Be Prepared for the AP Computer Science Exam in Java

Maria Litvin
Phillips Academy, Andover, Massachusetts

Gary Litvin
Skylight Publishing, Andover, Massachusetts

Skylight Publishing
Andover, Massachusetts
Brief Contents

Preface vii
How to Use This Book x
Chapter 1. Exam Format, Grading, and Tips 1
Chapter 2. Java Features, Part 1 13
Chapter 3. Java Features, Part 2 47
Chapter 4. Program Design and OOP Concepts 71
Chapter 5. Algorithms 83
Chapter 6. Annotated Solutions to Past Free-Response Questions 105

Practice Exams 105
Answers and Solutions 259
Index 299
About the Authors

**Maria Litvin** has taught computer science and mathematics at Phillips Academy in Andover, Massachusetts, since 1987. She is an AP Computer Science exam reader and Table Leader and, as a consultant for The College Board, provides AP training for high school computer science teachers. Maria is a recipient of the 1999 Siemens Award for Advanced Placement for Mathematics, Science, and Technology for New England and of the 2003 RadioShack National Teacher Award. Prior to joining Phillips Academy, Maria taught computer science at Boston University.

Maria has co-authored the earlier, C++ version of *Be Prepared* (Skylight Publishing, 1999) and several popular computer science textbooks: *C++ for You++: An Introduction to Programming and Computer Science*, which was the leading high school textbook for AP Computer Science courses in the C++ era, *Java Methods: Object-Oriented Programming and Data Structures*, now in its third AP Edition, and *Coding in Python and Elements of Discrete Mathematics* (Skylight Publishing, 2019).

**Gary Litvin** is a co-author of *C++ for You++*, the *Java Methods* series, and *Coding in Python and Elements of Discrete Mathematics*. Gary has worked in many areas of software development including artificial intelligence, pattern recognition, computer graphics, and neural networks. As the founder of Skylight Software, Inc., he developed SKYLIGHTS/GX, one of the first visual programming tools for C and C++ programmers. Gary led in the development of several state-of-the-art software products, including interactive touch screen development tools, OCR and handwritten character recognition systems, and credit card fraud detection software.
Contents

Preface vii

How to Use This Book x

Chapter 1. Exam Format, Grading, and Tips 1
  1.1. Exam Format and Materials 1
  1.2. The Java Subset 2
  1.3. Tested Terms, Concepts, and Algorithms 5
  1.4. Grading 6
  1.5. College Credit 8
  1.6. Exam Taking Tips 8

Chapter 2. Java Features, Part 1 13
  2.1. Variables; Arithmetic, Relational, and Logical Operators 13
  2.2. Conditional Statements and Loops 22
  2.3. Strings 31
  2.4. Integer and Double Classes 35
  2.5. Arrays 37
  2.6. The ArrayList Class 44

Chapter 3. Java Features, Part 2 47
  3.1. Classes 47
  3.2. Static Variables and Methods 52
  3.3. Calling Methods 55
  3.4. Random Numbers 65
  3.5. Input and Output 66
  3.6. Exceptions 68

Chapter 4. Program Design and OOP Concepts 71
  4.1. Program Design and Development Methodology 71
  4.2. Inheritance 72
  4.3. Class Hierarchies 76
  4.4. Polymorphism 78
  4.5. The “Class” Question 80
**Chapter 5. Algorithms**  
5.1. Iterations 83  
5.2. Sequential Search and Binary Search 90  
5.3. Selection and Insertion Sorts 93  
5.4. Recursion 96  
5.5. Mergesort 101

**Chapter 6. Annotated Solutions to Past Free-Response Questions**  
[www.skylit.com/beprepared](http://www.skylit.com/beprepared)

**Practice Exams**  
Exam #1 107  
Exam #2 137  
Exam #3 167  
Exam #4 195  
Exam #5 227

**Answers and Solutions**  
Exam #1 259  
Exam #2 267  
Exam #3 275  
Exam #4 283  
Exam #5 291

**Index**  
299

**Index to Free-Response Questions**  
303