

INDEX

SYMBOLS AND NUMBERS

- ' (apostrophe), 17
- \ (backslash), 94, 177
- #\ in *Escape*, 212
- : (colon), 19, 251
- , (comma), 84, 252
- # (for comments), 21, 63–64
 - case sensitivity, of comments, 251
 - commenting to turn code off, 101, 107, 112, 212, 213
 - uncommenting to turn code on, 147, 207, 212
- { } (curly brackets), 80, 251
- " (double quotation mark), 17, 29, 251
- // (floor division operator), 163, 170
- % (modulo operator), 71, 163, 170, 206
- * (multiplication), 56, 70
- != (not-equal-to operator), 71, 103
- = operator, 28
- + operator
 - for adding numbers, 17
 - for combining lists, 40
 - for combining strings, 65
- += operator
 - for adding numbers, 28
 - for combining or extending lists, 41, 64, 103
- () (parentheses), 16, 22, 23, 37, 65, 135, 251
- ; (semicolon), 251
- [] (square brackets), 34, 36, 37, 65, 251
- 1 (as index number), 104, 190
- 3D effect, 25–26, 30
- 3D room display, 53, 72
- 255, in *room_map*, 106–107, 108, 109, 156, 157, 169

A

- access cards, 86, 184, 185–187, 190, 196
- ACCESS_DICTIONARY, 187, 196
- add(), 128–129
- adding numbers, 17, 128–129
- add_object(), 159–160
- adjust_wall_transparency(), 143–145
- air, 174, 198–202
- air_countdown(), 199–200
- air_fixed, 174, 235, 236, 237
- airlock_door_frame, 194
- AIR section, 198–200
- alarm(), 199, 201, 202
- Anderson, Clayton, 14
- animation
 - airlock door, 194
 - astronaut, 113–114, 116, 119–122
 - doors, 184–196
 - front wall, 142–145
 - game completion, 180
- apostrophe ('), 17
- append(), 35, 45, 65, 160, 208
- arguments, 16, 128, 129, 148, 156
- arrow keys
 - in *Escape*, 116, 119–120
 - in *Explorer*, 74, 91, 108
 - in *Spacewalk*, 26, 27, 28
- assert, 65, 101, 109, 110, 154, 246
- astronaut names, changing, 64, 215

B

- backslash (\), 94, 177
- black space, under objects, 91, 109, 127, 139
- Boolean values, 61, 71
- bottom_edge, 70
- bottom edge type, 69

box Rect, 138
brackets, differences between,
65, 251
bugs. *See* errors
built-in functions, 16

C

cabinets, 156, 169
calculations, 17
calling a function, 157
case sensitivity, 22, 82, 251
centering the room display, 141
checksum, 101, 109–110
turning off for props, 154
clearing
game arena, 138
text area, 146
clipping area, 138–139, 141
clock, 29, 30, 74, 119, 163
clock.schedule_interval(), 119, 163
clock.schedule_unique(), 163
close button, 23
close_door(), 188
clues, 2, 86, 173, 181
cmd, 5, 10
collision detection, 120, 212
colon (:), 19, 251
color coding, 16, 21, 88, 252
colors, in Pygame Zero, 131–132,
138, 149
combining lists, 40–41
combining objects, 177–179
command line window, 23, 75
on Raspberry Pi, 9
on Windows, 5–6, 10
comma (,), 84, 252
comments. *See* # (for comments)
constants, 22
continuing code on next line,
94, 177
controls. *See* keyboard controls
converting
decimal numbers to integers, 71
numbers to strings, 74, 94
coordinates, 43, 45, 52, 56
corridors, 75, 77

cupboards, 169
curly brackets, {}, 80, 251
current_room, 72, 74, 109, 213
current_room_hazards_list, 206
curved brackets (parentheses), 16,
22, 23, 37, 65, 135, 251
customizing the game, 2, 215–216
difficulty, 187, 202, 210
doors, 184, 187, 195
game map, 76, 104, 139
images, 215
props, 154, 169
room designs, 89, 96, 101,
107, 109
sharing your customizations, 216

D

debugging, 65, 88, 249
decimal numbers, 71, 107
def statement, 19, 22, 250, 251
delays, 160, 163
deleting a list item, 37
del statement, 37
DEMO_OBJECTS, 55, 64
deplete_energy(), 205, 210, 216
diagonal movement, 29, 120
dice example, 156
dictionaries, 80, 95
as arguments, 129
checking keys, 82
compared to lists, 80
containing lists, 83–84, 95
creating, 80
errors, 82–83, 95, 251
keys, 80, 95
order of items, 82
using a variable as a key, 81
values, 80
difficulty of game, adjusting, 187,
202, 210
displaying numbers, 17
displaying text. *See* print()
display_inventory(), 160, 161, 162,
165, 167
DISPLAY section, 133, 136, 143, 145,
148, 210

division

- // operator, 163, 170
- calculating remainder, 71, 163, 170, 206
- do_door_animation(), 188, 189
- door_in_room_26(), 194, 195
- door_object_number, 188
- doors, 86, 98, 180, 184–196.
 - See also* exits
 - airlock (room 26), 193, 194
 - animation, 188, 189, 193, 196
 - closing, 187, 193
 - in customized map, 76
 - data, 185
 - opening, 185–190, 193–194
 - positioning, 184, 185
 - removing from game, 195–196
 - setting up in props
 - dictionary, 153
 - testing, 190, 193
 - timed, 185, 186, 190, 193, 196
- DOORS section, 187, 189, 191, 193
- double quotation mark ("), 17, 29, 251
- downloading game files, 7, 21
- draw()
 - 3D room, 55
 - final code for *Escape* game, 132, 136–139, 142
 - hazards, 210
 - in *Spacewalk*, 22, 25
- draw_energy_air(), 199, 200
- draw_image(), 135
- drawing
 - filled rectangles, 138, 149
 - images, 135
 - player, 135
 - room, 55, 136–139
 - scenery, 139
 - shadows, 135, 139, 140
 - text, 146, 201
- draw_player(), 135
- draw_shadow(), 135
- drones. *See* hazards
- drop_object(), 165, 166, 167
- dropping objects, 11, 166
- drop shadow (text effect), 201

E

- edge type, 69
- elif command, 28, 30, 120
- else command, 250, 251
- end_the_game(), 199, 200, 201
- energy, 174
 - drawing indicator bar, 199
 - reducing, 205
 - restoring, 198
 - variable, 199
- energy balls. *See* hazards
- engineering bay, 185, 186, 190, 193
- errors, 249. *See also* debugging
 - error message, 173
 - not defined, 251
 - without error message, 250
- escape folder, 7, 8
- Escape* game, 1, 8
 - building, 2
 - compatibility, 6
 - complete code listing, 217
 - customizing. *See* customizing the game
 - downloading files, 7, 21
 - playing, 2, 11
 - running, 9
 - sections in program listing, 63
- escape.zip, 7, 8
- examine_object(), 165, 168
- examining objects in the game, 11, 156, 165, 168
- example listings, 21
- exits, 61, 62, 68, 71. *See also* movement: between rooms
 - adding to room_map, 71
 - in customized map, 76
 - in game map, 60
 - testing from both sides, 75
- Explorer*, 72–74, 76, 91, 97, 107–108
- EXPLORER section, 72–74, 89, 115
 - deleting, 132
 - disabling keyboard controls, 112
 - drawbacks, 127
 - modifying to show room design, 89

F

- False, 61, 83, 251
- fanfare, adding to game, 214
- fences, 102
- File ▶ Save, 19
- find and replace, 147, 207
- find_object_start_x(), 158
- floating-point numbers, 71, 107
- floor, 68, 70, 74
- floor division operator (`//`), 163, 170
- floor pad, 139
- floor type, 69
- floor_type, 70
- for command, 49, 50, 58, 103, 250, 251
- frames list, 194
- FRIEND1_NAME, 64, 65
- FRIEND2_NAME, 64, 65
- from_player_x, 120
- from_player_y, 120
- functions, 16, 22, 30, 251. *See also*
 - arguments
 - built-in, 16
 - calling, 157
 - defining, 19
 - receiving information in, 128, 129, 148
 - returning information from, 156, 170
 - sending information to, 128–129, 148

G

- game. *See Escape game*
- game_completion_sequence(), 180
- game design, 184
- game_loop()
 - in *Escape*, 116, 119, 122, 126, 161, 164, 172, 207, 212
 - in *Spacewalk*, 26, 27
- GAME LOOP section, 116, 119, 147, 161
- GAME_MAP, 61, 62, 64, 66, 75, 76
- game_over, 113, 119, 201
- GAME OVER message, 199, 201
- generate_map()
 - adding props, 154–156
 - centering the map, 141–142

- generating rooms, 66, 68, 76
- hazards, 208
- scenery, 104–105, 109
- starting, 132

- get, 11, 159, 160
- get_floor_type(), 69, 160
- get_item_under_player(), 158, 159
- get_width(), 107
- global, 28, 30
- global variables, 28, 30
- GPS system, 177, 179
- gray in code listings, 23

H

- hazard_data, 204, 206
- hazard_map, 206, 208, 210
- hazard_move(), 206, 208, 210
- hazards, 197, 203
 - choosing, for each room, 206
 - data for, 204
 - direction numbers, 203, 210, 216
 - drawing, 210
 - movement patterns, 203, 204, 210, 216
 - object numbers, 206
 - positioning, 184
 - room map for, 206, 208, 210
 - starting, 205, 206
 - stopping, 205, 207
 - stopping player from walking through, 212
 - testing, 211
 - toxic spills, 212
- HAZARDS section, 204, 205, 208
- hazard_start(), 205, 206, 208
- HEIGHT, 22, 30, 55, 142
- hidden props, 156, 168, 169

I

- IDE (integrated development environment), 9
- IDLE, 9, 14
 - color coding, 16, 21, 88, 252
 - cut and paste, 24
 - find and replace, 147, 207
 - opening a new window, 18

- Replace All, 147, 207
 - script mode, 18, 29, 76
 - searching within code, 87
 - starting, 14
 - title bar, 18
- if command, 28, 30, 108, 250, 251
 - using a list instead of, 140
- image_here, 107
- images
 - as arguments, 129
 - customizing, 215
 - filenames in Pygame Zero, 22
 - getting width, 107
- images folder, 8, 9, 18, 19, 22, 54, 55, 252
- image_to_draw, 116
- image_width, 107
- image_width_in_tiles, 107
- indentation, 22, 28, 49, 51, 66, 81, 108, 250
- index numbers, 36, 40, 45, 68, 104
 - 1 (final item in list), 104, 190
 - equivalent for dictionary, 81
- in keyword, 120, 140
- in_my_pockets, 154, 163, 164, 165
 - adding items, 160
 - removing items, 167
- input(), 192, 196
- insert(), 36
- int(), 71, 192, 196
- integer, 71
- integrated development
 - environment (IDE), 9
- interactive mode. *See* shell
- International Space Station, 14
- inventory, 154, 159, 177
 - adding items, 160
 - displaying, 160, 161, 162, 165
 - keyboard control, 164
 - removing items, 166, 167
 - testing, 165
- item_carrying, 154, 160, 164, 165, 167
 - False, 167
- item_counter, 163
- item_player_is_on, 160, 168
- items_player_may_carry, 94, 95, 165
- items_player_may_stand_on, 95, 120, 212

K

- keyboard controls
 - drop, 165, 166
 - in *Escape*, 116–119
 - examine, 165, 168
 - get, 160
 - playing *Escape*, 11
 - sensitivity, 74
 - spacebar, 168
 - in *Spacewalk*, 26–28
 - TAB, 164
 - use, 172
- keys, in dictionaries, 80, 95

L

- LANDER_SECTOR, 87
- LANDER_X, 87, 153
- LANDER_Y, 87, 153
- launch, 180
- left_tile_of_item, 168
- legs of astronaut, disappearing, 118, 127, 140
- line_number, 146
- listings folder, 9, 21
- lists, 34, 251, 252
 - 1 (as index number), 104, 190
 - accessing an item, 36, 39, 45
 - across multiple lines, 94
 - adding items to, 35, 45, 103
 - append(), 35, 45
 - as arguments, 129
 - checking whether an item is
 - in a list, 120, 140
 - combining two lists, 40–41
 - compared to dictionaries, 80
 - creating a list of 0s, 208
 - creating with list(), 94
 - deleting an item, 37
 - in keyword, 120
 - insert(), 36
 - inserting an item, 36
 - inside another list, 38, 39
 - inside dictionaries, 83, 84, 95
 - last item in, 104, 190
 - looping through items, 103
 - for maps, 42, 45
 - multiplying, 70

- lists, *continued*
 - nested, 38, 39
 - printing, 35
 - remove(), 35, 45
 - removing items from, 35, 45
 - replacing an item, 37, 45
 - slicing, 163
- list_to_show, 163
- local variables, 27, 129, 148, 157
- loops, 47, 49–50. *See also*
 - for command;
 - while command
- inside another loop, 50–52
- looping through a list, 103
- lowercase, 251

M

- MAKE MAP section, 105, 208
- map, 42, 45, 184. *See also* room_map
 - accessing an item, 43
 - coordinates, 43, 45
 - data format, 60, 61
 - designing your own, 60–61, 76–77, 139
 - doors, 184
 - extending, 75, 77
 - fixing errors, 65
 - moving between rooms, 122, 126
 - planet surface rooms, 64
 - printing an item number, 44
 - removing planet surface scenery, 104
 - replacing an item, 44
 - for space station, 60
 - using printed numbers, 49
- MAP_HEIGHT, 75
- map maker, 60
- Mars, 13
- Mastracchio, Rick, 14
- math, 17
- maze, 60
- messages, 145
- methods, 82
- modulo operator (%), 71, 163, 170, 206

- movement
 - between rooms, 122, 126
 - of player, 116–122, 158
- movement(), 74
- MP3 player, 169, 176
- multiline code, 94, 177
- multiplication (*), 56, 70

N

- NASA, 14, 20
- nested lists, 38–39
- nested loops, 50, 58
- None, 86, 251
- not, 120
- not defined error, 251
- not-equal-to operator (!=), 71, 103
- numbers in circles, 19

O

- object number, 98, 99
- objects
 - adding your own, 215
 - combining, 177
 - destroying, 152
 - dictionary. *See* objects dictionary
 - display errors, 91
 - displaying in Explorer, 89
 - drawing, 135
 - dropping, 11, 166
 - examining, 11, 168
 - hidden, 156, 168, 169
 - image file, 86
 - long description, 86
 - not currently in the game, 152
 - picking up, 11, 159, 160
 - selecting, 11
 - shadow image, 86
 - short description, 86
 - standard use messages, 172
 - using, 12, 171–181
- objects dictionary, 85, 88, 91–95, 106, 109, 151, 171, 177
 - changing images, 190, 194
 - doors, 194
 - doors animation, 190
- offset numbers, in astronaut animation, 121

- .ogg files, 201
- old_hazard_x, 210
- old_hazard_y, 210
- old_player_x, 120
- old_player_y, 120
- open_door(), 186, 188
- outdoor_rooms, 64, 70
- output, 16

P

- parentheses, (), 16, 22, 23, 37, 65, 135, 251
- pgzrun, 9–10, 20
- picking up objects, 11, 159, 160
- pick_up_object(), 159–161, 166
- PILLARS, 142
- pixels, 56
- planets, 80–85
- planet surface rooms, 64, 70, 76, 102
- player
 - drawing in room, 115, 135
 - movement, 116, 119, 158
 - movement between rooms, 122, 126
- PLAYER dictionary, 114, 126
- player_direction, 120
- player_frame, 119, 120
- player_image, 115, 131, 136
- player_image_shadow, 131
- PLAYER_NAME, 64
- player_offset_x, 116, 119, 121, 126, 136
- player_offset_y, 116, 119, 121, 126, 136
- PLAYER_SHADOW dictionary, 131, 136
- player_x
 - for *Escape*, 113, 136
 - for *Spacewalk*, 22, 26, 27
- player_y
 - for *Escape*, 113, 136
 - for *Spacewalk*, 22, 26, 27
- Pluto, 82, 84
- Poodle lander, 11, 87, 94, 153
- Portable Network Graphics (PNG), 55

- pressure pad, 139, 193, 194, 196
- print(), 16–17, 29, 53, 128
 - item number from map, 44
 - lists, 35
 - numbers, 17
- programming languages, 14
- programs, 18, 29
- prompt, 15
- prop 71 (Poodle lander), 153
- prop_info, 155
- PROP INTERACTIONS section 158, 159, 166
- prop_number, 155
- prop_room, 155
- props, 71, 98, 151–170
 - adding to room_map, 154
 - creating your own, 215
 - doors, 185
 - hidden, 156, 168, 169
 - interactions, 158
 - picking up, 11, 159, 160
 - positioning, 184
 - using, 12, 171–181
 - wide, 156
- PROPS section, 152, 153, 160, 165, 167, 169, 178, 179
- prop_x, 155
- prop_y, 155
- puzzles, 171, 177
 - creating your own, 215
 - design, 184
- Pygame Zero, 1, 14, 20, 21, 22, 54
 - drawing images, 22, 25
 - installing, 3, 5–6
 - on other computers, 6
 - running programs, 8, 9, 30
 - saving files, 54
 - testing installation, 6
- Python, 1, 14, 21
 - editor. *See* IDLE
 - installing, 3–5

Q

- quotation mark ("), 17, 29, 251

R

- random, 156
- random.choice(), 103
- random.randint(), 87
- range(), 49, 57, 64, 65, 94, 107, 140
- Raspberry Pi
 - compatibility, 2, 6, 217
 - downloading game files, 7
 - running Pygame Zero programs, 9
 - software installation, 4
 - speed, 187, 202
 - starting IDLE, 15
- reason variable, 201
- recipes, 177–179, 181
- RECIPES, 178
- Rect, 138, 149, 163
- remove(), 35, 45
- remove_object(), 166, 167
- repeating
 - using clock, 119, 163
 - using loops. *See* loops
- Replace All, 147, 207
- replacing a list item, 37
- rescue ship, 180
- return, 69, 125, 157, 177
- robots. *See* hazards
- room
 - centering in the window, 141
 - designing your own, 89
 - drawing, 136, 139
 - drawing in 3D, 53, 55, 56
 - height, 69
 - maximum size, 61
 - name, 69
 - showing name on entry, 146
 - sizes, 77
 - width, 69
- room 0 (for storing extra items), 64, 152, 179
- room 26 (contains pressure pad), 139, 193, 215
- room 27 (engineering bay), 185
- room 32 (outside engineering bay), 185
- room_coordinate, 103
- room_data, 68, 71
- room_height, 55, 69

- room map, 167, 206
- room_map, 76
 - adding props, 154
 - adding scenery, 104–107
 - designing a room in the *Explorer*, 89–91
 - displaying with loops, 48–53
 - drawing the room, 55
 - emergency room example, 42–45
 - generating, 59–60, 62, 66–72
 - in player movement, 120
 - printing, 72
 - wide objects, 157
- room_name, 69, 147
- room_number, 103
- room_pixel_width, 142
- rooms
 - drawing, 72
 - designing, 96, 101, 107, 109
 - moving between, 122, 126
- room_width, 55, 69
- Run Module, 65

S

- saving, 18, 19, 54, 62
- scenery, 97, 108
 - adding to room_map, 105
 - changing, 109
 - changing the data, 101
 - combining with props, 177–179
 - creating your own, 215
 - dictionary, 98–100, 109
 - drawing, 139
 - error in data, 101
 - on planet surface, 102
 - randomly chosen, 103
 - randomly positioned, 103
 - removing for planet surface rooms, 104
 - shadows, 136
 - using, 12, 171–181
- scenery dictionary, 151
- scenery_number, 106
- SCENERY section, 99, 102
- scenery_x, 106
- scenery_y, 106

- scheduling, 74
- score, 21
- screen.blit(), 22, 30, 55, 135, 163
- screen.draw.filled_rect(), 138, 149
- screen.draw.text(), 146
- script mode, 18, 29, 76
- searching in your code, 87
- selected_item, 154, 160, 164
- selected_marker, 163
- selecting objects, 11, 164
- semicolon (;), 251
- sensitivity of keyboard controls, 74
- shadows, 57, 128, 130, 135, 139
 - drawing, 140
 - scenery, 136
 - spilling out of the
 - game area, 138
 - standard, 140
- shell
 - Python, 15, 18, 72, 76
 - Raspberry Pi, 9
- short description, 177
- show_text(), 146, 148
- shut_engineering_door(), 190
- side_edge, 70
- slicing, lists, 163
- slow programs, 2, 250
- snip--, 23
- software installation, 3–6
- soil, 70
- sound effects
 - alarm, 199
 - doors open, 187
 - fanfare, 214
 - playing, 201, 216
- sounds folder, 8, 9, 201, 252
- space station
 - inhabitants, 64
 - map, 60
 - rooms, 76
- Spacewalk*, 14, 18–31
- spelling errors, 251–252
- spoilers, 2, 86, 171
- square brackets, [], 34, 36, 37,
 - 65, 251
- standard_responses, 173, 181
- starfield, 18, 22
- start_display, 163

- start_room(), 125, 146, 206
- START section, 118, 144, 162, 202
- stopping programs, 23, 30
- storytelling, 184
- str(), 74, 94
- strings, 16, 29, 65
 - combining, 65
 - converting to numbers, 192, 196
 - drawing, 145, 201, 216
 - typing into a program, 192
- subtracting numbers, 149
- suit_stitched, 174
- switching off instructions, 101, 107,
 - 112, 212, 213

T

- TAB key, 11, 161, 163, 164
- teleporter
 - adding, 192
 - disabling, 213
 - using, 192, 195
- testing, 65, 72, 197, 212
- text. *See* strings
- text_lines, 146
- text_to_show, 146
- this_scenery, 106
- tiles, 56, 61, 113, 126
- TILE_SIZE, 105
- time limit, 202
- time.sleep(), 160
- top_left_x, 56, 64, 141
- top_left_y, 56, 64, 141
- toxic spills, 212
- training missions, 3
- True, 61, 71, 81, 83, 251
- tuple, 23, 30, 131, 252
- turning off instructions, 101, 107,
 - 112, 212, 213

U

- uncommenting, 147, 207, 212
- unexpected indent, 250
- uppercase, 251
- use_message, 173
- use_object(), 173, 174, 181, 185
- USE OBJECTS section, 172, 180
- using objects, 12, 171–173, 174–179

V

- values, in dictionaries, 80
- variables, 21, 29, 76, 105
 - as dictionary keys, 81
 - game progress, 174
 - global, 28, 30
 - increasing and decreasing values, 28
 - local, 129, 148, 157
 - names, 21, 22, 52
 - for player movement, 112
- VARIABLES section, 105, 199, 213

W

- walls, 68, 69, 70, 74, 99. *See also* exits
 - fading in and out, 142
 - front, 139
 - transparency, 130, 139, 142
- wall_transparency_frame, 131, 143
- .wav files, 201
- weight sensor. *See* pressure pad
- while command, 81, 250, 251
- while True, 81

- whiteboard, 215
- whole number, 71
- wide objects, 91, 106, 108, 157
- wide props, 156
- WIDTH, 22, 30, 55, 142
- Windows 8, starting IDLE in, 15
- Windows 10, starting IDLE in, 14
- Windows Explorer, 8
- window size, 22
- Windows PC, 4, 6, 8, 10

X

- x position, 22, 24, 98

Y

- "You're out of air!", 200
- y position, 23, 24, 98

Z

- ZIP file, 7, 8