

Fifth Grade: Computer Science

In Fifth Grade, students explore cloud computing, examining security risks and adopting best practices to protect information. They research cybersecurity policies and laws, researching ways to prevent unauthorized access to data. Algorithms undergo expansion with the inclusion of multi-way branching and nested conditional control structures. Students develop programs incorporating rational and arithmetic expressions for performing calculations. Evaluation of data source reliability becomes a focus, enabling students to draw conclusions from data visualizations. Additionally, the impact of social interactions through computing technologies and the exploration of open-source licenses are addressed, along with considerations on expanding the capabilities of computing devices.

Algorithms and Programming (AP)

5.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 a problem or process into a subset of smaller problems or groups of sequential instructions.
- c. Abstract relevant information to identify essential details.
- d. Design an algorithm to solve a problem.

5.AP.2 The student will plan and implement algorithms that consist of sequencing, loops, variables, user input, and nested conditional control structures using a block-based programming language.

- a. Describe the concept of nested conditional control structure.
- b. Create a design document to trace and predict an algorithm using plain language, pseudocode, or diagrams.
- c. Read, write, and interpret nested conditional control structures: “if-else” and “if-else; if-else” statements.

5.AP.3 The student will use the iterative design process to create, test, and debug programs containing sequencing, loops, variables, user inputs, nested conditional control structures, and two-way branching conditional control structures in a block-based programming tool.

- a. Use accurate terminology to describe and explain the iterative design process.
- b. Create and test programs that consist of sequencing, loops, variables, user inputs, nested conditional control structures, and two-way branching conditional control structures.
- c. Trace and predict outcomes of programs.
- d. Analyze and describe program results to assess validity of outcomes.
- e. Revise and improve programs to resolve errors or produce desired outcomes.

Computing Systems (CSY)

- 5.CSY.1 The student will explain how computing systems are used to collect and exchange data.**
- a. Identify and explain how computing systems store data representations, including images and sound.
 - b. Describe the role of processing speed and storage capacity when collecting and exchanging data.
- 5.CSY.2 The student will describe an automated decision-making process employed by a computing system.**
- a. Explore decision automation and how it is used.
 - b. List outcomes of a process based on automated decisions.
- 5.CSY.3 The student will evaluate and implement troubleshooting strategies when a computing system is not operational.**
- a. Identify and use troubleshooting protocols to resolve hardware, software, and connectivity issues.
 - b. Apply prior troubleshooting practices to new problems as they arise.

Cybersecurity (CYB)

- 5.CYB.1 The student will identify ways to limit unauthorized access on computing devices.**
- a. Define virus, malware, and phishing.
 - b. Explain how viruses and malware can put personal information at risk.
 - c. Describe the role of human interactions in social engineering attacks.
 - d. Identify ways to protect personal and private information when using a computing device and the Internet.
 - e. Explain the importance of updating software.
- 5.CYB.2 The student will explain how cybersecurity policies and laws are designed to protect individuals.**
- a. Explain the importance of policies and laws related to online use of computing devices and the Internet.
 - b. Research and discuss current cybersecurity policies and laws that protect individuals.
 - c. Explain legal consequences for inappropriate use of computing technologies.

Data and Analysis (DA)

5.DA.1 The student will collect data or use data sets to solve a problem or investigate a topic.

- a. Identify accurate ways data can be collected.
- b. Evaluate the reliability of the data source.
- c. Organize data based on similarities or patterns.
- d. Compare and contrast various data elements.

5.DA.2 The student will create multiple data representations to make predictions and conclusions.

- a. Formulate questions that require the collection or acquisition of data.
- b. Collect data to use in creating charts, graphs, and models.
- c. Analyze data as evidence to draw conclusions and make predictions.
- d. Propose solutions to problems or questions based on data analysis.

5.DA.3 The student will explain the significance of training data in machine learning.

- a. Compare how training data is utilized in supervised, unsupervised and reinforcement learning.
- b. Explain how training data is used to make classification predictions.
- c. Discuss the need and significance of diverse, inclusive, and large datasets.

Impacts of Computing (IC)

5.IC.1 The student will analyze the impact of inappropriate use of computing technologies.

- a. Predict consequences for inappropriate uses of computing technologies.
- b. Describe how technology-related problems can be avoided or prevented.
- c. Develop solutions for a scenario involving inappropriate use of computing technologies.

5.IC.2 The student will explain the potential impact of excessive screen time on academic performance.

- a. Analyze data to determine the impact of screen time on academic performance.
- b. Describe how academic behaviors that lead to academic success are impacted by daily screen time.
- c. Differentiate usage of screen time that benefit and hinder academic performance.

5.IC.3 The student will identify the impact of computing technologies on the workforce, culture, and global society.

- a. Research and analyze computing technology careers in global society.
- b. Examine the impacts of diversity and inclusivity in computing technology fields globally.
- c. Explore the impact of emerging technologies on workforce, culture, and global society.

5.IC.4 The student will observe and examine intellectual property rights when considering the use of open-source licenses and copyrights.

- a. Distinguish between open-source licenses and copyrights.
- b. Research risks associated with inappropriate use of various digital information sources.
- c. Describe and use strategies to protect online digital content and resources.

5.IC.5 The student will examine the effects of social interactions due to computing technologies.

- a. List and explain how advances in computing technologies impact communication and collaboration.
- b. Describe how computing technologies can be designed to engage and interact with users including those with diverse needs.
- c. Evaluate activities conducted in the physical and online environments.
- d. Create an artifact that illustrates a solution to address the need or want of a user.

Networks and the Internet (NI)

5.NI.1 The student will identify and describe cloud computing.

- a. Define cloud computing.
- b. List examples of cloud computing.
- c. List the advantages and disadvantages of cloud computing.
- d. Identify safe practices and potential security risks when using cloud computing.