

Eighth Edition

Be Prepared
for the

AP

Computer
Science
Exam in Java

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Preface to the Eighth Edition

This edition has six practice exams, one more than the previous edition.

Preface to the Seventh Edition

The College Board has recently updated the *Computer Science A Course and Exam Description* (CED) that was in effect since 2014. The new course description is based on the more formal Understanding by Design model (Wiggins and McTighe): “big ideas,” “enduring understandings,” “learning objectives,” and “essential knowledge.” The Development Committee identified four “big ideas” for this course: Modularity, Variables, Control, and Impact of Computing. The format of the exam remains essentially the same, but the content is slightly simplified, with some of the more challenging topics (number systems, abstract classes and interfaces) dropped. Also, the four free-response questions in the exam are now linked to specific topics:

Question 1: Methods and Control Structures

Question 2: Class

Question 3: Array / ArrayList

Question 4: 2D Array

The College Board expects a typical AP CSA course to have a lab component. The Development Committee has made available sample labs to demonstrate the extent of lab work expected. These labs are samples only; they will not be tested on the AP exams.

Preface

The AP Computer Science A (AP CSA) exam tests your understanding of basic concepts in computer science as well as your fluency in Java programming. The exam covers roughly the material of a one-semester introductory college course in computer science (CS-1). In the past, the College Board offered two computer science exams: “A” and the more advanced “AB.” Since 2010, the College Board has offered only AP Computer Science A and, more recently, the AP Computer Science: Principles (AP CSP) exam. Despite the College Board’s claims to the contrary, AP CSP is a lower-level exam that does not require coding fluency in any programming language.

Exam questions are finalized by The College Board’s AP Computer Science A Development Committee, and exams are administered by the Educational Testing Service (ETS). The College Board currently offers exams in 38 subjects. In 2018, 2,808,990 students took 5,090,324 exams. The most up-to-date information on the AP

exams offered and participation statistics can be found on The College Board's website <http://research.collegeboard.org/programs/ap/data>.

In the spring of 2004, the computer science exams used Java for the first time. At the same time, the AP CS program's emphasis shifted from implementation of algorithms and coding proficiency to object-oriented programming (OOP) concepts. More recent exams, however, show renewed interest in algorithms and less in OOP. Future exams are likely to focus more on control structures (`if-else`, `for` and `while` loops), one- and two-dimensional arrays and `ArrayList`.

Answers to exam questions written in a programming language other than Java or in pseudocode will not receive credit.

A working knowledge of Java is necessary but not sufficient for a good grade on the exam. You must also understand the basic concepts of computer science, OOP, and some common algorithms. As for Java: you don't have to know the whole language, just a subset.

This is a lot of material to cover, and it is certainly not the goal of this book to teach you everything you need to know from scratch. For that, you need a complete textbook with exercises and programming projects. Most students who take the exam are enrolled in an AP Computer Science course at their school. A determined student can prepare for the exam on his or her own; it may take anywhere between two and twelve months, and a good textbook will be even more important.

The goals of this book are:

- to describe the exam format and requirements
- to describe the Java subset
- to provide an effective review of what you should know with emphasis on the more difficult topics and on common omissions and mistakes
- to help you identify and fill the gaps in your knowledge
- to offer sample exam questions with answers, hints, and solutions for you to practice with and analyze your mistakes

The AP CSA exam is a paper-and-pencil affair. While you need a computer with a Java compiler to learn how to program and how to implement common algorithms in Java, this book does not require the use of a computer. In fact, it is a good idea not to use one when you work on practice questions, so that you can get used to the exam's format and environment. One-hundred-percent correct Java syntax is not the emphasis here. Small mistakes (a missed semicolon or a brace) that a compiler would normally help you catch will probably not affect your exam score. You'll need a computer only to access collegeboard.org and our website, www.skylit.com/beprepared/, for the latest updates and our solutions to the free-response questions from past exams.

Chapter 1 of this book explains the format, the required materials, and the Java subset for the exam and provides information about exam grading and exam-taking hints. Chapter 2 and Chapter 3 cover the elements of Java required for the exam. Chapter 4 deals with OOP topics (classes and inheritance). Chapter 5 reviews common searching and sorting algorithms. All review chapters contain sample multiple-choice questions with detailed explanations of all the right and wrong answers. Chapter 6 is actually on the web at this book's companion website, www.skylit.com/beprepared/. It offers our annotated solutions to the free-response questions from past exams. At the end of the book are five complete practice exams followed by answers and solutions.



Our colleague and friend Dave Wittry passed away in a tragic accident while training for a triathlon, on February 5, 2008. He was 41. Dave contributed practice exam questions for the second and third editions of this book. Dave taught at Troy High School, a magnet school for science, math, and technology in Fullerton, California, and contributed to Troy's immense success in Computer Science. In 2005 Dave moved to Taiwan and taught AP Computer Science and mathematics at the Taipei American School. He was a Reader for the AP Computer Science Exams for several years. Dave was always ready to help friends, students, and colleagues, and he developed valuable resources for computer science teachers. We miss Dave!



We are grateful to David Levine of St. Bonaventure University, who recommended many important improvements, helped us catch technical and stylistic mistakes, and pointed out questions that needed clarification in the first edition of *Be Prepared*, which came out in 1999.

Roger Frank and Judy Hromcik contributed practice questions to the second and third editions; some of the questions in this book are based on their ideas. Roger also went very thoroughly over the drafts of the earlier editions and recommended many corrections and improvements.

We thank teachers and students who alerted us to several mistakes in the earlier editions of this book.

Our special thanks to Margaret Litvin for making this book more readable with her thorough and thoughtful editing.

Finally, we thank the Boy Scouts of America for allowing us to allude to their motto in the book's title.