# Chapter 1 Java Answers

## Section 1.1

* a) programs
* b) input unit, output unit, memory unit, arithmetic and logic unit (ALU), control unit, secondary storage unit
* c) machine languages, assembly languages, high-level languages
* d) compilers
* e) Android
* f) production (or release) software
* g) accelerometer

## Section 1.2

* a) java
* b) javac
* c) .java
* d) .class
* e) bytecodes

## Section 1.3

* a) information hiding (or encapsulation)
* b) classes
* c) object-oriented analysis and design (OOAD)
* d) inheritance
* e) UML (Unified Modeling Language)
* f) attributes (or properties)

## Section 1.4

* a) input unit
* b) programming
* c) assembly language
* d) output unit
* e) memory unit and secondary storage unit
* f) arithmetic and logic unit (ALU)
* g) arithmetic and logic unit (ALU)
* h) high-level languages
* i) machine language
* j) control unit

## Section 1.5

* a) Java
* b) C
* c) TCP (Transmission Control Protocol)
* d) C++

## Section 1.6

* a) edit, compile, load, verify, execute
* b) integrated development environment (IDE)
* c) Java Virtual Machine (JVM)
* d) virtual machine
* e) class loader
* f) bytecode verifier

## Section 1.7

* 1. Compilation phase – The Java compiler (javac) translates source code (.java) into bytecode (.class) which is independent of any computer platform.
* 2. Execution phase – The Java Virtual Machine (java) loads the bytecode, verifies it, and interprets or just-in-time compiles it into machine code suitable for the host system, executing the program.

## Section 1.8

* Object: The watch itself.
* Attributes: Size, color, brand, material, display type, etc.
* Behaviors: Show time, set alarm, start/stop timer.
* Class: The general blueprint for watches.
* Inheritance: An alarm clock can inherit from the watch class and add alarm functionality.
* Modeling: Representing the watch system in an object-oriented design.
* Messages: Signals or method calls like showTime() or setAlarm().
* Encapsulation: Internal details like battery level or circuit design are hidden.
* Interface: The visible buttons and display through which users interact.
* Information hiding: Prevents access to internal mechanisms directly.

## Section 1.9

* Carbon footprint formulas are based on energy use, transportation, diet, and consumption patterns, combining CO₂ emission factors per activity (e.g., kg CO₂ per liter of fuel).

## Section 1.10

* BMI = weight (kg) / [height (m)]²
* For U.S. units: BMI = 703 × weight (lb) / [height (in)]²

## Section 1.11

* Attributes: city MPG, highway MPG, battery type, battery capacity (kWh), battery weight, engine size, CO₂ emissions per mile, electric-only range, fuel tank capacity, charging time.

## Section 1.12

* Procedure: Read text word by word, check against gendered terms, replace with neutral equivalents, and save the output.
* Problem: Strange terms (e.g., 'woperchild') occur if replacements are made on substrings instead of whole words.