

Contents

Introduction	1
Who Should Use This Book	1
The Book's Philosophy	2
Overview of This Book	2
Conventions Used in This Book	5
Index to the Icons	5
Margin Graphics (Book Diagrams)	6
Companion Disk Offer	8
 I Introduction to C++	
1 Welcome to C++	11
What C++ Can Do for You	12
The Background of C++	15
C++ Compared with Other Languages	16
C++ and Microcomputers	17
An Overview of Your Computer	19
Hardware	19
Software	29
Review Questions	33
Summary	34
2 What Is a Program?	35
Computer Programs	36
Program Design	38
Using a Program Editor	40
Using a C++ Compiler	42
Running a Sample Program	44
Handling Errors	46
Review Questions	48
Summary	49

3	Your First C++ Program	51
	Looking at a C++ Program.....	52
	The Format of a C++ Program	53
	Readability Is the Key.....	54
	Uppercase Versus Lowercase.....	55
	Braces and main()	56
	Comments in C++	57
	Explaining the Sample Program	60
	Review Questions	66
	Summary	67
4	Variables and Literals	69
	Variables	70
	Naming Variables	70
	Variable Types	72
	Declaring Variables	73
	Looking at Data Types	75
	Assigning Values to Variables	80
	Literals.....	82
	Assigning Integer Literals.....	83
	Assigning String Literals.....	85
	Assigning Character Literals	89
	Constant Variables	94
	Review Questions	95
	Review Exercises	97
	Summary	97
5	Character Arrays and Strings	99
	Character Arrays	100
	Character Arrays Versus Strings	103
	Review Questions	110
	Review Exercises	111
	Summary	111
6	Preprocessor Directives	113
	Understanding Preprocessor Directives	114
	The #include Directive	115
	The #define Directive	120

Review Questions	128
Review Exercises	130
Summary	130
7 Simple Input/Output	133
The cout Operator	134
Printing Strings.....	134
The cin Operator	144
printf() and scanf()	149
The printf() Function	149
Conversion Characters	151
The scanf() Function	154
Review Questions	157
Review Exercises	158
Summary	159
II Using C++ Operators	
8 Using C++ Math Operators and Precedence	163
C++'s Primary Math Operators.....	164
The Unary Operators.....	165
Division and Modulus.....	167
The Order of Precedence	168
Using Parentheses	170
The Assignment Statements	174
Multiple Assignments	175
Compound Assignments	176
Mixing Data Types in Calculations	178
Type Casting	179
Review Questions	182
Review Exercises	183
Summary	184
9 Relational Operators	185
Defining Relational Operators.....	186
The if Statement	189
The else Statement	199

Contents ♦

Review Questions	203
Review Exercises	204
Summary	205
10 Logical Operators	207
Defining Logical Operators.....	207
Logical Operators and Their Uses	209
C++'s Logical Efficiency	211
Logical Operators and Their Precedence	216
Review Questions	217
Review Exercises	218
Summary	219
11 Additional C++ Operators	221
The Conditional Operator	222
The Increment and Decrement Operators	225
The sizeof Operator	230
The Comma Operator	232
Bitwise Operators	234
Bitwise Logical Operators.....	235
Review Questions	242
Review Exercises	243
Summary	243
III C++ Constructs	
12 The while Loop	245
The while Statement.....	246
The Concept of Loops	247
The do-while Loop	252
The if Loop Versus the while Loop	255
The exit() Function and break Statement	256
Counters and Totals	260
Producing Totals	265
Review Questions	268
Review Exercises	269
Summary	270

13 The for Loop	273
The for Statement	274
The Concept of for Loops	274
Nested for Loops	286
Review Questions	292
Review Exercises	293
Summary	293
14 Other Loop Options	295
Timing Loops	296
The break and for Statements	298
The continue Statement	303
Review Questions	308
Review Exercises	308
Summary	309
15 The switch and goto Statements	311
The switch Statement	312
The goto Statement	321
Review Questions	327
Review Exercises	328
Summary	328
16 Writing C++ Functions	331
Function Basics	332
Breaking Down Problems	333
More Function Basics	335
Calling and Returning Functions	337
Review Questions	349
Summary	350

IV Variable Scope and Modular Programming

17 Variable Scope	353
Global Versus Local Variables	354
Defining Variable Scope	355
Use Global Variables Sparingly	362
The Need for Passing Variables	363
Automatic Versus Static Variables	369

Three Issues of Parameter Passing.....	374
Review Questions	375
Review Exercises	375
Summary	377
18 Passing Values	379
Passing by Value (by Copy)	379
Passing by Address (by Reference)	385
Variable Addresses	385
Sample Program	386
Passing Nonarrays by Address	391
Review Questions	394
Review Exercises	395
Summary	396
19 Function Return Values and Prototypes ...	397
Function Return Values	398
Function Prototypes	405
Prototype for Safety	407
Prototype All Functions	407
Review Questions	412
Review Exercises	412
Summary	413
20 Default Arguments and Function Overloading	415
Default Argument Lists	416
Multiple Default Arguments	417
Overloaded Functions	420
Review Questions	426
Review Exercises	426
Summary	427
V Character Input/Output and String Functions	
21 Device and Character Input/Output	431
Stream and Character I/O	432
Standard Devices	434
Redirecting Devices from MS-DOS	435

Printing Formatted Output to the Printer	436
Character I/O Functions	437
The get() and put() Functions	438
The getch() and putch() Functions	444
Review Questions	446
Review Exercises	447
Summary	448
 22 Character, String, and Numeric Functions	449
Character Functions	450
Character Testing Functions	450
Alphabetic and Digital Testing	450
Special Character-Testing Functions	453
Character Conversion Functions	453
String Functions	455
Useful String Functions	456
String I/O Functions	456
Converting Strings to Numbers	460
Numeric Functions	461
Useful Mathematical Functions	461
Trigonometric Functions	464
Logarithmic Functions	465
Random-Number Processing	465
Review Questions	467
Review Exercises	468
Summary	469
 VI Arrays and Pointers	
 23 Introducing Arrays	473
Array Basics	474
Initializing Arrays	479
Initializing Elements at Declaration Time	479
Initializing Elements in the Program	486
Review Questions	491
Review Exercises	491
Summary	492

24	Array Processing	493
	Searching Arrays	494
	Searching for Values	496
	Sorting Arrays	501
	Advanced Referencing of Arrays.....	508
	Review Questions	515
	Review Exercises	516
	Summary	517
25	Multidimensional Arrays.....	519
	Multidimensional Array Basics	520
	Reserving Multidimensional Arrays	522
	Mapping Arrays to Memory.....	524
	Defining Multidimensional Arrays	526
	Tables and for Loops	530
	Review Questions	537
	Review Exercises	538
	Summary	538
26	Pointers	541
	Introduction to Pointer Variables	542
	Declaring Pointers	543
	Assigning Values to Pointers	545
	Pointers and Parameters	546
	Arrays of Pointers.....	551
	Review Questions	553
	Summary	555
27	Pointers and Arrays	557
	Array Names as Pointers.....	558
	Pointer Advantages	560
	Using Character Pointers	563
	Pointer Arithmetic	568
	Arrays of Strings	574
	Review Questions	578
	Review Exercises	579
	Summary	580

VII Structures and File Input/Output

28 Structures	583
Introduction to Structures	584
Defining Structures	587
Initializing Structure Data	591
Nested Structures	600
Review Questions	603
Review Exercises	604
Summary	604
29 Arrays of Structures	605
Declaring Arrays of Structures	606
Arrays as Members	615
Review Questions	623
Review Exercises	624
Summary	624
30 Sequential Files	625
Why Use a Disk?	626
Types of Disk File Access	627
Sequential File Concepts	628
Opening and Closing Files	629
Writing to a File	635
Writing to a Printer	637
Adding to a File	638
Reading from a File	639
Review Questions	642
Review Exercises	643
Summary	644
31 Random-Access Files	645
Random File Records	646
Opening Random-Access Files	647
The seekg() Function	649
Other Helpful I/O Functions	656
Review Questions	658
Review Exercises	658
Summary	659

32	Introduction to Object-Oriented Programming	661
	What Is a Class?	662
	Data Members	662
	Member Functions	662
	Default Member Arguments	670
	Class Member Visibility	674
	Review Questions	676
	Review Exercise	676
	Summary	676

VIII References

A	Memory Addressing, Binary, and Hexadecimal Review	679
	Computer Memory	680
	Memory and Disk Measurements	680
	Memory Addresses	681
	Bits and Bytes	682
	The Order of Bits	686
	Binary Numbers	686
	Binary Arithmetic	690
	Binary Negative Numbers	692
	Hexadecimal Numbers	695
	Why Learn Hexadecimal?	697
	How Binary and Addressing Relate to C++	698
B	Answers to Review Questions	701
C	ASCII Table	719
D	C++ Precedence Table	729
E	Keyword and Function Reference	733
	stdio.h	734
	ctype.h	734
	string.h	735
	math.h	735
	stdlib.h	735

F The Mailing List Application	737
Glossary	747
Index	761