

CONTENTS IN DETAIL

ACKNOWLEDGMENTS	XVII
------------------------	-------------

INTRODUCTION	XIX
Why Learn to Program?	xx
Why Python?	xx
Why Minecraft?	xx
What's in This Book?	xx
Online Resources	xxii
Let the Adventure Begin!	xxii

1 SETTING UP FOR YOUR ADVENTURE	1
----------------------------------------	----------

Setting Up Your Windows PC	2
Installing Minecraft	2
Installing Python	3
Installing Java	4
Installing the Minecraft Python API and Spigot	6
Running Spigot and Creating a Game	7
Starting Over with a New World	8
Playing Offline	9
Switching to Survival Mode	10
Setting Up Your Mac	11
Installing Minecraft	12
Installing Python	13
Installing Java	14
Installing the Minecraft Python API and Spigot	15
Running Spigot and Creating a Game	16
Starting Over with a New World	17
Playing Offline	18
Switching to Survival Mode	18
Setting Up Your Raspberry Pi	18
Getting to Know IDLE	20
Getting to Know the Python Shell	20
Say Hello to IDLE's Text Editor	21
When to Use the Python Shell and When to Use the Text Editor	23
The Prompts Used in This Book	23
Testing Your Minecraft Python Setup	24

What Is a Program?	27
Storing Data with Variables.	28
The Structure of Programming Languages.	29
Syntax Rules for Variables	30
Changing the Values of Variables.	30
Integers	31
Mission #1: Teleport the Player	31
Floats	37
Mission #2: Go Exactly Where You Want.	38
Slowing Down Teleportation Using the time Module	39
Mission #3: Teleportation Tour	40
Debugging	42
Mission #4: Fix the Buggy Teleportation.	43
What You Learned	45

Expressions and Statements.	47
Operators	48
Addition	48
Mission #5: Stack Blocks	49
Mission #6: Super Jump	51
Subtraction.	52
Mission #7: Change the Blocks Under You.	52
Using Math Operators in Arguments	54
Mission #8: Speed Building	55
Multiplication	58
Division	58
Mission #9: Spectacular Spires	58
Exponents	60
Parentheses and Order of Operations	61
Handy Math Tricks	62
Shorthand Operators.	62
Playing with Random Numbers	62
Mission #10: Super Jump Somewhere New!	63
What You Learned	64

What Are Strings?	66
The print() Function	66
Mission #11: Hello, Minecraft World	67
The input() Function	68
Mission #12: Write Your Own Chat Message	69
Joining Strings	71
Converting Numbers to Strings	71
Concatenating Integers and Floats.	72
Mission #13: Add Usernames to Chat	72

Converting Strings to Integers with <code>int()</code>	74
Mission #14: Create a Block with <code>input</code>	74
Bounce Back from Errors	76
Mission #15: Only Numbers Allowed	77
Mission #16: Sprint Record	78
What You Learned	80

5

FIGURING OUT WHAT'S TRUE AND FALSE WITH BOOLEANS

81

Boolean Basics	82
Mission #17: Stop Smashing Blocks!	82
Concatenating Booleans	83
Comparators	83
Equal To	84
Mission #18: Am I Swimming?	85
Not Equal To	86
Mission #19: Am I Standing in Something Other Than Air?	87
Greater Than and Less Than	88
Greater Than or Equal To and Less Than or Equal To	89
Mission #20: Am I Above the Ground?	90
Mission #21: Am I Close to Home?	91
Logical Operators	92
and	93
Mission #22: Am I Entirely Underwater?	93
or	95
Mission #23: Am I in a Tree?	95
not	96
Mission #24: Is This Block Not a Melon?	97
Logical Operator Order	98
Is My Number Between Two Others?	99
Mission #25: Am I in the House?	100
What You Learned	101

6

MAKING MINI-GAMES WITH IF STATEMENTS

103

Using if Statements	104
Mission #26: Blast a Crater	105
else Statements	107
Mission #27: Prevent Smashing, or Not	108
elif Statements	109
Mission #28: Offer a Gift	110
Chaining Together elif Statements	112
Mission #29: Teleport to the Right Place	113
Nested if Statements	115
Mission #30: Open a Secret Passage	115
Using if Statements to Test a Range of Values	117
Mission #31: Restrict Teleport Locations	118
Boolean Operators and if Statements	119
Mission #32: Take a Shower	120
What You Learned	122

7

DANCE PARTIES AND FLOWER PARADES WITH WHILE LOOPS

123

A Simple while Loop	123
Mission #33: A Random Teleportation Tour	125
Controlling Loops with a Count Variable	127
Mission #34: The Watery Curse	128
Infinite while Loops	130
Mission #35: Flower Trail	130
Fancy Conditions	131
Mission #36: Diving Contest	132
Boolean Operators and while Loops	134
Checking a Range of Values in while Loops	135
Mission #37: Make a Dance Floor	135
Nested if Statements and while Loops	137
Mission #38: The Midas Touch	138
Ending a while Loop with break	139
Mission #39: Create a Persistent Chat with a Loop	139
while-else Statements	141
Mission #40: Hot and Cold	141
What You Learned	144

8

FUNCTIONS GIVE YOU SUPERPOWERS

145

Defining Your Own Functions	146
Calling a Function	146
Functions Take Arguments	147
Mission #41: Build a Forest	148
Refactoring a Program	150
Mission #42: Refactor Away	151
Commenting with Docstrings	152
Line Breaks in Arguments	153
Function Return Values	153
Mission #43: Block ID Reminder	155
Using if Statements and while Loops in Functions	157
if Statements	157
Mission #44: Wool Color Helper	158
while Loops	159
Mission #45: Blocks, Everywhere	160
Global and Local Variables	162
Mission #46: A Moving Block	163
What You Learned	165

9

HITTING THINGS WITH LISTS AND DICTIONARIES

167

Using Lists	168
Accessing a List Item	168
Changing a List Item	169
Mission #47: High and Low	169

Manipulating Lists	171
Adding an Item	171
Inserting an Item	172
Deleting an Item	172
Mission #48: Progress Bar.	173
Treating Strings like Lists	175
Tuples	175
Setting Variables with Tuples	176
Mission #49: Sliding	177
Returning a Tuple	179
Other Useful Features of Lists	179
List Length	179
Mission #50: Block Hits	180
Randomly Choosing an Item	182
Mission #51: Random Block	183
Copying a List	183
Items and if Statements	185
Mission #52: Night Vision Sword	186
Dictionaries	188
Defining a Dictionary	188
Accessing Items in Dictionaries	189
Mission #53: Sightseeing Guide	190
Changing or Adding an Item in a Dictionary	191
Deleting Items in Dictionaries	192
Mission #54: Block Hits Score	192
What You Learned	194

10		
MINECRAFT MAGIC WITH FOR LOOPS		195
A Simple for Loop	195	
Mission #55: Magic Wand	196	
The range() Function	198	
Mission #56: Magic Stairs	199	
Playing Around with range()	200	
Other List Functions	201	
Mission #57: Pillars	202	
Mission #58: Pyramid	203	
Looping Over a Dictionary	205	
Mission #59: Scoreboard	205	
for-else Loops	206	
Breaking a for-else Loop	207	
Mission #60: The Diamond Prospector	207	
Nested for Loops and Multidimensional Lists	208	
Thinking in Two Dimensions	209	
Accessing Values in 2D Lists	213	
Mission #61: Pixel Art	214	
Generating 2D Lists with Loops	216	
Mission #62: A Weather-Worn Wall	217	
Thinking in Three Dimensions	218	
Outputting 3D Lists	219	

Accessing Values in 3D Lists	223
Mission #63: Duplicate a Building	225
What You Learned	230

11 SAVING AND LOADING BUILDINGS WITH FILES AND MODULES 231

Using Files	232
Opening a File	232
Writing to and Saving a File	233
Reading a File	234
Reading a Line of a File	234
Mission #64: To-Do List	235
Part 1: Writing the To-Do List	235
Part 2: Displaying the To-Do List	237
Using Modules	238
The pickle Module	238
Importing pickle	238
Importing One Function with the from Clause	240
Importing All Functions with *	241
Giving a Module a Nickname	241
Mission #65: Save a Building	242
Part 1: Saving the Building	242
Part 2: Loading the Building	245
Storing Lots of Data with the shelve Module	247
Opening a File with shelve	247
Adding, Modifying, and Accessing Items with shelve	247
Mission #66: Save a Collection of Structures	248
Part 1: Saving a Structure to a Collection	248
Part 2: Loading a Structure from a Collection	249
Installing New Modules with pip	252
Using pip on Windows	252
Using pip on a Mac or Raspberry Pi	253
Using a Module from pip: Flask	253
Mission #67: Position Website	255
What You Learned	256

12 GETTING CLASSY WITH OBJECT-ORIENTED PROGRAMMING 257

Object-Oriented Basics	258
Creating a Class	258
Creating an Object	259
Accessing Attributes	259
Mission #68: Location Objects	260
Understanding Methods	261
Mission #69: Ghost House	263
Returning Values with Methods	266
Mission #70: Ghost Castle	266

Creating Multiple Objects	269
Mission #71: Ghost Town	269
Class Attributes	271
Understanding Inheritance	273
Inheriting a Class	274
Adding New Methods to Subclasses	275
Mission #72: Ghost Hotel	275
Overriding Methods and Attributes	278
Mission #73: Ghost Tree	280
What You Learned	282
AFTERWORD	283
BLOCK ID CHEAT SHEET	285
INDEX	291