A Practical Guide to AutoCAD® 2026

Tracy Chadwick and Rick Ellis

Foreword written by Lynn Allen

CADapult Press

A CADapult Press Publication

Copyright

Copyright © CADapult Press, Inc. 2025

All rights reserved. No part of this publication may be reproduced in any form, or by any means electronic, mechanical, recording, photocopying, or otherwise, without written permission from the publisher, except for brief quotations used in reviews, or for marketing purposes specific to the promotion of this work.

ISBN - Physical Book 978-1-934865-94-1
ISBN - Digital Book 978-1-934865-95-8

Although CADapult Press has made every attempt to ensure the accuracy of the contents of this book, the publisher and author make no representations or warranty with respect to accuracy or completeness of the contents in this book, including without limitation warranties of fitness for a particular purpose. The datasets included in this book are for training purposes only.

Autodesk screen shots reprinted with the permission of Autodesk, Inc.

Autodesk, AutoCAD, DWG, and the DWG logo are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and other countries. All other trademarks are the property of their respective owners.

Published in the United States of America by:
CADapult Press
(503) 266-2488
books@cadapult-software.com

Printed and manufactured in the United States of America

About the Authors

Tracy Chadwick serves as coordinator and instructor for the Computer Drafting Technology program at Hutchinson Community College in Hutchinson, Kansas. He is responsible for teaching a wide range of courses, including those on engineering graphics, AutoCAD software, Inventor software, and Revit Architecture software.

Tracy has been an AutoCAD user since 1995, and has been teaching AutoCAD classes to working professionals and college students since 2001. His experience and dedication to teaching led to him being recognized by Autodesk, Inc. with the North America Award for Distinguished Performance in AutoCAD Software Training.

Tracy has also been recognized as a top rated speaker at Autodesk University, where he has presented for several years. He has recently begun serving as a mentor to first-time Autodesk University speakers.

Tracy can be reached at: tracy@cadapult-software.com

Rick Ellis has worked with and taught AutoCAD Map 3D since the mid-90s, along with Civil 3D and other Autodesk products. He is the Author of several critically acclaimed books on AutoCAD Map 3D, Civil 3D and Land Desktop.

Rick continues to use AutoCAD Map 3D on projects in a production environment, in addition to teaching classes to organizations both large and small.

This practical background and approach has made him an award winning speaker at Autodesk University and a sought after instructor by organizations around the world.

Rick can be reached at: rick@cadapult-software.com

Acknowledgements

Thank you to my wonderful wife Candace, and my two amazing daughters Sydney and Casey. Without their support I could never have completed this book. Thank you to all the students of the Computer Drafting Technology program at Hutchinson Community College. I am honored to have played a part in helping so many students achieve fulfilling careers over the last two decades. Thank you to Vince Puyear, who first introduced me to AutoCAD back in 1995. He started as my instructor, then later became my colleague, mentor, and friend. Thank you to Amber Brawner for lending her graphic design talent to this book, and for being a great friend. Last, but not least, thank you to Rick Ellis and CADapult Press for helping me to achieve my dream of being an author, so that I may spread my love for AutoCAD from beyond central Kansas to the world!
-Tracy Chadwick

A Practical Guide to AutoCAD® 2026

Introduction

Congratulations on choosing this course to help you learn how to use AutoCAD 2026. The term “practical” is used in the title because this course focuses on what you need to effectively use AutoCAD 2026, and does not complicate your learning experience with unnecessary details of every feature in the product. Should you want to pursue aspects of features and functionality in greater detail than provided in this course, you are directed and guided to that information.

Each lesson contains the concepts and principles of each feature to provide you with the background and foundation of knowledge that you need to complete the lesson. You then work through exercises to reinforce your understanding and provide you with practice on common tasks that other professionals are performing with AutoCAD 2026 in the workplace every day.

Most lessons include a *Challenge Exercise* at the end. These exercises ask you to perform tasks based on what you learned in the lesson without the step-by-step instructions to test your skills and understanding of the new material.

When you complete this course, you will be armed with the background and knowledge to apply AutoCAD to your job tasks, and become more effective and productive in your job.

Course Objectives

The objectives of this course are performance based. In other words, once you have completed the course, you will be able to perform each objective listed. If you are already familiar with AutoCAD, you will be able to analyze your existing workflows, and make changes to improve your performance based on the tools and features that you learn and practice in this course.

After completing this course, you will be able to:

- Understand the user interface
- Navigate through drawings with pan and zoom commands
- Create drawing objects, including lines, arcs, and circles
- Create and modify polylines, including rectangles and polygons
- Use Layers to differentiate drawing objects
- Draw using Polar Tracking and coordinate methods
- Use Object Snaps and Object Snap Tracking
- Modify drawing objects
- Duplicate drawing objects
- Extract information from drawings with measuring tools
- Create and modify hatch patterns
- Create, insert, and modify blocks
- Work with external references
- Import a PDF
- Create and scale paper space layouts and viewports
- Print scale drawings and check plots
- Detail drawings with text, dimensions, and leaders

Downloading and Installing the Datasets

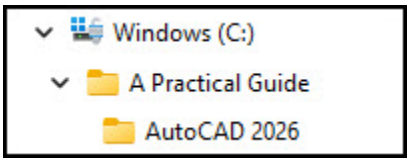
In order to perform the exercises in this book, you must download a zip file and install the datasets.

Type the address below into your web browser to load the page where you can download the dataset.
www.cadapult-software.com/data

Unzip the Files

Unzip the file **APG_AutoCAD2026.zip** directly to the C drive. The zip file will create the following folder structure:

C:\A Practical Guide\AutoCAD 2026*Files for Exercises*



Exercises

The exercises in this course have been carefully chosen and designed to represent common tasks that are performed by design professionals.

The exercise files are from many different industries and are meant only to be examples. It's important to focus on the tools being shown and how you could apply them to your project and industry.

Exercises provide higher level process information throughout the exercise tasks. You are given information about not only what to do, but why you are doing it. In most cases, an image is included to help guide you.

Most lessons include a *Challenge Exercise* at the end. These exercises ask you to perform tasks based on what you learned in the lesson without the step-by-step instructions to test your skills and understanding of the new material. If you get stuck in these exercises, go back and review the information in the lesson for guidance.

Table of Contents

Chapter 1 Introduction to AutoCAD 1

1.1. Lesson: Navigating the AutoCAD User Interface 2

1.1.1 Navigating the AutoCAD Interface 8

1.2. Lesson: Working with AutoCAD Drawing Files 10

1.2.1 Working with AutoCAD Drawings 17

1.3. Lesson: Basic AutoCAD Tools 20

1.4. Lesson: Selection Techniques 26

1.4.1 Selection Techniques 29

Chapter 2 Drawing Lines and Working with Layers 31

2.1. Lesson: Drawing Lines 32

2.1.1 Drawing Lines 35

2.2. Lesson: Drawing with Cartesian Coordinates 37

2.2.1 Drawing a Rectangle with Absolute Coordinates 41

2.2.2 Drawing a More Complex Shape with Absolute Coordinates 42

2.2.3 Drawing a Rectangle with Relative Coordinates 43

2.2.4 Drawing a More Complex Shape with Relative Coordinates 44

2.2.5 Drawing a Rectangle with Polar Coordinates 46

2.2.6 Drawing a More Complex Shape with Polar Coordinates 47

2.3. Drawing with Polar Tracking 49

2.3.1 Drawing a Rectangle with Polar Tracking 56

2.3.2 Drawing a More Complex Shape with Polar Tracking 58

2.3.3 Drawing with Additional Polar Tracking Angles 60

2.3.4 Drawing with Architectural Units 62

2.3.5 Challenge Exercise - Polar Tracking 64

2.4. Drawing with Layers 65

2.4.1 Drawing with Layers 72

2.4.2 Changing the Layers of Existing Objects 74

2.4.3 Modifying Layer States 75

2.4.4 Creating and Modifying Layers 77

2.4.5 Challenge Exercise - Layers 80

Chapter 3 Drawing Additional Objects (Part I) 83

3.1. Drawing Circles 84

3.1.1 Drawing Circles with the Center, Radius and Center, Diameter Methods 87

3.1.2 Additional Practice with the Center, Radius and Center, Diameter Methods 88

3.1.3 Drawing Circles with the 2-Point and 3-Point Methods 89
3.1.4 Drawing Circles with Tangent Methods 91
3.1.5 Challenge Exercise - Drawing Circles 94
3.2. Drawing Rectangles 95
3.2.1 Drawing Rectangles 97
3.2.2 Challenge Exercise - Drawing Rectangles 99
3.3. Drawing Polygons 100
3.3.1 Drawing Polygons 103
3.3.2 Additional Practice Drawing Polygons 104
3.3.3 Challenge Exercise - Drawing Polygons 105

Chapter 4 Object Snaps and Object Snap Tracking 107
4.1. Drawing with Object Snaps 108
4.1.1 Drawing with Endpoint, Midpoint, and Quadrant Object Snaps 115
4.1.2 Drawing with Center and Tangent Object Snaps 118
4.1.3 Drawing with Node and Perpendicular Object Snaps 120
4.1.4 Drawing with Intersection and Geometric Center Object Snaps 122
4.1.5 Drawing with Object Snap Overrides 123
4.1.6 Additional Practice Drawing with Object Snap Overrides 125
4.1.7 Challenge Exercise - Objects Snaps #1 127
4.1.8 Challenge Exercise - Objects Snaps #2 128
4.2. Drawing with Object Snap Tracking 129
4.2.1 Tracking Off of a Single Point with Object Snap Tracking 134
4.2.2 Object Snap Tracking of Multiple Points 136
4.2.3 Challenge Exercise - Objects Snap Tracking 138

Chapter 5 Drawing Additional Objects (Part II) 139
5.1. Drawing Arcs 140
5.1.1 Drawing Arcs 146
5.1.2 Additional Practice Drawing Arcs 148
5.1.3 Challenge Exercise - Drawing Arcs 151
5.2. Drawing and Editing Polylines 152
5.2.1 Drawing Polylines 159
5.2.2 Drawing Polylines with Varying Widths 161
5.2.3 Editing Polylines 164
5.2.4 Challenge Exercise - Drawing Polylines 166

Chapter 6 Modifying Drawing Objects 169
6.1. Moving Drawing Objects 170
6.1.1 Moving Drawing Objects 172
6.1.2 Additional Practice Moving Objects 173
6.1.3 Challenge Exercise - Moving Drawing Objects 178
6.2. Scaling Drawing Objects 179
6.2.1 Scaling Objects 182
6.2.2 Scaling Drawing Objects with the Reference Option 185
6.2.3 Challenge Exercise - Scaling Drawing Objects 187
6.3. Stretching Drawing Objects 188
6.3.1 Stretching Drawing Objects 190
6.3.2 Challenge Exercise - Stretching Drawing Objects 193
6.4. Rotating Drawing Objects 194
6.4.1 Rotating Drawing Objects 198
6.4.2 Rotating Objects with Polar Tracking 201
6.4.3 Rotating Objects with the Reference Option 203
6.4.4 Challenge Exercise - Rotating Drawing Objects 205
6.5. Trimming Drawing Objects 206
6.5.1 Trimming Drawing Objects 213
6.6. Extending Drawing Objects 216
6.6.1 Extending Drawing Objects 222
6.6.2 Additional Practice Trimming and Extending Objects 224
6.6.3 Challenge Exercise - Trimming and Extending Drawing Objects 228
6.7. Creating Rounded Corners with the Fillet Command 229
6.7.1 Filleting Drawing Objects 234
6.7.2 Additional Practice Filleting Drawing Objects 238
6.7.3 Challenge Exercise - Filleting Drawing Objects 241
6.8. Creating Angled Corners with the Chamfer Command 242
6.8.1 Chamfering Drawing Objects 250
6.8.2 Challenge Exercise - Chamfering Drawing Objects 256

Chapter 7 Duplicating Drawing Objects 257
7.1. Copying Drawing Objects 258
7.1.1 Copying Drawing Objects 260
7.1.2 Exercise: Additional Practice Copying Objects 262
7.1.3 Challenge Exercise - Copying Drawing Objects 264
7.2. Mirroring Drawing Objects 265
7.2.1 Mirroring Drawing Objects 268

7.2.2 Additional Practice Mirroring Objects 270
7.2.3 Challenge Exercise - Mirroring Drawing Objects 273
7.3. Creating Rectangular Arrays of Drawing Objects 274
7.3.1 Creating a Rectangular Array 278
7.3.2 Additional Practice Creating Rectangular Arrays 282
7.3.3 Challenge Exercise - Rectangular Array 285
7.4. Creating Polar Arrays of Drawing Objects 286
7.4.1 Creating a Polar Array 292
7.4.2 Additional Practice Creating Polar Arrays 296
7.4.3 Creating Polar Arrays with Multiple Rows 298
7.4.4 Challenge Exercise - Polar Array 300
7.5. Creating Path Arrays of Drawing Objects 301
7.5.1 Creating Path Arrays Using the Measure Method 306
7.5.2 Creating Path Arrays Using the Divide Method 309
7.5.3 Challenge Exercise - Path Array 311
7.6. Offsetting Drawing Objects 312
7.6.1 Offsetting Drawing Objects 316
7.6.2 Additional Practice Offsetting Objects 319
7.6.3 Challenge Exercise - Offsetting Drawing Objects 324
7.7. Modifying Drawing Objects with Grips 325
7.7.1 Grip Editing Drawing Objects 330

Chapter 8 Inquiry Tools 335
8.1. Measure commands 336
8.1.1 Measuring Distance, Area, and Perimeter 352
8.1.2 Measuring Distance, Radius, Area, and Angle 355
8.1.3 Measuring Angles 359
8.1.4 Measuring with the Quick Measure Tool 361
8.1.5 Challenge Exercise - Measure Commands 362
8.2. Object Properties 365
8.2.1 Viewing and Modifying Object Properties 372

Chapter 9 Adding and Modifying Hatch Patterns 377
9.1. Adding and Modifying Hatch Patterns 378
9.1.1 Adding Hatch Patterns 385
9.1.2 Additional Practice Adding Hatch Patterns 389
9.1.3 Challenge Exercise - Adding Hatch Patterns 394

Chapter 10 Working with Blocks, External References, and PDF Files 395
10.1. Inserting Blocks 396
10.1.1 Inserting Blocks with the Blocks Palette 408
10.1.2 Inserting Dynamic Blocks 415
10.1.3 Inserting Blocks with Tool Palettes 418
10.1.4 Inserting Blocks with DesignCenter 421
10.1.5 Challenge Exercise - Inserting Blocks 425
10.2. Creating Blocks 426
10.2.1 Creating Local Blocks 433
10.2.2 Creating Global Blocks 439
10.2.3 Challenge Exercise - Creating Blocks 443
10.3. Attaching External References 444
10.3.1 Working with External References 449
10.3.2 Challenge Exercise - External References 454
10.4. Importing PDF Files 455
10.4.1 Importing PDF Files 459
10.4.2 Challenge Exercise - Importing PDF Files 464

Chapter 11 Plotting Drawings 465
11.1. Plotting Drawings from Model Space 466
11.1.1 Plotting from Model Space 469
11.1.2 Challenge Exercise - Plotting from Model Space 474
11.2. Plotting Drawings from Paper Space 475
11.2.1 Plotting from Paper Space 481
11.2.2 Challenge Exercise - Plotting from Paper Space 488

Chapter 12 Annotating Drawings 489
12.1. Adding and Modifying Text 490
12.1.1 Adding Text Notes to a Drawing 494
12.1.2 Additional Practice Adding Text Notes to a Drawing 497
12.1.3 Challenge Exercise - Adding Text 500
12.2. Adding and Modifying Dimensions 501
12.2.1 Adding Linear Dimensions 511
12.2.2 Adding Aligned and Angular Dimensions 513
12.2.3 Adding Radius and Diameter Dimensions 515
12.2.4 Adding Continuous and Baseline Dimensions 519
12.2.5 Challenge Exercise - Adding Dimensions #1 521
12.2.6 Challenge Exercise - Adding Dimensions #2 522

12.3. Adding and Modifying Leaders 523
12.3.1 Adding Leaders 530
12.3.2 Adding Balloons with the Multileader Command 533
12.3.3 Challenge Exercise - Adding Leaders 538

Chapter 13 Drawing Projects 539
13.1. A Mechanical Drawing Project 540
13.1.1 Mechanical Drawing Project Practice 541
13.2. An Architectural Drawing Project 556
13.2.1 Architectural Drawing Project Practice 557

Index 571

Foreword

Welcome to the wonderful world of AutoCAD. I say that somewhat tongue and cheek as learning AutoCAD can be somewhat daunting – and no doubt why you've chosen to pick up this book. I commend you for not trying to learn AutoCAD completely on your own (a dreadful route to take) but for relying on the skillful guidance of Tracy Chadwick and Rick Ellis. These two award winning authors have been teaching AutoCAD for many years and know exactly what it takes to lead the beginning user through the oft overwhelming tools inside of AutoCAD. This ***A Practical Guide of AutoCAD 2026*** will focus on the all-important basics of the product and steer you clear of the nonessential tools (you can tackle those later when you are more seasoned!) There is a right and a wrong way to use AutoCAD…this book will ensure that you learn how to use it the "right" way!

I taught AutoCAD at the collegiate and professional level for 11 years before joining Autodesk in their training department. I know the importance of good training materials and I know a great AutoCAD book when I see it. You are looking at one right now. Tracy and Rick have mastered the art of writing in terms that we can all understand without a need to impress or complicate the task at hand. Their goal is simple: to help you successfully use AutoCAD for your design work. They have taken their many years of training expertise and rolled it all into this well massaged book. How I wish I'd had this book when I was training people how to use AutoCAD!

In my 20+ year role as Autodesk Evangelist, I had the distinct privilege of working with Tracy and Rick at Autodesk University and other conferences. Their presentations are always highly rated and very popular with attendees. They have that special knack of connecting with an audience and making the difficult sound easy – which is exactly what you need when you are learning to use AutoCAD. You will experience this as you make your way through the chapters of this book.

A Practical Guide of AutoCAD 2026 also includes real-world examples from many different industries. You won't be drawing any Mickey Mouses or smiley faces, but actual drafting examples. Let's face it – you wouldn't get a job with that limited skillset (well…unless you go work for Disney). The variety of practical examples used with practical commands is the perfect combination to get you prepared for drafting and designing in the real world.

Use this book to build a firm foundation for designing with AutoCAD. Those users with a firm foundation of the product do best overall in successfully mastering the product (another reason to read this book). Physically do as many exercises in the book as possible and you'll be on the road to becoming a great AutoCAD user!

I'm pretty sure that your first thought when you're finished with this book is going to be…"When are Tracy and Rick going to come out with an ***Advanced Practical Guide of AutoCAD***?" I know that's my question!

Lynn Allen
Global Technology Evangelist

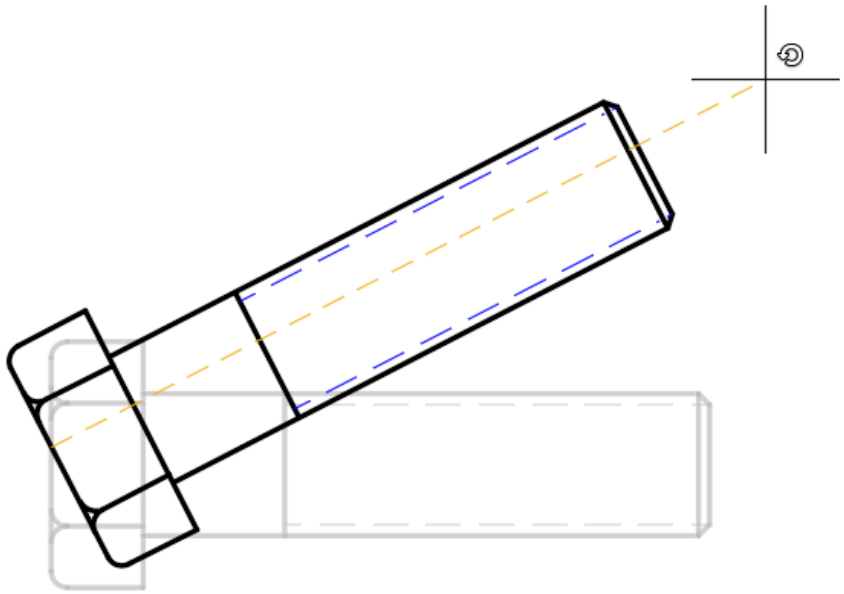
In her 20+ year career as Autodesk Technology Evangelist, Lynn Allen has spoken to more than a half million design professionals in over 50 countries throughout the world. Her online reach over the years easily reaches into the millions. An early CAD entrepreneur, Lynn taught AutoCAD at the corporate and collegiate level for 11 years before joining Autodesk. A popular columnist for Cadalyst magazine for over two decades, she is the face behind hundreds of software videos including the series "AutoCAD Tips and Tricks with Lynn Allen". A sought-after public speaker with a unique comedic style, Lynn was the host of Autodesk University for over a decade and is always one of the highest rated presenters at the many worldwide Autodesk Universities. She is also the author of three technical books focused on AutoCAD software.

Sample Lesson

6.4. Rotating Drawing Objects

Introduction

In this lesson, you learn how to rotate drawing objects.



Key Concepts

Concepts and key terms covered in this lesson are:

- Rotating Objects
- Base Point
- Rotation Angle
- Reference Angle

Objectives

After completing this lesson, you will be able to:

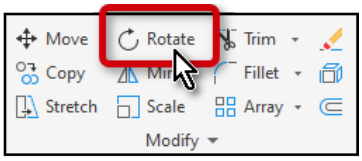
- Rotate drawing objects.

About the Rotate Command

Many times while drawing you will have the need to adjust the orientation of drawing objects by rotating them. The Rotate command can achieve this in a few simple steps.

Starting the Rotate Command

The **Rotate** command is located at **Ribbon: Home ⇒ Modify ⇒ Rotate**.



Alternatively, you can type **RO** then press **[Enter]** at the keyboard.

After starting the Rotate command, you are prompted to select the objects to be rotated.

```
Current positive angle in UCS:  ANGDIR=counterclockwise  ANGBASE=0
ROTATE Select objects:
```

The Rotate command will allow you to select as many objects as you want. When you are finished selecting objects you must press **[Enter]** at the keyboard to move on to the next step.

```
Select objects: 1 found, 3 total
ROTATE Select objects:
```

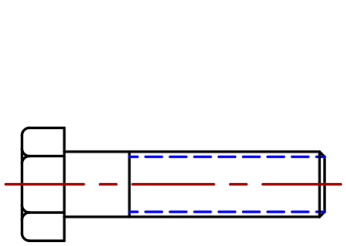
Next you will specify the base point. This point will remain in the same location while the rest of the selected objects rotate around it.

```
Select objects:
ROTATE Specify base point:
```

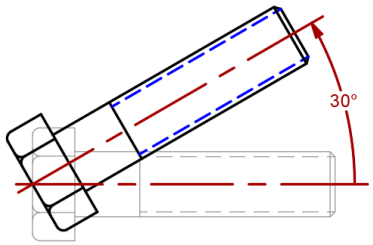
Finally, the Command line asks for the rotation angle. The angle can be specified by typing a value or by selecting a point on-screen.

```
Specify base point:
ROTATE Specify rotation angle or [Copy Reference] <0>:
```

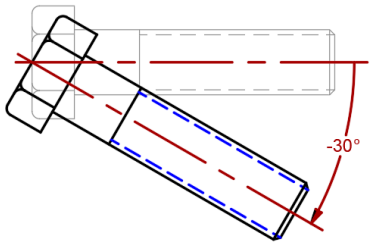
When entering a rotation angle value, it is important to remember that by default in AutoCAD, angles are positive when rotating in the counterclockwise direction; angles are negative when rotating in the clockwise direction.



Original Object

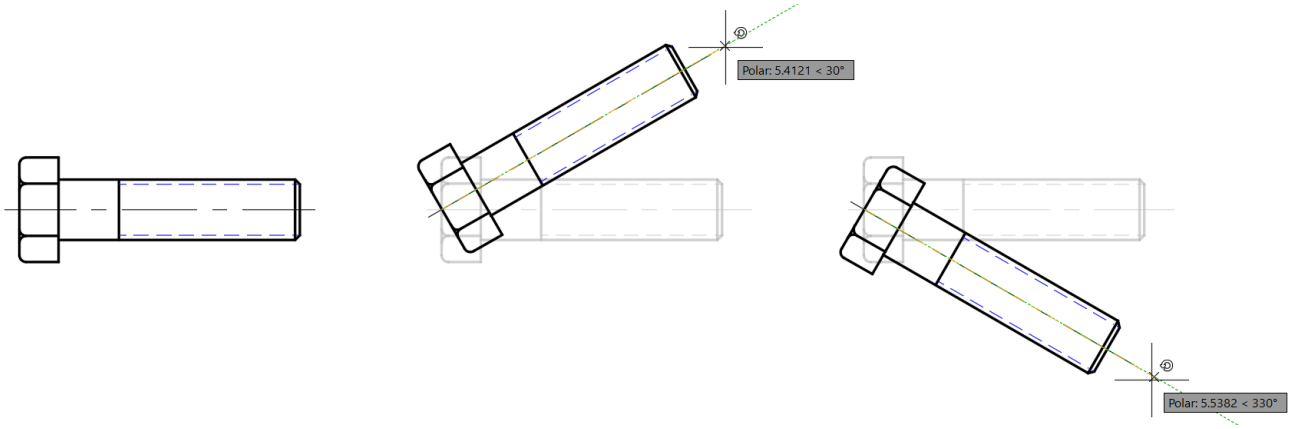


Object rotated positive 30°



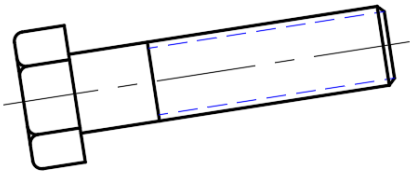
Object rotated negative 30°

Instead of typing the rotation angle value, you can also pick a point on-screen. Turn on *Polar Tracking* to ensure that the rotation angle is precise. In the example below the Incremental Angle value of *Polar Tracking* has been set to 30 degrees. This could be a more efficient workflow because you do not need to be concerned with whether or not an angle is positive or negative. Instead, you simply click when the object is located on the appropriate tracking angle.



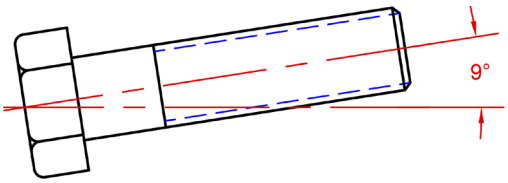
Specifying the Reference Angle

Occasionally when working in a drawing, you may find the need to rotate an object to return it to a standard orientation. For example, the bolt in the image to the right is currently at an angle, and it needs to be rotated until it is back to horizontal.

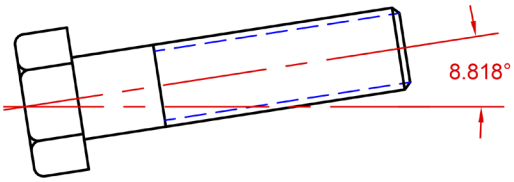


This is a fairly simple process if the object was rotated at a known angle, such as 30 degrees; you could simply rotate the object negative 30 degrees to return it to horizontal. However, if the object has been rotated at an unknown angle, the process could be more difficult. One possibility is to measure the angle from horizontal, then rotate using a negative value.

In the image to the right, the angle of the bolt has been measured and found to be nine degrees.



The first instinct might be to rotate the object negative nine degrees to return it to horizontal. This might not work precisely, because the nine degree dimension could be rounded off. A closer look reveals that the angle is slightly less.

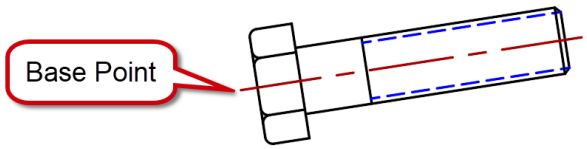


Using this new, more precise value could still lead to an incorrect drawing because this value is most likely rounded off as well.

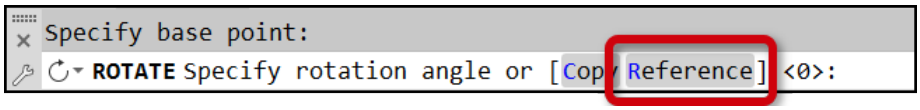
The much more precise and quicker solution is to use the Reference option of the Rotate command.

In this example the centerline of the bolt will serve as the reference angle. Therefore, the left endpoint of the centerline will serve as the basepoint.

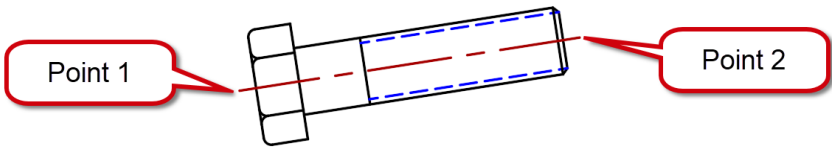
1. Begin the Rotate command and select the objects to be rotated.
2. Specify the basepoint.



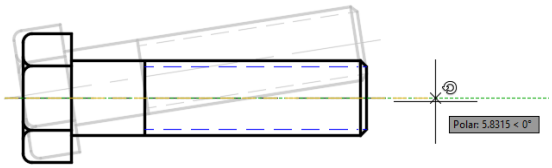
3. Choose the **[Reference]** option in the Command line.



4. Select the two endpoints of the centerline to represent the new reference angle.



5. Move the crosshairs horizontally to the right of the basepoint along the **0** degree *Polar Tracking* angle.
6. Select a point to rotate the bolt into place.



Exercises: Rotating Drawing Objects

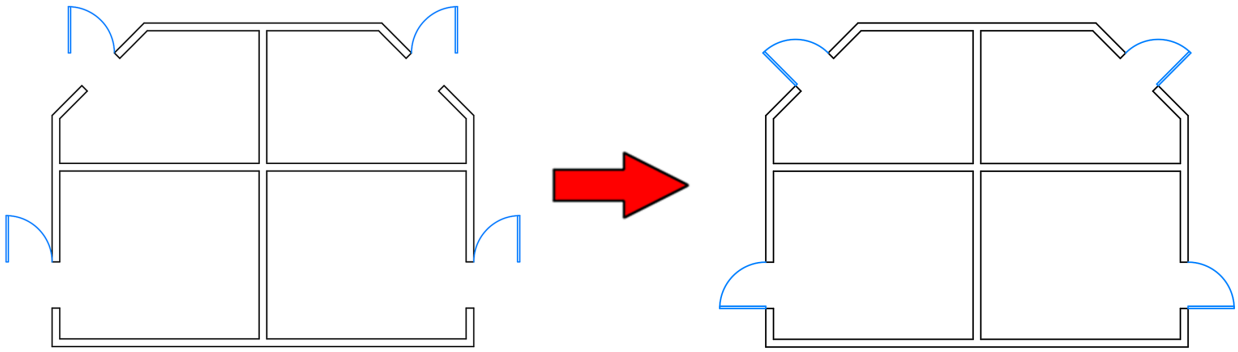
In these exercises, you will rotate several drawing objects.

You do the following:

- Start the Rotate command.
- Select objects.
- Specify base points.
- Specify a rotation angle by typing a value.
- Specify a rotation angle with *Polar Tracking*.
- Use the reference option to orient drawing objects.

6.4.1 Rotating Drawing Objects

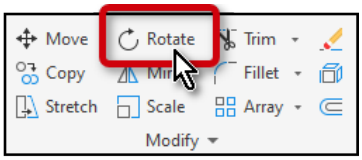
In this exercise you will use the Rotate command to adjust the orientation of several doors.



1. **Open** drawing **6.4.1 Rotating Objects 1.dwg**.
2. Set **Endpoint** as a *Running Object Snap*.

Four doors have been placed, but they need to be rotated into place. Start with the door in the lower left, then work clockwise around the building.

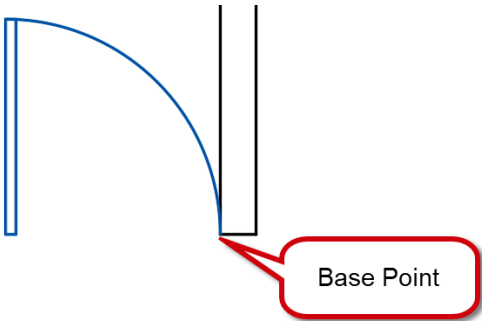
3. Zoom to the lower-left quadrant of the building.
4. Select **Ribbon: Home ⇒ Modify ⇒ Rotate**.



5. Select the door.
6. Press **[Enter]** at the keyboard to finish selecting objects.

You are now prompted to select the base point.

7. Select the point where the arc touches the wall to specify it as the base point.



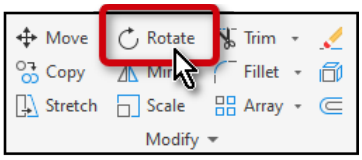
You are now prompted to specify the rotation angle.

8. At the Command line type **90** then press **[Enter]** at the keyboard.

The door is rotated into place.

9. Zoom to the upper-left quadrant of the building.

10. Select **Ribbon: Home ⇒ Modify ⇒ Rotate**.

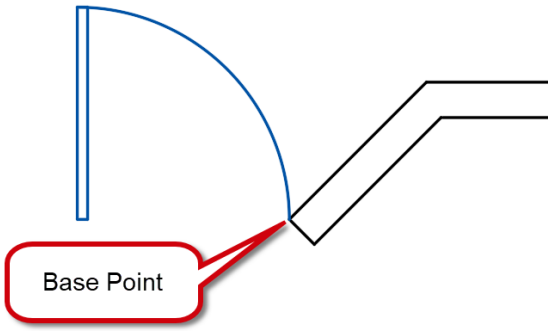


11. Select the door.

12. Press **[Enter]** at the keyboard to finish selecting objects.

You are now prompted to select the base point.

13. Select the point where the arc touches the wall to specify it as the base point.



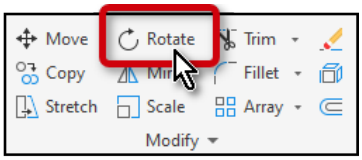
You are now prompted to specify the rotation angle.

14. At the Command line type **45** then press **[Enter]** at the keyboard.

The last two doors will be rotated in the clockwise direction, which will require negative rotation angles.

15. Zoom to the upper-right quadrant of the building.

16. Select **Ribbon: Home ⇒ Modify ⇒ Rotate**.

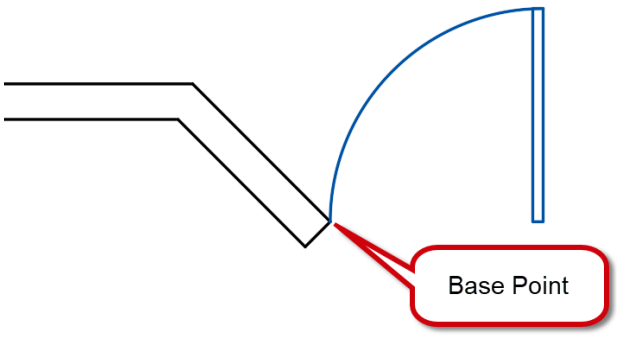


17. Select the door.

18. Press **[Enter]** at the keyboard to finish selecting objects.

You are now prompted to select the base point.

19. Select the point where the arc touches the wall to specify it as the base point.



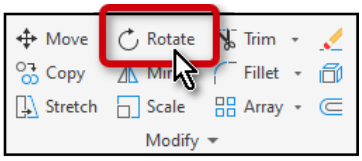
You are now prompted to specify the rotation angle.

20. At the Command line type **-45** then press **[Enter]** at the keyboard.

Next you will rotate the final door.

21. Zoom to the lower-right quadrant of the building.

22. Select **Ribbon: Home ⇒ Modify ⇒ Rotate**.

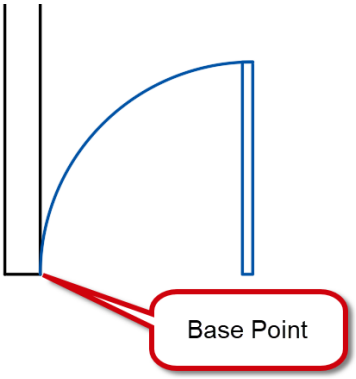


23. Select the door.

24. Press **[Enter]** at the keyboard to finish selecting objects.

You are now prompted to select the base point.

25. Select the point where the arc touches the wall to specify it as the base point.

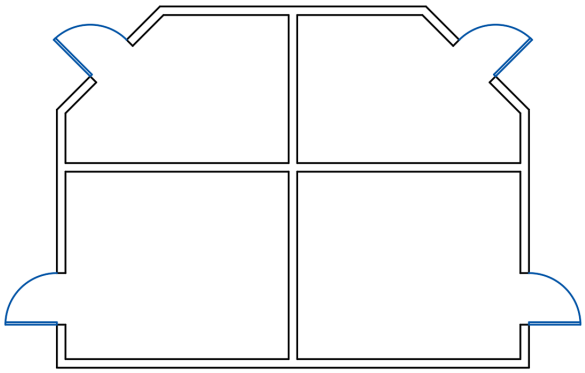


You are now prompted to specify the rotation angle.

At the Command line type **-90** then press **[Enter]** at the keyboard.

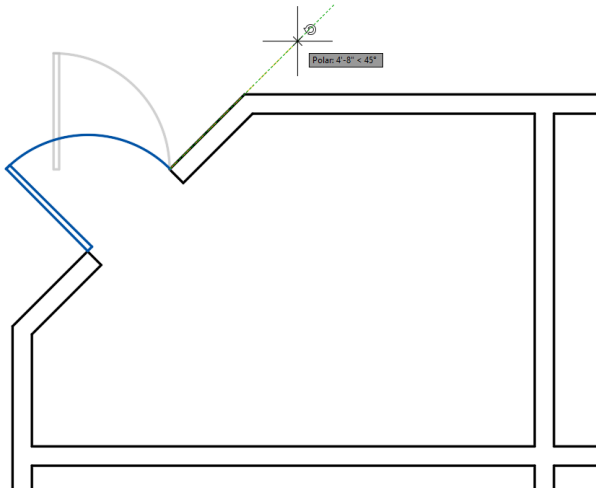
The completed drawing appears as shown.

26. **Save** the drawing.

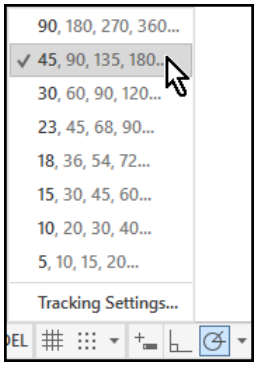


6.4.2 Rotating Objects with Polar Tracking

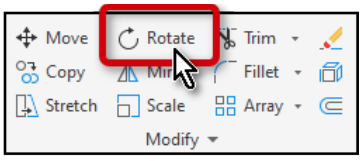
In this exercise you will use the Rotate command and *Polar Tracking* to speed up the rotate process.



1. **Open** drawing **6.4.2 Rotating Objects 2.dwg**.
2. Set **Endpoint** as a *Running Object Snap*.
3. Select the fly-out arrow next to the *Polar Tracking* button and select **45** degree increment angles.
4. If necessary, select the *Polar Tracking* button to turn it on.



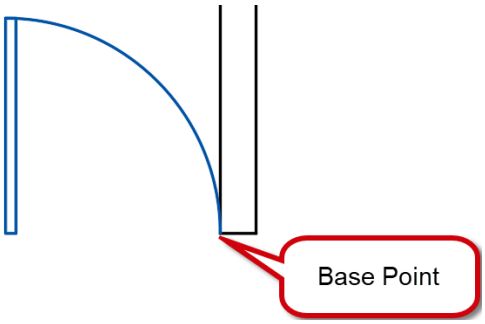
5. Zoom to the lower-left quadrant of the building.
6. Select **Ribbon: Home ⇒ Modify ⇒ Rotate**.



7. Select the door.
8. Press **[Enter]** at the keyboard to finish selecting objects.

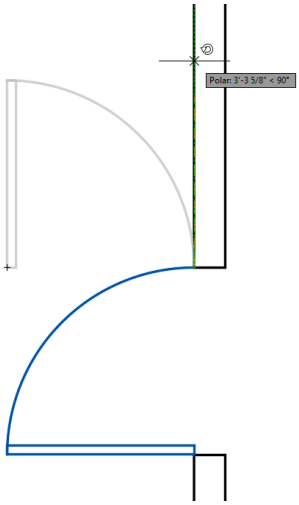
You are now prompted to select the base point.

9. Select the point where the arc touches the wall to specify it as the base point.



You are now prompted to specify the rotation angle.

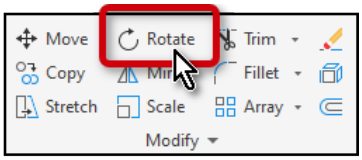
10. Move the crosshairs above the previous point, until it snaps on to the **90** degree *Polar Tracking* angle, then select a point.



The door is rotated into place.

11. Zoom to the upper-left quadrant of the building.

12. Select **Ribbon: Home** ⇒ **Modify** ⇒ **Rotate**.

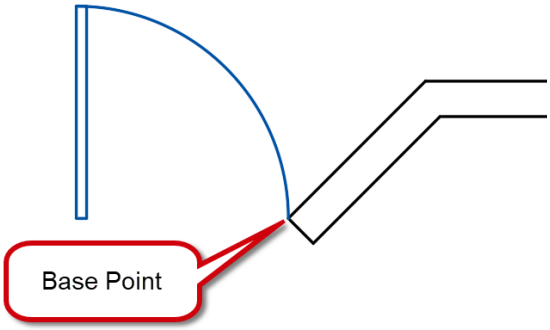


13. Select the door.

14. Press **[Enter]** at the keyboard to finish selecting objects.

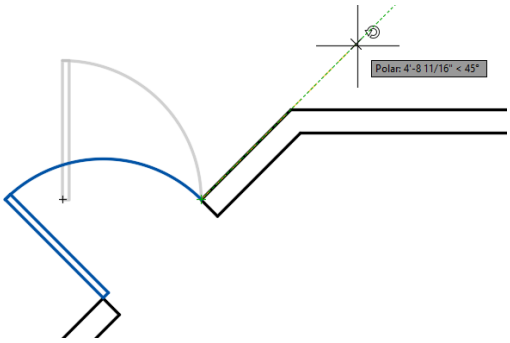
You are now prompted to select the base point.

15. Select the point where the arc touches the wall to specify it as the base point.



You are now prompted to specify the rotation angle.

16. Move the crosshairs above and to the right of the previous point, until it snaps on to the **45** degree *Polar Tracking* angle, then select a point.

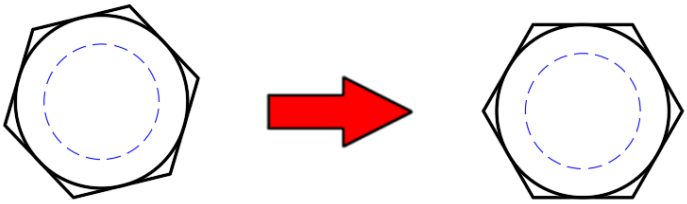


17. Repeat the process to complete the right side of the drawing.

18. **Save** the drawing.

6.4.3 Rotating Objects with the Reference Option

In this exercise you will use the Reference option of the Rotate command to adjust the orientation of objects.

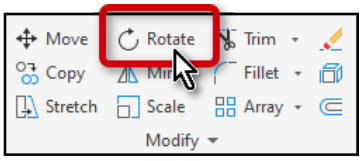


1. **Open** drawing **6.4.3 Rotating Objects 3.dwg**.

2. Set **Endpoint** as a Running Object Snap.

Each bolt head has been rotated at an unknown angle. You will start by rotating the first bolt head until the top and bottom edges are horizontal.

3. Select **Ribbon: Home** ⇒ **Modify** ⇒ **Rotate**.

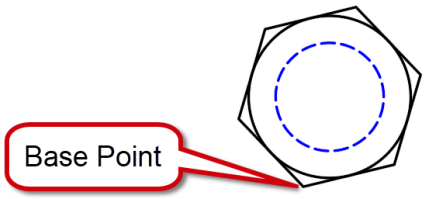


4. Select the objects that make up the first bolt head.

5. Press **[Enter]** at the keyboard to finish selecting objects.

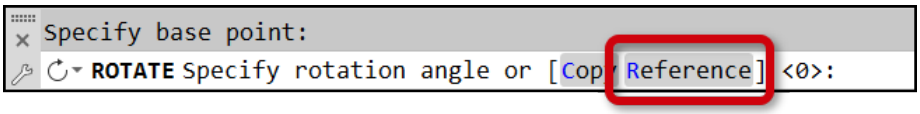
You are now prompted to select the base point.

6. Select the lower-left corner to specify it as the base point.



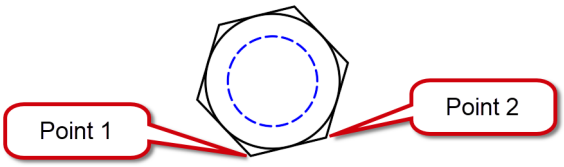
You are prompted for a rotation angle. By default, AutoCAD uses 0 as the reference angle, meaning that you are rotating from horizontal. In this case the reference angle should match the bottom edge of the bolt head. Since that value is unknown, you will select the two endpoints of that line to specify it as the new reference angle.

7. At the Command line select the **[Reference]** option.

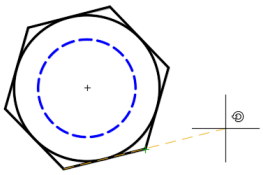


You are prompted to specify the reference angle.

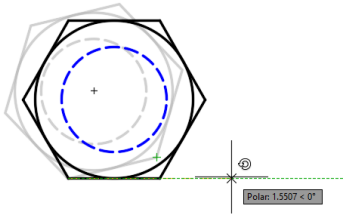
8. Click the lower-left point.
9. Click the lower-right point.



The reference angle now matches the bottom edge of the bolt head.

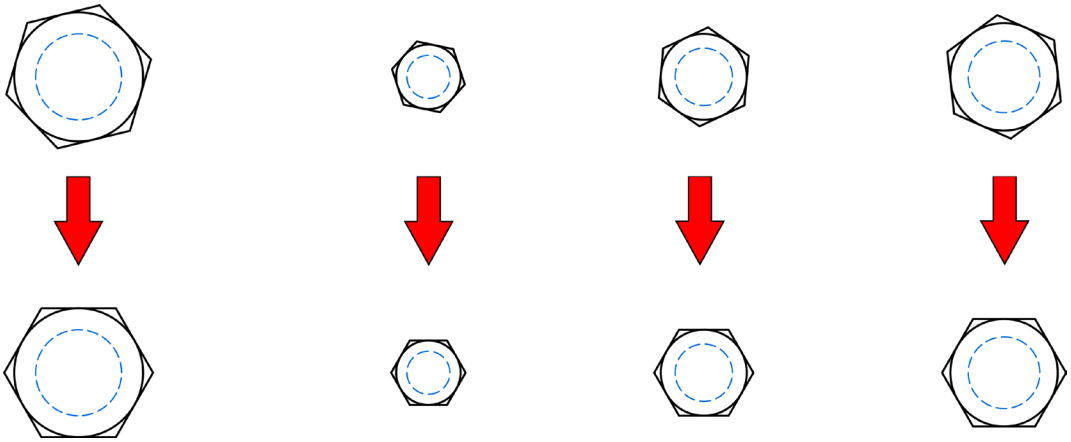


10. Move the crosshairs horizontally to the right along the **0** degree *Polar Tracking* angle.
11. Select a point to rotate the bolt head into place.



The top and bottom edges of the bolt head are now horizontal.

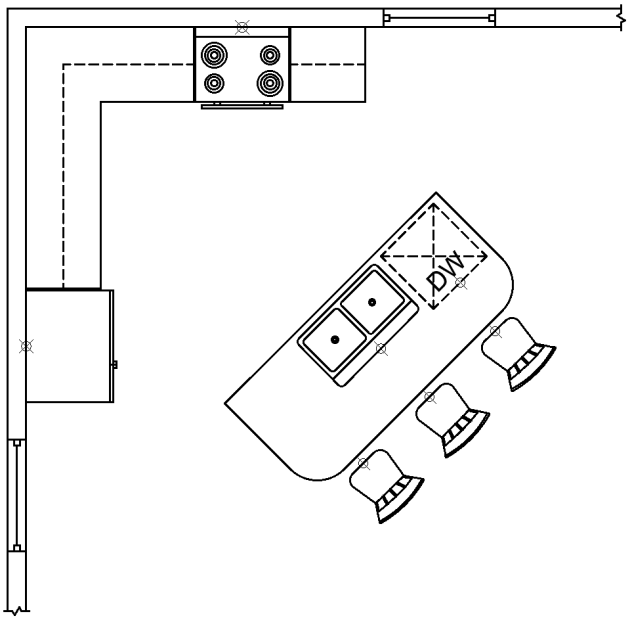
12. Repeat the process to rotate the remaining three bolts so that their top and bottom edges are horizontal.



13. **Save** the drawing.

6.4.4 Challenge Exercise - Rotating Drawing Objects

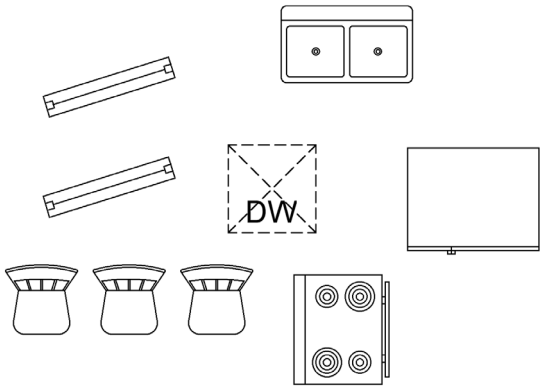
In this exercise you will use the Rotate and Move commands to complete the kitchen layout.



1. **Open** drawing **6.4.4 Rotating Objects 4.dwg**.

The drawing contains a partial floorplan of a kitchen layout.

Also included are several objects that need to be placed in the floorplan including appliances, furniture, and windows.



2. Rotate each object the appropriate angle, then move the object to the correct location as shown in the image above.

Points have been provided to aid in locating the objects properly. Enable the Node object snap to move the objects to the points.

The windows have been rotated to non-standard angles. Use the Reference option of the rotate command to rotate the windows to the proper angles.

3. **Save** the drawing.

Lesson Review

In this lesson, you learned how to rotate drawing objects both by typing angle values at the Command line and with the aid of *Polar Tracking*.

Index

[F2] 22
Absolute Coordinates 38
Additional Tracking Angles 52
Aligned Dimension 505
Angles 40
Angular Dimension 505
Application Menu 5
Arc 141
Area 346
Associative Dimensions 509
automatic save 15
automatic save files 15
backup copy 15
Baseline Dimension 508
Block Editor 430
Blocks 397, 445
Boundary edges 217
Boundary Edges in Quick Mode 218
Cartesian Coordinates 38
Center Snap 112
Chamfer command 243
Changing the Layer of Existing Objects 66
Circle 85
Circumscribed 102
Closing a File 16
Closing a Polyline 156
Command Line 7
Command Line Options 22
Continue Dimension 507
Copy command 259
Create Block command 427
Crosshairs 6
Crossing selection method 27
Current Layer 66
Cutting edges 207, 210, 220
Cutting Edges in Quick Mode 208
DesignCenter 407
Diameter Dimension 506
Dimensioning 502
Direct Distance Entry 50
Drafting Settings Dialog Box 110
Drawing Units 338
Drawing Window 6
Dynamic Blocks 404, 405
Edit Polyline 155
Endpoint Snap 111
Erasing Objects 25
Explode 158, 289, 401
Extend command 217
Extend Quick Mode 217
Extend Standard Mode 220
Extension Snap 132
External Reference Fading 447
External Reference Path Type 447
External Reference Type 446
External Reference Updating 447
External References 444
External References Palette 445
File Tabs 6
File Types 11
Fillet command 230
Freezing and Thawing Layers 67
Geometric Center Snap 112
Grip Editing 326
Hatch patterns 379
Help 6
Increment Tracking Angles 50
Inscribed 101
Insert command 445, 456
Insert Snap 114
Inserting Blocks 397
Intersection Snap 112
Joining Lines and Arcs 157
Keyboard Options 21
Lasso 28
Layer Properties Manager 69
Layer States 67
Layers 66
Layout Tabs 7
Layouts 478
Leaders 524
Line 33
Linear Dimension 504
Linetype 70
Lineweight 71
List command 367
Locking Layers 68
Match Properties 366, 383
Measure Angle 343, 344
Measure Area 346
Measure Commands 337
Measure Distance 339
Measure Radius 341
Midpoint Snap 111
Mirror command 266
Model Space 467, 479
Move command 171
Multileader 524
Multiline Text 491
Multiple Drawings 16
Navigation Bar 24
Nearest Snap 114
New 11
Node Snap 114

Object Snap Tracking 130
Object Snaps 109, 132
Offset command 313
Open 13
ORTHO 50
OSNAP 109
OTRACK 130
Page Setup Manager 476
Pan 24
Paper Space 476
Parallel Snap 133
Path Array 302
PDF data to import 457
PDF Import 456
Perpendicular Snap 113
Plot style table 468
Plotting 467, 476
Polar Array 287
Polar Coordinates 40
Polar Tracking 50
Polygon 101
polyline 96
Polyline Width 154, 156
Polylines 153
Properties palette 369
Properties Panel 366
QNew 11
Quadrant Snap 113
Quick Access Toolbar 6
Quick Measure 350
Quick Select 371
Radius Dimension 506
Rectangle 96
Rectangular Array 275
Redo 25
Reference Angle 196
Reference Option 180
Relative Coordinates 39
Removing objects from a selection set 28
Ribbons 5
Right-Click Context Menus 23
Rotate command 195
Running Object Snaps 109
Save 14
Save As 14
Scale command 180
Selection Techniques 26
Status Bar 7
Stretch command 189
Tangent Snap 113
Text 491
Text Window 22
Tool Palettes 406
Tracking Angles 132
Trim command 207
Trim Quick Mode 207
Trim Standard Mode 210
Turning Layers On and Off 67
UCS Icon 7
Undo 25, 34
Units 53, 338
View Cube 6, 24
Viewport Scale 480
Viewports 478
Window selection method 27
Write Block command 429
Zoom 24