Unknown

## **CONTENTS IN DETAIL**

[**ACKNOWLEDGMENTS**](ack.xhtml#ack)

[**INTRODUCTION**](introduction.xhtml#intro)

[Why Python](introduction.xhtml#ch00lev1sec1)

[How to Learn to Code](introduction.xhtml#ch00lev1sec2)

[Who Should Read This Book](introduction.xhtml#ch00lev1sec3)

[What’s in This Book](introduction.xhtml#ch00lev1sec4)

[Python for Kids Website](introduction.xhtml#ch00lev1sec5)

[Have Fun!](introduction.xhtml#ch00lev1sec6)

[**PART I**  
**LEARNING TO PROGRAM**](part01.xhtml#part01)

[**1**  
**NOT ALL SNAKES SLITHER**](ch01.xhtml#ch01)

[A Few Words About Language](ch01.xhtml#ch01lev1sec1)

[Installing Python](ch01.xhtml#ch01lev1sec2)

[Installing Python on Windows](ch01.xhtml#ch01lev2sec1)

[Installing Python on macOS](ch01.xhtml#ch01lev2sec2)

[Installing Python on Ubuntu](ch01.xhtml#ch01lev2sec3)

[Installing Python on Raspberry Pi (Raspberry Pi OS or Raspbian)](ch01.xhtml#ch01lev2sec4)

[Once You’ve Installed Python](ch01.xhtml#ch01lev1sec3)

[Saving Your Python Programs](ch01.xhtml#ch01lev1sec4)

[What You Learned](ch01.xhtml#ch01lev1sec5)

[**2**  
**CALCULATIONS AND VARIABLES**](ch02.xhtml#ch02)

[Calculating with Python](ch02.xhtml#ch02lev1sec1)

[Python Operators](ch02.xhtml#ch02lev1sec2)

[The Order of Operations](ch02.xhtml#ch02lev1sec3)

[Variables Are Like Labels](ch02.xhtml#ch02lev1sec4)

[Using Variables](ch02.xhtml#ch02lev1sec5)

[What You Learned](ch02.xhtml#ch02lev1sec6)

[**3**  
**STRINGS, LISTS, TUPLES, AND DICTIONARIES**](ch03.xhtml#ch03)

[Strings](ch03.xhtml#ch03lev1sec1)

[Creating Strings](ch03.xhtml#ch03lev1sec2)

[Handling Problems with Strings](ch03.xhtml#ch03lev1sec3)

[Embedding Values in Strings](ch03.xhtml#ch03lev1sec4)

[Multiplying Strings](ch03.xhtml#ch03lev1sec5)

[Lists Are More Powerful than Strings](ch03.xhtml#ch03lev1sec6)

[Adding Items to a List](ch03.xhtml#ch03lev1sec7)

[Removing Items from a List](ch03.xhtml#ch03lev1sec8)

[List Arithmetic](ch03.xhtml#ch03lev1sec9)

[Tuples](ch03.xhtml#ch03lev1sec10)

[Python Dictionaries](ch03.xhtml#ch03lev1sec11)

[What You Learned](ch03.xhtml#ch03lev1sec12)

[Programming Puzzles](ch03.xhtml#ch03lev1sec13)

[#1: Favorites](ch03.xhtml#ch03lev2sec1)

[#2: Counting Combatants](ch03.xhtml#ch03lev2sec2)

[#3: Greetings!](ch03.xhtml#ch03lev2sec3)

[#4: Multiline Letter](ch03.xhtml#ch03lev2sec4)

[**4**  
**DRAWING WITH TURTLES**](ch04.xhtml#ch04)

[Using Python’s Turtle Module](ch04.xhtml#ch04lev1sec1)

[Creating a Canvas](ch04.xhtml#ch04lev1sec2)

[Moving the Turtle](ch04.xhtml#ch04lev1sec3)

[What You Learned](ch04.xhtml#ch04lev1sec4)

[Programming Puzzles](ch04.xhtml#ch04lev1sec5)

[#1: A Rectangle](ch04.xhtml#ch04lev2sec1)

[#2: A Triangle](ch04.xhtml#ch04lev2sec2)

[#3: A Box Without Corners](ch04.xhtml#ch04lev2sec3)

[#4: A Tilted Box Without Corners](ch04.xhtml#ch04lev2sec4)

[**5**  
**ASKING QUESTIONS WITH IF AND ELSE**](ch05.xhtml#ch05)

[If Statements](ch05.xhtml#ch05lev1sec1)

[A Block Is a Group of Programming Statements](ch05.xhtml#ch05lev1sec2)

[Conditions Help Us Compare Things](ch05.xhtml#ch05lev1sec3)

[If-Then-Else Statements](ch05.xhtml#ch05lev1sec4)

[if and elif Statements](ch05.xhtml#ch05lev1sec5)

[Combining Conditions](ch05.xhtml#ch05lev1sec6)

[Variables with No Value—None](ch05.xhtml#ch05lev1sec7)

[The Difference Between Strings and Numbers](ch05.xhtml#ch05lev1sec8)

[What You Learned](ch05.xhtml#ch05lev1sec9)

[Programming Puzzles](ch05.xhtml#ch05lev1sec10)

[#1: Are You Rich?](ch05.xhtml#ch05lev2sec1)

[#2: Twinkies!](ch05.xhtml#ch05lev2sec2)

[#3: Just the Right Number](ch05.xhtml#ch05lev2sec3)

[#4: I Can Fight Those Ninjas](ch05.xhtml#ch05lev2sec4)

[**6**  
**GOING LOOPY**](ch06.xhtml#ch06)

[Using for Loops](ch06.xhtml#ch06lev1sec1)

[While We’re Talking About Looping](ch06.xhtml#ch06lev1sec2)

[What You Learned](ch06.xhtml#ch06lev1sec3)

[Programming Puzzles](ch06.xhtml#ch06lev1sec4)

[#1: The Hello Loop](ch06.xhtml#ch06lev2sec1)

[#2: Even Numbers](ch06.xhtml#ch06lev2sec2)

[#3: My Five Favorite Ingredients](ch06.xhtml#ch06lev2sec3)

[#4: Your Weight on the Moon](ch06.xhtml#ch06lev2sec4)

[**7**  
**RECYCLING YOUR CODE WITH FUNCTIONS AND MODULES**](ch07.xhtml#ch07)

[Using Functions](ch07.xhtml#ch07lev1sec1)

[Parts of a Function](ch07.xhtml#ch07lev1sec2)

[Variables and Scope](ch07.xhtml#ch07lev1sec3)

[Using Modules](ch07.xhtml#ch07lev1sec4)

[The input function](ch07.xhtml#ch07lev1sec5)

[What You Learned](ch07.xhtml#ch07lev1sec6)

[Programming Puzzles](ch07.xhtml#ch07lev1sec7)

[#1: Basic Moon Weight Function](ch07.xhtml#ch07lev2sec1)

[#2: Moon Weight Function and Years](ch07.xhtml#ch07lev2sec2)

[#3: Moon Weight Program](ch07.xhtml#ch07lev2sec3)

[#4: Mars Weight Program](ch07.xhtml#ch07lev2sec4)

[**8**  
**HOW TO USE CLASSES AND OBJECTS**](ch08.xhtml#ch08)

[Breaking Things into Classes](ch08.xhtml#ch08lev1sec1)

[Children and Parents](ch08.xhtml#ch08lev1sec2)

[Adding Objects to Classes](ch08.xhtml#ch08lev1sec3)

[Defining Functions of Classes](ch08.xhtml#ch08lev1sec4)

[Adding Class Characteristics](ch08.xhtml#ch08lev1sec5)

[Why Use Classes and Objects?](ch08.xhtml#ch08lev1sec6)

[Objects and Classes in Pictures](ch08.xhtml#ch08lev1sec7)

[Other Useful Features of Objects and Classes](ch08.xhtml#ch08lev1sec8)

[Inherited Functions](ch08.xhtml#ch08lev1sec9)

[Functions Calling Other Functions](ch08.xhtml#ch08lev1sec10)

[Initializing an Object](ch08.xhtml#ch08lev1sec11)

[What You Learned](ch08.xhtml#ch08lev1sec12)

[Programming Puzzles](ch08.xhtml#ch08lev1sec13)

[#1: The Giraffe Shuffle](ch08.xhtml#ch08lev2sec1)

[#2: Turtle Pitchfork](ch08.xhtml#ch08lev2sec2)

[#3: Two Small Spirals](ch08.xhtml#ch08lev2sec3)

[#4: Four Small Spirals](ch08.xhtml#ch08lev2sec4)

[**9**  
**MORE TURTLE GRAPHICS**](ch09.xhtml#ch09)

[Starting with the Basic Square](ch09.xhtml#ch09lev1sec1)

[Drawing Stars](ch09.xhtml#ch09lev1sec2)

[Drawing a Car](ch09.xhtml#ch09lev1sec3)

[Coloring Things In](ch09.xhtml#ch09lev1sec4)

[A Function to Draw a Filled Circle](ch09.xhtml#ch09lev1sec5)

[Creating Pure Black and White](ch09.xhtml#ch09lev1sec6)

[A Square-Drawing Function](ch09.xhtml#ch09lev1sec7)

[Drawing Filled Squares](ch09.xhtml#ch09lev1sec8)

[Drawing Filled Stars](ch09.xhtml#ch09lev1sec9)

[What You Learned](ch09.xhtml#ch09lev1sec10)

[Programming Puzzles](ch09.xhtml#ch09lev1sec11)

[#1: Drawing an Octagon](ch09.xhtml#ch09lev2sec1)

[#2: Drawing a Filled Octagon](ch09.xhtml#ch09lev2sec2)

[#3: Another Star-Drawing Function](ch09.xhtml#ch09lev2sec3)

[#4: Four Spirals Revisited](ch09.xhtml#ch09lev2sec4)

[**10**  
**USING TKINTER FOR BETTER GRAPHICS**](ch10.xhtml#ch10)

[Creating a Clickable Button](ch10.xhtml#ch10lev1sec1)

[Using Named Parameters](ch10.xhtml#ch10lev1sec2)

[Creating a Canvas for Drawing](ch10.xhtml#ch10lev1sec3)

[Drawing Lines](ch10.xhtml#ch10lev1sec4)

[Drawing Boxes](ch10.xhtml#ch10lev1sec5)

[Drawing a Lot of Rectangles](ch10.xhtml#ch10lev1sec6)

[Setting the Color](ch10.xhtml#ch10lev1sec7)

[Drawing Arcs](ch10.xhtml#ch10lev1sec8)

[Drawing Polygons](ch10.xhtml#ch10lev1sec9)

[Displaying Text](ch10.xhtml#ch10lev1sec10)

[Displaying Images](ch10.xhtml#ch10lev1sec11)

[Creating Basic Animation](ch10.xhtml#ch10lev1sec12)

[Making an Object React to Something](ch10.xhtml#ch10lev1sec13)

[More Ways to Use the Identifier](ch10.xhtml#ch10lev1sec14)

[What You Learned](ch10.xhtml#ch10lev1sec15)

[Programming Puzzles](ch10.xhtml#ch10lev1sec16)

[#1: Fill the Screen with Triangles](ch10.xhtml#ch10lev2sec1)

[#2: The Moving Triangle](ch10.xhtml#ch10lev2sec2)

[#3: The Moving Photo](ch10.xhtml#ch10lev2sec3)

[#4: Fill the Screen with Photos](ch10.xhtml#ch10lev2sec4)

[**PART II**  
**BOUNCE!**](part02.xhtml#part02)

[**11**  
**BEGINNING YOUR FIRST GAME: BOUNCE!**](ch11.xhtml#ch11)

[Whack the Bouncing Ball](ch11.xhtml#ch11lev1sec1)

[Creating the Game Canvas](ch11.xhtml#ch11lev1sec2)

[Creating the Ball Class](ch11.xhtml#ch11lev1sec3)

[Adding Some Action](ch11.xhtml#ch11lev1sec4)

[Making the Ball Move](ch11.xhtml#ch11lev2sec1)

[Making the Ball Bounce](ch11.xhtml#ch11lev2sec2)

[Changing the Ball’s Starting Direction](ch11.xhtml#ch11lev2sec3)

[What You Learned](ch11.xhtml#ch11lev1sec5)

[Programming Puzzles](ch11.xhtml#ch11lev1sec6)

[#1: Changing Colors](ch11.xhtml#ch11lev2sec4)

[#2: Flashing Colors](ch11.xhtml#ch11lev2sec5)

[#3: Take Your Positions!](ch11.xhtml#ch11lev2sec6)

[#4: Adding the Paddle . . . ?](ch11.xhtml#ch11lev2sec7)

[**12**  
**FINISHING YOUR FIRST GAME: BOUNCE!**](ch12.xhtml#ch12)

[Adding the Paddle](ch12.xhtml#ch12lev1sec1)

[Making the Paddle Move](ch12.xhtml#ch12lev1sec2)

[Finding Out When the Ball Hits the Paddle](ch12.xhtml#ch12lev1sec3)

[Adding an Element of Chance](ch12.xhtml#ch12lev1sec4)

[What You Learned](ch12.xhtml#ch12lev1sec5)

[Programming Puzzles](ch12.xhtml#ch12lev1sec6)

[#1: Delay the Game Start](ch12.xhtml#ch12lev2sec1)

[#2: A Proper “Game Over”](ch12.xhtml#ch12lev2sec2)

[#3: Accelerate the Ball](ch12.xhtml#ch12lev2sec3)

[#4: Record the Player’s Score](ch12.xhtml#ch12lev2sec4)

[**PART III**  
**MR. STICK MAN RACES FOR THE EXIT**](part03.xhtml#part03)

[**13**  
**CREATING GRAPHICS FOR THE MR. STICK MAN GAME**](ch13.xhtml#ch13)

[Mr. Stick Man Game Plan](ch13.xhtml#ch13lev1sec1)

[Getting GIMP](ch13.xhtml#ch13lev1sec2)

[Creating the Game Elements](ch13.xhtml#ch13lev1sec3)

[Preparing a Transparent Image](ch13.xhtml#ch13lev1sec4)

[Drawing Mr. Stick Man](ch13.xhtml#ch13lev1sec5)

[Mr. Stick Man Running to the Right](ch13.xhtml#ch13lev2sec1)

[Mr. Stick Man Running to the Left](ch13.xhtml#ch13lev2sec2)

[Drawing the Platforms](ch13.xhtml#ch13lev1sec6)

[Drawing the Door](ch13.xhtml#ch13lev1sec7)

[Drawing the Background](ch13.xhtml#ch13lev1sec8)

[Transparency](ch13.xhtml#ch13lev1sec9)

[What You Learned](ch13.xhtml#ch13lev1sec10)

[**14**  
**DEVELOPING THE MR. STICK MAN GAME**](ch14.xhtml#ch14)

[Creating the Game Class](ch14.xhtml#ch14lev1sec1)

[Setting the Window Title and Creating the Canvas](ch14.xhtml#ch14lev1sec2)

[Finishing the \_\_init\_\_ Function](ch14.xhtml#ch14lev1sec3)

[Creating the mainloop Function](ch14.xhtml#ch14lev1sec4)

[Creating the Coords Class](ch14.xhtml#ch14lev1sec5)

[Checking for Collisions](ch14.xhtml#ch14lev1sec6)

[Sprites Colliding Horizontally](ch14.xhtml#ch14lev1sec7)

[Sprites Colliding Vertically](ch14.xhtml#ch14lev1sec8)

[Putting It All Together: Our Final Collision-Detection Code](ch14.xhtml#ch14lev1sec9)

[The collided\_left Function](ch14.xhtml#ch14lev2sec1)

[The collided\_right Function](ch14.xhtml#ch14lev2sec2)

[The collided\_top Function](ch14.xhtml#ch14lev2sec3)

[The collided\_bottom Function](ch14.xhtml#ch14lev2sec4)

[Creating the Sprite Class](ch14.xhtml#ch14lev1sec10)

[Adding the Platforms](ch14.xhtml#ch14lev1sec11)

[Adding a Platform Object](ch14.xhtml#ch14lev1sec12)

[Adding a Bunch of Platforms](ch14.xhtml#ch14lev1sec13)

[What You Learned](ch14.xhtml#ch14lev1sec14)

[Programming Puzzles](ch14.xhtml#ch14lev1sec15)

[#1: Checkerboard](ch14.xhtml#ch14lev2sec5)

[#2: Two-Image Checkerboard](ch14.xhtml#ch14lev2sec6)

[#3: Bookshelf and Lamp](ch14.xhtml#ch14lev2sec7)

[#4: Random Background](ch14.xhtml#ch14lev2sec8)

[**15**  
**CREATING MR. STICK MAN**](ch15.xhtml#ch15)

[Initializing the Stick Figure](ch15.xhtml#ch15lev1sec1)

[Loading the Stick Figure Images](ch15.xhtml#ch15lev1sec2)

[Setting Up Variables](ch15.xhtml#ch15lev1sec3)

[Binding to Keys](ch15.xhtml#ch15lev1sec4)

[Turning the Stick Figure Left and Right](ch15.xhtml#ch15lev1sec5)

[Making the Stick Figure Jump](ch15.xhtml#ch15lev1sec6)

[What We Have So Far](ch15.xhtml#ch15lev1sec7)

[What You Learned](ch15.xhtml#ch15lev1sec8)

[**16**  
**COMPLETING THE MR. STICK MAN GAME**](ch16.xhtml#ch16)

[Animating the Stick Figure](ch16.xhtml#ch16lev1sec1)

[Creating the Animate Function](ch16.xhtml#ch16lev1sec2)

[Checking for Movement](ch16.xhtml#ch16lev2sec1)

[Changing the Image](ch16.xhtml#ch16lev2sec2)

[Getting the Stick Figure’s Position](ch16.xhtml#ch16lev1sec3)

[Making the Stick Figure Move](ch16.xhtml#ch16lev1sec4)

[Starting the move Function](ch16.xhtml#ch16lev2sec3)

[Has the Stick Figure Hit the Bottom or Top of the Canvas?](ch16.xhtml#ch16lev2sec4)

[Has the Stick Figure Hit the Side of the Canvas?](ch16.xhtml#ch16lev2sec5)

[Colliding with Other Sprites](ch16.xhtml#ch16lev2sec6)

[Colliding at the Bottom](ch16.xhtml#ch16lev2sec7)

[Checking Left and Right](ch16.xhtml#ch16lev2sec8)

[Testing Our Stick Figure Sprite](ch16.xhtml#ch16lev1sec5)

[The Exit!](ch16.xhtml#ch16lev1sec6)

[Creating the DoorSprite Class](ch16.xhtml#ch16lev1sec7)

[Detecting the Door](ch16.xhtml#ch16lev1sec8)

[Adding the Door Object](ch16.xhtml#ch16lev1sec9)

[The Final Game](ch16.xhtml#ch16lev1sec10)

[What You Learned](ch16.xhtml#ch16lev1sec11)

[Programming Puzzles](ch16.xhtml#ch16lev1sec12)

[#1: “You Win!”](ch16.xhtml#ch16lev2sec9)

[#2: Animating the Door](ch16.xhtml#ch16lev2sec10)

[#3: Moving Platforms](ch16.xhtml#ch16lev2sec11)

[#4: Lamp as a Sprite](ch16.xhtml#ch16lev2sec12)

[**AFTERWORD: WHERE TO GO FROM HERE**](aft.xhtml#after)

[Installing Python pip on Windows](aft.xhtml#aftlev1sec1)

[Installing Python pip on Ubuntu](aft.xhtml#aftlev1sec2)

[Installing Python pip on Raspberry Pi](aft.xhtml#aftlev1sec3)

[Installing Python pip on macOS](aft.xhtml#aftlev1sec4)

[Trying out PyGame](aft.xhtml#aftlev1sec5)

[Other Games and Graphics Programming](aft.xhtml#aftlev1sec6)

[Other Programming Languages](aft.xhtml#aftlev1sec7)

[JavaScript](aft.xhtml#aftlev2sec1)

[Java](aft.xhtml#aftlev2sec2)

[C#](aft.xhtml#aftlev2sec3)

[C/C++](aft.xhtml#aftlev2sec4)

[Ruby](aft.xhtml#aftlev2sec5)

[Go](aft.xhtml#aftlev2sec6)

[Rust](aft.xhtml#aftlev2sec7)

[Swift](aft.xhtml#aftlev2sec8)

[Final Words](aft.xhtml#aftlev1sec8)

[**A**  
**PYTHON KEYWORDS**](app01.xhtml#app01)

[**B**  
**PYTHON’S BUILT-IN FUNCTIONS**](app02.xhtml#app02)

[**C**  
**TROUBLESHOOTING**](app03.xhtml#app03)

[**INDEX**](index.xhtml#index)