

# Grade 8

## COMPUTING SYSTEMS CS

### D. Devices CS.D

- a Evaluate the advantages and limitations of existing computing devices to recommend design improvements based on analysis of how users interact with the device. CS.D.8.A
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### HS. Hardware and Software CS.HS

- a Design projects that combine hardware and software components that could complete a task. CS.HS.8.A
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### T. Troubleshooting CS.T

- a Use a systematic process to identify and evaluate the source of a routine computing problem. Select the best solution to solve the computing problem and communicate the solution to others. CS.T.8.A
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## NETWORKS AND THE INTERNET NI

### N. Networking NI.N

- a Model the role of hardware components to diagram the infrastructure of networks and the internet (including cloud servers). NI.N.8.A
  - b Model protocols (i.e., rules) and explain why they are used to transmit data across networks and the internet. NI.N.8.B
  - c Explain how a system responds when information is lost to understand the effect it has on the transferred information. NI.N.8.C
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### C. Cybersecurity NI.C

- a Explain how physical and digital security measures are used to protect electronic information. NI.C.8.A
- b Compare and contrast the effects of different types of malware to determine strategies for how to protect devices. NI.C.8.B
- c Compare and contrast examples of various threat actors, such as nation-states, cyber terrorist groups, organized crime or hacktivists. NI.C.8.C
- d Explore and differentiate examples of complex encryption methods, e.g., Vigenère, Bacon's cipher and Enigma. NI.C.8.D

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**IOT. Internet of Things (IoT)** NI.IOT

- a Explore career pathways related to IoT to identify careers associated with the computer science field. NI.IOT.8.A
  - b Model the lifecycle of information in the IoT including data gathering, transmission, reception and analysis to recreate a realworld scenario. NI.IOT.8.B
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**DATA AND ANALYSIS** DA**DCS. Data Collection and Storage** DA.DCS

- a Interpret digital data collection tools to manage information effectively. DA.DCS.8.A
  - b Identify data storage systems to define how data is stored and accessed. DA.DCS.8.B
  - c Create a logical file structure to organize data in different storage systems to support individual and collaborative work. DA.DCS.8.C
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**VC. Visualization and Communication** DA.VC

- a Evaluate data to construct a model or representation. DA.VC.8.A
  - b Create a spreadsheet utilizing formulas, functions and graphs to represent and analyze data. DA.VC.8.B
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**IM. Inference and Modeling** DA.IM

- a Create and analyze models and simulations to accurately hypothesize a real-world situation. DA.IM.8.A
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**ALGORITHMIC THINKING AND PROGRAMMING** ATP**A. Algorithms** ATP.A

- a Create multiple pseudocode to solve a multi-step process and justify the most efficient solution. ATP.A.8.A
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**VDR. Variables and Data Representation** ATP.VDR

- a Analyze test cases and determine the range of valid solutions. ATP.VDR.8.A
  - b Use a data structure to represent a collection. ATP.VDR.8.B
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**CS. Control Structures** ATP.CS

- a Use and apply decisions and loops in a program to solve a problem. ATP.CS.8.A
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**M. Modularity** ATP.M

- a Decompose problems and subproblems into parts to facilitate the design, implementation and review of complex programs. ATP.M.8.A

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**PD. Program Development** ATP.PD

- a Write code that utilizes algorithms, variables and control structures to solve problems or as a creative expression. ATP.PD.8.A
  - b Systematically test and refine programs using a range of test cases. ATP.PD.8.B
  - c Use procedures that utilize parameters to pass values. ATP.PD.8.C
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**ARTIFICIAL INTELLIGENCE** AI**P. Perception** AI.P

- a Explain how sounds and images are represented digitally in a computer to explain how sensor data is stored in a computer. AI.P.8.A
  - b Describe how a vision system might exhibit cultural bias if it lacked knowledge of objects not found in the culture of the people who created it to create inclusive and equitable data sets. AI.P.8.B
  - c Illustrate how sequences of words can be recognized as phrases, even if some of the words are unclear, by looking at how the words fit together to create a text recognition program. AI.P.8.C
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**RR. Representation & Reasoning** AI.RR

- a Model the process of solving a graph-search problem using breadth-first search to draw a search tree. AI.RR.8.A
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**ML. Machine Learning** AI.ML

- a Explain the difference between training and using a reasoning model to identify how a machine learns. AI.ML.8.A
  - b Illustrate how objects in an image can be segmented and labeled to construct a training set for object recognition. AI.ML.8.B
  - c Explain how the choice of training data shapes the behavior of the classifier to identify how bias can be introduced if the training set is not properly balanced. AI.ML.8.C
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**NI. Natural Interactions** AI.NI

- a Create a program, individually and collaboratively, that implements a language processing algorithm to create a functional chatbot. AI.NI.8.A
  - b Critically analyze and discuss features that make an entity “intelligent,” including discussing differences between human, animal and machine intelligence to identify how machine intelligence varies from natural intelligence. AI.NI.8.B
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**SI. Societal Impacts** AI.SI

- a Identify and explain how the composition of training data affects the outcome of a supervised artificial intelligence system to identify bias in data sets. AI.SI.8.A
  - b Identify bias potential in the design of artificial intelligence systems and describe how to utilize inclusive AI design to prevent algorithmic bias. AI.SI.8.B
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## IMPACTS OF COMPUTING IC

### **Cu. Culture** IC.CU

- a Compare current technologies and how they affect the current economy. IC.CU.8.A
  - b Propose potential guidelines/standards/criteria to positively impact bias and accessibility in the design of future technologies. IC.CU.8.B
  - c Identify and explore careers related to the field of computer science. IC.CU.8.C
  - d Explain how computing impacts innovation in other fields. IC.CU.8.D
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### **SI. Social Interactions** IC.SI

- a Evaluate the impacts of electronic communication on personal relationships to be able to evaluate differences between face-to-face and electronic communication. IC.SI.8.A
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### **SLE. Safety, Law and Ethics** IC.SLE

- a Explain user privacy concerns related to the collection and generation of data that may not be evident through automated processes. IC.SLE.8.A
- b Describe the social and economic implications of privacy in the context of safety, law or ethics to be global digital citizens. IC.SLE.8.B
- c Identify ethical and legal security measures used to protect electronic information. IC.SLE.8.C
- d Provide appropriate credit when using resources or artifacts that are not our own. IC.SLE.8.D