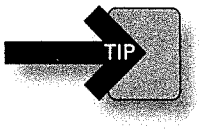
How to Take the Diagnostic Test

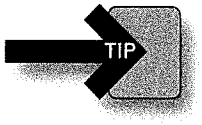
Take this diagnostic exam when you begin to review for the exam. It will help you determine what you already know and what you need to spend time reviewing. It will also give you an idea of the format of questions on the AP exam.

Take the diagnostic exam in a simulated testing environment. Be in a quiet location where you will not be disturbed. Use the answer sheet in this manual and a pencil to answer the multiple-choice questions. The AP Computer Science Principles Exam is still a pencil-and-paper exam!

Set a timer for two hours and try to pace yourself so you finish the exam. If you are not finished when the time is up, note how far you got, and then complete the rest of the exam. Answering all the questions will provide a better evaluation of what areas you need to review.



As you take the test, mark all the questions you were not sure about so you check the answer explanations for them as well as those you miss. But do not check an answer until you have finished all the questions and the two-hour testing period.



Test yourself in an exam-like setting. Take this diagnostic test and the practice exams at the end of this book in a place you won't be interrupted for two hours. Time yourself. If you use your cell phone to time yourself, make sure it's completely silenced in airplane mode so you won't be interrupted.

In the next section of this book, you'll find helpful strategies for attacking both the multiple-choice exam and the Explore and Create performance tasks. The strategies were developed to help you prepare in the most effective and efficient way. Then in Step 4, you'll begin the review of the concepts and skills tested. After taking this diagnostic exam, you will know which of these chapters you need to review the most.

Diagnostic Test: AP Computer Science Principles

Multiple-Choice Questions

ANSWER SHEET

1	A	B	C	D	26	A	B	C	D	51	A	B	C	D
2	A	B	C	D	27	A	B	C	D	52	A	B	C	D
3	A	B	C	D	28	A	B	C	D	53	A	B	C	D
4	A	B	C	D	29	A	B	C	D	54	A	B	C	D
5	A	B	C	D	30	A	B	C	D	55	A	B	C	D
6	A	B	C	D	31	A	B	C	D	56	A	B	C	D
7	A	B	C	D	32	A	B	C	D	57	A	B	C	D
8	A	B	C	D	33	A	B	C	D	58	A	B	C	D
9	A	B	C	D	34	A	B	C	D	59	A	B	C	D
10	A	B	C	D	35	A	B	C	D	60	A	B	C	D
11	A	B	C	D	36	A	B	C	D	61	A	B	C	D
12	A	B	C	D	37	A	B	C	D	62	A	B	C	D
13	A	B	C	D	38	A	B	C	D	63	A	B	C	D
14	A	B	C	D	39	A	B	C	D	64	A	B	C	D
15	A	B	C	D	40	A	B	C	D	65	A	B	C	D
16	A	B	C	D	41	A	B	C	D	66	A	B	C	D
17	A	B	C	D	42	A	B	C	D	67	A	B	C	D
18	A	B	C	D	43	A	B	C	D	68	A	B	C	D
19	A	B	C	D	44	A	B	C	D	69	A	B	C	D
20	A	B	C	D	45	A	B	C	D	70	A	B	C	D
21	A	B	C	D	46	A	B	C	D	71	A	B	C	D
22	A	B	C	D	47	A	B	C	D	72	A	B	C	D
23	A	B	C	D	48	A	B	C	D	73	A	B	C	D
24	A	B	C	D	49	A	B	C	D	74	A	B	C	D
25	A	B	C	D	50	A	B	C	D					

Diagnostic Test: AP Computer Science Principles

Multiple-Choice Questions

Time: 2 hours
Number of questions: 74
The multiple-choice questions represent 60% of your total score.

Directions: Choose the one best answer for each question. Some questions at the end of the test have more than one correct answer; for these, you will be instructed to choose two answer choices.

Tear out the answer sheet on the previous page and grid in your answers using a pencil.

AP Computer Science Principles Exam Reference Sheet

On the AP Computer Science Principles Exam, you will be given a reference sheet to use while you're taking the multiple-choice test. A copy of this seven-page reference sheet is included in the appendix of this book (reprinted by permission from the College Board).

To make taking this practice test like taking the actual exam, tear out the reference sheet so you can easily refer to it while taking the test. Save these reference pages since you'll need to use them when you take AP Computer Science Principles Practice Exams 1 and 2 at the end of this book.

1. How are procedures abstractions in computer science?
   (A) They are blocks of code that do something specific.
   (B) They represent the lowest level of code for the computer to run.
   (C) They use actual values to represent concepts.
   (D) They can be used without understanding or seeing the code used.

2. What do parameters used in a procedure provide?
   (A) A way to get values into the procedure making code more flexible
   (B) A way to return values calculated in the procedure back to the calling program
   (C) A way to call a procedure from within another procedure
   (D) A way to connect an API to the procedure

3. What happens when you "clean data"?
   (A) Corrupt data records are corrected or removed.
   (B) Incomplete data records are completed or removed.
   (C) Duplicate records are removed.
   (D) All of the above

4. What causes a problem to be classified as "intractable"?
   (A) The solution is too inefficient for large datasets.
   (B) There is not an algorithm that can solve it.
   (C) It is solved most efficiently with large datasets.
   (D) Multiple algorithms exist with different levels of efficiency.

5. What are statements, procedures, and libraries examples of?
   (A) Low-level machine code that the computer uses to run the code
   (B) Abstractions used in writing software because they can be used without knowing the details of how they work
   (C) Algorithms that provide suggestions on how to approach writing the code to solve a problem
   (D) Pseudocode that helps design a solution for coding challenges

6. What is an issue that organizations must handle when dealing with large datasets?
   (A) Ensuring enough staff are on hand to process the data
   (B) Ensuring the bandwidth can handle the processing of the data
   (C) Ensuring that people's private data is not exposed
   (D) Ensuring the system can scale down after the data are sent to the cloud

7. How does the Internet work with the different equipment in use?
   (A) The routers adjust for the different equipment manufacturers by sending data on the same equipment brands.
   (B) Specific companies are approved to make equipment for the Internet.
   (C) Vendors follow the protocols established to enable data to be sent and received across any equipment.
   (D) The server farms handle the data once the data reach the Regional ISP (Internet Service Provider).

8. What does *scalability* mean?
   (A) The ability to build additional functionality into the hardware
   (B) The ability to build additional functionality into the software
   (C) The ability to add more features to the hardware
   (D) The ability to add or remove resources as the size changes

9. Why do we have high-level programming languages?
   (A) To make it easier for people to write code
   (B) So code will compile faster increasing efficiency
   (C) To make code reusable to speed development time
   (D) To prevent errors in programs

10. How can an image of a house that is used in a program represent an abstraction?
    (A) When pressed, code will run to return your screen to the home page.
    (B) The program directions to drive to your house will be displayed on your device.
    (C) Data about the smart features of your house will be displayed.
    (D) All the above

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11. How do selection statements determine which section of code to execute?
(A) Through the use of the Turing algorithm for analysis
(B) Through random number generators
(C) Through conditions that evaluate to true or false
(D) Through variables initialized to execute these statements

12. How are list elements accessed individually?
(A) The list name plus an integer index in brackets are used.
(B) The list name is used along with the value the code needs to access.
(C) The "access" command is used with the list name and length.
(D) A FOR EACH loop is used with the list to find an individual value.

13. What do logical conditions always evaluate to?
(A) A Boolean value
(B) A value stored in a constant
(C) A "string" text field
(D) A real number

14. What is an example of a coding-related abstraction?
(A) Using comments in your code
(B) The CPU (Central Processing Unit)
(C) Pressing a button on an app
(D) A constant value

15. What is the process where algorithms are used with historical data to attempt to predict human needs or requests for information?
(A) Data mining
(B) Trend prediction
(C) Social analysis
(D) Machine learning

16. There are many programming languages. How do computers understand the different languages?
(A) Testing takes care of this for computers by confirming the correctness of the code.
(B) Debugging handles this for computers by confirming the validity of the code.
(C) Compilers and interpreters translate the code to machine language for computers to read.
(D) There is a special natural language tied in to all programming languages that all computers can read that is created behind the scenes using abstraction.

17. How is a logic gate an abstraction?
(A) It adds the detail needed for each logic condition possible.
(B) It is more specific than hardware components.
(C) It represents any true and false condition.
(D) It is an integrated system of physical components.

18. How do APIs simplify writing programs?
(A) By providing step-by-step instructions on how to use the programming language
(B) By importing the newly written software to the API for others to use
(C) By providing documentation on how to code the needed functionality
(D) By connecting pre-written and tested software to a new program

19. While algorithms can be analyzed mathematically, what information does the empirical testing process provide?
(A) It provides best, worst, and average case information about the algorithm.
(B) It provides the maximum size dataset the algorithm can handle.
(C) It provides the validity of the algorithm.
(D) It provides the clarity of the algorithm.

20. Why is there a need to find different algorithms for problems that already have a solution?
(A) Different algorithms could use heuristics rather than precise values.
(B) Different algorithms could be more efficient.
(C) Different algorithms could use frequency analysis.
(D) Different algorithms could provide intractability.

21. Algorithms can be written with a combination of what three statements?
(A) Sequence / Selection / Iteration
(B) Series / Procedural / Functional
(C) Connection / Collection / Recursive
(D) Selection / Sorting / Searching

22. What is the most common way computer viruses are spread?
(A) By people clicking on an infected file
(B) From pop-up ads
(C) Through network worms
(D) From random botnet attacks

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23. What does Moore's law indicate?
(A) That the power of processors would double approximately every two years
(B) That the size of computers would decrease by half every two years
(C) That the price of computers would decrease by half every two years
(D) That the cost of computer storage would decrease by half every two years

24. How does creating program components help with program development?
(A) Individual components can be added without additional testing.
(B) Adding the components incrementally to working code helps create program functionality that is correct.
(C) Multiple people can write the components and still ensure compatibility.
(D) The components can be combined at once to create the needed program functionality.

25. What is the name of the search method that divides the size of the dataset by two with each iteration of the search?
(A) Bucket search
(B) Merge Search
(C) Linear Search
(D) Binary Search

26. How does documentation help with maintaining programs?
(A) It journals the history of program changes showing how the program first worked before changes.
(B) If code is modified, the documentation can guide the programmer in testing to ensure the functionality is still correct.
(C) It documents how to run the program in multiple languages for a global audience.
(D) It is useful for training new employees on how to learn the programming language.

27. What is the purpose of the DNS (Domain Name System)?
(A) To translate natural language website names to their IP address
(B) To create a new IP address for a website each time it is requested
(C) To position the packets in their correct order
(D) To route the Internet request on the way to its destination

28. What could a binary number represent?
(A) A number in decimal
(B) A color
(C) Text
(D) All of the above

29. How can programmers avoid duplicating code?
(A) Through the use of selection statements
(B) Through the use of iteration to repeat needed code
(C) Through sequential statements to process all data once
(D) Through the use of efficient algorithms

30. What is a problem that no algorithm exists to solve all instances called?
(A) Indeterminable problem
(B) Undecidable problem
(C) Infinite problem
(D) Exponential problem

31. What must occur before patterns can be identified in data?
(A) Computational tools must process the data in iterative ways.
(B) Algorithms need to be written for the patterns.
(C) Abstracting out the details in the data must occur.
(D) The data must be encrypted.

32. Why should procedures be used?
(A) They ease the workload on the processors.
(B) They facilitate the storage of data on hard drives.
(C) They make writing and maintaining programs easier through reuse of code.
(D) They control the flow of input and output data.

33. How should large datasets be analyzed?
(A) Using information filtering and search tools because they are efficient
(B) Using frequency analysis tools so patterns stand out
(C) Using exponential tools for faster analysis
(D) Using linear tools to see patterns as they develop

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34. What can help with identifying and correcting program errors?
(A) Revisiting requirements
(B) Collaboration
(C) Clustering requirements and tests
(D) Consolidating testing

35. How can financial transactions safely occur on the Internet?
(A) Through the use of symmetric keys
(B) Through certificates issued by Certificate Authorities (CAs) that validate the keys used
(C) Through the use of double authentication methods
(D) Through the use of frequency analysis

36. What is the definition of *bandwidth*?
(A) The frequency that data can be transmitted across the Internet
(B) The speed that data can be sent through the Internet
(C) The amount of data that can be transmitted in a fixed amount of time
(D) The delay between the request and the receipt of information on the Internet

37. Which type of loop is most effective to iterate over a list?
(A) Continuous
(B) While
(C) FOR EACH
(D) Do

38. What is one way to help ensure the correctness of algorithms?
(A) By testing with small sets of expected data
(B) Through the reuse of existing correct algorithms to build new algorithms
(C) Through documenting the functionality of the algorithm
(D) Through the use of heuristic algorithms

39. How has the sharing of information globally with experts impacted the medical field?
(A) Diagnosis and consultations can be done by non-local experts.
(B) There's been an increase in the sales of hardware needed to create the Internet to enable the sharing of data.
(C) Privacy laws have prevented the sharing of patient data on the Internet. It can be discussed online after sending the data using a delivery service.
(D) Social media sharing has increased the general public's knowledge of disease outbreaks.

40. Why do we use hexadecimal, a base-16 number system that uses 0–9 and A–F?
(A) It runs more efficiently than decimal.
(B) Computers use hexadecimal.
(C) It is easier to debug program errors written with hexadecimal.
(D) It takes fewer characters to represent larger numbers.

41. Why is it important to write programs that are readable?
(A) They are easier to modify and debug through use of good names, procedures, and formatting.
(B) They run more efficiently.
(C) They effectively process all cases of input.
(D) They produce accurate results.

42. How is collaboration useful in analyzing datasets?
(A) The multiple viewpoints can provide several outcomes for the data.
(B) Applying differing experiences and skills provides better analysis and insight.
(C) The analysis can be divided among several people, speeding up the analysis.
(D) Having multiple leaders helps the group form alliances based on interests.

43. When would lossless data compression be preferred over a lossy one?
(A) When you need to get back to the original file
(B) When you do not need to get back to the original file
(C) When you need to display the file on mobile devices and websites
(D) When you have limited space available on your computer

44. How does cryptography enable the Internet to process transactions securely?
(A) The public key encryption model is easy to use to encrypt data but intractable to decrypt for large numbers.
(B) Frequency analysis is used to disguise the use of common letters in encrypted messages keeping passwords secure.
(C) Symmetric keys are used to encrypt and decrypt messages for speed in processing to avoid being intercepted.
(D) Polynumeric alphabets are used to encrypt and decrypt messages to allow for use with different languages.

45. Why are the Boolean logic values used in computer science?
(A) Because most programs need to process both numbers and text fields
(B) Because they are used to test a program's results to ensure the output is correct
(C) Because they evaluate to true or false, which matches binary values of 0 and 1
(D) Because they are useful to determine if an instruction is running in memory

46. Given the importance of sharing insight and knowledge gained from processing data, how can this be effectively communicated?
(A) Using summaries of the insights
(B) Providing detailed examples of the data to prove accuracy
(C) Using tables and diagrams of the findings
(D) All of the above

47. Why are models and simulations useful abstractions?
(A) They can test hypotheses without real-world constraints.
(B) They can change multiple options at the same time, leading to new insights.
(C) They can precisely test real-world events to identify the ultimate outcome.
(D) They can confirm the cause of events.

48. Why is "big data" important to science and business?
(A) The investment in the time and expense of processing big data is large so the expectation for critical findings is huge.
(B) It can identify trends or solve problems that smaller datasets may not identify.
(C) It is too large to process when time is short, so businesses cannot use it effectively to react quickly enough for product changes.
(D) It is useful to generate new research possibilities, so it is only important to science.

49. What is an example of lower-level abstractions combining to make higher-level abstractions?
(A) Dividing functionality into separate modules that are all part of one program
(B) Writing pseudo-code to identify what the program needs to do
(C) Creating help documentation so the user will know how to use the program
(D) Using a flowchart to identify program decisions

50. How is the Internet scalable?
(A) Through the ability for additional networks and routers to be added without impacting service
(B) Through the ability to add longer public keys to keep data secure
(C) Through the ability to add additional authentication for users
(D) Through the ability to add additional latency to requests

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51. How can social media have a positive global impact?
(A) By allowing people to post their views anonymously and safely
(B) By allowing accounts of unverified events to spread quickly
(C) By providing a way for those impacted by disasters to communicate that they are safe
(D) By posting images or videos without a person's permission to make them famous

52. What does it mean if a program runs in less time than another?
(A) It is efficient.
(B) It is correct.
(C) It has been verified.
(D) It provides economies of scale in processing.

53. How do parameters provide abstraction?
(A) They block invalid input values.
(B) They return calculated values from the procedure to the calling program.
(C) They allow software reuse for different values.
(D) They provide the detail needed for an abstraction to function.

54. Tracing what your code is doing is an example of which one of the following terms?
(A) Discovery
(B) Debugging
(C) Shadowing the code
(D) Scaffolding

55. How can an organization begin the process of analyzing data?
(A) By following an iterative development process
(B) By establishing measurements the data should show
(C) By developing hypotheses and questions to test
(D) By checking to see if the data matches previously collected data

56. What is an example of "metadata"?
(A) A line of code
(B) A header in a document
(C) Author of the document
(D) Test data

57. Why should we use an iterative development approach?
(A) Because each iteration improves or adds code to build a successful program
(B) To meet the legal requirements for code to handle sensitive data
(C) To be able to begin coding while remaining requirements are being defined
(D) To minimize the amount of time needed for testing

58. Which statement describes a good variable name in a program?
(A) Variable names should be short so there is less opportunity for a typo.
(B) Variable names should be descriptive to help others understand their purpose.
(C) Variable names should start with program name and then the variable name for ease of tracking.
(D) Variable names should begin with a number starting with 1, followed by 2, and so on to know how many there are.

59. How is hardware an abstraction?
(A) Hardware is very specific and is therefore not abstract.
(B) It builds physical layers of increasing generality to process machine code.
(C) Hardware provides a specific way to run generalized software.
(D) It uses general information about how it works at the lowest level.

60. Compound expressions can be created using which of the following operators?
(A) IS / IS NOT
(B) NOT / NOR
(C) IF / ONLY IF
(D) AND / OR

61. What does it mean when we say the Internet is redundant?
(A) Parts of it are unnecessary.
(B) If a path is down, packets can be routed a different way.
(C) It has a delay between the request and the response to the request.
(D) If there is an error, a backup system is brought online to be used.

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62. What are packets when referring to the Internet?
(A) The delay in time from when a request is sent and received
(B) The individual sections of the IP address
(C) Information to be sent over the Internet broken into same size groupings
(D) The intermediate locations that send information to their destination

63. What type of software tools can organize and filter data?
(A) Word processing tools
(B) Spreadsheets and databases
(C) Interactive tools
(D) Input/output tools

64. Which two measures are used to determine the efficiency of an algorithm?
(A) The time needed to compile and the size of the dataset
(B) The time to run and the memory usage
(C) The number of lines of code and the size of dataset
(D) The number of procedures and the number of loops used

65. What describes the process of keeping common or similar features and functionality while removing details that are different?
(A) An algorithm
(B) Decomposition
(C) Simulation
(D) Abstraction

66. Why is there a need for more than one programming language?
(A) Some programming languages are designed for specific uses and are best used in those situations.
(B) Some programming languages cannot implement needed algorithms.
(C) Some programming languages cannot be compiled and therefore cannot run efficiently.
(D) There is no real need, just the preference of those who create new languages.

67. What is the job of a computer's processor?
(A) To calibrate the hardware
(B) To determine how much memory is needed for a program task
(C) To maintain the connections of all the computer's components
(D) To handle the instructions when a program is being executed

68. What is a benefit of combining algorithms?
(A) It saves time.
(B) It minimizes complexity.
(C) It increases flexibility.
(D) All the above

69. How can you use an image on your website that you found on the Internet?
(A) You can use it copyright free.
(B) You can use it after paying a fee for use or obtaining written permission unless the author provided a Creative Commons license allowing such use.
(C) You can use it if you provide attribution to the owner.
(D) You can use it only if you do not plan to make money from it.

70. What does OSI (Open Systems Interconnection) do?
(A) It's the process for sharing Open Source software.
(B) It shows the steps to include in an implementation to communicate over the Internet.
(C) It's the model for connecting continents with regional ISPs with fiber.
(D) It's the process for breaking data into packets and reassembling them.

71. Which of the following list of hardware abstractions goes from least to most abstract?
(A) Circuit diagram, truth table, logic gate diagram
(B) Truth table, circuit diagram, logic gate diagram
(C) Logic gate diagram, circuit diagram, truth table
(D) Truth table, logic gate diagram, circuit diagram

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72. How are algorithms and programs related?
(A) They have a hierarchical relationship.
(B) Programs implement algorithms.
(C) Algorithms implement programs.
(D) They can both be run on a computer.

73. What should people do to ensure online sources are credible?
(A) Review the author, publisher, and sponsor credentials.
(B) Check to see if the site has anything that has gone viral to ensure credibility.
(C) Read the comments at the bottom of the article to see if they validate the article's claim.
(D) See how active the author is on social media for reliability.

74. What is a benefit of collaboration when writing code?
(A) Collaboration allows the work to be divided among independent programmers to create.
(B) Collaboration makes it easier to document another person's code.
(C) Collaboration makes it easier to find errors.
(D) Collaboration produces an increase in user requirements that can be met with more team members.

STOP. End of Exam