Self-Review Exercises

1.1   Fill in the blanks in each of the following statements:
a) Computers process data under the control of sets of instructions called _____.
ANS: programs.
b) The key logical units of the computer are the _____, _____, _____, _____, _____ and _____.
ANS: input unit, output unit, memory unit, central processing unit, arithmetic and logic unit, secondary storage unit.
c) The three types of languages discussed in the chapter are _____, _____ and _____.
ANS: machine languages, assembly languages, high-level languages.
d) The programs that translate high-level-language programs into machine language are called _____.
ANS: compilers.
e) _____ is an operating system for mobile devices based on the Linux kernel and Java.
ANS: Android.
f) _____ software is generally feature complete, (supposedly) bug free and ready for use by the community.
ANS: Release candidate.
g) The Wii Remote, as well as many smartphones, use a(n) _____ which allows the device to respond to motion.
ANS: acceleromoter.
h) C is widely known as the development language of the _____ operating system.
ANS: UNIX.
i) _____ is the new programming language for developing iOS and Mac apps.
ANS: Swift.

1.2   Fill in the blanks in each of the following sentences about the C environment.
a) C programs are normally typed into a computer using a(n) _____ program.
ANS: editor.
b) In a C system, a(n) _____ program automatically executes before the translation phase begins.
ANS: preprocessor.
c) The two most common kinds of preprocessor directives are _____ and _____.
ANS: including other files in the file to be compiled, performing various text replacements.
d) The _____ program combines the output of the compiler with various library functions to produce an executable image.
ANS: linker.
e) The _____ program transfers the executable image from disk to memory.
ANS: loader.

1.3   Fill in the blanks in each of the following statements (based on Section 1.8):
a) Objects have the property of _____—although objects may know how to communicate with one another across well-defined interfaces, they normally are not allowed to know how other objects are implemented.
ANS: information hiding.
b) In object-oriented programming languages, we create _____ to house the set of methods that perform tasks.
ANS: classes.

c) With _____, new classes of objects are derived by absorbing characteristics of existing classes, then adding unique characteristics of their own.
ANS: inheritance.
d) The size, shape, color and weight of an object are considered _____ of the object's class.
ANS: attributes.

Exercises

1.4 Categorize each of the following items as either hardware or software:
a) CPU
ANS: Hardware.
b) C++ compiler
ANS: Software.
c) ALU
ANS: Hardware.
d) C++ preprocessor
ANS: Software.
e) input unit
ANS: Hardware.
f) an editor program
ANS: Software.

1.5 Fill in the blanks in each of the following statements:
a) The logical unit that receives information from outside the computer for use by the computer is the _____.
ANS: input unit.
b) The process of instructing the computer to solve a problem is called _____.
ANS: computer programming.
c) _____ is a type of computer language that uses Englishlike abbreviations for machine-language instructions.
ANS: assembly language.
d) _____ is a logical unit that sends information which has already been processed by the computer to various devices so that it may be used outside the computer.
ANS: output unit.
e) _____ and _____ are logical units of the computer that retain information.
ANS: memory unit, secondary storage unit.
f) _____ is a logical unit of the computer that performs calculations.
ANS: ALU.
g) _____ is a logical unit of the computer that makes logical decisions.
ANS: ALU.
h) _____ languages are most convenient to the programmer for writing programs quickly and easily.
ANS: high-level.
i) The only language a computer can directly understand is that computer's _____.
ANS: machine language.
j) The _____ is a logical unit of the computer that coordinates the activities of all the other logical units.
ANS: CPU.

1.6 Fill in the blanks in each of the following statements:

a) _____ is now used to develop large-scale enterprise applications, to enhance the functionality of web servers, to provide applications for consumer devices and for many other purposes.
ANS: Java
b) _____ initially became widely known as the development language of the UNIX operating system.
ANS: C.
c) The _____ programming language was developed by Bjarne Stroustrup in the early 1980s at Bell Laboratories.
ANS: C++.

1.7   Discuss the meaning of each of the following names:
a) `stdin`
ANS: `stdin` (the standard input stream), which is normally the keyboard, but `stdin` can be connected to another stream.
b) `stdout`
ANS: Data is often output to `stdout` (the standard output stream), which is normally the computer screen, but `stdout` can be connected to another stream.
c) `stderr`
ANS: The standard error stream is referred to as `stderr`. The `stderr` stream (normally connected to the screen) is used for displaying error messages. It's common to route regular output data, i.e., `stdout`, to a device other than the screen while keeping `stderr` assigned to the screen so that the user can be immediately informed of errors.

1.8   Why is so much attention today focused on object-oriented programming?
ANS: Object-oriented programming helps you write reusable software components that model items in the real world. Using a modular, object-oriented design-and-implementation approach can make software-development groups more productive.

1.9   *(Internet Negatives)* Besides their numerous benefits, the Internet and the web have several downsides, such as privacy issues, identity theft, spam and malware. Research some of the negative aspects of the Internet. List five problems and describe what could possibly be done to help solve each.
ANS: Answers will vary.

1.10   *(Watch as an Object)* You are probably wearing on your wrist one of the most common types of objects—a watch. Discuss how each of the following terms and concepts applies to the notion of a watch: object, attributes, behaviors, class, inheritance (consider, for example, an alarm clock), messages, encapsulation and information hiding.
ANS: The entire watch is an object that is composed of many other objects (such as the moving parts, the band, the face, etc.) Watch attributes are time, color, band, style (digital or analog), etc. The behaviors of the watch include setting the time and getting the time. A watch can be considered a specific type of clock (as can an alarm clock). With that in mind, it is possible that a class called `Clock` could exist from which other classes such as watch and alarm clock could inherit the basic features in the clock. The watch is an abstraction of the mechanics needed to keep track of the time. The user of the watch does not need to know the mechanics of the watch in order to use it; the user only needs to know that the watch keeps the proper time. In this sense, the mechanics of the watch are encapsulated (hidden) inside the watch. The interface to the watch (its face and controls for setting the time) allows the user to set and get the time. The user is not allowed to directly touch the internal mechanics of the watch. All interaction with the internal mechanics is controlled by the in-