

Sixth Grade: Computer Science

In the Sixth Grade, students build upon their understanding of computing systems and the network and gather and share information effectively. Students gain a more defined understanding of how data is transmitted over the Internet. Students explore real-world applications of cybersecurity, through exploring laws governing privacy and understanding user agreements. Students continue to use computational thinking and an iterative design process to create algorithms and programs. A greater emphasis on the application of data and analysis is present with an understanding of the importance of accuracy and reliability of data, and the use of appropriate computational tools to create data visualizations that are used to make predictions and draw conclusions. Students actively engage in troubleshooting and documenting hardware and software issues to foster resilience, analytical reasoning, and effective communication. Students explore potential career paths and evaluate how computer science skills can be applied in various professions.

Algorithms and Programming (AP)

6.AP.1 The student will apply computational thinking to identify patterns, make use of decomposition to break down problems or processes into sub-components, and design algorithms.

- a. Identify patterns and repeated steps in an algorithm, problem, or process.
- b. Decompose an algorithm, problem, or process into sub-components.
- c. Abstract relevant information to identify essential details.
- d. Design algorithms using abstraction to accomplish a task or express a computational process.

6.AP.2 The student will plan and implement algorithms that include conditional control structures and collection of numeric data using a block-based or text-based tool.

- a. Create a decision tree diagram to illustrate the decision-making process.
- b. Read and write programs that initialize Boolean, integer, and decimal number variables.
- c. Read and write programs that collect numeric data from users.
- d. Read and write programs that contain nested conditional control structures.
- e. Predict the results of logic expressions that use Boolean operators: and, or, and not; including expressions that use relational expressions as one or more operands.

6.AP.3 The student will use the iterative design process to create, test, and debug programs using a block-based or text-based programming language.

- a. Create and test programs that uses multiple conditional control structures.
- b. Incorporate existing code, media, or libraries into original programs.
- c. Trace and predict outcomes of programs.

- d. Analyze and describe program results to assess validity of outcomes.
- e. Analyze the outcomes of programs to identify logic and syntax errors.
- f. Incorporate feedback from others to refine program.
- g. Revise and improve programs to resolve errors and produce desired outcomes.

6.AP.4 The student will demonstrate proper attribution when incorporating ideas and works of others.

- a. Identify and give proper attribution of information and assets from the Internet and other sources.

Computing Systems (CSY)

6.CSY.1 The student will define and explain application software and operating systems of a computing device within a computing system.

- a. Define and describe the functions of an operating system and application software.
- b. List advantages and limitations of application software and operating systems based on the needs of the user.

6.CSY.2 The student will identify and explain hardware, software, and connectivity problems and troubleshooting solutions.

- a. Identify and explain hardware, software, and connectivity problems and solutions with accurate terminology.
- b. Identify resources for troubleshooting hardware, software, and connectivity-related problems.

6.CSY.3 The student will identify and describe Artificial Intelligence (AI).

- a. Define artificial intelligence and identify the characteristics of artificial intelligence.
- b. Describe how AI technologies generate information or automate decision and how people interact with AI technologies.
- c. Define algorithmic bias and explain its consequences on AI technologies and systems.

Cybersecurity (CYB)

6.CYB.1 The student will evaluate the risks and benefits associated with sharing personal and public resources or artifacts.

- a. Identify and explain the difference between personal and public information.

- b. Discuss the consequences of sharing personal and confidential information online.
- c. Evaluate risks and benefits associated with sharing information online.

6.CYB.2 The student will investigate various usage agreements designed to protect individuals.

- a. Identify laws governing privacy with computing devices and emerging technologies.
- b. Investigate and describe common components of usage agreements.
- c. Identify user and company protections in a usage agreement.

Data and Analysis (DA)

6.DA.1 The student will utilize computational tools to collect and organize data.

- a. Select and use appropriate computational tools to collect data.
- b. Organize data to make it easier to understand and use.
- c. Clean data to remove and correct errors.
- d. Analyze data sources for accuracy and reliability.

6.DA.2 The student will utilize computational tools to visualize and evaluate data.

- a. Identify different types of visual representations of data.
- b. Compare various visual representations and identify when each should be used.
- c. Create charts, graphs, models, and simulations to visualize data.
- d. Describe and synthesize information from a visual representation of data.

6.DA.3 The student will make predictions and draw conclusions from data visualizations.

- a. Visualize data using appropriate graphs, charts, and data visualization techniques to enhance understanding and communicate findings effectively.
- b. Use computational tools to analyze patterns within data sets and identify trends.
- c. Draw conclusions and make predictions based on the analysis and interpretation of the data visualization.
- d. Utilize simulations and models to formulate, refine, and test hypotheses.

6.DA.4 The student will identify ways people curate and provide training data.

- a. Identify and list ways people provide data that is used as training data.
- b. Discuss the role of human intervention in curating training data.
- c. Identify and describe the effect training data has on the accuracy of artificial intelligence systems.

Impacts of Computing (IC)

6.IC.1 The student will assess the impact of computing technologies on local society.

- a. Explain how computing impacts innovation and describe the development of new computing technologies in communication, entertainment, and business.
- b. Discuss how computing technologies have influenced various industries and sectors locally.
- c. Research simple and complex problems that computing systems can be used to solve.
- d. Analyze the implications of emerging technologies and potential real-world impact in the local community.

6.IC.2 The student will analyze the impact of screen time on physical and mental health.

- a. Analyze and describe the impact of excessive technology usage may have on one's physical health.
- b. Examine the impact of blue light on sleep patterns and regulations.
- c. Propose strategies that provide alternatives of technology usage to promote physical activity.
- d. Discuss the potential impact the use of social media may have on self-identity and mental health.
- e. Define cyberbullying and its impact on one's health and well-being.
- f. Discuss the possible effects of cyberbullying.
- g. Identify ways to report illegal or psychologically maladaptive online behavior.

6.IC.3 The student will explore career pathways and identify how computer science and computational thinking practices align with these pathways.

- a. Investigate a career of interest and determine how computer science and computational thinking practices are used in the chosen career.

6.IC.4 The student will identify copyrighted and licensed software material.

- a. Identify the role of software licenses, including open-source, and why they are used.
- b. Compare and contrast the positives and negatives of various software licenses.

6.IC.5 The student will describe the impacts of computing network architecture, including the role of the Internet in society.

- a. Discuss ethical issues and laws related to accessibility, censorship, privacy, access, and safety while using the Internet.
- b. Explain the role broadband connectivity has in social life, culture, and global economy.

6.IC.6 The student will investigate and analyze the impact of the progression and advancement of AI technologies on industries.

- a. Discuss the type of industries that may be impacted by the use and integration of Artificial Intelligence (AI).
- b. Compare and contrast the evolving nature of work across diverse industries because of the progression and advancement of Artificial Intelligence.

Networks and the Internet (NI)

6.NI.1 The student will outline the advantages and disadvantages of transmitting information over the Internet, including speed, reliability, cost, and security.

- a. Explain the role of the Internet in social life, culture, and the economy.
- b. Explain data transfer and the impact of connectivity speed when data is going from one device to another.
- c. Compare the speed and reliability of various data transmission media.
- d. Describe the advantages and disadvantages of transporting information over the Internet.