

# Foundations (9-12)

Adopted 2017

## Computing Systems

- 1. The student will** [CSF.1](#)
  - compare the structures, functions, and interactions between application software, system software, and hardware; and [CSF.1.A](#)
  - explore the relationship between hardware and software using the Internet of Things. [CSF.1.B](#)

## Networks and the Internet

- 2. The student will model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination.** [CSF.2](#)
- 3. The student will explain the role of protocols in transmitting data across networks and the Internet.** [CSF.3](#)
- 4. The student will evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology and addressing.** [CSF.4](#)

## Cybersecurity

- 5. The student will identify and explain ways that sensitive data (assets) can be threatened by malware and other computer attacks, using appropriate terminology.** [CSF.5](#)
- 6. The student will give examples of ways to protect sensitive data (assets) from malware and other computer attacks and evaluate them according to multiple criteria.** [CSF.6](#)
- 7. The student will explain typical tradeoffs between usability and security and recommend security measures in a given scenario based on these (or other) tradeoffs.** [CSF.7](#)
- 8. The student will write or adapt a program to validate its input and to avoid certain kinds of vulnerabilities.** [CSF.8](#)

## Data and Analysis

- 9. The student will evaluate the tradeoffs in how data elements are organized and where data is stored.** [CSF.9](#)
- 10. The student will create interactive data visualizations using software tools to help others better understand real-world phenomena.** [CSF.10](#)

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## Algorithms and Programming

- 11. The student will use data analysis tools and techniques to identify patterns in data representing complex systems. CSF.11**

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- 12. The student will develop a program working individually and in teams using a text-based language. CSF.12**

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- 13. The student will identify the expected output of a program given a problem and some input. CSF.13**

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- 14. The student will design and iteratively develop programs for practical intent or personal expression, incorporating feedback from users. CSF.14**

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- 15. The student will design and implement algorithms using CSF.15**
  - a. sequencing of instructions; CSF.15.A
  - b. conditional execution; and CSF.15.B
  - c. iteration. CSF.15.C

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- 16. The student will implement a program that accepts input values, stores them in appropriately named variables, and produces output. CSF.16**

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- 17. The student will trace the execution of an algorithm, illustrating output and changes in values of named variables. CSF.17**

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- 18. The student will apply the basic operations used with numeric and non-numeric data types in developing programs. CSF.18**

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- 19. The student will use predefined functions to simplify the solution of a complex problem. CSF.19**

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- 20. The student will apply simple algorithms to a collection of data. CSF.20**

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- 21. The student will create programs CSF.21**
  - a. demonstrating an understanding that program development is an ongoing process that requires adjusting and debugging along the way; and CSF.21.A
  - b. using version control to create and refine programs. CSF.21.B

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## Impacts of Computing

- 22. The student will use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields. CSF.22**

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- 23. The student will evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. CSF.23**

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- 24. The student will explain the beneficial and harmful effects that intellectual property laws can have on innovation, including the impact of open source software. CSF.24**

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**25. The student will explain the privacy concerns related to the collection and generation of data through automated processes that are not always evident to users.** CSF.25