

Videos
Includes Video Tutorials

AutoCAD[®] 2026 INSTRUCTOR

A Student Guide for In-Depth Coverage
of AutoCAD's Commands and Features

James A. Leach
Shawna Lockhart



Better Textbooks. Lower Prices.
www.SDCpublications.com



ACCESS CODE
UNIQUE CODE INSIDE

Visit the following websites to learn more about this book:



[amazon.com](https://www.amazon.com)

[Google books](https://books.google.com)

[BARNES & NOBLE](https://www.barnesandnoble.com)

Table of Contents

CHAPTER 1 GETTING STARTED	1	<i>Open</i>	33
CONCEPTS.....	2	<i>Save</i>	35
Coordinate Systems	2	<i>Qsave</i>	35
The CAD Database	3	<i>Saveas</i>	35
Angles in AutoCAD	3	<i>Close</i>	37
Draw True Size	3	<i>Closeall</i>	37
Plot to Scale	5	<i>Closeallother</i>	37
STARTING AUTOCAD	5	<i>Exit</i>	37
THE AutoCAD DRAWING EDITOR.....	6	<i>Quit</i>	38
Beginning a Drawing	6	<i>Partialopen</i>	38
Drafting & Annotation Workspace.....	7	<i>Partialload</i>	39
Command Entry Using the Keyboard.....	11	<i>Recover</i>	40
Accelerator Keys (Control Key Sequences)	12	<i>Dwgprops</i>	40
Special Key Functions	12	<i>SAVETIME</i>	41
Mouse Buttons	12	AutoCAD Backup Files	42
COMMAND ENTRY	12	Drawing Recovery	42
Methods for Entering Commands	12	AutoCAD Drawing File Management	43
Understanding the “Command Tables” in this		Using Other File Formats	43
Book	13		
Command Entry Methods Practice	13	CHAPTER 3 DRAW COMMAND CONCEPTS	45
<i>Line</i>	13	AutoCAD OBJECTS	46
DRAWING AIDS	15	LOCATING THE DRAW COMMANDS	46
Status Bar	15	COORDINATE ENTRY	48
Function Keys	20	Coordinate Formats and Types.....	48
AutoCAD Text Window	20	Coordinate Formats	48
Model Space and Layouts	21	Coordinate Types	48
CUSTOMIZING THE AUTOCAD SCREEN	22	Typical Combinations.....	48
Toolbars.....	22	Three Methods of Coordinate Input.....	48
Ribbon	23	Mouse Input	49
Clean Screen	24	Dynamic Input	49
Multiple Drawings	24	Command Line Input.....	50
Options	25	PRACTICE USING COORDINATE INPUT METHODS	50
CHAPTER 2 WORKING WITH FILES	27	<i>Line</i>	50
AutoCAD DRAWING FILES.....	28	Using Mouse Input to Draw Lines and Circles...	51
Naming Drawing Files	28	<i>Circle</i>	51
Beginning and Saving a Drawing	28	Using <i>Dynamic Input</i> to Draw Lines and Circles ..	53
Accessing File Commands	28	Using Command Line Input to Draw Lines &	
File Navigation Dialog Box Functions.....	29	Circles.....	55
Windows Right-Click Shortcut Menus	30	Direct Distance Entry and Angle Override	57
<i>New</i>	31	<i>Dynamic Input</i> Settings	57
AUTOCAD FILE COMMANDS	31	POLAR TRACKING AND POLAR SNAP	58
<i>Qnew</i>	32	Polar Tracking	58
		<i>Polar Tracking</i> with Direct Distance Entry.....	59

<i>Polar Tracking</i> Override	60	<i>Limits</i>	99
Polar Snap	60	<i>Snap</i>	101
DRAWING LINES USING POLAR TRACKING	61	<i>Grid</i>	103
Using <i>Polar Tracking</i> and <i>Grid Snap</i>	61	Using <i>Snap</i> and <i>Grid</i>	104
Using <i>Polar Tracking</i> and <i>Dynamic Input</i>	62	<i>Dsettings</i>	104
Using <i>Polar Tracking</i> , <i>Polar Snap</i> , and <i>Dynamic Input</i>	63	INTRODUCTION TO LAYOUTS AND PRINTING	105
CHAPTER 4 SELECTION SETS	69	<i>Model</i> Tab and <i>Layout</i> Tabs	105
MODIFY COMMAND CONCEPTS.....	70	Why Set Up Layouts Before Drawing?	108
SELECTION SETS	70	Printing and Plotting.....	108
Selection Set Options	71	Setting Layout Options and Plot Options.....	109
Selection Cycling.....	76	CHAPTER 7 OBJECT SNAP AND	
Select.....	76	OBJECT SNAP TRACKING	113
NOUN/VERB SYNTAX.....	77	CAD ACCURACY	114
SELECTION SETS PRACTICE	77	OBJECT SNAP	114
Using <i>Erase</i>	78	OBJECT SNAP MODES.....	115
<i>Erase</i>	78	Acquisition Object Snap Modes	118
Using <i>Move</i>	79	Object Snap Modifiers	120
<i>Move</i>	79	OBJECT SNAP SINGLE POINT SELECTION.....	121
Using <i>Copy</i>	80	Object Snaps (Single Point)	121
<i>Copy</i>	80	OBJECT SNAP RUNNING MODE	123
Noun/Verb Command Syntax Practice	82	Running Object Snap Modes.....	123
CHAPTER 5 HELPFUL COMMANDS	85	<i>Osnap</i>	123
CONCEPTS.....	86	Running Object Snap Toggle	124
<i>Help</i>	86	Running Object Snap Override	124
<i>Oops</i>	88	Object Snap Options	124
<i>U</i>	88	OBJECT SNAP TRACKING	127
<i>Undo</i>	88	To Use Object Snap Tracking:	128
<i>Redo</i>	90	Object Snap Tracking with Polar Tracking	128
<i>Mredo</i>	90	Object Snap Tracking Settings.....	130
<i>Regen</i>	91	CHAPTER 8 DRAW COMMANDS I	137
CHAPTER 6 BASIC DRAWING SETUP	93	CONCEPTS.....	138
STEPS FOR BASIC DRAWING SETUP.....	94	Draw Commands—Simple and Complex.....	138
STARTUP OPTIONS	94	Draw Command Access	138
DRAWING TEMPLATES	95	COMMANDS	139
Table of Basic Settings for the ACAD (Inch) Templates	96	<i>Line</i>	139
Table of Basic Settings for the ACADISO (Metric) Templates	96	<i>Circle</i>	140
SETUP COMMANDS.....	97	<i>Arc</i>	142
<i>Units</i>	97	Use Arcs or Circles?	146
Keyboard Input of <i>Units</i> Values.....	98	<i>Point</i>	147
		<i>Ptype</i>	147
		<i>Pline</i>	148
		<i>Pline</i> Arc Segments	150

CHAPTER 9 MODIFY COMMANDS I	155	CHAPTER 11 LAYERS AND	
CONCEPTS	156	OBJECT PROPERTIES	219
COMMANDS	157	CONCEPTS	220
<i>Erase</i>	157	Assigning Colors, Linetypes, Lineweights, and	
<i>Move</i>	158	Transparency	220
<i>Rotate</i>	159	Object Properties	221
<i>Scale</i>	161	Plot Styles	221
<i>Stretch</i>	162	LAYERS AND LAYER PROPERTIES CONTROLS	222
<i>Lengthen</i>	163	Layer Drop-Down List.....	222
<i>Trim</i>	165	<i>Layer</i>	222
<i>Extend</i>	168	<i>Layer Properties Manager</i> Layer List	223
<i>Trim</i> and <i>Extend</i> Shift-Select Option	169	<i>Color</i>, <i>Linetype</i>, <i>Lineweight</i>,	
<i>Break</i>	169	and Other Properties	225
<i>Join</i>	171	Layer Filters	227
<i>Copy</i>	172	Displaying an Object's Properties	
<i>Mirror</i>	173	and Visibility Settings	229
<i>Offset</i>	174	<i>Laymcur</i>	230
<i>Array</i>	176	<i>Layerp</i>	230
<i>Arrayrect</i>	177	<i>Layerstate</i>	230
Creating and Editing Arrays Using Grips	178	OBJECT-SPECIFIC PROPERTIES CONTROLS	233
<i>Arraypolar</i>	178	<i>Linetype</i>	233
<i>Arraypath</i>	181	Linetype Drop-Down List.....	235
<i>Fillet</i>	183	<i>Lweight</i>	235
<i>Chamfer</i>	185	Lineweight Drop-Down List	236
		<i>Color</i>	237
CHAPTER 10 VIEWING COMMANDS	199	Color Drop-Down List	238
CONCEPTS	200	<i>True Color</i> and <i>Color Books</i>	238
ZOOM AND PAN WITH THE MOUSE WHEEL	201	<i>Setbylayer</i>	239
<i>Zoom</i> and <i>Pan</i>	201	CONTROLLING LINETYPE SCALE	240
<i>Zoom</i> with the Mouse Wheel	201	<i>LTSCALE</i>	240
<i>Pan</i> with the Mouse Wheel	202	<i>CELTSCALE</i>	241
<i>Zoom</i>	203	CHANGING OBJECT PROPERTIES	242
<i>Pan</i>	207	<i>Properties</i> Panel	242
<i>Zoom</i> and <i>Pan</i> with <i>Undo</i> and <i>Redo</i>	208	<i>Properties</i>	243
<i>Viewback</i>	208	<i>Matchprop</i>	243
<i>Viewforward</i>	208	<i>Laymch</i>	244
<i>View</i>	208	<i>Laycur</i>	245
<i>Viewres</i>	210	<i>Layiso</i>	245
<i>Ucsicon</i>	211	<i>Layuniso</i>	247
<i>Viewgo</i>	212	<i>Copytolayer</i>	247
<i>Qvdrawing</i>	212	<i>Laywalk</i>	248
<i>Vports</i>	213	<i>Layfrz</i>	251
		<i>Laythw</i>	252

<i>Layoff</i>	252	CHAPTER 14 PRINTING AND PLOTTING	309
<i>Layon</i>	252	CONCEPTS	310
<i>Laylck</i>	253	TYPICAL STEPS TO PLOTTING	310
<i>Layulk</i>	253	PRINTING, PLOTTING, AND SAVING PAGE SETUPS ..	311
<i>Layvpi</i>	253	<i>Plot</i>	311
<i>Laymrg</i>	254	<i>-Plot</i>	316
<i>Laydel</i>	255	<i>Viewplotdetails</i>	316
CHAPTER 12 ADVANCED DRAWING SETUP	261	<i>Pagesetup</i>	317
CONCEPTS	262	Should You Use the <i>Plot</i> Dialog Box	
STEPS FOR DRAWING SETUP	262	or the <i>Page Setup Manager</i> ?	319
USING AND CREATING TEMPLATE DRAWINGS	266	PLOTTING TO SCALE	320
Using Template Drawings	266	<i>Preview</i>	320
Table of Standard AutoCAD Templates	267	Standard Paper Sizes	321
Creating Template Drawings	268	Calculating the Drawing Scale Factor	321
Additional Advanced Drawing Setup Concepts ..	269	Guidelines for Plotting Model Space to Scale ...	322
Steps for Drawing Setup		Guidelines for Plotting Layouts to Scale	322
Using Annotative Objects	269	TABLES OF LIMITS SETTINGS	323
CHAPTER 13 LAYOUTS AND VIEWPORTS	273	Examples for Plotting to Scale	329
CONCEPTS	274	CONFIGURING PLOTTERS AND PRINTERS	330
Paper Space and Model Space	274	Plotting Components	330
Layouts	274	<i>Plottermanager</i>	330
Viewports	275	Add-A-Plotter Wizard	331
Layouts and Viewports Example	277	Plotter Configuration Editor	332
Guidelines for Using Layouts and Viewports ...	280	CHAPTER 15 DRAW COMMANDS II	337
<i>Layoutwizard</i>	281	CONCEPTS	338
<i>Layout</i>	283	COMMANDS	338
Inserting Layouts with AutoCAD DesignCenter ..	285	<i>Xline</i>	338
Setting Up the Layout	285	<i>Ray</i>	340
Options	286	<i>Polygon</i>	341
<i>Pagesetup</i>	287	<i>Rectang</i>	342
<i>Psetupin</i>	288	<i>Donut</i>	343
USING VIEWPORTS IN PAPER SPACE	289	<i>Spline</i>	344
<i>Vports</i>	289	<i>Ellipse</i>	346
<i>Qvlayout</i>	292	<i>Divide</i>	348
Scaling the Display of Viewport Geometry	293	<i>Measure</i>	349
Locking Viewport Geometry	295	<i>Mline</i>	350
Linetype Scale in Viewports— <i>PSLTSCALE</i>	295	<i>Multiline Style</i> Dialog Box	352
<i>Vpmax</i>	296	<i>Mlstyle</i>	352
<i>Vpmin</i>	297	<i>Multiline Style</i> Dialog Box	353
<i>Scalelistedit</i>	297	<i>Multiline Styles</i> Example	354
<i>Chspace</i>	298	Editing Multilines	355
Advanced Applications of Paper Space Viewports ...	299	<i>Sketch</i>	355

<i>Solid</i>	357	<i>Id</i>	413
<i>Boundary</i>	357	<i>Time</i>	413
<i>Region</i>	358	<i>Setvar</i>	414
<i>Wipeout</i>	360	<i>Sysvarmonitor</i>	415
<i>Revcloud</i>	360	<i>Massprop</i>	416
CHAPTER 16 MODIFY COMMANDS II	367	CHAPTER 18 TEXT AND TABLES	419
CONCEPTS	368	CONCEPTS	420
COMMANDS	368	TEXT CREATION COMMANDS	422
Considerations for Changing Basic		<i>Text</i>	422
Properties of Objects	369	<i>Mtext</i>	425
<i>Properties</i>	370	Bullets and Lists	432
<i>Dblclledit</i>	373	Creating Stacked Text	432
<i>Matchprop</i>	374	Creating Columns	433
Object Properties Drop-Down Lists	375	Calculating Text Height for Scaled Drawings	434
Quick Properties	376	<i>Spacetrans</i>	435
<i>Chprop</i>	376	<i>Txt2mtxt</i>	436
<i>Change</i>	376	<i>Style</i>	437
<i>Explode</i>	377	Annotative Text	440
<i>Align</i>	378	Importing External Text into AutoCAD	443
<i>Pedit</i>	379	Using an External Text Editor for <i>Multiline Text</i>	443
Vertex Editing	382	Format Codes for Creating <i>Multiline Text</i> in	
Editing <i>Plines</i> with Grips	384	External Text Editors	444
Editing <i>Spline Fit Data Points</i>	385	<i>Textedit</i>	446
<i>Splinedit</i>	385	<i>Mtextedit</i>	446
Editing <i>Spline Control Vertices</i>	387	<i>Properties</i>	446
Editing <i>Splines</i> with Grips	388	<i>Spell</i>	447
<i>Reverse</i>	389	<i>Find</i>	448
<i>Blend</i>	389	<i>Find/Replace</i> in the <i>Text Editor</i> Tab	450
<i>Arrayedit</i>	390	<i>Scaletext</i>	450
<i>Mledit</i>	392	<i>Justifytext</i>	452
<i>Overkill</i>	396	<i>Qtext</i>	453
Boolean Commands	397	<i>TEXTFILL</i>	454
<i>Union</i>	398	Substituting Fonts	454
<i>Subtract</i>	398	TEXT FIELDS AND TABLES	455
<i>Intersect</i>	399	Text Fields	455
Modifying <i>Revclouds</i>	400	<i>Field</i>	456
CHAPTER 17 INQUIRY COMMANDS	407	Creating and Editing Tables	457
CONCEPTS	408	<i>Updatefield</i>	457
COMMANDS	408	<i>Table</i>	458
<i>Status</i>	408	<i>Tablestyle</i>	459
<i>List</i>	409	The <i>Table Cell</i> Editor	461
<i>Measuregeom</i>	410	<i>Tabledit</i>	461
		Editing Tables with Grips	463

Editing Tables with the <i>Properties</i> Palette	463		
Importing and Exporting Tables	464		
Table Breaks	465		
Text Fields and Calculations in Tables.....	465		
Text Attributes.....	468		
CHAPTER 19 GRIP EDITING	475		
CONCEPTS.....	476		
GRIPS FEATURES	476		
Activating Grips on Objects	477		
Cold and Hot Grips	477		
GRIPS System Variable Settings.....	478		
Grips Menus	478		
Grip Editing Options.....	479		
Shift to Turn on <i>Ortho</i>	481		
Auxiliary Grid	481		
Editing Dimensions	481		
Multifunctional Grips	482		
GUIDELINES FOR USING GRIPS	482		
GRIPS SETTINGS.....	483		
Point Specification Precedence	484		
More Grips.....	485		
CHAPTER 20 ADVANCED SELECTION SETS	489		
CONCEPTS.....	490		
SELECTION SET VARIABLES	490		
Changing the Settings	490		
Options.....	491		
OBJECT SELECTION TOOLS AND FILTERS	493		
Selall	493		
Selectsimilar.....	493		
Hideobjects.....	494		
Unisolateobjects.....	495		
Isolateobjects	495		
Qselect	495		
Filter	498		
OBJECT GROUPS	501		
Group	502		
Groupedit.....	503		
Ungroup.....	503		
Group Examples	504		
Classicgroup.....	505		
Changing Properties of a Group.....	507		
CHAPTER 21 BLOCKS, DESIGNCENTER, AND TOOL PALETTES	513		
CONCEPTS.....	514		
COMMANDS	516		
Block	516		
Block Color, Linetype, and Lineweight Settings ...	517		
Insert.....	518		
–Insert.....	520		
Mininsert	520		
Explode	521		
–Insert with *	522		
Xplode.....	522		
Wblock	524		
Redefining Blocks and the Block Editor	526		
Base	526		
Bedit.....	527		
Blocks Search Path	529		
Purge.....	529		
Rename.....	531		
Setbylayer.....	532		
Adcenter.....	533		
DesignCenter Options	534		
To Open a Drawing from DesignCenter	538		
To Insert a Block Using DesignCenter.....	539		
BLOCK DETECTION AND CONVERSION	541		
Convert to a Block.....	541		
TOOL PALETTES.....	542		
Toolpalettes.....	542		
Creating and Managing Tool Palettes.....	544		
COUNTING BLOCKS	546		
Count.....	546		
CHAPTER 22 BLOCK ATTRIBUTES AND DATA LINKS	555		
CONCEPTS.....	556		
CREATING ATTRIBUTES.....	556		
Steps for Creating and Inserting Block Attributes... ..	556		
Attdef.....	557		
Saving the Attributed Block.....	561		
Inserting Attributed Blocks	561		
The ATTDIA Variable	562		
The ATTREQ Variable	562		
DISPLAYING AND EDITING ATTRIBUTES.....	562		

<i>Attdisp</i>	562	Creating .DWF and .PDF Files with Publish	608
<i>Attedit</i>	563	<i>Publish</i>	608
Multiple Attedit	564	IMPORTING .PDF FILES	611
<i>Eattedit</i>	564	<i>Import</i>	611
<i>Properties</i>	565	<i>Pdfimport</i>	614
<i>Find</i>	566	Importing SHX Fonts from .PDF Files	615
<i>-Attedit</i>	567	<i>PDFSHXTEXT</i>	615
Global and Individual Editing Example	569	Suggested Steps for Scaling and Importing .PDF Files	616
<i>Battman</i>	573	Considerations for Importing and Exporting .PDF Files	617
<i>Attredf</i>	575	VIEWING .DWF AND .PDF FILES	618
Refedit, Properties, and Refclose	576	Autodesk Design Review	618
The Block Editor	577	DWF Underlay and PDF Underlay in AutoCAD	620
Grip Editing Attribute Location	578	<i>Attach</i>	620
<i>Attsync</i>	578	<i>Dwfclip</i>	622
EXTRACTING ATTRIBUTES	579	To Detach a DWF or PDF Underlay	623
<i>Eattext</i>	579	Viewing URLs (Hyperlinks) in a DWF Image	623
Updating Attribute Data	583	<i>Dwflayers</i>	623
<i>Datalink</i>	584	COLLABORATING AND MARKUP TOOLS	624
Data Link Examples	586	The Markup Tools	624
<i>Datalinkupdate</i>	587	The Markup Process	624
CHAPTER 23 INTERNET TOOLS AND COLLABORATION	593	Shared Views	625
CONCEPTS	594	<i>Shareview</i>	625
<i>Browser</i>	595	Marking Up a Shared View	628
Autodesk App Store (formerly Autodesk Exchange)	596	Making Markup in Autodesk Design Review ...	630
<i>Inetlocation</i>	596	Markups from Autodesk Design Review	631
USING HYPERLINKS	598	<i>Opendwfmarkup</i>	631
<i>Open from/Save to Web & Mobile</i>	598	<i>Markup</i>	631
<i>Hyperlink</i>	598	<i>Share</i>	632
HYPERLINKBASE	600	DRAWING COMPARE	633
<i>Selecturl</i>	600	<i>Trace</i>	633
Transmitting Drawings	601	<i>Compare</i>	633
<i>Etransmit</i>	601	ACTIVITY INSIGHTS	634
Transmittal Setups	602	<i>ACTIVITYINSIGHTSOPEN</i>	634
Modify Transmittal Setup Dialog Box.....	602	CHAPTER 24 MULTIVIEW DRAWING	639
CREATING .DWF AND .PDF FILES	604	CONCEPTS	640
Raster Files and Vector Files	605	PROJECTION AND ALIGNMENT OF VIEWS	640
Creating .DWF and .PDF Files with ePlot and Export	605	Using Ortho and Object Snap to Draw Projection Lines	640
<i>Exportpdf</i>	606	Using Polar Tracking to Draw Projection Lines ...	641
<i>Exportdwf</i>	607	Using Object Snap Tracking to Draw Projection Lines Aligned with Object Snap Points	642
ePlot Options	608		

Using <i>Xline</i> and <i>Ray</i> for Construction Lines....	644	<i>Properties</i> Panel.....	686
Using <i>Offset</i> for Construction of Views.....	644	<i>Boundaries</i> Panel (Selecting the Hatch Area) .	687
Realignment of Views Using <i>Polar Snap</i> and <i>Polar Tracking</i>	645	<i>Origin</i> Panel	689
USING CONSTRUCTION LAYERS	645	<i>Options</i> Panel.....	690
USING LINETYPES.....	646	<i>Hatch and Gradient</i> Dialog Box.....	692
Drawing With Hidden and Center Linetypes...	647	<i>Gradient</i> Hatches	692
Managing Linetypes, Lineweights, and Colors...	648	<i>-Hatch</i> Command Line Options.....	694
ASSOCIATIVE CENTERLINES AND CENTERMARKS ...	650	<i>Toolpalettes</i>	696
Drawing Associative Centerlines and Centermarks	650	Creating Tool Palettes	697
<i>Centerline</i>	650	EDITING HATCH PATTERNS AND BOUNDARIES	698
<i>Centermark</i>	651	<i>Hatchedit</i>	698
Modifying <i>Centerlines</i> and <i>Centermarks</i>	652	Using Grips with Hatch Patterns	699
Grips	652	Using <i>Trim</i> with Hatch Patterns	700
<i>Properties</i>	653	Solid <i>Hatch</i> Fills	700
<i>Centerdisassociate</i>	654	<i>Draworder</i>	701
<i>Centerreassociate</i>	654	<i>Texttofront</i>	702
<i>Centermark</i> and <i>Centerline</i> System Variables...	655	CHAPTER 27 AUXILIARY VIEWS	709
<i>Centerreset</i>	655	CONCEPTS.....	710
CREATING FILLETS, ROUNDS, AND RUNOUTS.....	657	CONSTRUCTING AN AUXILIARY VIEW	710
GUIDELINES FOR CREATING A TYPICAL THREE-VIEW DRAWING	659	Setting Up the Principal Views.....	710
CHAPTER 25 PICTORIAL DRAWINGS	667	Using <i>Snap Rotate</i> and <i>Ortho</i>	711
CONCEPTS.....	668	Rotating <i>Snap</i> Back to the Original Position ..	712
Types of Pictorial Drawings	668	Using <i>Polar Tracking</i>	714
Pictorial Drawings Are 2D Drawings.....	669	Using the <i>Offset</i> Command.....	715
ISOMETRIC DRAWING IN AUTOCAD	670	<i>Offset</i>	716
<i>Snap</i>	670	Using the <i>Xline</i> and <i>Ray</i> Commands	717
Isometric Ellipses	672	<i>Xline</i>	717
<i>Ellipse</i>	672	<i>Ray</i>	717
Creating an Isometric Drawing	674	Constructing Full Auxiliary Views	718
Dimensioning Isometric Drawings in AutoCAD..	676	Reorienting the User Coordinate System	719
OBLIQUE DRAWING IN AUTOCAD.....	676	CHAPTER 28 DIMENSIONING	723
Isometric Drawing.....	678	CONCEPTS.....	724
Oblique Drawing	680	Dimension Components	724
CHAPTER 26 SECTION VIEWS	681	Dimension Placement	724
CONCEPTS.....	682	Associativity.....	725
DEFINING HATCH PATTERNS & HATCH BOUNDARIES ..	682	Accessing Dimension Commands	725
Steps for Creating a Section View Using the <i>Hatch</i> Command	683	DIMENSION DRAWING COMMANDS	726
<i>Hatch</i>	684	<i>Dim</i>	726
<i>Pattern</i> Panel	685	<i>Dimlinear</i>	726
		<i>Dimaligned</i>	729
		<i>Dimbaseline</i>	730
		<i>Dimcontinue</i>	731

<i>Dimspace</i>	732	CHAPTER 29 DIMENSION STYLES	
<i>Dimangular</i>	733	AND VARIABLES	785
<i>Dimdiameter</i>	734	CONCEPTS	786
<i>Dimradius</i>	735	Dimension Variables	786
<i>Dim</i>	737	Dimension Styles	787
<i>Dimjogline</i>	741	Dimension Style Families	787
<i>Dimjogged</i>	742	Dimension Style Overrides	788
<i>Dimarc</i>	742	DIMENSION STYLES	789
<i>Dimcenter</i>	743	<i>Dimstyle</i> or <i>Ddim</i>	789
<i>Dimbreak</i>	744	<i>-Dimstyle</i>	793
<i>Leader</i>	745	DIMENSION VARIABLES	794
<i>Qleader</i>	746	Changing Dimension Variables Using	
<i>Mleader</i>	749	the Dialog Box Method	795
<i>Mleaderstyle</i>	750	Lines Tab	795
<i>Mleaderedit</i>	753	Dimension Lines Section (Lines Tab)	795
<i>Mleaderalign</i>	754	Extension Line Section (Lines Tab)	797
<i>Mleadercollect</i>	755	Symbols and Arrows Tab	798
<i>Dimordinate</i>	756	Arrowheads Section	
<i>Qdim</i>	758	(Symbols and Arrows Tab)	798
<i>Tolerance</i>	761	Other Sections (Symbols and Arrows Tab)	799
Editing Feature Control Frames	763	Text Tab	800
Basic Dimensions	763	Text Appearance Section (Text Tab)	801
GDT-Related Dimension Variables	764	Text Placement Section (Text Tab)	802
Geometric Dimensioning and Tolerancing		Text Alignment Section (Text Tab)	803
Example	764	Fit Tab	803
<i>Diminspect</i>	768	Scale for Dimension Features Section (Fit Tab) ..	804
EDITING DIMENSIONS	769	Fit Options Section (Fit Tab)	804
Grip Editing Dimensions	769	Text Placement Section (Fit Tab)	806
Multifunctional Grips	771	Fine Tuning Section (Fit Tab)	806
Exploding Associative Dimensions	772	Primary Units Tab	807
Dimension Editing Commands	772	Linear Dimensions Section (Primary Units Tab) ..	808
<i>Dimtedit</i>	772	Measurement Scale Section (Primary Units Tab) ..	809
<i>Dimedit</i>	773	Zero Suppression Section (Primary Units Tab) ..	810
<i>Properties</i>	774	Angular Dimensions Section (Primary Units Tab) ..	810
Customizing Dimensioning Text	775	Alternate Units Tab	810
Associative Dimensions	776	Alternate Unit Section (Alternate Units Tab) ..	811
<i>Dimreassociate</i>	778	Zero Suppression Section (Alternate Units Tab) ..	812
<i>Dimdisassociate</i>	779	Placement Section (Alternate Units Tab)	812
DIMENSIONING VARIABLES INTRODUCTION	780	Tolerances Tab	812
<i>Dimregen</i>	780	Tolerance Format Section (Tolerances Tab) ...	812
		Alternate Unit Tolerance Section	
		(Tolerances Tab)	814
		DIMCONTINUEMODE	814

Changing Dimension Variables Using the Command Line Format.....	814	<i>XREFOVERRIDE</i>	863
<i>Dim...</i> (variable name).....	814	EDITING FOR XREFS AND BLOCKS	864
DIMASSOC (Associative Dimensions)	815	<i>Xopen</i>	864
MODIFYING EXISTING DIMENSIONS	816	In-Place Xref and Block Editing	865
Modifying a Dimension Style	816	<i>Refedit</i>	866
Creating Dimension Style Overrides and Using -Dimstyle, Apply (Update)	817	Using -Refedit at the Command Line	868
<i>Properties</i>	817	<i>Refset</i>	868
-Dimstyle	817	<i>Refclose</i>	869
<i>Apply</i>	817	<i>XEDIT</i>	869
<i>Dimoverride</i>	818	<i>XFADECTL</i>	870
<i>Matchprop</i>	819	<i>XREFNOTIFY</i>	870
Dimension Right-Click Menu	820	<i>PROJECTNAME</i>	871
GUIDELINES FOR NON-ANNOTATIVE DIMENSIONING IN AUTOCAD	821	<i>Project Aware Connected Support Files</i>	873
Strategy 1. Dimensioning a Single Drawing... ..	821	Reference Manager	873
Strategy 2. Creating Dimension Styles as Part of Template Drawings	823	<i>XREFCTL</i>	873
Optional Method for Fixed Dimension Text Height in Template Drawings	823	CHAPTER 31 OBJECT LINKING AND EMBEDDING (OLE)	881
DIMENSIONING IN PAPER SPACE LAYOUTS	824	CONCEPTS	882
When to Dimension in Paper Space.....	825	Cut and Paste Between AutoCAD Drawings....	882
Procedure for Dimensioning in Paper Space ..	825	Cut and Paste Between AutoCAD and Other Windows Applications (OLE)	883
DIMENSIONING ISOMETRIC DRAWINGS	829	The Windows Clipboard	885
CHAPTER 30 XREFERENCES	837	OLE RELATED COMMANDS	886
CONCEPTS	838	<i>Copyclip</i>	887
An <i>Xref</i> Example	842	<i>Copybase</i>	888
CREATING AND USING XREFS	844	<i>Copylink</i>	888
<i>Xref</i> or External-references.....	845	<i>Cutclip</i>	889
Dependent Objects and Names	850	<i>Cutbase</i>	889
Evaluating New Layers	852	<i>Pasteclip</i>	889
<i>VISRETAIN/VISRETAINMODE/XREFOVERRIDE</i>	854	<i>Pasteorig</i>	891
Evaluating and Reconciling Layers	855	<i>Pasteblock</i>	891
<i>Xattach</i>	855	<i>Pastespec</i>	892
<i>Xbind</i>	855	<i>Insertobj</i>	894
<i>Adcenter</i>	856	<i>Pasteashyperlink</i>	895
<i>Xclip</i>	858	MANAGING OLE OBJECTS	896
<i>XCLIPFRAME</i>	859	<i>Olelinks</i>	896
Demand Loading	860	OLE Right-Click Shortcut Menu	897
<i>INDEXCTL</i>	861	<i>Olescale</i>	897
<i>XLOADCTL</i>	862	<i>Oleopen</i>	897
<i>XLOADPATH</i>	862	Other AutoCAD Commands with OLE Objects ...	898
		OLE-RELATED SYSTEM VARIABLES	899
		<i>MSOLESCALE</i>	899

<i>OLEHIDE</i>	899
<i>OLEQUALITY</i>	899
<i>OLESTARTUP</i>	899
 CHAPTER 32 ADVANCED LAYOUTS, ANNOTATIVE OBJECTS, AND PLOTTING 903	
CONCEPTS.....	904
ADVANCED LAYOUTS.....	904
Layer Visibility for Viewports.....	905
<i>Layer</i>	906
<i>Vplayer</i>	908
Layer Property Overrides.....	911
Linetype Scale in Viewports.....	914
<i>Psltscale</i>	914
Dimensioning in Paper Space.....	916
The “Reverse Method” for Calculating Drawing Scale Factor.....	918
Steps for Calculating the Drawing Scale Factor by the “Reverse Method”.....	919
ANNOTATIVE OBJECTS.....	920
Setting Annotation Scale and Viewport Scale....	920
Creating and Displaying Annotative Objects in Multiple Viewports.....	922
<i>SELECTIONANNODISPLAY</i>	924
Adding and Deleting Scale Representations for Annotative Objects.....	924
<i>Objectscale</i>	924
Adjusting Positions for Individual Annotative Object Scale Representations.....	926
<i>ANNOALLVISIBLE</i>	928
<i>Annoreset</i>	928
<i>Annouupdate</i>	929
<i>SAVEFIDELITY</i>	930
Linetype Scales for Annotative Drawings.....	930
<i>MSLTSCALE</i>	931
Applications for Multiple Viewports.....	932
Using Two Layouts to Plot the Same Geometry at Different Scales.....	932
Using Two Viewports to Display the Same Geometry at Different Scales.....	934
Using One Layout to Plot <i>Xref</i> Drawings in Multiple Viewports at Different Scales.....	936
PLOT STYLE TABLES AND PLOT STYLES.....	937
What is the Difference between a Plot Style and a Plot Style Table?.....	938
Color-Dependent and Named Plot Style Tables..	940
Attaching a Plot Style Table to a Layout.....	941
Creating a Plot Style Table.....	942
<i>Stylesmanager</i>	942
Editing Plot Styles.....	943
Assigning Named Plot Styles to Objects.....	945
<i>Plotstyle</i>	947
Named Plot Style Table Example.....	948
<i>Convertpstyles</i>	950
PLOT STAMPING.....	951
<i>Convertctb</i>	951
<i>Plotstamp</i>	951
 CHAPTER 33 3D BASICS, NAVIGATION, AND VISUAL STYLES 963	
SETTING UP AUTOCAD TO DRAW IN 3D.....	964
Setting Up a Workspace.....	964
Activating the ACAD3D or ACADISO3D Drawing Template.....	965
TYPES OF 3D MODELS.....	966
Wireframe Models.....	966
Surface Models.....	967
Solid Models.....	968
3D COORDINATE ENTRY.....	969
3D Coordinate Entry Formats.....	970
COORDINATE SYSTEMS.....	975
The World Coordinate System (WCS) and WCS Icon.....	976
User Coordinate Systems (UCS) and Icons.....	976
The Right-Hand Rule.....	978
<i>Ucsicon</i>	978
3D NAVIGATION AND VIEW COMMANDS.....	980
<i>Pan</i>	981
<i>Zoom</i>	982
<i>Navvcube</i>	982
3D Orbit Commands.....	986
<i>3Dorbit</i>	987
<i>3Dforbit</i>	988
<i>3Dcorbit</i>	990
<i>PERSPECTIVE</i>	990
<i>3Ddistance</i>	991
View Presets.....	992

<i>View</i>	994	<i>UCSSELECTMODE</i>	1053
Adjusting the Amount of Perspective	996	<i>Ucsaxisang</i>	1053
<i>3Dclip</i>	997	USER COORDINATE SYSTEMS AND 3D MODELING ...	1054
<i>Camera</i>	998	Dynamic User Coordinate Systems	1054
Editing Camera Settings	1000	 CHAPTER 35 SOLID MODELING	
<i>3Dswivel</i>	1001	CONSTRUCTION	1057
<i>Navswheel</i>	1001	CONCEPTS	1058
SteeringWheel Shortcut Menu	1002	Solid Model Construction Process	1058
SteeringWheel Navigation Tools	1003	Solid Primitives Commands	1058
SteeringWheel Settings	1005	Dynamic User Coordinate Systems	1059
<i>-Vpoint</i>	1006	Commands to Move, Rotate, Mirror,	
<i>Vpoint</i>	1007	and Scale Solids	1059
<i>Plan</i>	1008	Boolean Operations	1059
<i>Grid</i>	1008	SOLID PRIMITIVES COMMANDS	1061
<i>Vports</i>	1009	<i>Box</i>	1062
VISUAL STYLES	1011	<i>Cone</i>	1063
Default Visual Styles	1012	<i>Cylinder</i>	1065
<i>Vscurrent</i>	1012	<i>Wedge</i>	1066
Face Settings	1016	<i>Sphere</i>	1067
Shadow Settings	1018	<i>Torus</i>	1068
Edge Effects	1019	<i>Pyramid</i>	1069
<i>Visualstyles</i>	1020	<i>Polysolid</i>	1070
Named Views and Viewports	1025	<i>Extrude</i>	1072
Graphics Performance Tuning	1027	<i>Revolve</i>	1074
Shade, SHADEDIF, SHADEDGE	1029	<i>Sweep</i>	1075
<i>Render</i>	1029	<i>Loft</i>	1077
Printing 3D Models	1029	DYNAMIC USER COORDINATE SYSTEMS	1080
 CHAPTER 34 USER COORDINATE SYSTEMS	1039	COMMANDS TO MOVE, ROTATE, MIRROR,	
CONCEPTS	1040	AND SCALE SOLIDS	1081
CREATING AND MANAGING USER		<i>Move</i>	1082
COORDINATE SYSTEMS	1040	<i>3Dalign</i>	1083
<i>Ucs</i>	1041	<i>3Dmove</i>	1084
<i>Dducsp</i>	1047	<i>3Dscale</i>	1086
<i>Ucsman</i>	1048	<i>3Drotate</i>	1086
ViewCube UCS Drop-Down List	1049	<i>Mirror3D</i>	1088
UCS SYSTEM VARIABLES	1050	<i>3Darray</i>	1090
<i>Ucsbase</i>	1050	BOOLEAN OPERATION COMMANDS	1093
<i>Ucsview</i>	1050	<i>Union</i>	1093
<i>UcsOrtho</i>	1050	<i>Subtract</i>	1094
<i>Ucsfollow</i>	1052	<i>Intersect</i>	1095
<i>Ucsvp</i>	1052	<i>Chamfer</i>	1096
<i>UCS3DPERPDISPLAYSETTING</i>	1053	<i>Fillet</i>	1098
<i>UCS3DPARADISPLAYSETTING</i>	1053	DESIGN EFFICIENCY	1099

CHAPTER 36 SOLID MODEL EDITING	1111
CONCEPTS.....	1112
EDITING PRIMITIVES USING THE <i>PROPERTIES</i>	
PALETTE	1112
Editing <i>Properties</i> of Individual Primitives	1112
Composite Solid Subobject Selection	1114
Editing <i>Properties</i> of Composite Solids	1115
EDITING SOLIDS USING GRIPS AND GIZMOS.....	1115
Move, Rotate, and Scale Gizmos	1121
Grip Editing Composite Solids	1123
Subobjects and Selection	1124
Grip Editing Faces, Edges, and Vertices.....	1125
Selecting Overlapping Subobjects.....	1129
History Settings	1129
SOLIDS EDITING COMMANDS	1131
<i>Solidedit</i>	1132
<i>Face</i> Options	1133
<i>Edge</i> Options.....	1140
<i>Body</i> Options	1141
<i>Slice</i>	1144
<i>Presspull</i>	1145
<i>Sectionplane</i>	1147
<i>Sectionplane</i> Contextual Tab.....	1151
<i>Section Settings</i> Dialog Box.....	1153
<i>Interfere</i>	1153
<i>Imprint</i>	1155
<i>Massprop</i>	1156
USING SOLIDS DATA.....	1156
<i>Stlout</i>	1157
<i>3Dprint</i>	1158
<i>Acisin</i>	1158
<i>Acisout</i>	1158
 CHAPTER 37 2D DRAWINGS FROM 3D MODELS	1165
CONCEPTS.....	1166
COMMANDS	1167
<i>Viewbase</i>	1167
<i>Viewbase</i> Options.....	1171
<i>Viewedit</i>	1173
Drawing View Editing	1174
<i>Viewproj</i>	1175
<i>Viewstd</i>	1176
<i>Viewsection</i>	1177
Section View Examples.....	1179
<i>Viewsectionstyle</i>	1183
<i>Modify Section View Style</i> and <i>New Section View Style</i> Dialog Boxes.....	1184
Section View Style and Detail View Style Issues.....	1187
<i>Viewcomponent</i>	1188
<i>Viewdetail</i>	1189
<i>Viewdetailstyle</i>	1191
<i>Modify Detail View Style</i> and <i>New Detail View Style</i> Dialog Boxes.....	1192
<i>Viewupdate</i>	1194
<i>Viewupdateauto</i>	1196
<i>Viewsymbolsketch</i>	1196
Creating Auxiliary Views Using <i>Viewsection</i>	1197
Dimensioning a Documentation Drawing	1199
 CHAPTER 38 PARAMETRICS	1207
PARAMETRIC CONSTRAINT AND DIMENSION CONCEPTS.....	1208
GEOMETRIC CONSTRAINTS	1208
GEOMCONSTRAINT	1209
GCCOINCIDENT	1210
GCPERPENDICULAR.....	1211
GCPARALLEL.....	1211
GCTANGENT	1212
GCHORIZONTAL	1212
GCVERTICAL	1213
GCCOLLINEAR	1213
GCCONCENTRIC	1214
GCSMOOTH	1214
GCSYMMETRIC	1215
GCEQUAL.....	1215
VIEWING CONSTRAINTS	1216
GCFIX.....	1216
DELETING CONSTRAINTS	1218
DELCONSTRAINT	1218
CONSTRAINT SETTINGS.....	1219
CONSTRAINTSETTINGS.....	1219
AutoConstrain.....	1223
INFERRED GEOMETRIC CONSTRAINTS.....	1224
DIMENSIONAL CONSTRAINTS.....	1225
OVERCONSTRAINED VS UNDERCONSTRAINED....	1227
CONSTRAINTS EXAMPLE	1228
PARAMETERS.....	1230

APPENDIX A 1235
APPENDIX A..... 1236
 AutoCAD Command Alias List Sorted by Com-
 mand, See AutoCAD Help 1236

APPENDIX B 1241
APPENDIX B 1242
BUTTONS AND SPECIAL KEYS 1242
 Mouse and Digitizing Puck Buttons 1242
 Function (F) Keys 1242
 Control Key Sequences (Accelerator Keys) ... 1243
 Special Key Functions 1244
 List of Drawing Exercise File Names 1262