Your Name Here

Start, End, Direction

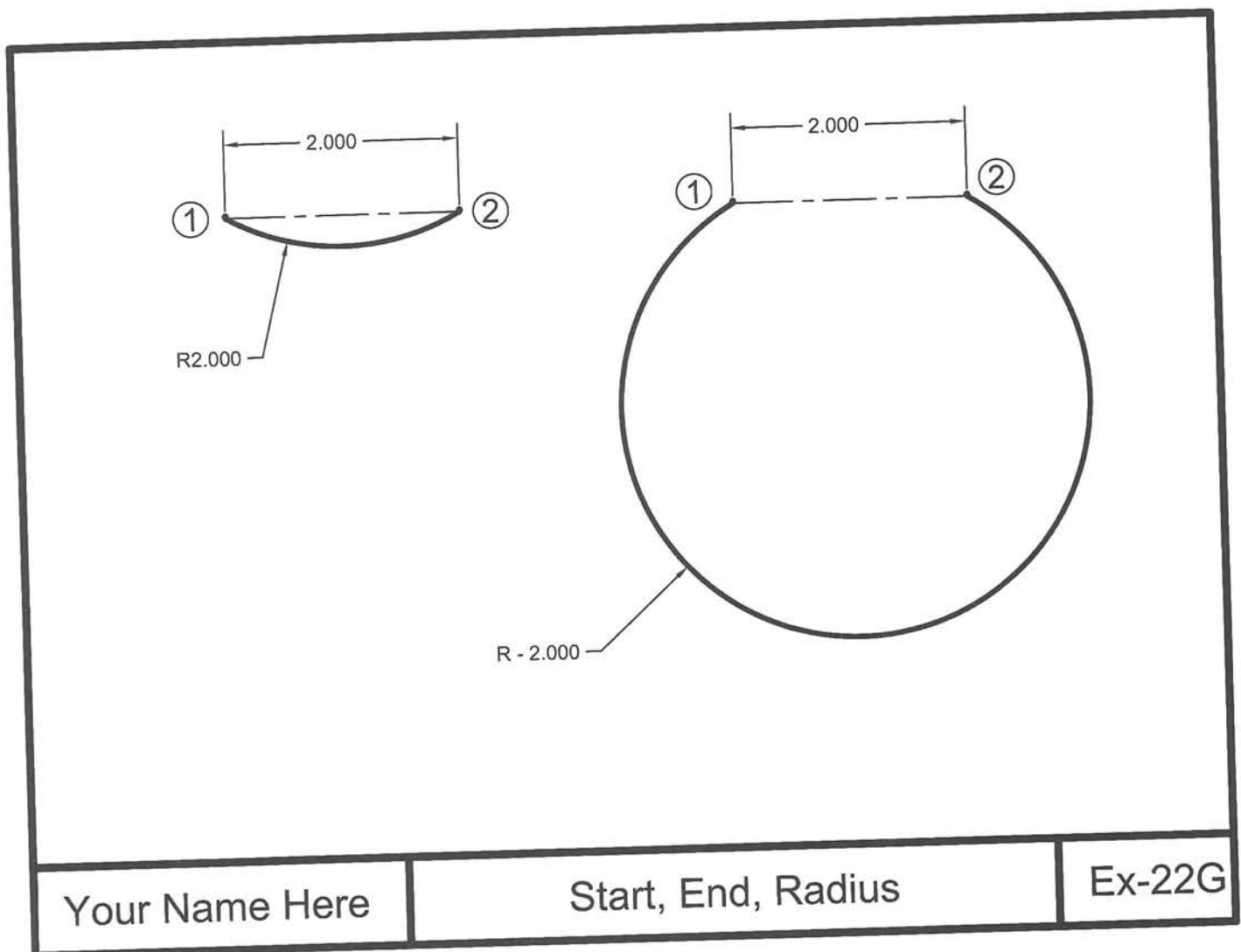
Ex-22F

EXERCISE 22G

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Start, End, Radius** on Layer Object Line.
Place the **Start** at location ①, **End** at location ② and enter the **Radius** of ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22G**
7. Plot using Page Setup **Class Model A**

**Note: Positive Radius draws the small segment.
Negative Radius draws the large segment.**

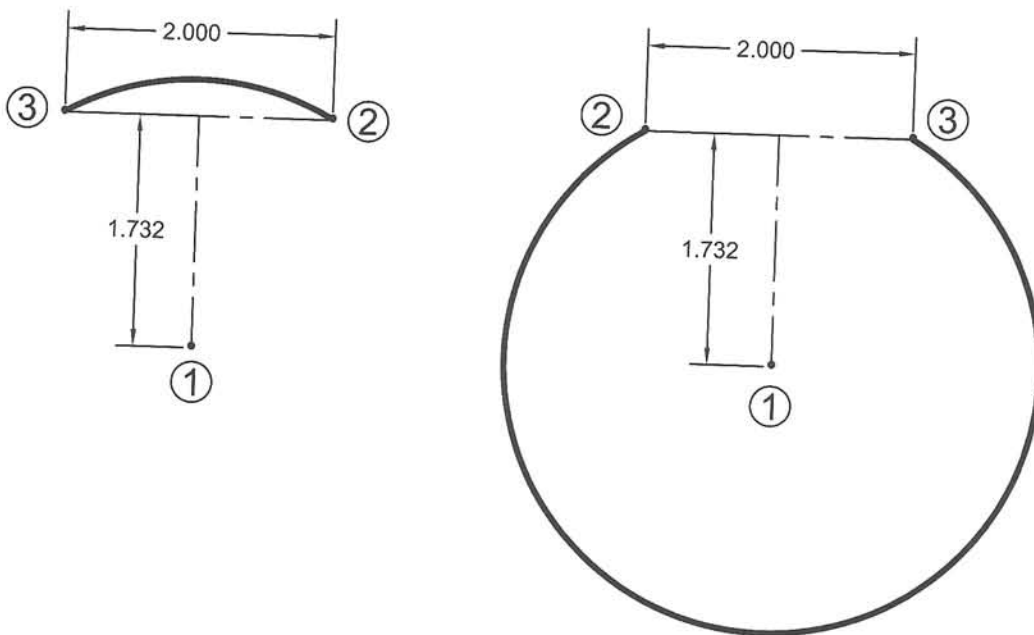


EXERCISE 22H

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Center, Start, End** on Layer Object Line.
Place the **Center** at location ①, **Start** at location ② and **End** at location ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22H**
7. Plot using Page Setup **Class Model A**

Note: Draws the Arc Counter Clockwise only.



Your Name Here

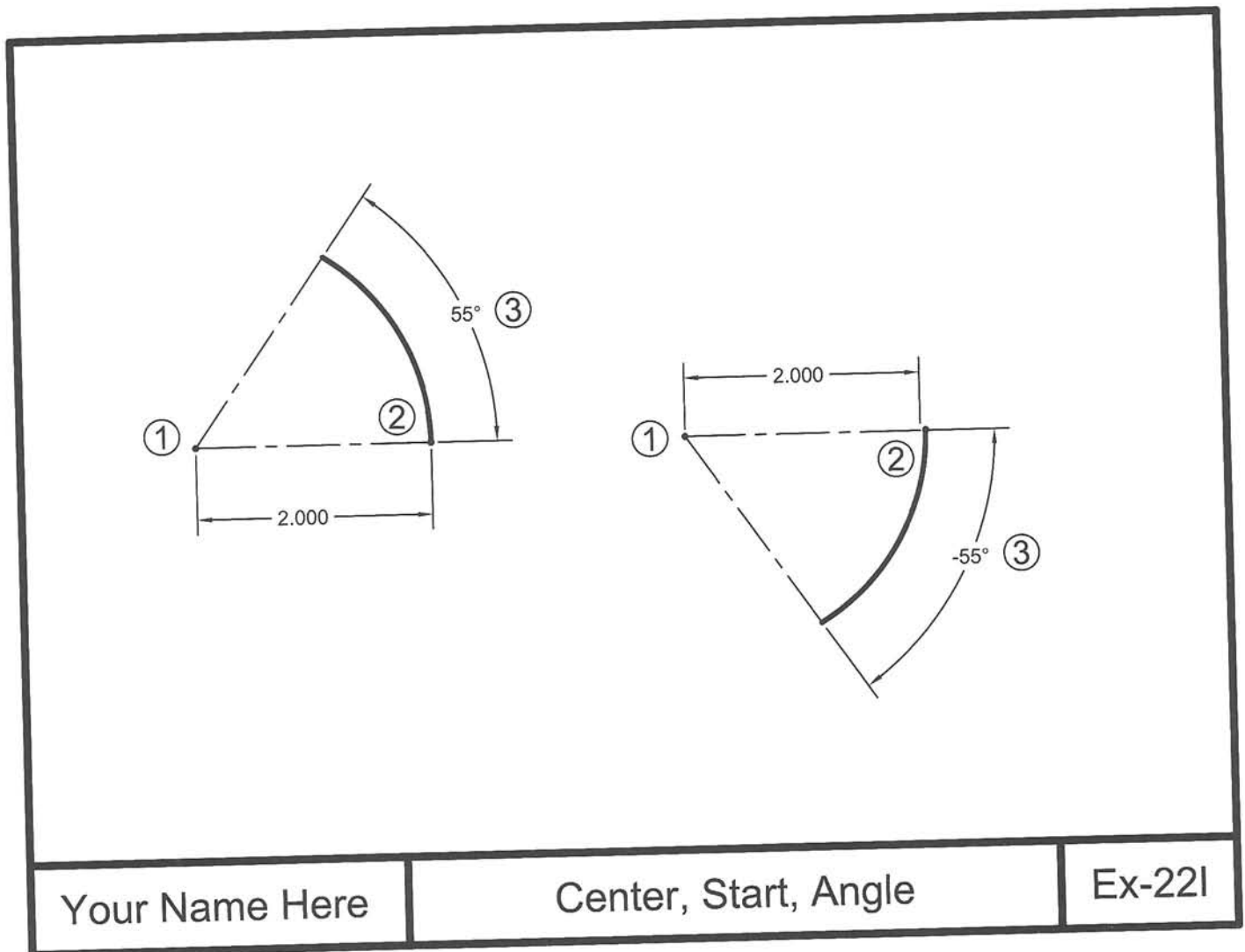
Center, Start, End

Ex-22H

EXERCISE 22I

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Center, Start, Angle** on Layer Object Line.
Place the **Center** at location ①, **Start** at location ② and enter **Angle** ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22I**
7. Plot using Page Setup **Class Model A**

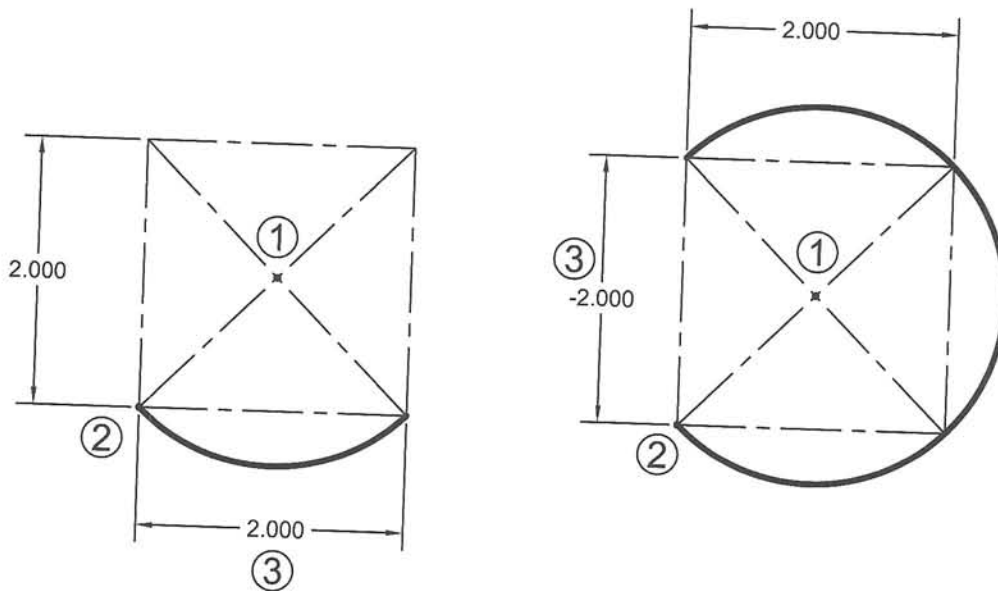


EXERCISE 22J

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the center lines first on layer Center line.
3. Draw the 2 Arcs using method **Center, Start, Length** on Layer Object Line.
Place the **Center** at location ①, **Start** at location ② and enter **Length** ③.
4. Dimension as shown using Dimension Style Class Style and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22J**
7. Plot using Page Setup **Class Model A**

**Note: Positive Chord Length draws small segment counter clockwise.
Negative Chord Length draws large segment counter clockwise.**



Your Name Here

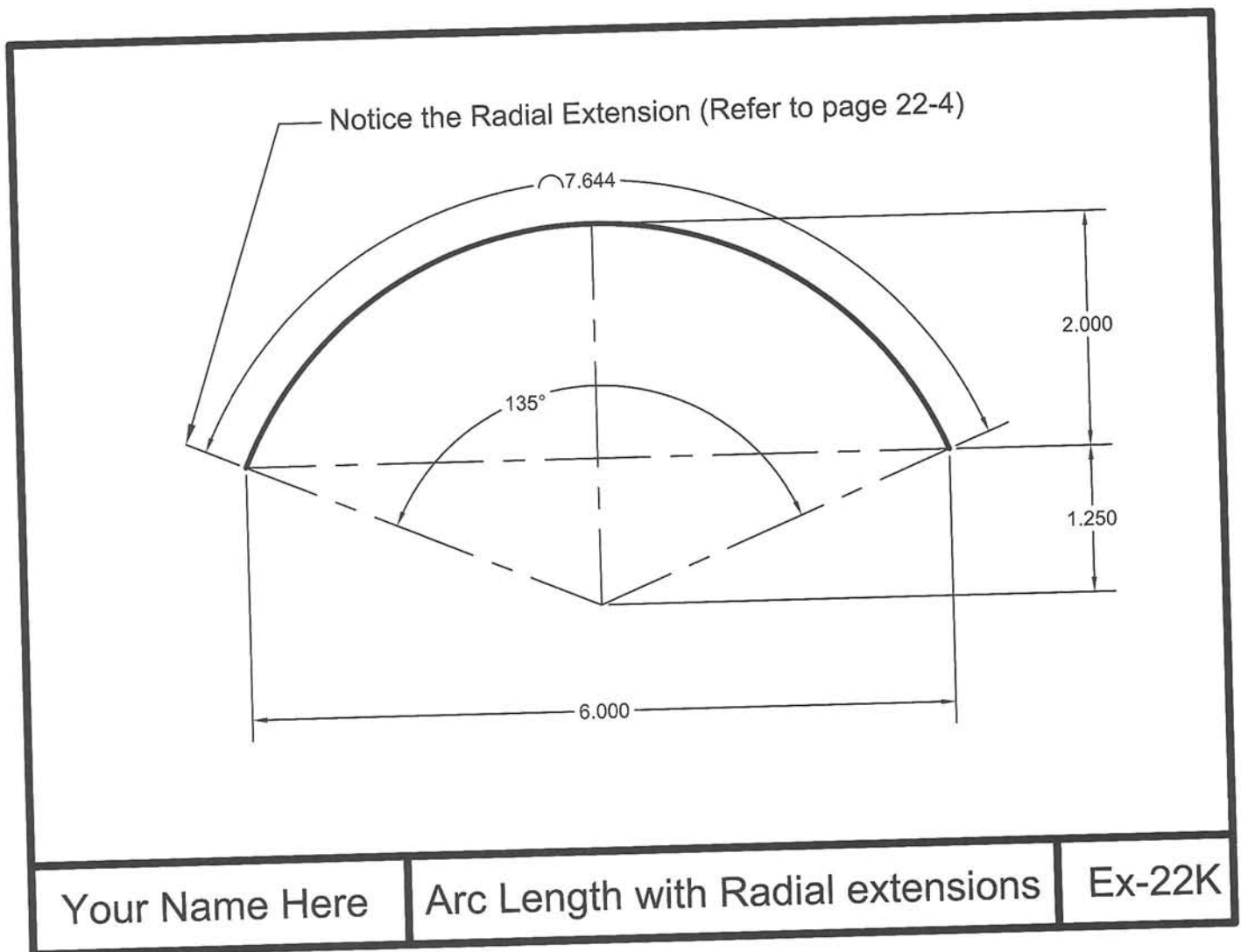
Center, Start, Length

Ex-22J

EXERCISE 22K

INSTRUCTIONS:

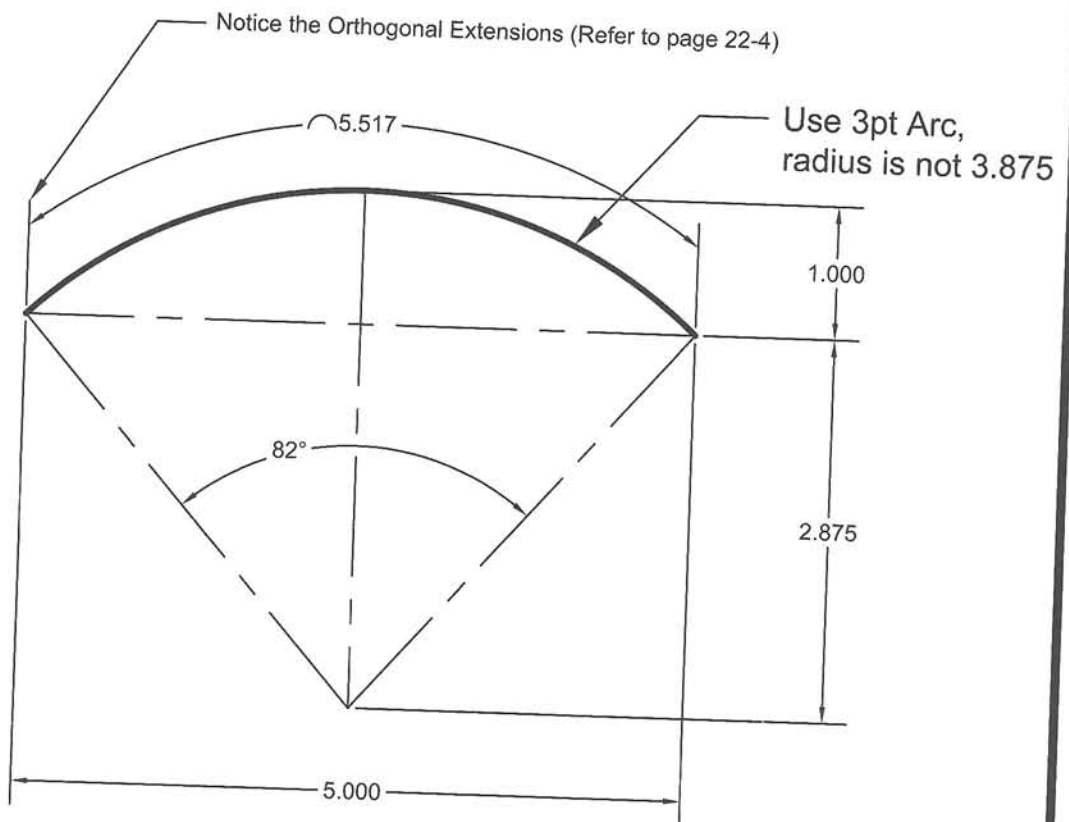
1. Start a **New** file using **Border A-2013.dwt**
2. Draw the Lines first on layer Center line.
3. Draw the Arc using Layer Object Line. Refer to the previous pages to select method.
4. Dimension as shown using Dimension Style **Class Style** and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22K**
7. Plot using Page Setup **Class Model A**



EXERCISE 22L

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw the Lines first on layer Center line.
3. Draw the Arc using Layer Object Line. Refer to the previous pages to select method.
4. Dimension as shown using Dimension Style **Class Style** and Layer Dimension.
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22L**
7. Plot using Page Setup **Class Model A**



Your Name Here

Arc Length with Orthogonal Ext.

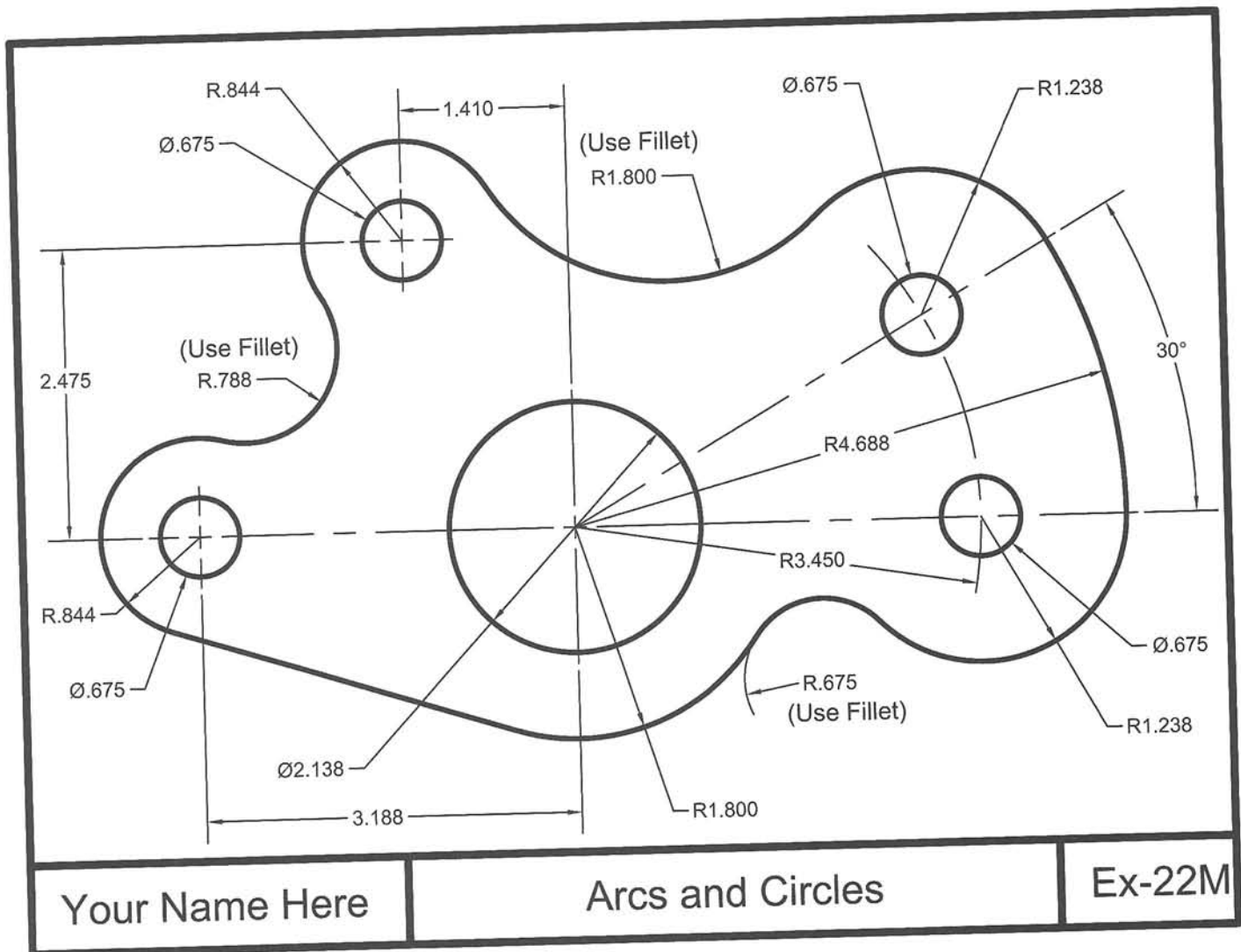
Ex-22L

EXERCISE 22M

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw objects below using Circles, Arcs, Lines and Fillet on layer Object Line.
3. Dimension as shown using Dimension Style **Class Style** and Layer Dimension.
(Refer to page 18-3 and 18-5 for Radius and Diameter dimension settings)
4. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
5. Save as **EX22M**
6. Plot using Page Setup **Class Model A**

Refer to the next page for drawing assistance.



EX 22M Helper

INSTRUCTIONS:

Step 1.

- Draw the horizontal and vertical lines then offset to create intersections for circles.
- Draw the 30 degree line

Step 2.


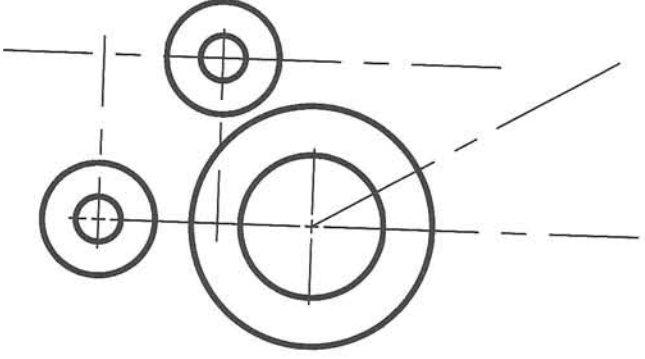
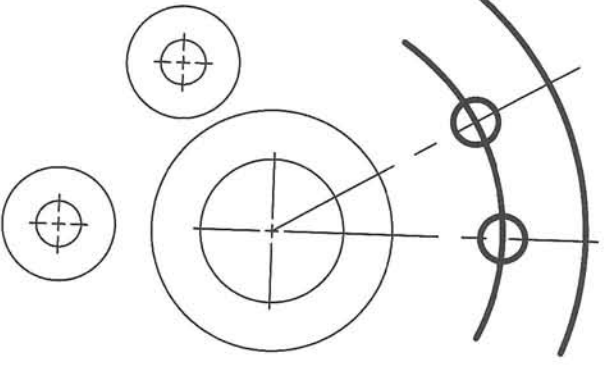
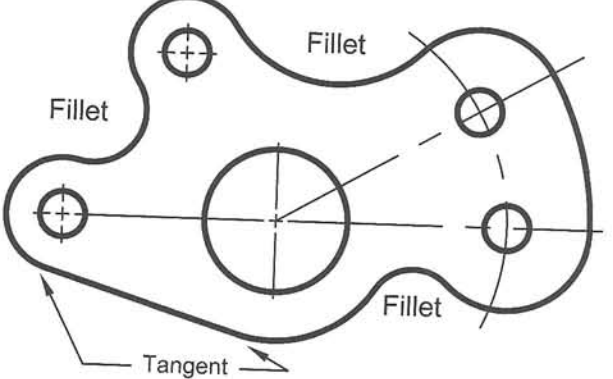
- Draw the Circles

Step 3.

- Draw the Arcs and draw the circles.

Step 4.

- Fillet, draw the tangent line and dimension.

<p>Step 1.</p> 	<p>Step 2.</p> 	
<p>Step 3.</p> 	<p>Step 4.</p> 	
<p>Your Name Here</p>	<p>Arcs and Circles</p>	<p>Ex-22M</p>

EXERCISE 22N

INSTRUCTIONS:

1. Start a **New** file using **Border A-2013.dwt**
2. Draw a 9" Radius Circle on Layer Object line, as shown below.
3. Trim so it does not extend beyond the the border lines.
4. Dimension as shown using Dimension Style **Class Style** and Layer Dimension.
(Refer to page 22-5)
5. Edit the Title and Ex-XX by double clicking on the text. Do not erase and replace.
6. Save as **EX22N**
7. Plot using Page Setup **Class Model A**

