

By the End of the 12th Grade

Computing Systems

Devices

- 1 Illustrate ways computing systems implement logic through hardware components. [11-12.CS.D.01](#)
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Hardware & Software

- 1 Describe and categorize roles of an operating system. [11-12.CS.HS.01](#)
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Troubleshooting

- 1 Describe how hardware components facilitate logic, input, output and storage in computing systems. [11-12.CS.T.01](#)
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Networks & the Internet

Network Communication & Organization

- 1 Analyze the relationship between routers, switches, servers, topology and addressing. [11-12.NI.NCO.01](#)
 - 2 Describe key protocols and underlying processes of internet-based services (e.g., http/https and Simple Mail Transfer Protocol (SMTP)/internet Message Access Protocol (IMAP), routing protocols). [11-12.NI.NCO.02](#)
 - 3 Explain how the characteristics of the internet influence the systems developed on it. [11-12.NI.NCO.03](#)
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Cybersecurity

- 1 Compare and refine ways in which software developers protect devices and information from unauthorized access. [11-12.NI.C.01](#)
 - 2 Analyze cryptographic techniques to model the secure transmission of information. [11-12.NI.C.02](#)
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Data & Analysis

Storage

- 1 Compare different bit representations of data types, such as characters, Booleans and numbers while recognizing when using each data type is appropriate. [11-12.DA.S.01](#)
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Collection, Visualization & Transformation

- 1 Generate data sets that use a variety of data collection tools and analysis techniques to support a claim and/or communicate information. [11-12.DA.CVT.01](#)

Inference & Models

- 1 Evaluate the ability of models and simulations to test and support the refinement of hypotheses. [11-12.DA.IM.01](#)
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Algorithms & Programming

Algorithms

- 1 Critically examine and trace classic algorithms (e.g., selection sort, insertion sort, binary search, linear search). [11-12.AP.A.01](#)
 - 2 Implement an artificial intelligence algorithm to interact with a human or solve a problem. [11-12.AP.A.02](#)
 - 3 Describe how artificial intelligence algorithms drive many software and physical systems (e.g., autonomous robots, computer vision, pattern recognition, text analysis). [11-12.AP.A.03](#)
 - 4 Evaluate algorithms (e.g., sorting, searching) in terms of their efficiency and clarity. [11-12.AP.A.04](#)
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Variables

- 1 Create problem solutions that utilize data structures (e.g., lists, arrays, ArrayLists). [11-12.AP.V.01](#)
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Control

- 1 Trace the execution of iteration (e.g., loops, recursion), illustrating output and changes in values of named variables. [11-12.AP.C.01](#)
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Modularity

- 1 Construct solutions to problems using student- created components (e.g., procedures, modules, objects). [11-12.AP.M.01](#)
- 2 Create programming solutions by reusing existing code (e.g., libraries, Application Programming Interface (APIs), code repositories). [11-12.AP.M.02](#)
- 3 Analyze a large-scale computational problem and identify generalizable patterns that can be applied to a solution. [11-12.AP.M.03](#)

Program Development

- 1 Use integrated development environments (IDEs) and collaborative tools and practices (code documentation) in a software project. [11-12.AP.PD.01](#)
- 2 Plan and develop programs using a development process (e.g., waterfall, iterative, spiral, rapid application development, agile). [11-12.AP.PD.02](#)
- 3 Identify and compare features of various programming languages that make them useful for solving problems and developing systems. [11-12.AP.PD.03](#)
- 4 Design software using version control. [11-12.AP.PD.04](#)
- 5 Develop and use a series of test cases to verify that a program performs according to its design specifications. [11-12.AP.PD.05](#)
- 6 Explain security issues that might lead to compromised computer programs. [11-12.AP.PD.06](#)
- 7 Evaluate key qualities of a program through a process such as a code review. [11-12.AP.PD.07](#)

Impacts of Computing

Culture

- 1 Evaluate the impact of equity, access and influence on the distribution of computing resources in a global society. [11-12.IC.C.01](#)

Safety, Law & Ethics

- 1 Debate laws and regulations that impact the development and use of software. [11-12.IC.SLE.01](#)