decibel (dB), 62
design process, 86–88
detecting
  a clap, 62
  an obstacle, 60, 91, 112
  a person, 69–70
Display block, 11, 152–155
  clearing the screen, 156–158
  controlling image location, 154–157
  drawing, 155
    a circle, 155
    a line, 155, 156–158
  images, 152
  point, 155
  text, 12
  X and Y values, 152, 154
DisplayNumber My Block, 166–174, 205
  building, 167–172
  configuration items, 166, 171–172
  testing, 170
  using, 173, 204, 222, 243, 251
Don’t Repeat Yourself (DRY) principle, 138, 206
DoorChime program, 68–70, 161–164, 223–228, 230–232
  Download and Run Selected button, 50
  downloading a program, 9, 11
  drawing, See Display block
  DRY (Don’t Repeat Yourself) principle, 138, 206
Edit Constants dialog, 145
Edit Variables dialog, 131–132
edit-compile-test cycle, 13
ending a program, See Stop block
engineering, 4
error value, 244
  calculating, 246–247
  percent error, 245
exclusive or (xor), logic operation, 186
Exit button, 59, 147
feedback box, 48, 58
File Access block, 195–196, 200, 255
  Configuration Panel, 195–196
  and data types, 196, 200
  operations, 196
FileReader program, 200–201, 237–238
  files, 195–208
  closing, 196, 197, 202, 208
  common problems, 208
  common uses for, 195
  creating, 196, 215
  deleting, 196, 197, 207, 208
  downloading, 208
  errors in, 199–200
  gaps in, 214–216
  initial size, 215–216
  managing, 207–208
  naming, 196, 198
  reading, 196, 200, 208, 238
  uploading, 208, 212
  uses, 195
  writing, 196, 197, 200, 208
finding a light source, 140, 141
floor (floors), 103
feedback box, 48, 58
File Access block, 195–196, 200, 255
  Configuration Panel, 195–196
  and data types, 196, 200
  operations, 196
FileReader program, 200–201, 237–238
  files, 195–208
  closing, 196, 197, 202, 208
  common problems, 208
  common uses for, 195
  creating, 196, 215
  deleting, 196, 197, 207, 208
  downloading, 208
  errors in, 199–200
  gaps in, 214–216
  initial size, 215–216
  managing, 207–208
  naming, 196, 198
  reading, 196, 200, 208, 238
  uploading, 208, 212
  uses, 195
  writing, 196, 197, 200, 208
float, 183
  and the Number to Text block, 183
  precision, 183
  range, 183
frequency, 103
front panel, 14
front screen, 15
front window, 6
fuzzy logic, 19
G
  gain, 248
gears, 25
  generating a random number, 184
GentleStop program, 97–101, 112–113
Getting Started window, 7, 11
  grouping common settings, 138
  hard-coded values, 234
  hardware, 5
Hello program, 10–11
HelloDisplay program, 11–12
help file, 6, 103
  help panel, 9
hertz (Hz), 103
HiTechnic, 3
IDE (integrated development environment), 5, 7
initializing the display, 135
initializing variables, 140, 201–204
integer math, 179–180
division, 180
order of operations, 179
range of values, 179
scaling values, 180, 181
integrated development environment (IDE), 5, 7
Keep Alive block, 79–80
LabVIEW, 5
Light Sensor, 2, 63–64
  Configuration Panel, 63
  feedback box, 64
  trigger value, 64, 76
  View menu, 64
  Download and Run Selected button, 50
  downloading a program, 9, 11
  drawing, See Display block
LogicToText program, 113–116
loop, 185–186
Logic block, 185–186
  Configuration Panel, 186
  logic operations, 186
  See also individual operations
  logic value, 104
LogicToText program, 113–116
Loop block, 51–52, 79
  checking the condition at the beginning of the loop, 129
  checking two conditions, 187
Condition data plug, 125
Configuration Panel, 79
count data plug, 123
Control options, 79
Count data plug, 123
and data wires, 123–129
expanding, 226–227
the final loop count value, 124
and multiple Sequence Beams, 229
nested, 124
restarting a loop, 124
setting the loop condition, 125
loop body, 79
loop condition, 79
LoopCountTest program, 123, 229
LoopCountTest2 program, 124
LoopCountTest3 program, 124
LoopStartTest program, 229
Managing constants, 144–146
managing the custom palette, 174–175
managing memory, 207–208
managing variables, 131–132
magnifying glass tab, 9
manual routing of data wires, 101
Math block, 103, 255
maze, solving, 86–88
following a wall, 89–91
going through an opening, 93–95
testing, 95
turning a corner, 91–93
memory tab, 207
millisecond, 126
mindsensors, 3
MINDSTORMS NXT Kit, 1
building pieces, 2
versions, 3
MINDSTORMS software
sections, 7–9
versions, 2, 3, 9, 255–256
more help link, 9
Motor block, 52–53, 248
comparison with Move block, 53, 248
steering, 248–251
three phases of a motion, 52
motors, 2, 45
power, 45
speed, 45
Move block, 46–48, 248
comparison with Motor block, 53, 248
controlling the Power setting, 97–98
degrees and rotations, 47
determining duration, 49
feedback boxes, 48
following a curve, 50
next action, 48
problem with coasting, 53–55
random duration, 184–185
spinning the robot, 49
synchronized motion, 46
multiple Sequence Beams. See Sequence
Beams
multitasking, 221
My Block, 161–177. See also individual My
Block names
broken, 176
Builder window, 162
configuration settings, 164–166, 177
names, 165–166
copying, 175, 230
creating, 161–163
and data plugs, 164–166
adding, 177
and data wires, 164
deleting, 174
editing, 163–164
icons for, 162
moving, 174–175
nested, 176
organizing, 174–175
renaming, 174
and Sequence Beams, 230
sharing, 175
testing, 170
and variables, 176
My Portal, 8
MyBlockTest program, 230
N
National Instruments, 5
Navigation Panel, 9
nested blocks, 78
not, logic operation, 186
Number to Text block, 105, 255
Configuration Panel, 105
and floating-point numbers, 183
NXT Button block, 148
Configuration Panel, 148
NXT buttons, 147
adjusting a value, 150
clearing the screen, 156–158
controlling a loop, 149
pressed vs. bumped, 151–152, 237
NXT Data Logging application, 219–220
NXT Intelligent Brick, 3
NXT-G, 5
moving from 1.1 to 2.0, 255
side-by-side installation, 256
NXTSketch program, 155–159
O
Odometer program, 181–182
off-by-one error, 124
old programs, using, 256
online community. See websites, NXT-G
or, logic operation, 186
out of memory error, 207
P
percent error, 245
persistence, 195
pixel, 152
Play button, 11
pointer tool, 15
port, 58
PowerSetting program, 148–152, 173
PowerSettingWithImages program,
153–155
precision, 183
program flow, 73
and multiple Sequence Beams, 229–230
programmable timers, 126–129
programs. See also individual program names
assumptions, 88, 233
copying, 175
downloading, 9
initial condition, 88
instructions, 235-238
practices, 6, 61, 93, 95, 137, 138, 166, 232
qualities of good, 4
requirements, 86, 233
running, 11
sharing, 174
testing, 90
writing, 9
ProgTimer1 My Block, 164–165
prompting the user, 235-238
proportional controller, 244
pseudocode, 83–85
question mark tab, 9
Random block, 184
Configuration Panel, 184, 185
limits, 184
Range block, 189
reading a program configuration file, 238-241
Record/Play block, 55–56
RedOrBlue program, 64–67, 189-192
RedOrBlueColorMode program, 64–67, 192-194
RedOrBlueCount program, 133-137, 197-199, 201-206
refactoring, 206
reflected light, measuring, 63
remembering, a position, 140
remote control tool, 56
requirements, 4
for programs, 86, 233
Reset Motor block, 55
returning to a position, 143-144
right-hand rule algorithm, 86
Robo Center, 8
Rotation Sensor, 2, 45, 70-71
Configuration Panel, 70
Rotation Sensor block, 70-71
NXT-G 1.1 vs. NXT-G 2.0, 103, 158-159, 256
saving your work, 10
scaling values, 180
Sensor blocks, 57, 99, 113
advantages of, 113
sensors, 2, 57. See also individual sensor names
selecting a port, 61
Sequence Beams, 9, 73
adding, 221-223, 225-226
keeping out of trouble, 232
multiple, 221-232
and My Blocks, 230
and program flow, 229-230
synchronizing, 230-232
side-by-side installation, 256
SimpleMove program, 46
simplifying assumption, 64
sleep timer, 79
software, 5
Sound block, 10, 69, 103
controlling tone with, 103-104
controlling volume with, 102, 117
and debugging, 95
playing sound file with, 10
playing tone with, 69
Sound Sensor, 2, 61-62
Configuration Panel, 61
trigger value, 61
View menu, 62
SoundMachine program, 101-109, 117-121
source code, 9, 83
for example programs, 6
square root, 103
stall, motor, 47
Start Data Logging block, 217-218
Start New Program. See Create New Program
steering, 47-48
Stop block, 80
Stop Data Logging block, 217-218
storing
program data, 195, 197-199, 201-205
program settings, 195, 235-238
Switch block, 64–65, 73-75, 255
and comments, 78
conditions list, 116-117
adding a condition, 116
the default condition, 117, 119
fixing the order, 119-120
removing a condition, 116
Configuration Panel, 74–75
and data types, 111
and data wires 111-121
connecting data wires, 111
114-116, 120
input data plug, 111
multiple Sequence Beams, 229
passing data in, 113
passing data out, 113-114
Flat and Tabbed View, 74, 78, 113
more than two choices, 76, 116-117
nested, 77
numbers as input, 117
NXT-G 1.1 vs. NXT-G 2.0, 117
tabs, 74, 121
trigger, 74
value control, 111
target value, 239
Temperature Sensor, 3
testing, 13, 52, 93, 137, 242
single block, 50
Text block, 107
combining values, 212-214
Configuration Panel, 107
text value, 104
ThereAndBack program, 49-50
three-state controller, 243
time values, 126
timer block, 125-126
Configuration Panel, 125
range of values, 126
trigger, 126
Timer1 program, 126
Timer2 program, 127
Timer3 program, 129
timers, 125
timestamp, 212
Touch Sensor, 2, 58
  Configuration Panel, 58
feedback box, 58
  View menu, 59
  waiting for the user, 66
Touch Sensor block, 114
TriBot, building instructions, 17
  alternate placement for Color Sensor, 42
  alternate placement for Ultrasonic Sensor, 43
  wires, 41
  trigger, 58, 74, 234–235
  truth table, 186
  tuning a controller, 248
U
Ultrasonic Sensor, 2, 68
  Configuration Panel, 68
feedback box, 68
  inches and centimeters, 99
  range, 68
  trigger, 68, 69
  View menu, 68
Ultrasonic Sensor block, 99
undo, 10
USB, 11
V
Variable block, 132
  Configuration Panel, 132
variables, 131-144, 243
  creating, 131-132, 133-134
  and data types, 132
  deleting, 132
  in place of long data wires, 138, 243
  initializing, 140, 201-204
  and My Blocks, 176
  naming, 132, 133
VerifyLightPointer program, 209-217
VerifyLightPointer2 program, 218-219
Vernier, 3
  View menu, 48, 59
W
Wait block
  Sensor, 57
  Time, 13
Wait for Completion, 13
WallFollower program, 83–96
websites, NXT-G, 2, 253
wheel circumference, 181
wheels as dials, 101-102, 155-158
  NXT-G 2.0, 158
whole numbers. See integer math
work area, 8
X
xor. See exclusive or (xor), logic operation