Pre	eface	xv
1.	Introduction to HTML5 Canvas	1
	What Is HTML5?	2
	The Basic HTML5 Page	3
	html	3
	<html lang="en"></html>	4
	<meta charset="utf-8"/>	4
	<title></title>	4
	A Simple HTML5 Page	4
	Basic HTML We Will Use in This Book	5
	<div> Gradients and first.</div>	5
	<canvas> demand and a polymer Cloud beauty by a contract of the contract of th</canvas>	7
	The Document Object Model (DOM) and Canvas	7
	JavaScript and Canvas	7
	Where Does JavaScript Go and Why?	8
	HTML5 Canvas "Hello World!"	8
	Encapsulating Your JavaScript Code for Canvas	9
	Adding Canvas to the HTML Page	10
	Using the document Object to Reference the Canvas Element in JavaScript	11
	Testing to See Whether the Browser Supports Canvas	11
	Retrieving the 2D Context	12
	The drawScreen() Function	12
	Debugging with console.log	16
	The 2D Context and the Current State	17
	The HTML5 Canvas Object	18
	Another Example: Guess The Letter	19
	How the Game Works	20
	The "Guess The Letter" Game Variables	20

The initGame() Function	21
The eventKeyPressed() Function	21
The drawScreen() Function	23
Exporting Canvas to an Image	24
The Final Game Code	25
Hello World Animated Edition	25
Some Necessary Properties	26
Animation Loop	27
Alpha Transparency with the globalAl	pha Property 28
Clearing and Displaying the Backgrou	and 28
Updating the globalAlpha Property fo	r Text Display 29
Drawing the Text	29
HTML5 Canvas and Accessibility: Sub I	
Hit Testing Proposal	
What's Next?	33
	<ol> <li>Introduction to HTML5 Canvas</li> </ol>
2. Drawing on the Canvas	
The Basic File Setup for This Chapter	35 The Basic HTML5 Page
The Basic Rectangle Shape	36 cldoctype html>
The Canvas State	os spal lands 37
What's Not Part of the State?	38 <meta charset="utf-8"/>
How Do We Save and Restore the Car	
Using Paths to Create Lines	88 A Simple HTML5 Page
	800 Hard HIML We Will Use in This Book
The Actual Drawing	cyth> 39
Examples of More Advanced Line Dra	
	24 The Document Object Model (DOM) a
Arcs	42 JavaScript and Canvas
	44 Where Does JavaScript Go and Why?
The Canvas Clipping Region	45 HTML5 Canvas "Hello World!"
Compositing on the Canvas	
	Adding Canvas to the HTML Page
Rotation and Translation Transformat	
Scale Transformations	
Combining Scale and Rotation Transf	
Filling Objects with Colors and Gradien	
Setting Basic Fill Colors	Ob Debugging with console log
Filling Shapes with Gradients	16 The 2D Context and the Current State
Filling Shapes with Patterns	17 The HTML5 Canvas Object
Creating Shadows on Canvas Shapes	75 Another Example: Guess The Letter
Methods to Clear the Canvas	77 How the Came Works
Simple Fill	77 The "Guess The Letter" Game Variab

Resetting the Canvas Width and Height	77
Resetting the Canvas clearRect Function	77
Checking to See Whether a Point Is in the Current Path	79
Drawing a Focus Ring	80
What's Next?	
3. The HTML5 Canvas Text API	
Canvas Text and CSS	81
Displaying Basic Text	82
Basic Text Display	82
Handling Basic Text in Text Arranger	
Communicating Between HTML Forms and the Canvas	83
Using measureText	84
fillText and strokeText	85
Setting the Text Font	
Font Size, Face, Weight, and Style Basics	
Handling Font Size and Face in Text Arranger	
Font Color	
Font Baseline and Alignment	
Text Arranger Version 2.0	
Text and the Canvas Context	
Global Alpha and Text	
Global Shadows and Text	
Text with Gradients and Patterns	
Linear Gradients and Text	
Radial Gradients and Text	
Image Patterns and Text	
Handling Gradients and Patterns in Text Arranger	
Width, Height, Scale, and toDataURL() Revisited	
Dynamically Resizing the Canvas	
Dynamically Scaling the Canvas	
The toDataURL() Method of the Canvas Object	
Final Version of Text Arranger	
Animated Gradients	
The Future of Text on the Canvas	
CSS Text as lower and anotality of the control of t	
Making Text Accessible	
What's Next?	
4. Images on the Canvas	135
The Basic File Setup for This Chapter	
Image Basics	

	Preloading Images	137
	Displaying an Image on the Canvas with drawImage()	137
	Resizing an Image Painted to the Canvas	139
	Copying Part of an Image to the Canvas	140
	Simple Cell-Based Sprite Animation	142
	Creating an Animation Frame Counter	143
	Creating a Timer Loop	143
	Changing the Tile to Display	143
	Advanced Cell-Based Animation	145
	Examining the Tile Sheet	145
	Creating an Animation Array	145
	Choosing the Tile to Display	146
	Looping Through the Tiles	146
	Drawing the Tile	147
	Moving the Image Across the Canvas	148
	Applying Rotation Transformations to an Image	149
	Canvas Transformation Basics	150
	Animating a Transformed Image	153
	Creating a Grid of Tiles	155
	Defining a Tile Map	155
	Creating a Tile Map with Tiled	156
	Displaying the Map on the Canvas	158
	Diving into Drawing Properties with a Large Image	161
	Diving into Drawing Properties with a Large Image	162
	Creating a window for the image	162
	2	164
	Changing the view of troperty of the shall	166
	Change of the course of the course	167
	8	168
	The same of the sa	170
		170
		170
		179
		182
	Using Tixer Data to Detect Object Comstons	183
	The Comaing Objects	184
	Tiow we will rest comstons	184
	Checking for intersection between two copers	
	What's Next?	190
5.	Math, Physics, and Animation	191
	Moving in a Straight Line	191
	Moving Between Two Points: The Distance of a Line	194

Moving on a Vector	199
Bouncing Off Walls	204
Bouncing a Single Ball	205
Multiple Balls Bouncing Off Walls	208
Multiple Balls Bouncing with a Dynamically Resized Canvas	214
Multiple Balls Bouncing and Colliding	219
Multiple Balls Bouncing with Friction	233
Curve and Circular Movement	239
Uniform Circular Motion	239
Moving in a Simple Spiral	243
Cubic Bezier Curve Movement	245
Moving an Image	251
Creating a Cubic Bezier Curve Loop	255
Simple Gravity, Elasticity, and Friction	259
Simple Gravity	260
Simple Gravity with a Bounce	263
Gravity with Bounce and Applied Simple Elasticity	266
Simple Gravity, Simple Elasticity, and Simple Friction	270
Easing	273
Easing Out (Landing the Ship)	273
Easing In (Taking Off)	277
Box2D and the Canvas	281
Downloading Box2dWeb	281
How Does Box2dWeb Work?	281
Box2D Hello World	282
Including the Library	
Creating a Box2dWeb World	=0=
Units in Box2dWeb	283
Defining the Walls in Box2D	284
Creating Balls	285
Rendering b2debugDraw vs. Canvas Rendering	286
drawScreen()	287
Bouncing Balls Revisited	289
Translating to the Canvas	290
Interactivity with Box2D	293
Creating the Boxes	294
Rendering the Boxes	
Adding Interactivity	296
Growing Dones	296
Handling the Balls	271
Box2D Further Reading	303

	What's Next?	303
10	oncing Off Walls Character and Course	205
6.		
	HTML5 Video Support	
	Theora + Vorbis = .ogg	
	H.264 + \$\$\$ = .mp4	
	VP8 + Vorbis = .webm	
	Combining All Three	
	Converting Video Formats	
	Basic HTML5 Video Implementation	
	Plain-Vanilla Video Embed	
	Video with Controls, Loop, and Autoplay	
	Altering the Width and Height of the Video	312
	Preloading Video in JavaScript	317
	Video and the Canvas	321
	Displaying a Video on HTML5 Canvas	321
	HTML5 Video Properties	327
	Video on the Canvas Examples	331
	Using the currentTime Property to Create Video Events	331
	Canvas Video Transformations: Rotation	335
	Canvas Video Puzzle	341
	Creating Video Controls on the Canvas	
	Animation Revisited: Moving Videos	364
	Capturing Video with JavaScript	369
	Web RTC Media Capture and Streams API	370
	Example 1: Show Video	370
	Example 2: Put Video on the Canvas and Take a Screenshot	
	Example 3: Create a Video Puzzle out of User-Captured Video	376
	Video and Mobile	
	What's Next?	
7.	Working with Audio	
	The Basic <audio> Tag</audio>	381
	Audio Formats	
	Supported Formats Claude and with the same of the same	
	Audacity Paxol of and self-	
	Example: Using All Three Formats	
	Audio Tag Properties, Functions, and Events	
	Audio Functions	
	Important Audio Properties	
	Important Audio Events	
	Loading and Playing the Audio	387

Displaying Attributes on the Canvas	388
Playing a Sound with No Audio Tag	391
Dynamically Creating an Audio Element in JavaScript	392
Finding the Supported Audio Format	393
Playing the Sound	394
Look Ma, No Tag!	395
Creating a Canvas Audio Player	397
Creating Custom User Controls on the Canvas	398
Loading the Button Assets	399
Setting Up the Audio Player Values	400
Mouse Events	401
Sliding Play Indicator	402
Play/Pause Push Button: Hit Test Point Revisited	403
Loop/No Loop Toggle Button	406
Click-and-Drag Volume Slider	406
Case Study in Audio: Space Raiders Game	416
Why Sounds in Apps Are Different: Event Sounds	416
Iterations	416
Space Raiders Game Structure	417
Iteration #1: Playing Sounds Using a Single Object	426
Iteration #2: Creating Unlimited Dynamic Sound Objects	427
Iteration #3: Creating a Sound Pool	429
Iteration #4: Reusing Preloaded Sounds	431
Web Audio API	435
What Is the Web Audio API?	436
Space Raiders with the Web Audio API Applied	436
What's Next?	439
A* with Mode Weights   Attended to BSBiogoldbol   Attended Spirits   A	
Canvas Games: Part I	. 441
Why Games in HTML5?	441
Canvas Compared to Flash	442
What Does Canvas Offer?	442
Our Basic Game HTML5 File	442
Our Game's Design	444
Game Graphics: Drawing with Paths	444
Needed Assets Headed Assets	445
Using Paths to Draw the Game's Main Character	445
Animating on the Canvas	448
Game Timer Loop	448
The Player Ship State Changes	449
Applying Transformations to Game Graphics	451
The Canvas Stack	451

	Game Graphic Transformations	453
	Rotating the Player Ship from the Center and the Marian Banks	453
	Alpha Fading the Player Ship	455
	Game Object Physics and Animation	456
	How Our Player Ship Will Move	456
	Controlling the Player Ship with the Keyboard	458
	Giving the Player Ship a Maximum Velocity	462
	A Basic Game Framework	463
	The Game State Machine	463
	The Update/Render (Repeat) Cycle	467
	The FrameRateCounter Object Prototype	469
	Putting It All Together	471
	Geo Blaster Game Structure	471
	Geo Blaster Global Game Variables	475
	The Player Object robids and V gard-baselold	
	Geo Blaster Game Algorithms	477
	Arrays of Logical Display Objects	477
	Level Knobs anothers a	479
	Level and Game End	480
	Awarding the Player Extra Ships	481
	Applying Collision Detection	481
	The Geo Blaster Basic Full Source	483
	Rock Object Prototype	484
	Simple A* Path Finding on a Tile Grid	486
	What Is A*?	486
	A* Applied to a Larger Tile Map	493
	A* Taking Diagonal Moves into Account	
	A* with Node Weights	502
	A* with Node Weights and Diagonals	506
	Moving a Game Character Along the A* Path	514
	Tanks That Pass Through Walls?	
	What's Next?	528
9.	Canvas Games: Part II	. 529
	Geo Blaster Extended	529
	Geo Blaster Tile Sheet	530
	Rendering the Other Game Objects	535
	Adding Sound	
	Pooling Object Instances	546
	Adding a Step Timer	4 10 10 10 10 10 10 10 10 10 10 10 10 10
	Creating a Dynamic Tile Sheet at Runtime	550
	A Simple Tile-Based Game	

	Micro Tank Maze Description		556
	The Tile Sheet for Our Game		556
	The Playfield		558
	The Player		559
	The Enemy		560
	The Goal		561
	The Explosions		561
	Turn-Based Game Flow and th	e State Machine	562
	Simple Tile Movement Logic C	Overview	566
	Rendering Logic Overview		
	Simple Homegrown AI Overvi		
	Micro Tank Maze Complete G	ame Code	
	Scrolling a Tile-Based World		570
	First, a Tile Sheet That Contain	ns the Tiles We Want to Paint to the Screen	570
	Second, a Two-Dimensional A	rray to Describe Our Game World	571
	Third, Paint the Tile-Based Wo	orld to the Canvas	571
	Coarse Scrolling vs. Fine Scroll	ling	572
	The Camera Object		572
	The World Object		573
	Fine Scrolling the Row and Co	lumn Buffers	574
	Coarse Scrolling Full Code Exa	imple	580
	Fine Scrolling Full Code Exam	ple	585
	What's Next?		589
10.	Going Mobile!		. 591
	The First Application		591
	The Code		592
	Examining the Code for BSBin	go.html	597
	The Application Code		600
	Scaling the Game for the Brow	ser	601
	Testing the Game on an Actual		606
	Retro Blaster Touch		607
	Mobilizing Retro Blaster Touch		610
	Jumping to Full Screen	d other issues that have arisen over the pass	610
	Touch Move Events		612
	Retro Blaster Touch Complete	Game Code	618
	Beyond the Canvas		619
	What's Next?		619
11.	Further Explorations		. 621
	3D with WebGL		621
	What Is WebGL?		621

How Does One Test WebGL?	622
The state of the s	
How Do I Learn More About WebGL?	622
What Does a WebGL Application Look Like?	623
Further Explorations with WebGL	628
WebGL JavaScript Libraries	629
Multiplayer Applications with ElectroServer 5	630
Installing ElectroServer	631
The Basic Architecture of a Socket-Server Application	634
The Basic Architecture of an ElectroServer Application	634
Creating a Chat Application with ElectroServer	636
Testing the Application in Google Chrome	641
Further Explorations with ElectroServer	642
This Is Just the Tip of the Iceberg	645
Creating a Simple Object Framework for the Canvas	646
Creating the Drag-and-Drop Application	646
Application Design	647
Windows 8 Apps and the HTML5 Canvas	659
What's Next in HTML5.1 and Canvas Level 2?	663
HTML5.1 Canvas Context	663
Canvas Level-2	664
Conclusion Segment Shoot Mary and Sh	664
A. Full Code Listings	667
Index	711