

Contents

Corresponding units in
Mr Minich's Java class

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	32
Answer Key (Section I)	44
Diagnostic Chart for Practice Exam	44
Answers Explained	46
Chapter 1. Introductory Java Language Features	56
Packages and Classes	56
Types and Identifiers	58
2 Identifiers	58
2 Built-in Types	58
2 Storage of Numbers	59
1 Hexadecimal and Octal Numbers	60
2 4 Final Variables	61
Operators	62
2 Arithmetic Operators	62
3 Relational Operators	63
3 Logical Operators	64
2 Assignment Operators	64
2 Increment and Decrement Operators	65
2 Operator Precedence	65
Input/Output	66
2 Input	66
1 Output	66
1 Escape Sequences	67
Control Structures	67
3 Decision-Making Control Structures	67
1 Iteration	69
10 Errors and Exceptions	73
Multiple-Choice Questions on Introductory Java Language Concepts . .	75
Answer Key	86
Answers Explained	86

	Chapter 2. Classes and Objects	90
4	6 Objects	90
4	6 Classes	91
4	6 Public, Private, and Static	91
4	6 Methods	92
	4 Headers	92
	4 Types of Methods	93
	4 Method Overloading	96
4	Scope	97
	4 The this Keyword	97
	References	98
2	4 Reference vs. Primitive Data Types	98
	4 The Null Reference	99
	4 Method Parameters	100
	Multiple-Choice Questions on Classes and Objects	108
	Answer Key	123
	Answers Explained	123
	Chapter 3. Inheritance and Polymorphism	128
10	Inheritance	128
	Superclass and Subclass	128
	Inheritance Hierarchy	128
	Implementing Subclasses	129
	Declaring Subclass Objects	134
2	10 Polymorphism	135
	Dynamic Binding (Late Binding)	135
10	Type Compatibility	136
	Downcasting	136
	The ClassCastException	137
9	Abstract Classes	138
	Abstract Class	138
	The abstract Keyword	138
9	Interfaces	140
	Interface	140
	Defining an Interface	140
	The implements Keyword	141
	The Comparable Interface	141
	Sample Free-Response Question	144
	Multiple-Choice Questions on Inheritance and Polymorphism	148
	Answer Key	166
	Answers Explained	166
	Chapter 4. Some Standard Classes	171
10	The Object Class	171
	The Universal Superclass	171
	Methods in Object	171
2	The String Class	174
	String Objects	174
	Constructing String Objects	174
	The Concatenation Operator	175

	Comparison of String Objects	175
	Other String Methods	176
2	Wrapper Classes	177
	The Integer Class	178
	The Double Class	179
2	The Math Class	180
	Random Numbers	181
	Multiple-Choice Questions on Standard Classes	184
	Answer Key	199
	Answers Explained	199
Chapter 5. Program Design and Analysis		206
	The Software Development Life Cycle	206
4	The Waterfall Model	206
4	Program Specification	207
4	Program Design	207
4	Program Implementation	207
11	Testing and Debugging	207
11	Program Maintenance	209
	Object-Oriented Program Design	209
4	6 Identifying Classes	209
4	6 Identifying Behaviors	210
4	6 Determining Relationships Between Classes	210
	6 UML Diagrams	211
	6 Implementing Classes	211
	6 Implementing Methods	212
	6 Vocabulary Summary	215
	Program Analysis	216
5	11 Program Correctness	216
5	11 Assertions	216
5	11 Efficiency	217
	Multiple-Choice Questions on Program Design and Analysis	218
	Answer Key	227
	Answers Explained	227
Chapter 6. Arrays and Array Lists		230
5	One-Dimensional Arrays	230
	Initialization	230
	Length of Array	231
	Traversing an Array	232
	Arrays as Parameters	232
	Array Variables in a Class	235
	Array of Class Objects	236
	Analyzing Array Algorithms	237
8	Array Lists	238
	The Collections API	238
	The Collections Hierarchy	239
	Collections and Generics	239
	Auto-Boxing and -Unboxing	239
8	The List<E> Interface	240

	The Methods of List<E>	240
	The ArrayList<E> Class	241
	Using ArrayList<E>	241
9	Collections and Iterators	243
	Definition of an Iterator	243
	The Iterator<E> Interface	243
	Using a Generic Iterator	244
5	Two-Dimensional Arrays	246
	Declarations	246
	Processing a Two-Dimensional Array	247
	Two-Dimensional Array as Parameter	248
	Multiple-Choice Questions on Arrays and Array Lists	250
	Answer Key	279
	Answers Explained	279
12	Chapter 7. Recursion	285
	Recursive Methods	285
	General Form of Simple Recursive Methods	286
	Writing Recursive Methods	288
	Analysis of Recursive Methods	289
	Sorting Algorithms That Use Recursion	290
	Recursive Helper Methods	290
	Recursion in Two-Dimensional Grids	293
	Sample Free-Response Question 1	295
	Sample Free-Response Question 2	298
	Multiple-Choice Questions on Recursion	303
	Answer Key	314
	Answers Explained	314
	Chapter 8. Sorting and Searching	319
13	Sorts: Selection and Insertion Sorts	319
	Selection Sort	319
	Insertion Sort	320
13	Recursive Sorts: Mergesort and Quicksort	320
	Mergesort	320
	Quicksort	322
13	Sorting Algorithms in Java	323
8	Sequential Search	324
8	Binary Search	324
	Multiple-Choice Questions on Sorting and Searching	326
	Answer Key	341
	Answers Explained	341
7	Chapter 9. The GridWorld Case Study	346
	Overview	346
	The Classes	346
	The Actors	347
	The Location Class	348
	Description	348
	Methods	350

The Actor Class	350
Description	350
Methods	351
The Rock and Flower Classes	352
The Rock Class	352
The Flower Class	352
The Bug Class	352
Description	352
Methods	353
The BoxBug Class	354
Description	354
Methods	355
The Critter Class	355
Description	355
Methods	356
The ChameleonCritter Class	357
Description	357
Methods	358
The Grid<E> Interface	358
Methods	358
The AbstractGrid<E> Class	358
Description	358
Methods	359
The BoundedGrid<E> and UnboundedGrid<E> Classes	360
Description	360
Methods	361
The Case Study and the AP Exam	364
Multiple-Choice Questions on the Case Study	366
Answer Key	384
Answers Explained	384
 Practice Exams	 389
 Practice Exam Two	 391
Computer Science Section I	393
Computer Science Section II	418
Answer Key (Section I)	429
Answers Explained	429
 Practice Exam Three	 441
Computer Science Section I	443
Computer Science Section II	469
Answer Key (Section I)	479
Answers Explained	479
 Appendix: Glossary of Useful Computer Terms	 490
 Index	 493