

Contents

Preface	ix
Introduction	xi
General Information About the Exam	xi
Hints for Taking the Exam	xii
The Multiple-Choice Section	xii
The Free-Response Section	xii
How to Use This Book	xiii
Practice Exam One / Diagnostic Test	1
Computer Science Section I	5
Computer Science Section II	33
Answer Key (Section I)	45
Diagnostic Chart for Practice Exam	45
Answers Explained	47
Chapter 1. Introductory Java Language Features	57
Packages and Classes	57
Javadoc Comments	59
Types and Identifiers	60
Identifiers	60
Built-in Types	60
Storage of Numbers	61
Hexadecimal and Octal Numbers	62
Final Variables	63
Operators	63
Arithmetic Operators	63
Relational Operators	64
Logical Operators	65
Assignment Operators	66
Increment and Decrement Operators	66
Operator Precedence	67
Input/Output	67
Input	67
Output	67
Escape Sequences	68
Control Structures	69
Decision-Making Control Structures	69
Iteration	71
Errors and Exceptions	74
Multiple-Choice Questions on Introductory Java Language Concepts	77
Answer Key	88
Answers Explained	88

Chapter 2. Classes and Objects	92
4 Objects	92
4 Classes	93
4 Public, Private, and Static	94
4 Methods	95
Headers	95
Types of Methods	95
Method Overloading	99
6 Scope	100
4 6 The this Keyword	100
References	101
Reference vs. Primitive Data Types	101
The Null Reference	103
Method Parameters	103
Multiple-Choice Questions on Classes and Objects	111
Answer Key	126
Answers Explained	126
Chapter 3. Inheritance and Polymorphism	131
9 Inheritance	131
Superclass and Subclass	131
Inheritance Hierarchy	131
Implementing Subclasses	132
Declaring Subclass Objects	137
2 9 Polymorphism	138
Dynamic Binding (Late Binding)	138
Using super in a Subclass	139
Type Compatibility	140
Downcasting	140
16 The ClassCastException	142
9 Abstract Classes	142
Abstract Class	142
The abstract Keyword	142
8 Interfaces	144
Interface	144
Defining an Interface	145
The implements Keyword	145
The Comparable Interface	145
Multiple-Choice Questions on Inheritance and Polymorphism	150
Answer Key	169
Answers Explained	169
Chapter 4. Some Standard Classes	174
10 The Object Class	174
The Universal Superclass	174
Methods in Object	174
2 The String Class	177
String Objects	177
Constructing String Objects	177
The Concatenation Operator	178

	Comparison of String Objects	178
	Other String Methods	179
2	Wrapper Classes	180
	The Integer Class	181
	The Double Class	182
2	The Math Class	183
	Random Numbers	184
	Multiple-Choice Questions on Standard Classes	187
	Answer Key	200
	Answers Explained	200
	Chapter 5. Program Design and Analysis	207
	The Software Development Life Cycle	207
	4 The Waterfall Model	207
6	4 Program Specification	208
6	4 Program Design	208
6	4 Program Implementation	208
6	10 Testing and Debugging	208
6	10 Program Maintenance	210
	Object-Oriented Program Design	210
	Identifying Classes	210
	Identifying Behaviors	211
	Determining Relationships Between Classes	211
	UML Diagrams	212
	Implementing Classes	212
	Implementing Methods	213
	Vocabulary Summary	219
	Program Analysis	219
	Program Correctness	219
	Assertions	219
	Efficiency	220
	Multiple-Choice Questions on Program Design and Analysis	221
	Answer Key	230
	Answers Explained	230
	Chapter 6. Arrays and Array Lists	233
5	One-Dimensional Arrays	233
	Initialization	233
	Length of Array	234
	Traversing an Array	235
	Arrays as Parameters	235
	Array Variables in a Class	238
	Array of Class Objects	239
	Analyzing Array Algorithms	240
7	Array Lists	241
	The Collections API	241
	The Collections Hierarchy	242
	Collections and Generics	242
	Auto-Boxing and -Unboxing	242
8	7 The List<E> Interface	243

	The Methods of List<E>	243
	The ArrayList<E> Class	244
	Using ArrayList<E>	245
9	Collections and Iterators	247
	Definition of an Iterator	247
	The Iterator<E> Interface	247
	Using a Generic Iterator	247
5	Two-Dimensional Arrays	249
	Declarations	250
	Matrix as Array of Row Arrays	250
	Processing a Two-Dimensional Array	251
	Two-Dimensional Array as Parameter	253
	Multiple-Choice Questions on Arrays and Array Lists	255
	Answer Key	284
	Answers Explained	284
11	Chapter 7. Recursion	290
	Recursive Methods	290
	General Form of Simple Recursive Methods	291
	Writing Recursive Methods	293
	Analysis of Recursive Methods	294
	Sorting Algorithms That Use Recursion	295
	Recursive Helper Methods	295
	Recursion in Two-Dimensional Grids	298
	Sample Free-Response Question 1	300
	Sample Free-Response Question 2	303
	Multiple-Choice Questions on Recursion	308
	Answer Key	319
	Answers Explained	319
	Chapter 8. Sorting and Searching	324
12	Sorts: Selection and Insertion Sorts	324
	Selection Sort	324
	Insertion Sort	325
12	Recursive Sorts: Mergesort and Quicksort	325
	Mergesort	325
	Quicksort	327
12	Sorting Algorithms in Java	328
5	Sequential Search	329
5	Binary Search	329
	Multiple-Choice Questions on Sorting and Searching	331
	Answer Key	346
	Answers Explained	346
	Chapter 9. The AP Computer Science A Labs	351
3	The Magpie Lab	351
	Special Emphasis	352
9	The Elevens Lab	353
	Special Emphasis	354

5	The Picture Lab	356
	Special Emphasis	356
	Multiple-Choice Questions on the Lab Concepts	360
	Answer Key	373
	Answers Explained	373
	Practice Exams	377
	Practice Exam Two	379
	Computer Science Section I	381
	Computer Science Section II	408
	Answer Key (Section I)	420
	Answers Explained	420
	Practice Exam Three	433
	Computer Science Section I	435
	Computer Science Section II	460
	Answer Key (Section I)	472
	Answers Explained	472
	Appendix: Glossary of Useful Computer Terms	482
	Index	485