

Level 3B: 11-12

Computing Systems

3B-CS-01 Categorize the roles of operating system software. [P.7.2](#)

3B-CS-02 Illustrate ways computing systems implement logic, input, and output through hardware components. [P.7.2](#)

Networks and the Internet

3B-NI-03 Describe the issues that impact network functionality (e.g., bandwidth, load, delay, topology). [P.7.2](#)

3B-NI-04 Compare ways software developers protect devices and information from unauthorized access. [P.7.2](#)

Data and Analysis

3B-DA-05 Use data analysis tools and techniques to identify patterns in data representing complex systems. [P.4.1](#)

3B-DA-06 Select data collection tools and techniques to generate data sets that support a claim or communicate information. [P.7.2](#)

3B-DA-07 Evaluate the ability of models and simulations to test and support the refinement of hypotheses. [P.4.4](#)

Algorithms and Programming

3B-AP-08 Describe how artificial intelligence drives many software and physical systems. [P.7.2](#)

3B-AP-09 Implement an artificial intelligence algorithm to play a game against a human opponent or solve a problem. [P.5.3](#)

3B-AP-10 Use and adapt classic algorithms to solve computational problems. [P.4.2](#)

3B-AP-11 Evaluate algorithms in terms of their efficiency, correctness, and clarity. [P.4.2](#)

3B-AP-12 Compare and contrast fundamental data structures and their uses. [P.4.2](#)

3B-AP-13 Illustrate the flow of execution of a recursive algorithm. [P.3.2](#)

3B-AP-14 Construct solutions to problems using student-created components, such as procedures, modules and/or objects. [P.5.2](#)

3B-AP-15 Analyze a large-scale computational problem and identify generalizable patterns that can be applied to a solution. [P.4.1](#)

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- 3B-AP-16** Demonstrate code reuse by creating programming solutions using libraries and APIs. P.5.3
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- 3B-AP-17** Plan and develop programs for broad audiences using a software lifecycle process. P.5.1
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- 3B-AP-18** Explain security issues that might lead to compromised computer programs. P.7.2
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- 3B-AP-19** Develop programs for multiple computing platforms. P.5.2
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- 3B-AP-20** Use version control systems, integrated development environments (IDEs), and collaborative tools and practices (code documentation) in a group software project. P.2.4
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- 3B-AP-21** Develop and use a series of test cases to verify that a program performs according to its design specifications. P.6.1
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- 3B-AP-22** Modify an existing program to add additional functionality and discuss intended and unintended implications (e.g., breaking other functionality). P.5.3
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- 3B-AP-23** Evaluate key qualities of a program through a process such as a code review. P.6.3
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- 3B-AP-24** Compare multiple programming languages and discuss how their features make them suitable for solving different types of problems. P.7.2
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Impacts of Computing

- 3B-IC-25** Evaluate computational artifacts to maximize their beneficial effects and minimize harmful effects on society. P.6.1, P.1.2
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- 3B-IC-26** Evaluate the impact of equity, access, and influence on the distribution of computing resources in a global society. P.1.2
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- 3B-IC-27** Predict how computational innovations that have revolutionized aspects of our culture might evolve. P.7.2
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- 3B-IC-28** Debate laws and regulations that impact the development and use of software. P.3.3, P.7.3
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