

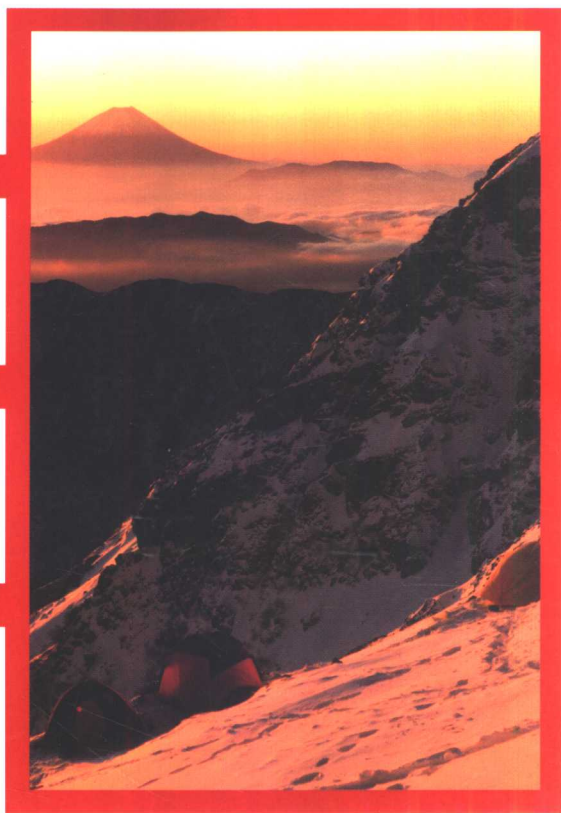
Complete Java 2 Certification Study Guide Fourth Edition

Java 2

认证考试学习指南

(第四版)

(英文版)



[美] Philip Heller 著
Simon Roberts

本书由认证考试领域的专业出版社Sybex出版，
奉献给广大参加认证考试的读者



电子工业出版社

Publishing House of Electronics Industry
<http://www.phei.com.cn>

**Complete Java 2 Certification
Study Guide Fourth Edition**

Java 2认证考试学习指南（第四版）

（英文版）

〔美〕 Philip Heller 著
Simon Roberts

電子工業出版社

Publishing House of Electronics Industry

北京 • BEIJING

版 权 声 明



Copyright©2004 SYBEX Inc., 1151 Marina Village Parkway, Alameda, CA 94501. World rights reserved. No part of this publication may be stored in a retrieval system, transmitted, or reproduced in any way, including but not limited to photocopy, photograph, magnetic or other record, without the prior agreement and written permission of the publisher. This book can only be sold and distributed into the People's Republic of China excluding Hong Kong district, Macau district, Taiwan district and the place in the world outside of People's Republic of China.

本书英文版由美国SYBEX公司出版, SYBEX公司已将英文版独家版权授予中国电子工业出版社及北京美迪亚电子信息有限公司。本书仅限于在中国境内(但除去香港、澳门特别行政区和台湾地区)销售。未经许可,不得以任何形式和手段复制或抄袭本书内容。

版权贸易合同登记号: 01-2003-7029

图书在版编目(CIP)数据

Java 2认证考试学习指南(第四版)(英文版) - Complete Java 2 Certification Study Guide Fourth Edition/ (美)海勒(Heller, P.)等著. - 北京: 电子工业出版社, 2004.1

ISBN 7-5053-9348-0

I. J... II. 海... III. JAVA语言 - 程序设计 - 工程技术人员 - 资格考核 - 自学参考资料 - 英文 IV. TP312

中国版本图书馆CIP数据核字(2003)第105137号

责任编辑: 陈 宇

印 刷: 北京天竺颖华印刷厂

出版发行: 电子工业出版社 <http://www.phei.com.cn>

北京市海淀区万寿路173信箱 邮编: 100036

北京市海淀区翠微东里甲2号 邮编: 100036

经 销: 各地新华书店

开 本: 787×1092 1/16 印张: 29.25 字数: 750千字

版 次: 2004年1月第1版 2004年1月第1次印刷

定 价: 48.00元

凡购买电子工业出版社的图书, 如有缺损问题, 请向购买书店调换, 若书店售缺, 请与本社发行部联系。联系电话: (010) 68279077。质量投诉请发邮件至zlts@phei.com.cn, 盗版侵权举报请发邮件至dbqq@phei.com.cn。

To Our Valued Readers:

Thank you for looking to Sybex for your Java 2 certification exam prep needs. We at Sybex are proud of the reputation we've established for providing certification candidates with the practical knowledge and skills needed to succeed in the highly competitive IT marketplace. Sybex has helped thousands of Java certification candidates prepare for their exams over the years, and we are excited about having the continued opportunity to provide IT professionals with the most essential programming and development skills.

With its latest 1.4 release of the Java 2 program, Sun has raised the bar for programmers yet again. Certification in this program demonstrates proficiency in the fundamentals of the Java programming language using the Java 2 Platform—indeed an invaluable skill and necessary to advance your career in today's ever changing programming market.

The authors and editors have worked hard to ensure that the Study Guide you hold in your hand is comprehensive, in-depth, and pedagogically sound. We're confident that this book will exceed the demanding standards of the certification marketplace and help you, the Java 2 certification candidate, succeed in your endeavors.

As always, your feedback is important to us. Please send comments, questions, or suggestions to support@sybex.com. At Sybex we're continually striving to meet the needs of individuals preparing for IT certification exams.

Good luck in pursuit of your Java 2 certification!

Neil Edde
Associate Publisher-Certification
Sybex, Inc.

Software License Agreement: Terms and Conditions

The media and/or any online materials accompanying this book that are available now or in the future contain programs and/or text files (the "Software") to be used in connection with the book. SYBEX hereby grants to you a license to use the Software, subject to the terms that follow. Your purchase, acceptance, or use of the Software will constitute your acceptance of such terms.

The Software compilation is the property of SYBEX unless otherwise indicated and is protected by copyright to SYBEX or other copyright owner(s) as indicated in the media files (the "Owner(s)"). You are hereby granted a single-user license to use the Software for your personal, noncommercial use only. You may not reproduce, sell, distribute, publish, circulate, or commercially exploit the Software, or any portion thereof, without the written consent of SYBEX and the specific copyright owner(s) of any component software included on this media.

In the event that the Software or components include specific license requirements or end-user agreements, statements of condition, disclaimers, limitations or warranties ("End-User License"), those End-User Licenses supersede the terms and conditions herein as to that particular Software component. Your purchase, acceptance, or use of the Software will constitute your acceptance of such End-User Licenses.

By purchase, use or acceptance of the Software you further agree to comply with all export laws and regulations of the United States as such laws and regulations may exist from time to time.

Software Support

Components of the supplemental Software and any offers associated with them may be supported by the specific Owner(s) of that material, but they are not supported by SYBEX. Information regarding any available support may be obtained from the Owner(s) using the information provided in the appropriate read.me files or listed elsewhere on the media.

Should the manufacturer(s) or other Owner(s) cease to offer support or decline to honor any offer, SYBEX bears no responsibility. This notice concerning support for the Software is provided for your information only. SYBEX is not the agent or principal of the Owner(s), and SYBEX is in no way responsible for providing any support for the Software, nor is it liable or responsible for any support provided, or not provided, by the Owner(s).

Warranty

SYBEX warrants the enclosed media to be free of physical defects for a period of ninety (90) days after purchase. The Software is not available from SYBEX in any other form or media than that enclosed herein or posted

to www.sybex.com. If you discover a defect in the media during this warranty period, you may obtain a replacement of identical format at no charge by sending the defective media, postage prepaid, with proof of purchase to:

SYBEX Inc.

Product Support Department

1151 Marina Village Parkway

Alameda, CA 94501

Web: <http://www.sybex.com>

After the 90-day period, you can obtain replacement media of identical format by sending us the defective disk, proof of purchase, and a check or money order for \$10, payable to SYBEX.

Disclaimer

SYBEX makes no warranty or representation, either expressed or implied, with respect to the Software or its contents, quality, performance, merchantability, or fitness for a particular purpose. In no event will SYBEX, its distributors, or dealers be liable to you or any other party for direct, indirect, special, incidental, consequential, or other damages arising out of the use of or inability to use the Software or its contents even if advised of the possibility of such damage. In the event that the Software includes an online update feature, SYBEX further disclaims any obligation to provide this feature for any specific duration other than the initial posting.

The exclusion of implied warranties is not permitted by some states. Therefore, the above exclusion may not apply to you. This warranty provides you with specific legal rights; there may be other rights that you may have that vary from state to state. The pricing of the book with the Software by SYBEX reflects the allocation of risk and limitations on liability contained in this agreement of Terms and Conditions.

Shareware Distribution

This Software may contain various programs that are distributed as shareware. Copyright laws apply to both shareware and ordinary commercial software, and the copyright Owner(s) retains all rights. If you try a shareware program and continue using it, you are expected to register it. Individual programs differ on details of trial periods, registration, and payment. Please observe the requirements stated in appropriate files.

Copy Protection

The Software in whole or in part may or may not be copy-protected or encrypted. However, in all cases, reselling or redistributing these files without authorization is expressly forbidden except as specifically provided for by the Owner(s) therein.

To Richard Philip Gross, 1903 – 2002: a man of his century, and so much more
—Philip

For my children, Emily and Bethan
—Simon

To my brother Tom, for introducing me to Java
—James

Acknowledgments

The authors would like to acknowledge the dedicated and talented people at Sybex who worked on this edition: Elizabeth Hurley Peterson, Sally Engelfried, James Nuzzi, and Leslie Light.

The authors would also like to acknowledge their students and readers of previous editions who have provided the invaluable comments and suggestions that motivated the changes in this edition.

Finally, the authors thank you—the consumer of this edition—for choosing this book to prepare you for your Java certifications.

Introduction

Welcome to the fourth edition of this book!

Inside you'll find detailed explanations for many of the questions and problems you'll encounter in the CX-310-035, CX-310-252A, and CS-310-027 Java certifications, otherwise known as the Programmer's Exam, Developer's Programming Assignment, and Developer's Essay Exam, respectively.

The first part of the book contains eight chapters that discuss the content of every objective of the Programmer's Exam. The second part of the book contains seven chapters that prepare you to write the programming assignment and take the essay exam for the Developer's certification.

There are several ways to prepare for the Java certification exams, including attending seminars and study groups, visiting websites and newsgroups, programming at home and at work, and of course, reading study guides such as this. We're glad you chose our book as one of your preparation tools, and we encourage you to exploit as many other resources as you can to ensure your success.

We believe you'll find this book particularly helpful because it was written by Java instructors and practitioners who have also taken part in the writing of the Java certification exams.

Why Become Java 2 Certified?

There are a number of reasons for becoming Java 2 certified:

- It provides proof of professional achievement.
- It increases your marketability.
- It provides greater opportunity for advancement in your field.
- It is increasingly found as a requirement for some types of advanced training.
- It raises customer confidence in you and your company's services.

Let's explore each reason in detail.

Provides Proof of Professional Achievement

Specialized certifications are the best way to stand out from the crowd. In this age of technology certifications, you will find hundreds of thousands of administrators who have successfully completed the Microsoft and Novell certification tracks. To set yourself apart from the crowd, you need a little bit more. The Java 2 Certification is the starting point for the Java Certification Track and will give you the recognition you deserve.

Increases Your Marketability

Almost anyone can bluff their way through an interview. Once you have been certified in Java, you will have the credentials to prove your competency. And certifications are not something that can be taken from you when you change jobs. Once certified, you can take that certification with you to any of the positions you accept.

Provides Opportunity for Advancement

Those individuals who prove themselves as competent and dedicated are the ones who will most likely be promoted. Becoming certified is a great way to prove your skill level, and it shows your employers that you are committed to improving your skill set. Look around you at those who are certified. They are probably the ones who receive good pay raises and promotions when they come up.

Fulfills Training Requirements

Many companies have set training requirements for their staff so that they stay up-to-date on the latest technologies. Having a certification program for the Sun's Java family of products provides administrators another certification path to follow when they have exhausted some of the other industry-standard certifications.

Raises Customer Confidence

As companies continue to write their production software using Java, they will undoubtedly require qualified staff to embrace this ever-changing technology. Many companies outsource the work to consulting firms with experience working with Java. Those firms that have certified staff have a definite advantage over other firms that do not.

Who Should Buy This Book?

If you want to acquire a solid foundation in Java and your goal is to prepare for the exam by learning how to program and develop in Java, this book is for you. You'll find clear explanations of the concepts you need to grasp and plenty of help to achieve the high level of professional competency you need in order to succeed in your chosen field.

If you want to become certified as a Java programmer and developer, this book is definitely for you. However, if you just want to attempt to pass the exam without really understanding Java, this study guide is not for you. It is written for people who want to acquire hands-on skills and in-depth knowledge of programming Java.

How to Become a Sun Certified Programmer for the Java 2 Platform 1.4

You can take the Java Certification Exam whenever you like by making an appointment with Sun Educational Services. Sun contracts with third-party test centers throughout the world, so you probably won't have to travel far. The cost of taking the exam is \$150.



NOTE

The U.S. telephone number for Sun Educational Services is (800) 422-8020; their URL is <http://suned.sun.com>. From there it will be easy to find the links you need. We hesitate to give more detailed instructions, because the site layout may change.

You can make an appointment for any time during regular business hours. When you make the appointment, ask how much time you will have. This is subject to change; on average, you'll be given two minutes per question. You will not be allowed to bring food or personal belongings into the test area. One piece of scratch paper is permitted; you will not be allowed to keep it after you have finished the exam. Most sites have security cameras.

You will be escorted to a cubicle containing a PC. The exam program will present you with randomly selected questions. Navigation buttons take you to the next or previous question for review and checking. When you have finished the test, the program will immediately present you with your score and a pass/fail indication. You will also be given feedback that indicates how well you performed in each of the dozen or so categories of the objectives. You will not be told which particular questions you got right or wrong.

Formalities of the Programmer's Exam

There are no trick questions on the exam, but every question requires careful thought. The wording of the questions is highly precise; the exam has been reviewed not just by Java experts, but also by language experts whose task was to eliminate any possible ambiguity. All you have to worry about is knowing Java; your score will not depend on your ability to second-guess the examiners.

It is not a good idea to try to second-guess the question layout. For example, do not be biased toward answer C simply because C has not come up recently. The questions are taken from a pool and presented to you in a random order, so it is entirely possible to get a run of a particular option; it is also possible to get the answers neatly spread out.

Most of the questions are multiple-choice. Of these, some have a single answer and others require you to select all the appropriate responses. The graphical user interface of the test system indicates which kind of answer you should supply. If a question only has one correct answer, you will be presented with radio buttons, so that selecting a second answer cancels the selection of a previous answer. With this kind of question, you have to select the most appropriate answer. If, on the other hand, you are presented with check boxes, then you may need to make more than one selection, so every possible answer must be considered on its own merits, not weighed against the others.

You should be aware that where multiple answers are possible, you are being asked to make a decision about each answer, almost as though the question were five individual true/false questions. This requires more effort and understanding from you, because you have to get all the pieces correct. Think carefully, and always base your answer on your knowledge of Java.

The short-answer, type-in questions often cause undue concern. How are they marked? What happens if you omit a semicolon? These worries can stem from the knowledge that the questions are marked electronically and the belief that an answer might be marked wrong simply because the machine didn't have the sense to recognize a good variation of what it was programmed to accept.

As with all exam questions, you should be careful to answer precisely what is asked. However, you should also be aware that the system does accept a variety of different answers; it has been set up with all the variations the examination panel considered to be reasonable.

Some of the type-in questions *do*, however, provide specific instructions concerning the format of the answer. Take this guidance seriously. If, for example, a question says, "Answer in the form `methodName()`", then your answer should be

```
methodName()
```

and not any of the following:

```
object.method()  
method();  
method(a, b)  
method
```

Some of the other answers might well be accepted, but programming is a precision job, and you should be accustomed to following precise directions.

The test is taken using a windowed interface that can be driven almost entirely with the mouse. Many of the screens require scrolling; the scroll bar is on the right side of the screen. Always check the scroll bar so you can be sure you have read a question in its entirety. It would be a shame to get a question wrong because you didn't realize you needed to scroll down a few lines.

The exam contains 61 questions. Some of the questions are easier than others, and undoubtedly you will be able to answer some more quickly than others. However, you really do need to answer all the questions if you possibly can. The test system allows you to review your work after you reach the end. The system will explicitly direct your attention toward any multiple-choice questions that have no items selected. So, if you find a particular question difficult, consider moving on and coming back to it later. You must score at least 52 percent (32 out of 61 questions answered correctly) to pass the Programmer's Exam.

Conventions Used in This Book

This book uses a number of conventions to present information in as readable a manner as possible. Tips, Notes, and Warnings, shown here, appear from time to time in the text in order to call attention to specific highlights.



This is a Tip. Tips contain specific programming information.



This is a Note. Notes contain important side discussions.



This is a Warning. Warnings call attention to bugs, design omissions, and other trouble spots.

This book takes advantage of several font styles. **Bold font** in text indicates something that the user types. A monospaced font is used for code, output, URLs, and file and directory names. A *monospaced italic font* is used for code variables mentioned in text.

These style conventions are intended to facilitate your learning experience with this book—in other words, to increase your chances of passing the exam.

If you type, compile, and run the sample code in this book, you may observe slightly different results than what you see in the book. This is particularly true with code that has a GUI. Each platform has its own windowing system that displays buttons, checkboxes, and so on differently.

How to Use This Book and the CD

We've included several testing features in both the book and on the CD bound at the back of the book. These tools will help you retain vital exam content as well as prepare to sit for the actual exam. Using our custom test engine, you can identify weak areas up front and then develop a solid studying strategy using each of these robust testing features. Our thorough *readme* will walk you through the quick and easy installation process.

Before You Begin At the beginning of the book (right after this introduction, in fact) is an assessment test that you can use to check your readiness for the actual exam. Take this test before you start reading the book. It will help you determine the areas you may need to brush up on. The answers to each assessment test appear on a separate page after the last question of the test. Each answer also includes an explanation and a note telling you in which chapter this material appears.

Chapter Review Questions To test your knowledge as you progress through the book, there are review questions at the end of each chapter. As you finish each chapter, answer the review questions and then check to see if your answers are right—the correct answers appear on the page following the last review question. You can go back to reread the section that deals with each question you got wrong to ensure that you get the answer correctly the next time you are tested on the material.

Test Engine In addition to the assessment test and the chapter review tests, you'll find four sample exams, three that are only on the CD and one that is both printed and electronic. Take these practice exams just as if you were taking the actual exam (that is, without any reference material). When you have finished the first exam, move onto the next one to solidify your test-taking skills. If you get more than 90 percent of the answers correct, you're ready to go ahead and take the certification exam.

Full Text of the Book in PDF If you have to travel but still need to study for the Java 2 programming exam and you have a laptop with a CD drive, you can carry this entire book with you just by taking along the CD. The CD contains this book in PDF (Adobe Acrobat) format so it can be easily read on any computer.

About the Authors and Technical Editor

Philip Heller is a technical author, novelist, public speaker, and consultant. He has been instrumental in the creation and maintenance of the Java Programmer and Developer exams. His popular seminars on certification have been delivered internationally. He is the co-author of several books on Java, all available from Sybex.

Simon Roberts is a Sun Microsystems programmer, an instructor, an authority on the Java language, and the key player in the development of the entire Java certification program.

James Casaletto has been writing Java code since he was a computer science graduate student back in 1996. His Java projects include writing educational software for the Department of Computer Science at SFSU, developing websites for a Bay Area startup company, and leading study groups of EECS students at UC Berkeley. James has been teaching Java programming for Sun Educational Services since 1998 and has authored several of their course books. James enjoys living in San Jose, playing music, and appreciating the splendor of being an instance of the human race.

James Nuzzi, the technical editor, is a Sun Certified Web Component Developer, a Sun Certified Java Developer, and a Sun Certified Java Programmer (1.2 and 1.4). He has a B.S. in Computer Science from SUNY-Stony Brook. James has over six years of development experience, with the last three and a half years focusing on Java programming. He also has experience with servlets, JSP, EJB, JNDI, JDBC (Oracle), Weblogic, and WebSphere.

Assessment Test

1. Given the following code, which of the results that follow would you expect?

```
1. package mail;
2.
3. interface Box {
4.     protected void open();
5.     void close();
6.     public void empty();
7. }
```

- A. The code will not compile because of line 4.
 - B. The code will not compile because of line 5.
 - C. The code will not compile because of line 6.
 - D. The code will compile.
2. You can determine all the keys in a Map
- A. By getting a Set object from the Map and iterating through it.
 - B. By iterating through the Iterator of the Map.
 - C. By enumerating through the Enumeration of the Map.
 - D. By getting a List from the Map and enumerating through the List.
 - E. You cannot determine the keys in a Map.
3. What keyword is used to prevent an object from being serialized?
- A. private
 - B. volatile
 - C. protected
 - D. transient
 - E. None of the above
4. An abstract class can contain methods with declared bodies.
- A. True
 - B. False
5. Select the order of access modifiers from least restrictive to most restrictive.
- A. public, private, protected, default
 - B. default, protected, private, public
 - C. public, default, protected, private
 - D. default, public, protected, private
 - E. public, protected, default, private
6. Which access modifier allows you to access method calls in libraries not created in Java?
- A. public

- B. static
 - C. native
 - D. transient
 - E. volatile
7. Which of the following statements are true? (Select all that apply.)
- A. A final object's data cannot be changed.
 - B. A final class can be subclassed.
 - C. A final method cannot be overloaded.
 - D. A final object cannot be reassigned a new address in memory.
 - E. E. None of the above.
8. The keyword extends refers to what type of relationship?
- A. "is a"
 - B. "has a" w Ro08l ◊
 - C. "was a" w Ro08l ◊
 - D. "will be a" 08l ◊
 - E. None of the above
9. Which of the following keywords is used to invoke a method in the parent class?
- A. this
 - B. super
 - C. final
 - D. static
10. Given the following code, what will be the outcome?

```
public class Funcs extends java.lang.Math {  
    public int add(int x, int y) {  
        return x + y;  
    }  
    public int sub(int x, int y) {  
        return x - y;  
    }  
    public static void main(String [] a) {  
        Funcs f = new Funcs();  
        System.out.println("" + f.add(1, 2));  
    }  
}
```

- A. The code compiles but does not output anything.
 - B. "3" is printed out to the console.
 - C. The code does not compile.
 - D. None of the above.
11. Given the following code, what is the expected outcome?

```
public class Test {  
    public static void main(String [] a) {  
        int [] b = [1,2,3,4,5,6,7,8,9,0];  
    }  
}
```

```
        System.out.println("a[2]=" + a[2]);  
    }  
}
```

- A. The code compiles but does not output anything.
- B. "a[2]=3" is printed out to the console.
- C. "a[2]=2" is printed out to the console.
- D. The code does not compile.
- E. None of the above.

12. What is the value of *x* after the following operation is performed?

```
x = 23 % 4;
```

- A. 23
- B. 4
- C. 5.3
- D. 3
- E. 5

13. Given the following code, what keyword must be used at line 4 in order to stop execution of the for loop?

```
1. boolean b = true;  
2. for (;;) {  
3.     if (b) {  
4.         <insert code>  
5.     }  
6.     // do something  
7. }
```

- A. stop
- B. continue
- C. break
- D. None of the above

14. What method call is used to tell a thread that it has the opportunity to run?

- A. wait()
- B. notify()
- C. start()
- D. run()

15. Which of the following types of Collections does not permit duplicate keys and is optimized for searching?

- A. Map
- B. Set
- C. List
- D. Collection
- E. None of the above

16. Assertions are used to enforce all but which of the following?

- A. Preconditions
- B. Postconditions

- C. Exceptions
 - D. Class invariants
17. The developer can force garbage collection by calling `System.gc()`.
- A. True
 - B. False
18. Select the valid primitive data types. (Select all that apply.)
- A. boolean
 - B. bit
 - C. char
 - D. float
 - E. All of the above
19. How many bits does a float contain?
- A. 1
 - B. 8
 - C. 16
 - D. 32
 - E. 64
20. What is the value of `x` after the following line is executed?
- ```
x = 32 * (31 ~ 10 * 3);
```
- A. 32
  - B. 31
  - C. 3
  - D. 704
  - E. None of the above
21. A `StringBuffer` reallocates memory for each modification to its `String` representation.
- A. True
  - B. False
22. Select the list of primitives ordered in smallest to largest bit size representation.
- A. boolean, char, byte, double
  - B. byte, int, float, char
  - C. char, short, long, float
  - D. char, int, float, long
  - E. None of the above
23. Given the binary value 00101100, what is the value after a bitwise inversion is applied?
- A. 00101100
  - B. 11010111
  - C. 11010011
  - D. None of the above
24. The following line of code is valid.
- ```
int x = 9; byte b = x;
```
- A. True
 - B. False

25. Select all the valid Java keywords.

- A.** NULL
- B.** if
- C.** goto
- D.** gosub
- E.** None of the above

26. What will be the output of the following code?

```
public class StringTest {  
    public static void main(String [] a) {  
        String s1 = "test string";  
        String s2 = 'test string';  
        if (s1 == s2) {  
            System.out.println("same");  
        } else {  
            System.out.println("different");  
        }  
    }  
}
```

- A.** The code will compile but not run.
- B.** The code will not compile.
- C.** "different" will be printed out to the console.
- D.** "same" will be printed out to the console.
- E.** None of the above.

27. Java arrays always start at index 1.

- A.** True
- B.** False

28. Which of the following statements accurately describes how variables are passed to methods?

- A.** Arguments are always passed by value.
- B.** Arguments are always passed by reference.
- C.** Arguments that are primitive type are passed by value.
- D.** Arguments that are passed with the & operator are passed by reference.

29. How do you change the value that is encapsulated by a wrapper class after you have instantiated it?

- A.** Use the setXXX() method defined for the wrapper class.
- B.** Use the parseXXX() method defined for the wrapper class.
- C.** Use the equals() method defined for the wrapper class.
- D.** None of the above.

30. Which of the following methods from the java.lang.Math class returns an integer that may be greater than its single argument?

- A.** abs() and random()
- B.** ceil() and round()
- C.** ceil() and sqrt()
- D.** floor() and max()