

Essential Skills for Grade 4

Concept	Sub-concept	Standard	Essential Skills
Computing Systems	Devices	4. CS.D.01 Describe how internal and external parts of computing devices function to form a system.	Describe how different parts of a computing device interact with each other and work together.
Computing Systems	Hardware & Software	4. CS.HS.01 Identify and describe a variety of ways computer hardware and software work together as a system to accomplish a task, using appropriate technical terminology (e.g., input, output, processors, sensors, storage).	Describe the different types of input that a computing system may receive and the components that could be involved (e.g., mouse, keyboard, sensors) Identify the processor as the component which manipulates input into output and describe the different ways in which a computing system may produce output and the components that could be involved (e.g., monitor, printer, speaker)
Computing Systems	Troubleshooting	4. CS.T.01 Identify, using appropriate technical terminology, simple hardware and software problems that may occur during everyday use, discuss problems with peers and adults, and apply various strategies for solving these problems (e.g., rebooting the device, checking the power, forced shutdown of an application, running anti-virus).	Apply a variety of troubleshooting strategies to address the problems that arise with computing devices .
Networks and the Internet	Network Communication & Organization	4. NI.NCO.01 Summarize how information is sent and received over physical and wireless pathways (e.g., information is deconstructed in smaller pieces called packets, transmitted to final destination, and reassembled).	Examine the reasons for deconstructing information into packets . Describe the role of packets in transmitting information efficiently over the internet.
Networks and the Internet	Cybersecurity	4.NI.C.01 Identify problems that relate to unsecure networks and inappropriate use of computing devices and potential subsequent consequences	Describe the consequences of using unsecure networks and inappropriate use of computing devices.
Networks and the Internet	Cybersecurity	Not addressed at this level.	

Data Analysis	Storage	4. DA.S.01 Store information in various formats for specific purposes (e.g., file type, file size, file compression).	Determine how to store information for a specific purpose (for example: save an image differently for printing than for display on a website)
Data Analysis	Collection, Visualization & Transformation	4. DA.CVT.01 Organize and present collected data in a variety of visual formats to emphasize particular aspects or parts of the data set to make interpretation easier.	Distinguish among different ways of visualizing the same data by describing what information is given in each visualization. Analyze different displays of the same data to determine which visualization is most effective to display information and/or support a claim.
Data Analysis	Inference & Models	4. DA.IM.01 Discuss the potential accuracy of conclusions and predictions based on the adequacy of the data set (number of data).	Identify features that increase the reliability of a data set such as sample size relative to total number, composition of sample relative to composition of whole group, etc. Assess how reliable a prediction is based on the features of the data set.
Algorithms and Programming	Algorithms	4.AP.A.01 Develop, compare, and refine multiple algorithms for the same task	Modify two or more algorithms to complete the same task. Modifications may include finding possible errors (debugging), making instructions more efficient (adding loops if instructions are repeated), etc.
Algorithms and Programming	Variables	4. AP.V.01 Create programs that use variables to store and modify grade-appropriate data.	Create a computer program in which a variable is used to store data. Identify how a variable changes within a computer program that uses a variable.
Algorithms and Programming	Control	4. AP.C.01 Create programs using a programming language that includes sequences, loops, conditionals, and variables that utilize mathematics operations to manipulate values in order to solve a problem or express an idea.	Perform mathematical operations (addition, division, etc.) on variables in a program for a purpose such as tallying a score or keeping time (ex. If the ball crosses the line score=score+1).
Algorithms and Programming	Modularity	4. AP.M.01 Decompose a large problem into smaller, manageable sub-problems to facilitate the program development process.	Break a complex problem (including a programming challenge) into smaller sub-problems. Identify reasons for developing a number of programs to solve smaller sub-problems, rather than developing one program to address a larger, more complex problem.

Algorithms and Programming	Modularity	4. AP.M.02 Modify, remix, or incorporate portions of an existing program into one's own work, to develop or add more advanced features (grade-level appropriate).	Add a portion of an existing computer program to an original project in order to add a new element or capability.
Algorithms and Programming	Program Development	4. AP.PD.01 Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences while solving simple problems.	Review and revise the plan for a computer program repeatedly by incorporating feedback from peers.
Algorithms and Programming	Program Development	4.AP.PD.02 Observe intellectual property rights and give appropriate attribution when creating or remixing programs	Provide attribution in an appropriate format for ideas and creations of others when used in writing computer programs . Determine the limitations on reusing or remixing specific items given the way they are licensed (For example determine if the artifact is copyrighted or licensed as Creative Commons.)
Algorithms and Programming	Program Development	4.AP.PD.03 Create and debug a program or algorithm that includes sequencing, repetition, and variables in a programming language	Create a program that includes sequences, loops and variables , and detect, and correct flaws found in the program.
Algorithms and Programming	Program Development	4.AP.PD.04 Communicate and explain program development to peers and adults using comments, presentations, and demonstrations	Correlate the steps taken when developing a computer program to the final program produced.
Impacts of Computing	Culture and Diversity	4. IC.C.01 Summarize how different technologies created by people from diverse backgrounds have contributed to computing and helped to change the world.	Give examples of technologies that have changed computing or other aspects of life.
Impacts of Computing	Culture and Diversity	4. IC.C.02 Brainstorm solutions to improve accessibility/usability and ways computing could be improved to increase accessibility for all users.	Suggest an improvement for an accessibility issue in existing technology. Explain how an improvement could increase accessibility and/or usability of an existing technology.
Impacts of Computing	Social Interactions	4. IC.SI.01 Develop a code of conduct, explain, and practice grade-level appropriate behavior and responsibilities while participating online.	Evaluate and select the proper way to provide attribution for the ideas and creations of others.
Impacts of Computing	Social Interactions	4. IC.SI.02 Discuss ways existing devices or computational products can be improved by collaborating with peers to gain their diverse perspectives.	Evaluate and select the proper way to provide attribution for the ideas and creations of others.

Impacts of Computing	Safety, Law & Ethics	4. IC.SLE.01 Observe intellectual property law and give appropriate credit when using resources.	Evaluate and select the proper way to provide attribution for the ideas and creations of others.
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These annotations are a collaboration between [Maryland Center for Computing Education](#) and the [Maryland State Department of Education](#).