

Kelly L. Murdock

Autodesk® Maya® 2024

BASICS GUIDE



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)

Contents

Contents	i
CHAPTER 1	1
Learning the Maya Interface	1
Lesson 1.1: Work with Menus	2
Changing Menu Sets	2
Viewing Keyboard Hotkeys	2
Accessing Option Dialog Boxes	3
Using Tear-Off Menus	4
Understanding Tools versus Actions	4
Lesson 1.1-Tutorial 1: Use a Menu Command to Create a Polygon Sphere	5
Lesson 1.2: Use the Status Line Buttons	6
Using Pop-up Help	7
Watching for Cursor Clues	8
Expanding and Collapsing Icon Button Groups	8
Opening and Saving a Scene	8
Using the Home Screen	9
Opening Editors	10
Showing and Hiding Interface Elements	11
Lesson 1.2-Tutorial 1: Open a File	11
Lesson 1.2-Tutorial 2: Save a File	12
Lesson 1.2-Tutorial 3: Maximize the Workspace Interface	12
Lesson 1.3: Access the Shelf	13
Using the Shelf Menu	14
Creating and Deleting Shelves	14
Adding Icons and Menu Commands to a Shelf	14
Adding Layouts and Scripts to a Shelf	15
Using the Shelf Editor	15
Lesson 1.3-Tutorial 1: Create a New Shelf	16
Lesson 1.3-Tutorial 2: Populate a New Shelf	16
Lesson 1.4: Explore the Channel Box and Layer Editor	17
Selecting Attributes	18
Changing Attributes with the Mouse	18
Locking Attributes	19
Adding and Deleting Layers	19
Adding Objects to a Layer	20
Hiding All Layer Objects	20
Freezing All Layer Objects	20
Lesson 1.4-Tutorial 1: Change Channel Box Attributes	21
Lesson 1.4-Tutorial 2: Create and Rename a New Layer	22
Lesson 1.4-Tutorial 3: Add Objects to a New Layer	22
Lesson 1.5: Identify the Animation Controls, the Command Line, and the Help Line	22
Selecting an Animation Frame	23
Setting an Animation Range	23

Playing an Animation.....	23
Accessing the Animation Preferences	24
Using the Command Line.....	25
Viewing the Help Line.....	26
Lesson 1.5-Tutorial 1: Play an Animation.....	26
Lesson 1.5-Tutorial 2: Enter a Command	27
Lesson 1.6: Use the Toolbox	27
Selecting Objects	27
Using the Transform Tools	28
Understanding Manipulators	28
Lesson 1.6-Tutorial 1: Select Objects	29
Lesson 1.6-Tutorial 2: Transform an Object	30
Lesson 1.7: Discover the Marking Menus.....	31
Accessing the Marking Menus.....	31
Customizing Marking Menus.....	32
Using the Hotbox.....	33
Customizing the Hotbox	34
Lesson 1.7-Tutorial 1: Access a Marking Menu	34
Lesson 1.7-Tutorial 2: Use the Hotbox	34
Chapter Summary.....	35
What You Have Learned.....	35
Key Terms From This Chapter.....	36

CHAPTER 2 37

Controlling the View Panel 37

Lesson 2.1: Change the View	37
Using the Tumble, Track, Dolly, and Camera Tools	37
Framing an Object	39
Moving Through Views.....	39
Tearing Off Panels	40
Using Heads-Up Displays	40
Accessing Grids.....	41
Opening Other Interfaces Within a Panel.....	41
Annotating with the Blue Pencil tools	42
Lesson 2.1-Tutorial 1: Change the Object’s View.....	44
Lesson 2.1-Tutorial 2: Mark Up the Scene	46
Lesson 2.2: Change Display Options	47
Changing Resolution.....	47
Changing Shading	48
Displaying Textures	49
Enabling Backface Culling and Improving Wireframes	49
Isolating Objects	50
Hiding and Showing Objects.....	50
Changing Object Name and Color	50
Lesson 2.2-Tutorial 1: Change the Object’s Resolution.....	51
Lesson 2.2-Tutorial 2: Change the Object’s Name and Color.....	53
Lesson 2.3: Change the Layout	53
Switching Layouts	53

Customizing Layouts.....	54
Resizing and Editing View Panels.....	54
Using the Outliner	55
Searching Commands, Tools and Scene Objects	56
Accessing Help	57
Lesson 2.3-Tutorial 1: Change the Interface Layout.....	57
Lesson 2.3-Tutorial 2: Search for a Command	58
Chapter Summary.....	59
What You Have Learned	60
Key Terms From This Chapter.....	60
CHAPTER 3	61
Starting with Primitive Objects	61
Lesson 3.1: Use Polygon Primitives	61
Creating Polygon Primitives.....	62
Creating Gears	63
Creating Abstract Objects.....	64
Lesson 3.1-Tutorial 1: Create Polygon Primitives.....	65
Lesson 3.2: Learn the NURBS Primitives.....	66
Creating Spheres and Cubes.....	67
Creating Cylinders and Cones.....	68
Creating a Plane and a Torus.....	68
Inserting Isoparms	68
Lesson 3.2-Tutorial 1: Create a Candle from Primitives	69
Lesson 3.2-Tutorial 2: Add Isoparms.....	70
Lesson 3.3: Draw 2D Primitives	71
Creating Circles and Squares	71
Creating Arcs	72
Lesson 3.3-Tutorial 1: Create an Eye Using Arcs and Primitive Shapes.....	73
Lesson 3.4: Create 3D Type	74
Generating Text Curves	74
Changing Extrusion Depth.....	74
Creating Beveled Type.....	75
Lesson 3.4-Tutorial 1: Create and Bevel Text.....	76
Lesson 3.4-Tutorial 2: Create a Sign.....	76
Lesson 3.5: Use Construction Aid Objects	78
Placing Construction Planes.....	78
Placing Free Image Planes	78
Marking position with Locators.....	79
Annotating objects	79
Using the Measure Tools.....	79
Lesson 3.5-Tutorial 1: Test Pythagoras	79
Lesson 3.6: Access the Content Browser	80
Browsing the mesh categories	80
Loading meshes from the Content Browser.....	81
Lesson 3.6-Tutorial 1: Load a mesh from the Content Browser.....	81
Lesson 3.7: Import Objects	82
Importing 3D meshes	82

Importing 2D.....	82
Creating 3D meshes from 2D outlines.....	83
Lesson 3.7-Tutorial 1: Import a 3D mesh	83
Lesson 3.7-Tutorial 2: Import Adobe Illustrator content	84
Lesson 3.7-Tutorial 3: Import SVG content	85
Chapter Summary.....	86
What You Have Learned	86
Key Terms From This Chapter.....	87
CHAPTER 4	89
Working with Objects	89
Lesson 4.1: Select Objects	89
Selecting Multiple Objects.....	90
Understanding the Key Object	90
Using Selection Masks	91
Selecting by Menu	92
Saving a Selection Set	92
Lesson 4.1-Tutorial 1: Select Multiple Objects.....	92
Lesson 4.2: Select Components	93
Switching to Component Mode.....	94
Selecting Components.....	95
Growing and Shrinking Selections	95
Selecting Edges	95
Lesson 4.2-Tutorial 1: Select Components.....	96
Lesson 4.3: Transform, Group, and Parent Objects.....	97
Understanding Pivot Points.....	97
Transforming Objects Along an Axis.....	98
Transforming Objects Within a Plane.....	98
Constrained Rotations.....	99
Uniform and Non-Uniform Scaling	100
Grouping Objects Together	101
Parenting Objects	102
Viewing Hierarchy in the Outliner	102
Using Undo, Redo, and Repeat.....	103
Lesson 4.3-Tutorial 1: Move Pivot Point	104
Lesson 4.3-Tutorial 2: Transform Car Wheels	105
Lesson 4.3-Tutorial 3: Parent an Object	106
Lesson 4.4: Snap and Align Objects	107
Using Grids.....	107
Duplicating with Transform	108
Replacing Objects	108
Snapping Objects.....	108
Snapping to a Live Object	109
Aligning Objects.....	109
Aligning Points.....	110
Snapping Surfaces Together	110
Lesson 4.4-Tutorial 1: Snap Objects to Grid Points	111
Lesson 4.4-Tutorial 2: Snap to a Curve.....	112

Lesson 4.4-Tutorial 3: Snap to a Live Object	113
Lesson 4.4-Tutorial 4: Align Letters	114
Lesson 4.5: Understand Nodes and Attributes	115
Understanding the Various Node Types	116
Viewing Nodes in the Attribute Editor	117
Viewing construction history	119
Deleting construction history	120
Editing Attributes	120
Working with Nodes	121
Viewing Dependency with Node Editor	121
Adding Nodes	122
Connecting Nodes	123
Lesson 4.5-Tutorial 1: Explore Dependent Nodes	123
Lesson 4.5-Tutorial 2: Delete Construction History	125
Lesson 4.5-Tutorial 3: Building Node Dependency	125
Chapter Summary	127
What You Have Learned	127
Key Terms From This Chapter	127

CHAPTER 5 129

Creating and Editing Polygon Objects..... 129

Lesson 5.1: Learn Normals and Manually Create Polygons	130
Understanding Normals	130
Determining Normal Direction	130
Showing Normals	130
Reversing and Controlling Normals	131
Softening and Hardening Edges	131
Using the Vertex Normal Edit Tool	131
Creating Polygon Objects by Hand	132
Appending to a Polygon	132
Combining Polygons	133
Mirroring Polygon Objects	133
Cleaning Up and Reducing Polygons	134
Lesson 5.1-Tutorial 1: Conform Normals	135
Lesson 5.1-Tutorial 2: Create a Polygon	135
Lesson 5.1-Tutorial 3: Append to a Polygon	136
Lesson 5.1-Tutorial 4: Mirror an Object	137
Lesson 5.2: Edit Polygons	138
Selecting Polygon Components	138
Subdividing and Splitting Polygon Faces	140
Cutting Faces	141
Merging Vertices	142
Merging and Collapsing Edges	143
Bridging Edges	144
Deleting Components	145
Lesson 5.2-Tutorial 1: Create a Mushroom	145
Lesson 5.2-Tutorial 2: Bridge Edges	146
Lesson 5.2-Tutorial 3: Merge Vertices and Edges	147

Lesson 5.3: Use Polygon Operations	148
Duplicating Faces.....	148
Extruding Components.....	149
Chamfer a Vertex.....	151
Beveling an Edge	152
Poking a Face	153
Creating a Wedge	154
Using Symmetry.....	155
Lesson 5.3-Tutorial 1: Offset Faces	155
Lesson 5.3-Tutorial 2: Extrude Cube Vertices	156
Lesson 5.3-Tutorial 3: Extrude Cube Edges and Faces	157
Lesson 5.3-Tutorial 4: Chamfer Vertices	158
Lesson 5.3-Tutorial 5: Bevel Edges.....	159
Lesson 5.3-Tutorial 6: Poke Faces	160
Lesson 5.3-Tutorial 7: Wedge Faces.....	161
Lesson 5.3-Tutorial 8: Symmetrical Editing.....	162
Lesson 5.4: Retopology and Smooth Polygon Edges	163
Retopologizing a Mesh	163
Smoothing Polygons with Subdivisions	164
Creating a Smooth Proxy	165
Adding a Crease to a Smoothed Polygon	165
Smoothing Polygons with Vertex Averaging	166
Lesson 5.4-Tutorial 1: Retopologize Mesh	166
Lesson 5.4-Tutorial 2: Smooth Faces.....	167
Lesson 5.4-Tutorial 3: Smooth Proxy Turtle	168
Lesson 5.4-Tutorial 4: Smooth Faces with Vertex Averaging	169
Lesson 5.5: Use Polygon Booleans and Triangulate Polygons	170
Combining Polygon Objects.....	172
Finding the Difference Between Objects.....	173
Creating an Intersection Object.....	173
Slicing and Punching Holes	173
Using Cut Out and Split Edges	173
Triangulating Polygon Faces	174
Switching Polygon Faces to Rectangles	174
Flipping Triangle Edges	174
Lesson 5.5-Tutorial 1: Create a Button from Booleans	174
Lesson 5.5-Tutorial 2: Change Boolean.....	175
Lesson 5.5-Tutorial 3: Triangulate Non-Planar Polygons	176
Lesson 5.6: Create Holes in Polygons	177
Detaching a Vertex	177
Detaching Faces.....	178
Using the Make Hole Tool	179
Filling Holes	180
Lesson 5.6-Tutorial 1: Add Holes to a Cube	180
Lesson 5.7: Work with Edge Loops, Rings, and Borders	181
Selecting Edge Loops, Rings, and Borders	182
Converting Selections	182
Using the Insert Loop Tool.....	182
Creating Custom Edge Loops.....	183

Lesson 5.7-Tutorial 1: Add Edge Loops to a Face	184
Lesson 5.8: Learn the Modeling Toolkit.....	185
Selecting Components.....	186
Setting Constraints	187
Using Soft Selection.....	187
Using Polygon Tools.....	187
Using the Target Weld Tool.....	188
Making Shapes with the Connect Tool.....	188
Lesson 5.8-Tutorial 1: Modeling with Constraints and Soft Select.....	189
Lesson 5.8-Tutorial 2: Adding Arms to a Torso	190
Lesson 5.9: Model with the Quad Draw Tool	191
Creating Polygons with the Quad Draw Tool.....	192
Moving Components with the Quad Draw Tool.....	193
Relaxing Components with the Quad Draw Tool	193
Adding Edge Loops with the Quad Draw Tool.....	193
Extending Edges with the Quad Draw Tool	194
Deleting Components with the Quad Draw Tool	195
Accessing the Quad Draw Tool Options	195
Lesson 5.9-Tutorial 1: Adding Arms to a Torso	196
Chapter Summary.....	197
What You Have Learned.....	198
Key Terms From This Chapter.....	198
CHAPTER 6	201
Working with NURBS Surfaces	201
Lesson 6.1: Edit NURBS Surfaces	202
Selecting Components.....	202
Using the Surface Editing Tool.....	203
Using the Sculpt Geometry Tool.....	203
Simplifying Surfaces.....	204
Breaking and Smoothing Tangents.....	204
Lesson 6.1-Tutorial 1: Edit NURBS Components	204
Lesson 6.1-Tutorial 2: Use the Surface Editing Tool.....	205
Lesson 6.1-Tutorial 3: Use the Sculpt Geometry Tool.....	206
Lesson 6.1-Tutorial 4: Create a Hard Edge	207
Lesson 6.2: Apply Surface Operators.....	208
Attaching and Detaching Surfaces.....	208
Aligning Surfaces	209
Closing and Opening NURBS Surfaces	210
Extending Surfaces	211
Offsetting a Surface	211
Filletting Surfaces.....	211
Blending Surfaces	212
Lesson 6.2-Tutorial 1: Attach Surfaces	213
Lesson 6.2-Tutorial 2: Detach Surfaces	214
Lesson 6.2-Tutorial 3: Open and Close a Surface	215
Lesson 6.2-Tutorial 4: Offset Surface	216
Lesson 6.2-Tutorial 5: Add a Circular Fillet.....	217

Lesson 6.2-Tutorial 6: Blend Two Surfaces.....	218
Lesson 6.3: Trim NURBS Surfaces	219
Drawing Curves on a NURBS Surface.....	219
Projecting Curves onto a NURBS Surface	220
Marking Intersecting Surfaces.....	220
Trimming a Surface.....	221
Lesson 6.3-Tutorial 1: Draw and Trim a Surface	222
Lesson 6.3-Tutorial 2: Project and Trim a Curve	223
Lesson 6.4: Use Boolean Tools	224
Combining Surfaces with the Union Tool	225
Removing Surface Parts with the Difference Tool.....	225
Creating a Surface Intersection with the Intersect Tool.....	225
Lesson 6.4-Tutorial 1: Create Boolean Union Surfaces	225
Lesson 6.4-Tutorial 2: Create Boolean Difference Surfaces	226
Lesson 6.4-Tutorial 3: Create Boolean Intersect Surfaces.....	227
Lesson 6.5: Stitch Surfaces Together	228
Applying Global Stitch	229
Stitching Surface Points Together	229
Stitching Surface Edges Together	229
Lesson 6.5-Tutorial 1: Apply Global Stitch.....	229
Lesson 6.6: Convert Objects	230
Converting NURBS to Polygons	231
Converting to Subdivision Surfaces	231
Converting Subdivision Surfaces to NURBS and Polygons.....	231
Lesson 6.6-Tutorial 1: Convert NURBS to Polygons	232
Lesson 6.6-Tutorial 2: Convert NURBS to Polygons and Back.....	233
Chapter Summary.....	234
What You Have Learned	234
Key Terms From This Chapter.....	235
CHAPTER 7	237
Drawing and Editing Curves	237
Lesson 7.1: Create Curves.....	238
Creating Smooth Curves.....	238
Creating Straight Line Curves	238
Drawing Freehand Curves	239
Simplifying and Smoothing Curves	239
Lesson 7.1-Tutorial 1: Draw and Compare CV, EP, and Freehand Curves.....	240
Lesson 7.1-Tutorial 2: Simplify Freehand Curves	241
Lesson 7.2: Edit Curve Details.....	243
Using the Edit Curve Tool	243
Altering Tangents	244
Adding Sharp Points to a Curve	244
Adding Points to the End of a Curve.....	245
Closing and Opening Curves.....	245
Lesson 7.2-Tutorial 1: Create and Edit a Star Shape	246
Lesson 7.2-Tutorial 2: Use the Edit Curve Tool	247
Lesson 7.2-Tutorial 3: Create Sharp Points	248

Lesson 7.2-Tutorial 4: Close a Curve	249
Lesson 7.3: Modify Curves	250
Locking Length	250
Straightening Curves	250
Smoothing Curves.....	250
Curling and Bending Curves.....	251
Scaling Curvature.....	252
Lesson 7.3-Tutorial 1: Curl a Curve.....	252
Lesson 7.4: Apply Curve Operators.....	254
Attaching Curves.....	255
Aligning Curves	256
Detaching and Cutting Curves	256
Finding Curve Intersections	257
Offsetting Curves	257
Filleting Curves	257
Lesson 7.4-Tutorial 1: Connect Cursive Letters	258
Lesson 7.4-Tutorial 2: Align Flower Petals	259
Lesson 7.4-Tutorial 3: Offset Curves	260
Lesson 7.4-Tutorial 4: Fillet Curves	261
Lesson 7.5: Create Sweep Mesh Objects.....	262
Changing the cross-section.....	263
Creating a group of sweeps.....	263
Adding twist and taper	264
Optimizing a sweep mesh.....	264
Applying to multiple curves.....	264
Lesson 7.5-Tutorial 1: Sweep a bugle.....	264
Lesson 7.6: Create Simple Surfaces from Curves.....	265
Revolving a Curve	266
Lofting a Set of Curves	266
Creating Planar Curves	267
Creating a Surface from Boundary Curves	267
Extruding Curves.....	267
Using the Birail Tools	268
Lesson 7.6-Tutorial 1: Revolve a Baseball Bat.....	268
Lesson 7.6-Tutorial 2: Loft a Banana	269
Lesson 7.6-Tutorial 3: Create a Planar Surface	270
Lesson 7.6-Tutorial 4: Extrude a Circle	271
Lesson 7.6-Tutorial 5: Create a Birail Surface.....	272
Chapter Summary.....	273
What You Have Learned	273
Key Terms From This Chapter.....	274
CHAPTER 8	275
Using Deformers.....	275
Lesson 8.1: Use nonlinear deformers	275
Bending objects	275
Flaring objects	276
Squashing objects.....	277

Twisting objects.....	278
Adding waves.....	279
Lesson 8.1-Tutorial 1: Bending a hammer	280
Lesson 8.1-Tutorial 2: Adding a wave to a table	281
Lesson 8.2: Working with Deformers	282
Adding object density.....	282
Using manipulator handles.....	283
Removing the deformer	284
Making the changes permanent.....	284
Transforming the manipulator	284
Painting Deformer Weights	284
Lesson 8.2-Tutorial 1: Painting Deformer Weights	285
Lesson 8.3: Modifying with the Lattice and Wire Deformers	285
Using the Lattice deformer.....	285
Using the Wire deformer.....	286
Lesson 8.3-Tutorial 1: Using a Lattice deformer	287
Lesson 8.3-Tutorial 2: Using a Wire deformer	288
Lesson 8.4: Conforming with the Shrinkwrap Deformer	289
Lesson 8.4-Tutorial 1: Wrapping a road to a terrain	291
Lesson 8.5: Deforming Components.....	292
Using Component Tags.....	292
Moving component groups with the Cluster deformer	293
Preventing movement with the Solidify deformer.....	294
Smoothing with the Delta Mush deformer	295
Lesson 8.5-Tutorial 1: Carving a river through a terrain.	296
Lesson 8.6: Creating Softbody Objects	297
Lesson 8.6-Tutorial 1: Creating a softbody.....	298
Lesson 8.7: Use the Texture deformer	299
Lesson 8.7-Tutorial 1: Deforming with a texture.	300
Chapter Summary.....	301
What You Have Learned	302
Key Terms From This Chapter.....	302

CHAPTER 9 305

Assigning Materials and Textures 305

Lesson 9.1: Apply Materials.....	306
Applying New Materials	306
Applying Standard Surface Presets.....	307
Renaming Materials.....	308
Applying Existing Materials	308
Applying Materials to Selected Faces.....	308
Changing Material Attributes	308
Moving Between Nodes	310
Rendering Materials	310
Lesson 9.1-Tutorial 1: Apply a Material	311
Lesson 9.1-Tutorial 2: Apply a Material to Face Selection	312
Lesson 9.1-Tutorial 3: Apply and Render a Texture	313
Lesson 9.2: Use the Hypershade.....	314

Using the Create Bar.....	315
Using the tabbed panes.....	316
Using the Work Area	317
Working with Nodes.....	318
Connecting Nodes	318
Using the Material Viewer.....	319
Dragging Materials to Objects.....	320
Lesson 9.2-Tutorial 1: Create a Custom Material.....	320
Lesson 9.2-Tutorial 2: Create a Custom Cloth Material	321
Lesson 9.3: Work with Materials	322
Learning the Surface Materials.....	322
Changing Material Color.....	323
Changing Material Transparency.....	324
Using Other Material Attributes.....	324
Layering Materials	324
Using the Ramp Shader	326
Using the Shading Map.....	326
Lesson 9.3-Tutorial 1: Change Color and Transparency	327
Lesson 9.3-Tutorial 2: Layer Materials	328
Lesson 9.3-Tutorial 3: Use a Shading Map	329
Lesson 9.4: Work with Textures	330
Connecting Texture Nodes	331
Applying Textures as Color	331
Mapping Textures to Attributes	332
Using Bump Maps.....	332
Loading File Textures.....	333
Layering Textures	334
Lesson 9.4-Tutorial 1: Apply Textures	334
Lesson 9.4-Tutorial 2: Load an Image Texture	335
Lesson 9.5: Position Textures	336
Using Default Mapping.....	336
Using Projection Mapping	337
Placing 2D Textures	338
Placing 3D Textures	338
Lesson 9.5-Tutorial 1: Position 2D Textures.....	339
Lesson 9.5-Tutorial 2: Position 3D Textures.....	340
Lesson 9.6: Use Displacement Maps	341
Bump Maps vs. Displacement Maps	341
Adding Relief with Displacement Maps.....	342
Converting Displacement Maps to Geometry.....	344
Lesson 9.6-Tutorial 1: Use a Displacement map	344
Lesson 9.6-Tutorial 2: Convert a Displacement map.....	345
Lesson 9.7: Use Utilities Nodes.....	346
Using the General Utilities.....	346
Using the Color Utilities.....	347
Using the Switch Utilities.....	347
Lesson 9.7-Tutorial 1: Blend Colors.....	347
Lesson 9.8: Paint in 3D.....	348
Assigning a Paint Texture	348

Selecting a Brush	349
Applying Color	350
Using Different Paint Operations	350
Painting Other Attributes	351
Lesson 9.8-Tutorial 1: Use the 3D Paint Tool	352
Lesson 9.9: Edit UVs.....	353
Understanding UVs.....	353
Accessing the UV Editor.....	353
Selecting and Editing UV Components	354
Working with UVs and Shells.....	355
Using Different Mappings.....	356
Unfolding UV Shells	357
Cutting and Sewing UVs	358
Arranging UV Shells	359
Generating a UV Snapshot	360
Lesson 9.9-Tutorial 1: Edit UVs.....	360
Lesson 9.9-Tutorial 2: Work with UV Shells	362
Chapter Summary.....	364
What You Have Learned.....	364
Key terms From This Chapter	365

CHAPTER 10 **367**

Adding Paint Effects **367**

Lesson 10.1: Use the Preset Brushes.....	367
Accessing the Paint Effects Panel	368
Using the Paint Effects Tool.....	368
Using Preset Brushes.....	368
Introducing the Content Browser.....	369
Blending Presets	370
Redrawing the View	371
Clearing the View.....	371
Lesson 10.1-Tutorial 1: Use a Paint Effects Brush	371
Lesson 10.1-Tutorial 2: Use a Content Browser Brush.....	372
Lesson 10.1-Tutorial 3: Blend Brushes	373
Lesson 10.2: Create Custom Brushes.....	374
Changing Template Brush Settings.....	374
Using the Various Brush Types	375
Changing Brush Size.....	377
Changing Brush Color	378
Enabling Illumination and Shadows	379
Enabling Glows	380
Creating and Saving Custom Brushes	381
Lesson 10.2-Tutorial 1: Change Brush Size.....	382
Lesson 10.2-Tutorial 2: Change Brush Color	383
Lesson 10.2-Tutorial 3: Add Shadows	384
Lesson 10.2-Tutorial 4: Add a Glow.....	385
Lesson 10.3: Paint in 2D.....	386
Introducing the Paint Effects Canvas.....	386

Changing the Canvas Size	387
Creating Seamless Textures.....	387
Saving Textures.....	388
Undoing the Last Stroke	388
Saving the Alpha Channel.....	388
Lesson 10.3-Tutorial 1: Create a Seamless Texture	389
Lesson 10.3-Tutorial 2: Save an Image and Alpha Channel.....	390
Lesson 10.4: Paint on 3D Objects	392
Painting in a View Panel	392
Painting on Objects.....	393
Auto-Painting an Object	394
Saving Depth as a Grayscale Map.....	395
Lesson 10.4-Tutorial 1: Paint on Objects.....	395
Lesson 10.4-Tutorial 2: Auto-Paint on Objects.....	396
Lesson 10.5: Edit Paint Effects	397
Selecting Strokes	397
Editing Strokes.....	398
Converting Strokes to Polygons.....	398
Changing the Default Light	399
Lesson 10.5-Tutorial 1: Select and Edit Strokes	399
Lesson 10.5-Tutorial 2: Convert Paint Effects to Polygons.....	400
Chapter Summary.....	401
What You Have Learned	401
Key Terms From This Chapter.....	402
CHAPTER 11	403
Using Cameras and Lights	403
Lesson 11.1: Work with Cameras	404
Creating Cameras	404
Changing Camera Settings.....	404
Selecting a Camera	405
Positioning Cameras	405
Looking Through a New Camera	405
Setting View Guidelines.....	406
Changing the Depth of Field	407
Lesson 11.1-Tutorial 1: Create a Camera	408
Lesson 11.1-Tutorial 2: Aim a Camera.....	408
Lesson 11.1-Tutorial 3: Create a Depth-of-Field Effect	409
Lesson 11.2: Create a Background.....	410
Setting the Background Color.....	410
Adding an Image Plane	411
Creating a Textured Background	411
Loading a Background Image.....	412
Positioning the Background.....	413
Lesson 11.2-Tutorial 1: Change Background Color	413
Lesson 11.2-Tutorial 2: Change Background Texture.....	414
Lesson 11.2-Tutorial 3: Add and Position a Background Image	415
Lesson 11.3: Create and Position Lights	416

Using Default Lights.....	416
Understanding the Light Types.....	416
Creating Lights.....	417
Manipulating Lights.....	417
Manipulating Spot Lights.....	418
Lesson 11.3-Tutorial 1: Create and Manipulate a Light.....	419
Lesson 11.4: Change Light Settings.....	421
Changing Light Color.....	421
Changing Light Intensity and Decay.....	421
Enabling Shadows.....	422
Lesson 11.4-Tutorial 1: Change Light Color and Intensity.....	424
Lesson 11.4-Tutorial 2: Enable Shadows.....	424
Lesson 11.5: Create Light Effects.....	425
Creating Light Fog.....	425
Creating Glows and Halos.....	426
Creating Lens Flares.....	427
Lesson 11.5-Tutorial 1: Enable Light Fog.....	428
Lesson 11.5-Tutorial 2: Enable a Halo Light Effect.....	430
Chapter Summary.....	431
What You Have Learned.....	431
Key Terms From This Chapter.....	432

CHAPTER 12 433

Animating with Keyframes 433

Lesson 12.1: Set Keyframes.....	433
Setting Keys.....	434
Using Auto Key.....	434
Selecting Keys.....	435
Copying Keys.....	436
Deleting Keys.....	437
Snapping Keys.....	437
Lesson 12.1-Tutorial 1: Set Keys.....	437
Lesson 12.1-Tutorial 2: Use Auto Key.....	438
Lesson 12.1-Tutorial 3: Move Keys.....	439
Lesson 12.2: View an Animation.....	440
Previewing Animation.....	440
Setting Frame Rate.....	441
Looping an Animation.....	441
Accessing Animation Preferences.....	441
Enabling Ghosting.....	442
Creating Motion Trails.....	444
Enabling Cached Playback.....	445
Using Playblast.....	445
Lesson 12.2-Tutorial 1: Preview an Animation.....	446
Lesson 12.2-Tutorial 2: Use Playblast.....	447
Lesson 12.3: Animate Using Motion Paths.....	448
Creating Motion Path Keys.....	448
Drawing a Motion Path.....	449

Attaching an Object to a Motion Path.....	449
Adjusting an Attached Motion Path	450
Deforming an Object as it Follows a Motion Path	451
Lesson 12.3-Tutorial 1: Create a Motion Path	452
Lesson 12.3-Tutorial 2: Draw a Motion Path and Attach an Object.....	453
Lesson 12.4: Edit Animation Curves	454
Using the Graph Editor	454
Framing Curves.....	455
Editing Keys	455
Editing Curves.....	456
Setting Infinity Conditions	457
Working with Tangents	458
Adding Keys	458
Lesson 12.4-Tutorial 1: Edit Animation Curves	459
Lesson 12.4-Tutorial 2: Repeat Motion.....	459
Lesson 12.5: Control Animation Timing and Adding Sound	460
Using the Dope Sheet	460
Using the Dope Sheet Manipulator	461
Adding Sound	462
Lesson 12.5-Tutorial 1: Use the Dope Sheet	462
Lesson 12.5-Tutorial 2: Add Sound.....	464
Chapter Summary.....	465
What You Have Learned	465
Key Terms From This Chapter.....	466
CHAPTER 13	467
Working with Characters	467
Lesson 13.1: Build a Skeleton	467
Creating Joints	468
Inserting a Joint	468
Connecting a Joint Chain	469
Removing and Disconnecting Joints	470
Mirroring Joints	470
Resetting the Root Joint	471
Naming Joints	471
Lesson 13.1-Tutorial 1: Create a Skeleton.....	471
Lesson 13.1-Tutorial 2: Add a Tail to the Skeleton.....	472
Lesson 13.2: Edit Joint Attributes	473
Inheriting Transforms	473
Orienting Joints.....	473
Labeling Joints	474
Showing and Hiding Labels.....	474
Limiting Joints.....	474
Displaying Joints	475
Lesson 13.2-Tutorial 1: Label Joints	476
Lesson 13.2-Tutorial 2: Limit Joint Motion.....	477
Lesson 13.3: Add Inverse Kinematics.....	478
Using the Create IK Handle Command	478

Using the Create IK Spline Handle Command	479
Posing the IK Handles	480
Switching Between FK and IK	481
Lesson 13.3-Tutorial 1: Add IK to a Skeleton.....	481
Lesson 13.3-Tutorial 2: Add IK Spline to the Skeleton Tail.....	482
Lesson 13.4: Skin a Character	483
Creating Effective Skin.....	483
Positioning a Skeleton	484
Using X-Ray Mode	484
Binding Skin	484
Binding Interactive Skin	485
Returning to Default Pose	486
Unbinding Skin.....	486
Animating Joints	486
Lesson 13.4-Tutorial 1: Position a Skin.....	486
Lesson 13.4-Tutorial 2: Bind Skin	487
Lesson 13.4-Tutorial 3: Animate Joints	488
Lesson 13.5: Edit a Skin.....	489
Adding Influence Objects	489
Understanding Skin Weights	490
Using the Interactive Bind Skin Tool.....	491
Painting and Smoothing Skin Weights.....	492
Mirroring Skin Weights.....	493
Resetting Skin Weights	493
Lesson 13.5-Tutorial 1: Add Influence Object	493
Lesson 13.5-Tutorial 2: Paint Weights.....	494
Lesson 13.6: Automatic Rigging.....	495
Creating a Rig with One-Click	495
Creating a Step-by-Step Rig.....	496
Controlling the Human IK Rig	497
Animating with Motion Capture data.....	498
Lesson 13.6-Tutorial 1: Creating a Quick Rig.....	499
Lesson 13.6-Tutorial 1: Animate with Motion Capture.....	499
Lesson 13.7: Add Hair and Fur.....	500
Adding preset hair to an object	500
Creating hair	501
Style hair.....	502
Making hair dynamic	502
Creating and editing hair attributes	503
Rendering hair and fur.....	504
Creating Hair with XGen	505
Opening the XGen Editor.....	505
Sculpting Hair with Modifiers	506
Lesson 13.7-Tutorial 1: Add hair	507
Lesson 13.7-Tutorial 1: Add XGen grass.....	508
Chapter Summary.....	509
What You Have Learned.....	509
Key Terms From This Chapter.....	510

CHAPTER 14	513
Animating with Dynamics	513
Lesson 14.1: Use Particles	514
Viewing Particle Examples	514
Creating Particles.....	514
Creating Surface Particles.....	515
Viewing Particle Attributes and Count	516
Setting Particle Lifespan	517
Changing Particle Render Type.....	517
Using Instances.....	518
Cycling Instances	519
Lesson 14.1-Tutorial 1: Add Clouds to a Sphere.....	520
Lesson 14.1-Tutorial 2: Use an Instance.....	521
Lesson 14.1-Tutorial 3: Cycle Instances.....	522
Lesson 14.2: Create an Emitter.....	523
Using an Emitter	523
Using a Directional Emitter.....	524
Using a Volume Emitter.....	525
Using an Object as an Emitter	526
Changing Emitter Attributes.....	527
Lesson 14.2-Tutorial 1: Create an Omni Emitter.....	528
Lesson 14.2-Tutorial 2: Create a Directional Emitter	529
Lesson 14.2-Tutorial 3: Create an Object Emitter	530
Lesson 14.3: Create Fields and Goals	531
Understanding Fields.....	531
Connecting Objects to a Field.....	532
Changing Field Attributes	532
Regulating Field Forces.....	533
Establishing Goals.....	534
Lesson 14.3-Tutorial 1: Create a Vortex Field	535
Lesson 14.3-Tutorial 2: Create a Goal	536
Lesson 14.4: Animating Rigid Body Collisions.....	537
Adding rigid body objects.....	537
Adding Passive body objects	538
Adding a force	538
Seeing the collisions	538
Using MASH Dynamics.....	539
Creating a MASH Network.....	539
Opening the MASH Editor and enabling dynamics.....	539
Adding collision objects and fields	541
Lesson 14.4-Tutorial 1: Enable rigid body collisions.....	541
Lesson 14.4-Tutorial 1: Using MASH dynamics	542
Lesson 14.5: Manage Particle Collisions	543
Enabling Particle Collisions	543
Enabling Particle Collisions.....	544
Setting Particle Attributes	544
Defining New Events	545
Assigning a Solver	546

Creating Soft Body Objects.....	546
Lesson 14.5-Tutorial 1: Enable Particle Collisions	546
Lesson 14.5-Tutorial 2: Add a Collision Event	547
Lesson 14.5-Tutorial 3: Filling a Container with Particles	548
Lesson 14.5-Tutorial 4: Create Soft Body Objects.....	549
Lesson 14.6: Use Cloth.....	550
Viewing Cloth Examples	550
Creating Cloth.....	551
Creating a Cloth Collision Object	552
Setting Cloth Object Properties.....	553
Lesson 14.6-Tutorial 1: Drape a Tablecloth.....	554
Lesson 14.7: Constrain Motion.....	555
Adding Constraints	555
Creating Component Constraints	556
Locking Components in Space	557
Creating Springs.....	557
Lesson 14.7-Tutorial 1: Constrain a Flag to a Pole	557
Lesson 14.8: Use Fluids.....	558
Creating a Fluid Container	559
Creating a Fluid Emitter.....	559
Changing Fluid Properties.....	559
Creating Oceans and Ponds.....	560
Lesson 14.8-Tutorial 1: Fill a Container.....	560
Lesson 14.8-Tutorial 2: Create a Pond with Ripples.....	561
Lesson 14.9: Create Effects.....	562
Creating Fire and Smoke.....	562
Creating Fireworks.....	564
Creating Lightning.....	564
Shattering Objects	565
Flowing Along a Curve	566
Lesson 14.9-Tutorial 1: Create a Fire Effect	567
Lesson 14.9-Tutorial 2: Create Fireworks.....	568
Lesson 14.9-Tutorial 3: Create Lightning.....	569
Lesson 14.9-Tutorial 4: Create Curve Flow.....	570
Chapter Summary.....	571
What You Have Learned.....	571
Key Terms From This Chapter.....	572

CHAPTER 15 575

Rendering a Scene 575

Lesson 15.1: Configure the Render Process	576
Choosing a Renderer	577
Saving Render Presets	577
Changing a File Name	577
Changing File Format.....	577
Changing Camera View and Resolution.....	577
Using render layers.....	578
Lesson 15.1-Tutorial 1: Set Render Settings.....	578

Lesson 15.1-Tutorial 2: Change the Rendering Path	578
Lesson 15.2: Use Special Rendering Features.....	579
Adjusting Render Quality.....	579
Enabling Raytracing	581
Enabling Motion Blur.....	581
Lesson 15.2-Tutorial 1: Change the Render Quality.....	582
Lesson 15.2-Tutorial 2: Enable Raytracing	582
Lesson 15.2-Tutorial 3: Enable Motion Blur	583
Lesson 15.2-Tutorial 4: Add Environment Fog	584
Lesson 15.3: Use the Render View Window	585
Opening the Render View	585
Rendering a Region.....	586
Using Interactive Photorealistic Rendering (IPR).....	587
Saving Rendered Images	587
Lesson 15.3-Tutorial 1: Render a Region.....	587
Lesson 15.3-Tutorial 2: Use IPR Rendering	588
Lesson 15.4: Create a Final Render.....	589
Rendering a Single Frame	589
Rendering an Animation Sequence	589
Using Batch Rendering	590
Lesson 15.4-Tutorial 1: Render an Animation.....	590
Lesson 15.5: Render with Maya Vector	591
Using Maya Vector	591
Lesson 15.5-Tutorial 1: Render Using Vectors	593
Lesson 15.6: Render with Arnold.....	594
Using Arnold Materials.....	596
Using Arnold Lights.....	598
Adding Physical Sky	598
Lesson 15.6-Tutorial 1: Render with Arnold.....	600
Chapter Summary.....	601
What You Have Learned	601
Key Terms From This Chapter.....	602
CHAPTER 16	603
Using MEL Scripting	603
Lesson 16.1: Use the Command Line.....	603
Using MEL in the Command Line.....	603
Repeating Command Line Commands	604
Using the MEL Scripting Commands.....	604
Lesson 16.1-Tutorial 1: Enter MEL Commands in the Command Line	605
Lesson 16.2: Use the Script Editor	606
Executing Script Commands	607
Viewing Interface Commands	607
Reusing Interface Commands.....	607
Saving Scripts.....	608
Adding Scripts to the Shelf	608
Lesson 16.2-Tutorial 1: Use the Script Editor	609
Lesson 16.2-Tutorial 2: View Interface Commands and Save a Script	609

Lesson 16.2-Tutorial 3: Execute a Custom Script	610
Chapter Summary.....	611
What You Have Learned.....	611
Key Terms From This Chapter.....	612