

Indiana Academic Standards

Computer Science



Kindergarten - Grade 8

K-8 Computer Science Indiana Academic Standards Overview

The K-8 Computer Science Indiana Academic Standards are based on the *K-12 Computer Science Framework* and *CSTA K-12 Computer Science Standards (2017)* are meant to reflect a new vision for computer science education. The following shifts reflect updates to these computer science standards. The K-8 Computer Science Indiana Academic Standards:

- Build logically from kindergarten through grade eight;
- Integrate core student practices;
- Reflect the growing range of fields within computer science; and
- Focus on computer science as a collaborative endeavor.

The K-8 Computer Science Indiana Academic Standards include content knowledge and skills practiced and utilized in the real world. Engaging in the vertically-aligned K-8 Computer Science Indiana Academic Standards prepares students for success in high school computer science course sequences and complements skill requirements needed in other academic areas and career fields.

Core Practices

Seven core practices of computer science are integrated in the K-8 Computer Science Indiana Academic Standards. These practices describe behaviors and dispositions that computationally-literate students use in a data- and technology-rich society. Algorithmic problem solving and collaboration are highlighted in the standards and can be integrated as methods and tools across multiple disciplines. The core practices are:

1. Fostering an inclusive computing culture;
2. Collaborating around computing;
3. Recognizing and defining computational problems;
4. Developing and using abstractions;
5. Creating computational artifacts;
6. Testing and refining computational artifacts; and
7. Communicating about computing.

Core Concepts

As students move through grade levels, they will work with and experience the standards at those grade bands (K-2, 3-5, and 6-8). The standards are based on the six core concepts: Data and Information (DI), Computing Devices and Systems (CD), Programs and Algorithms (PA), Networking and the Internet (NI), Impact and Culture (IC), and Digital Literacy (DL).

Data & Information (DI)		
Kindergarten - Grade 2	Grades 3 - 5	Grades 6 - 8
K-2.DI.1: In order to solve a problem, sort information into a useful order.	3-5.DI.1: Decompose problems and subproblems into parts as a means to solving complex problems.	6-8.DI.1: Decompose (break down) problems into smaller, more manageable subsets by applying the algorithmic problem solving steps to make the possible solutions easier to follow, test, and debug.
K-2.DI.2: Identify and collect data using digital tools (e.g., take pictures of all blue items, create a document with things that start with “a”).	3-5.DI.2: Organize and present collected data visually to highlight relationships and support a claim.	6-8.DI.2: Collect data using computational tools (e.g., sensors, inputs like microphones) and transform the data to make it more useful and reliable.
K-2.DI.3: Define stored information as data and when appropriate, copy, search, retrieve, modify, and delete it.	3-5.DI.3: Demonstrate how variables can represent data, and are used to store and modify information.	6-8.DI.3: Examine the data represented by different program variables to ensure consistent format and remove errors.
K-2.DI.4: Model that data can be stored and manipulated using numbers or symbols to represent information.	3-5.DI.4: Describe that data can be represented in different forms understandable by people, including words, symbols, and digital displays of color.	6-8.DI.4: Describe that data can be represented in multiple encoding schemes such as binary, RGB values, hexadecimal codes.
K-2.DI.5: Organize and present data in different visual formats such as charts, graphs, and symbols, and identify and describe patterns to make predictions.	3-5.DI.5: Use data to highlight or propose cause-and-effect relationships, predict outcomes, or communicate an idea.	6-8.DI.5: Create visuals such as flowcharts, diagrams, pseudocode to represent complex problems as algorithms.
Computing Devices & Systems (CD)		
Kindergarten - Grade 2	Grades 3 - 5	Grades 6 - 8
K-2.CD.1: Use appropriate terminology in identifying and describing computer hardware.	3-5.CD.1: Model how computer hardware and software work together to accomplish tasks.	6-8.CD.1: Design projects that combine hardware and software components to collect and exchange data.

K-2.CD.2: Describe and troubleshoot basic hardware and software problems using appropriate terminology.	3-5.CD.2: Determine potential solutions to solve simple hardware and software problems using common troubleshooting strategies.	6-8.CD.2: Systematically identify and fix problems (troubleshoot) with computing devices and their components (e.g. checklist, decision tree, flowchart).
K-2.CD.3: Select and operate appropriate software to perform a variety of tasks and recognize that users have different needs and preferences for the technology they use.	3-5.CD.3: Describe how internal and external parts of computing devices function to form a system.	6-8.CD.3: Recommend improvements to the design of computing devices, based on analysis of how users interact with the devices.
	3-5.CD.4: Describe what distinguishes humans from machines focusing on human intelligence versus machine intelligence.	6-8.CD.4: Describe what distinguishes humans from machines focusing on ways we can communicate, as well as ways in which computers use models of intelligent behavior (e.g., robot motion, speech and language understanding, and computer vision).
Programs & Algorithms (PA)		
Kindergarten - Grade 2	Grades 3 - 5	Grades 6 - 8
K-2.PA.1: Breakdown the steps needed for a desired outcome and plan the order to accomplish the goal.	3-5.PA.1: Collaborate with peers to implement problem solving steps to create a variety of programming solutions.	6-8.PA.1: Demonstrate dispositions to open-ended problem solving within programming (e.g., persistence, brainstorming, creativity, debugging, iterating).
K-2.PA.2: Using age-appropriate vocabulary, explain steps taken and choices made to improve the design of a sequence.	3-5.PA.2: Using age-appropriate vocabulary, explain steps taken and choices made to improve the design of a sequence.	6-8.PA.2: Modify, remix, or incorporate portions of an existing program into one's own work to develop something new or add more advanced features.
K-2.PA.3: Develop programs with sequences and simple loops, to express ideas or address a problem.	3-5.PA.3: Design programs that incorporate sequences, events, loops, and conditionals.	6-8.PA.3: Design and iteratively develop programs that combine the following: sequencing, looping (including nested loops), conditionals (including compound conditionals), expressions, variables, functions, and parameters.

K-2.PA.4: Identify and fix (debug) errors in sequences and simple loops.	3-5.PA.4: Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.	6-8.PA.4: Systematically test and refine programs using a range of test cases.
K-2.PA.5: Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks.	3-5.PA.5: Construct and analyze solutions to problems using the basic steps of algorithmic problem solving.	6-8.PA.5: Use the basic steps in the algorithmic problem-solving process to evaluate and revise solutions using a range of test cases.
K-2.PA.6: Give attribution when using the ideas and creations of others while developing programs.	3-5.PA.6: Observe intellectual property rights and give appropriate attribution when creating or remixing programs.	6-8.PA.6: Incorporate existing code, media, and libraries into original programs and give attribution.
	3-5.PA.7: Describe choices made during program development using code comments, presentations, and demonstrations.	6-8.PA.7: Document programs in order to make them easier to follow, test, and debug.
Networking & the Internet (NI)		
Kindergarten - Grade 2	Grades 3 - 5	Grades 6 - 8
K-2.NI.1: Explain what passwords are, why they are used, and why it is important to develop strong passwords to protect devices and information.	3-5.NI.1: Discuss real-world cybersecurity problems and how personal information can be protected.	6-8.NI.1: Explain how physical and cybersecurity measures protect electronic information.
	3-5.NI.2: 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.	6-8.NI.2: Model the role of protocols in transmitting data across networks and the internet.
		6-8.NI.3: Apply multiple methods of encryption to model the secure transmission of information.
Impact & Culture (IC)		
Kindergarten - Grade 2	Grades 3 - 5	Grades 6 - 8
K-2.IC.1: Practice digital citizenship by giving credit when using the ideas and creations of	3-5.IC.1: Assess the responsible use of technology as well as the consequences of how inappropriate	6-8.IC.1: Exhibit legal and ethical behaviors when using technology and information and

others.	use can negatively impact society, cyber security, and one's own personal life.	discuss the consequences of misuse.
K-2.IC.2: Compare and contrast the effects of technology on communities and social interactions.	3-5.IC.2: Describe the positive and negative impacts of technology on one's personal life, society, and our culture.	6-8.IC.2: Discuss issues of bias and accessibility in the design of existing technologies.
K-2.IC.3: Identify expected behaviors for working responsibly with others online.	3-5.IC.3: Seek diverse perspectives for the purpose of improving computational artifacts.	6-8.IC.3: Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.
K-2.IC.4: Keep login information private, and log off of devices appropriately.	3-5.IC.4: Identify which information should be kept private and which information can be shared.	6-8.IC.4: Describe tradeoffs between allowing information to be public and keeping information private and secure.
	3-5.IC.5: Critique computing technologies that have changed the world. Analyze how those technologies influence and/or are influenced by cultural practices and societal biases.	6-8.IC.5: Discuss how unequal distribution and participation in technology and computer science disadvantages marginalized populations resulting in issues of equity, access, power, and exclusion.

Digital Literacy (DL)

Kindergarten - Grade 2	Grades 3 - 5	Grades 6 - 8
K-2.DL.1: Use technology to research and create multimedia products that support learning across the curriculum.	3-5.DL.1: Working in a group, select the appropriate tool from a menu of options for general purpose productivity, skill remediation, written communication, and publishing activities.	6-8.DL.1: Select appropriate tools and technology resources to support learning and personal productivity, publish individual products, and design, develop, and publish data, accomplish a variety of tasks, and solve problems.
K-2.DL.2: With support, communicate and work collaboratively with peers using technology.	3-5.DL.2: Collaborate to iteratively develop computational artifacts (e.g., videos, computer programs).	6-8.DL.2: Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.
K-2.DL.3: Use standard input and output devices to operate computers and other technologies.	3-5.DL.3: Demonstrate proficiency with keyboards and other input and output devices.	6-8.DL.3: Demonstrate an understanding of the relationship between hardware and software.

References

Computer Science Teachers Association (2017). CSTA K-12 Computer Science Standards, Revised 2017. Retrieved from <http://www.csteachers.org/standards>.

K–12 CS Framework. (2016). Retrieved March 23, 2021, from <http://www.k12cs.org>

More information can be found on IDOE's [Indiana Academic Standards webpage](#). Contact IDOE's [Office of Teaching and Learning](#) with questions regarding this document.