Acknowledgements

*Exploring Computer Science: Curriculum Mapping to Learning Standards* was developed by the Center for Technology in Learning at SRI International with support from the National Science Foundation under contract numbers, CNS-1132232 and CNS-1240625.

The Common Core standards included here are from [http://www.corestandards.org/the-standards](http://www.corestandards.org/the-standards). The same numbering scheme is used here as in the original documents.
<table>
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<tr>
<th>Unit</th>
<th>Unit Objectives</th>
<th>Computational Practices</th>
<th>Common Core Standards</th>
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</table>
| 1    | * Analyze the characteristics of hardware components to determine the applications for which they can be used.  
      * Use appropriate tools and methods to execute Internet searches which yield requested data.  
      * Evaluate the results of web searches and the reliability of information found on the Internet.  
      * Explain the differences between tasks that can and cannot be accomplished with a computer.  
      * Analyze the effects of computing on society within economic, social, and cultural contexts.  
      * Communicate legal and ethical concerns raised by computing innovation.  
      * Explain the implications of communication as data exchange. | * Analyze the effects of developments in Computing  
      * Design and implement creative solutions and artifacts.  
      * Apply abstractions and models.  
      * Connect computation with other disciplines.  
      * Communicate thought processes and results.  
      * Work effectively in teams. | Anchor Standards:  
      * CCSS.ELA-Literacy.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.  
      * CCSS.ELA-Literacy.CCRA.R.2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.  
      * CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.  
      * CCSS.ELA-Literacy.CCRA.W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.  
      * CCSS.ELA-Literacy.CCRA.W.8 Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.  
      * CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.  
      * CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations |
and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively.

- CCSS.ELA-Literacy.CCRA.SL.2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

- CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

- CCSS.ELA-Literacy.CCRA.L.6 Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

Mathematical Practice:

- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.


- CCSS.Math.Practice.MP5 Use appropriate tools strategically.

<table>
<thead>
<tr>
<th>2</th>
<th>* Name and explain the steps they use in solving a problem.</th>
<th>* Analyze the effects of developments in computing.</th>
<th>Anchor Standards:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>* Solve a problem by applying appropriate problem-solving techniques.</td>
<td>* Apply abstractions and models.</td>
<td>- CCSS.ELA-Literacy.CCRA.R.1 Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.</td>
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<td></td>
<td>* Express a solution using standard design tools.</td>
<td>* Connect computation with other disciplines.</td>
<td>- CCSS.ELA-Literacy.CCRA.R.2 Determine central</td>
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</table>
* Determine if a given algorithm successfully solves a stated problem.

* Create algorithms that meet specified objectives.

* Explain the connections between binary numbers and computers.

* Summarize the behavior of an algorithm.

* Compare the tradeoffs between different algorithms for solving the same problem.

* Explain the characteristics of problems that cannot be solved by an algorithm.

* Communicate thought processes and results.

* Work effectively in teams.

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- CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

- CCSS.ELA-Literacy.CCRA.W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

- CCSS.ELA-Literacy.CCRA.W.7 Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

- CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

- CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively.

- CCSS.ELA-Literacy.CCRA.SL.2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

- CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
### English Language Arts:

- Reading Standards for Literacy in Science and Technical Subjects 6-12 - Grades 9-10 students: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exception defined in the text.

### Mathematical Practice:

- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.
- CCSS.Math.Practice.MP2 Reason abstractly and quantitatively.
- CCSS.Math.Practice.MP3 Construct viable arguments and critique the reasoning of others.

### Mathematical Content:

- CCSS.Math.Content.HSF-BF.A.1a Building Functions - Write a function that describes a relationship between two quantities: Determine an explicit expression, a recursive process, or steps for calculation from a context.

### Anchor Standards:

- CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- CCSS.ELA-Literacy.CCRA.W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
- CCSS.ELA-Literacy.CCRA.W.8 Gather relevant information from multiple print and digital sources.

| 3 | * Create web pages to address specified objectives. | * Analyze the effects of developments in computing. | * Provide clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. | * Create web pages with a practical, personal, and/or societal purpose. | * Design and implement creative solutions and artifacts. | * CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. | * Select appropriate techniques when creating web pages. | * Apply abstractions and models. | * CCSS.ELA-Literacy.CCRA.W.6 Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. | * Use abstraction to separate style from content in web page design and development. | * Analyze their computational work and the work of others. | * CCSS.ELA-Literacy.CCRA.W.8 Gather relevant information from multiple print and digital sources. | * Communicate thought processes and reasoning clearly. |
* Describe the use of a website with appropriate documentation. results.

sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

Mathematical Practice:
- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.

Mathematical Content:
- CCSS.Math.Content.HSF-BF.A.1a Building Functions - Write a function that describes a relationship between two quantities: Determine an explicit expression, a recursive process, or steps for calculation from a context.
- CCSS.Math.Content.HSA-CED.A.3 Creating Equations - Create Equations that describe

| 4 | Use appropriate algorithms to solve a problem. | Design and implement creative solutions and artifacts. |
| 4 | Design, code, test, and execute a program that corresponds to a set of specifications. | Analyze their computational work and the work of others. |
| 4 | Select appropriate programming structures. | Connect computation with other disciplines. |
| 4 | Locate and correct errors in a program. | Communicate thought processes and results. |
| 4 | Explain how a particular program functions. | |
| 4 | Justify the correctness of a program. | |
| 4 | Create programs with practical, personal, and/or societal intent. | |

Anchor Standards:
- CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
- CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively.
- CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

Mathematical Practice:
- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.
numbers or relationships: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

| 5 | * Describe the features of appropriate data sets for specific problems. | * Analyze the effects of developments in computing. | Anchor Standards:  
|   | * Apply a variety of analysis techniques to large data sets. | * Design and implement creative solutions and artifacts. |  
|   | * Use computers to find patterns in data and test hypotheses about data. | * Analyze their computational work and the work of others. |  
|   | * Compare different analysis techniques and discuss the tradeoffs among them. | * Connect computation with other disciplines. |  
|   | * Justify conclusions drawn from data analysis. | * Communicate thought processes and results. |  
|   | | * Work effectively in teams. |  

Anchors Standards:

- CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
- CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively.
- CCSS.ELA-Literacy.CCRA.SL.2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
- CCSS.ELA-Literacy.CCRA.SL.3 Evaluate a [speaker’s] point of view, reasoning, and use of evidence and rhetoric.
- CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
- CCSS.ELA-Literacy.CCRA.SL.5 Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
- CCSS.ELA-Literacy.CCRA.L.6 Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for
reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

Mathematical Practice:

- CCSS.Math.Practice.MP5 Use appropriate tools strategically.

Mathematical Content:

- CCSS.Math.Content.HSS-ID.A.1 Interpreting Categorical and Quantitative Data - Summarize, represent, and interpret data on a single count or measurement variable: Represent data with plots on the real number line (dot plots, histograms, and box plots).

- CCSS.Math.Content.HSS-ID.A.3 Interpreting Categorical and Quantitative Data - Summarize, represent, and interpret data on a single count or measurement variable: Interpret differences in shape, center, and spread in the context of data sets, accounting for possible effects of extreme data points (outliers).

- CCSS.Math.Content.HSS-ID.A.13 Interpreting Categorical and Quantitative Data - Summarize, represent, and interpret data on a single count or measurement variable: Represent data with plots on the real number line (dot plots, histograms, and box plots).

- CCSS.Math.Content.HSS-CP.A.1 Conditional Probability and the Rules of Probability - Understand independence and conditional probability and use them to interpret data: Describe events as subsets of a sample space (the set of outcomes) using characteristics (or
categories) of the outcomes, or as unions, intersections, or complements of other events ("or" and "not").

- CCSS.Math.Content.HSS-IC.B.4 Making inferences and Justifying Conclusions - Make inferences and justify conclusions from sample surveys, experiments, and observational studies: Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

<table>
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<tr>
<th>6</th>
<th>* Identify the criteria that describe a robot and determine if something is a robot.</th>
<th>* Design and implement creative solutions and artifacts.</th>
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<tr>
<td></td>
<td>* Match the actions of the robot to the corresponding parts of the program.</td>
<td>* Communicate thought processes and results.</td>
<td>- CCSS.ELA-Literacy.CCRA.R.2 Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.</td>
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<td>* Build, code, and test a robot that solves a stated problem.</td>
<td>* Work effectively in teams.</td>
<td>- CCSS.ELA-Literacy.CCRA.W.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</td>
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<td>* Explain ways in which different hardware designs affect the function of a machine.</td>
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<td>- CCSS.ELA-Literacy.CCRA.W.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.</td>
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<td>* Describe the tradeoffs among multiple ways to program a robot to achieve a goal.</td>
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<td>- CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others’ ideas and expressing their own clearly and persuasively.</td>
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| | | | - CCSS.ELA-Literacy.CCRA.L.6 Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary.
knowledge when encountering an unknown term important to comprehension or expression.

Mathematical Practice:

- CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them.
- CCSS.Math.Practice.MP5 Use appropriate tools strategically.

Mathematical Content

- CCSS.Math.Content.HSA-CED.A.3 Creating Equations - Create Equations that describe numbers or relationships: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.