

Wilson Area School District Planned Course Guide

Title of planned course: 6th Grade Computer Science

Subject Area: Computer Science

Grade Level: 6th

Course Description: This course is designed to expand student knowledge of using computer science and computing systems including devices, hardware and software. Students will continue to develop and practice troubleshooting strategies with consideration of larger interconnected systems. They will also have a more focused experience in coding and debugging while continuing to develop their vocabulary associated with computational thinking and skills. In addition, students will continue to learn about and practice their digital citizenship skills, including respecting intellectual property and giving attribution, creating and using strong passwords, and discussing real world cyber-security problems including how to protect themselves. Students will be encouraged to think creatively about solutions to real-world computer problems and consider the history and future of computing.

Sixth grade students will continue to practice their keyboarding skills with the goal of perfecting technique and memorizing primary keys. Touch typing is an example of cognitive automaticity, the ability to do things without conscious attention or awareness. It enables students to use higher level thinking for critical academic pursuit. Although speed and accuracy of text will be secondary, there will be a goal range of 20-30 wpm with at least 90 percent accuracy and achievement beyond their previous year's experience.

All students will be exposed to computing practices that include:

- Fostering an inclusive computing culture
- Collaborating around computing
- Recognizing and defining computational thinking
- Developing and using abstractions
- Creating computational artifacts
- Testing and refining computational artifact
- Communicating about computing

Lessons will be presented in either Chromebook or Windows Desktop format depending on which device is most appropriate for the instruction and objectives. Students will access the assignments and showcase their work through Google Classroom and computer applications using worksheets, instructions, and finished projects.

Time/Credit for this Course: 36 days of instruction, practice and/or application of skills. Students have scheduled computer classes for 36 consecutive days during the academic year. The actual number of classes will fluctuate based on changes to the academic calendar.

Curriculum Writing Committee: Susan Austin

Curriculum Map

Students will demonstrate and develop skills and knowledge of computer science and related technologies throughout this 36-day course as part of their Computer Arts instruction.

Week 1: (4 days)

- Keyboarding Unit
- Computing Systems Unit

Week 2: (4 Days)

- Keyboarding Unit
- Networks and the Internet Unit

Week 3: (4 Days)

- Keyboarding Unit
- Data and Analysis Unit

Week 4-6: (20 days)

- Keyboarding Unit
- Algorithms and Programming Unit

Week 7: (4 days)

- Keyboarding Unit
- Impacts of Computing Unit

Planned Course Materials

Title of planned course: 6th Grade Computer Science

Subject Area: Computer Science

Grade Level: 6th

Teacher and Student Resources:

- In January 2018 the Pennsylvania State Board of Education endorsed the Computer Science Teachers Association (CTSA) K-12 standards <https://www.csteachers.org/Page/standards>
- Original PA State Academic Standards for Business, Computer and Information Technology http://static.pdesas.org/content/documents/BCIT_standards.pdf
- Various Computer Application and Coding Development program resources
- Typing Programs-- Typing.com
- CS First by Google for Scratch---[CSFirst](#)
- Common Sense Education---<https://www.common sense.org/education/>
- TechnoKids Computer Curriculum---<https://www.technokids.com/>
 - TechnoInternet lesson materials/activities
 - TechnoCode lesson materials/activities
- [Creative Commons Media](#) to enhance Digital Citizenship lessons
- Code.org--Computer Science Fundamentals (Course F) bridging into CS Discoveries (Problem Solving and Computing)
- References from [Computer Hope](#) for student research and vocabulary development.
- Khan Academy--<https://www.khanacademy.org/computing> videos accessed through Code.org
- Physical Computer Science experiences with devices such as the Makey Makey kits and MicroBits.
- Teacher created activities, worksheets, assessments
- Google Applications including Google Classroom

Curriculum Scope & Sequence

Title of planned course: 6th Grade Computer Science

Unit: Keyboarding

Time frame: 5-10 minutes of each class (36 classes)

6th Grade Keyboarding Standards:

- K1 Use correct posture when keyboarding and demonstrate proper keyboarding technique for each letter of the alphabet.
- K2 Keyboard word lists and sentences using correct posture and proper keyboarding technique.
- K3 Use language skills including capitalization, punctuation, spelling, word division, and the use of numbers and symbols as grade-level appropriate.
- K6 Use a variety of software applications to produce, proofread, and correct errors within documents.
- K5 Students will keyboard 20 words per minute with 94% accuracy by the end of the sixth grade.
- K6 Use one space after all punctuation marks.
- K7 Keyboard from copy (documents, textbooks, or other printed sources of information).

Essential content/objectives: Students will continue building a foundation for correct typing technique by accessing all letters and basic punctuation keys, utilizing all ten fingers. Sixth grade students will be encouraged to reach a speed of 20 wpm with 94% accuracy. Proper keyboarding technique and memorization of key locations will be valued over speed and accuracy.

Students will be able to use correct keyboarding technique:

- Demonstrate correct use space bar, return, enter, shift, tab, Esc and Control keys.
- Demonstrate correct use of right and left hands
- Practice alphabetic keys by touch
- Demonstrate mastery of the home row keys
- Demonstrate correct fingering of basic punctuation keys
- Demonstrate proper spacing after punctuation
- Demonstrate use of the enter key, and the shift key to capitalize and access additional symbols
- Practice accessing the number keys
- Show correct body and finger positions
- Compose at the keyboard as well as proofread and correct errors within a document

Core Activities: Students will complete/participate in the following:

- Access specific grade level lessons in Typing.com
- Practice progressive skill based lessons in Typing.com
 - Identify the Home Row and Correct Finger Placement.
 - J, F, & Space Keys
 - U, R, & K Keys
 - D, E, & I Keys
 - C, G, & N Keys
 - Beginner Review 1
 - Personalized Practice customized to review individual problem keys
 - T, S, & L Keys

- o O, B, & A Keys
- o V, H, & M Keys
- o Period & Comma
- o Beginner Review 2
- o Personalized Practice
- o W, X, & semicolon Keys
- o Q, Y, & P Keys
- o Z and Enter Keys
- o Beginner Wrap-up
- o Personalized Practice
- o Shift Key and Capitalization
- o Basic & Intermediate Punctuation (Quotation Marks, Colons, Slashes, Question Marks)

Instructional Methods:

- Direct instruction
- Modeling correct keyboarding techniques
- Independent practice
- Individual student assistance (hand-over-hand)

Materials & Resources:

- Computer and other peripherals
- Google applications
- Typing.com Grade 6 sequence
- Keyboard Covers
- Supplemental worksheets

Assessments:

- Formative:
 - o Daily Assignments
 - o Observation
 - o Self-monitoring progress the Typing.com interface
- Summative
 - o Teacher reports for semester progress from Typing.com

Curriculum Scope & Sequence

Title of planned course: 6th Grade Computer Science

Unit: Computing Systems

Time frame: 4 classes

State Standards:

- Networks & the Internet: CSTA 1A-NI-04, 1B-NI-04, 1B-NI-05, 2-NI-05
- Impacts of Computing: CSTA 1A-IC-16, 1A-IC-17, 1A-IC-18, 1B-IC-18, 2-IC-20, 2-IC-23
- Computing Systems: CSTA 1A-CS-02, 1B-CS-01, 1B-CS-03

Essential content/objectives: At the end of the unit, students will be able to:

- Identify the connections between human and computer interactions and brainstorm ideas for improvement.
- Given a variety of factors, make decisions about computer hardware and software to accomplish specific tasks or goals.
- Identify the interconnected components of computing systems (hardware, software, connections) that work together for effective systems.
- Begin to consider more complex issues for troubleshooting problems. (Since this is the first unit, within the context of initial instruction, students will also review the district AUP, including shared devices, password and security issues and digital citizenship.)

Core Activities: Students will complete/participate in the following:

- Demonstrate AUP knowledge and model procedures appropriate digital access & behaviors.
- Review and practice good online digital citizenship.
- Describe various design standards related to computing devices and applications including accessibility, ergonomics, and learnability.
- Make effective decisions about the most appropriate hardware and software given various computer assisted task using a variety of factors:
 - cost
 - functionality
 - speed
 - accessibility
 - aesthetics
- Diagnose and identify possible solutions for hardware/software problems using an understanding of the interconnections between components of functional computer systems. (Examples of troubleshooting strategies include following a troubleshooting flow diagram, making changes to software to see if hardware will work, checking connections and settings, and swapping in working components.)

Instructional Methods:

- Direct instruction
- Model tasks
- Discussion
- Independent practice
- Scaffolding and group work
- Review

Materials & Resources:

- Computing Device and attached peripherals
- Google applications
- Code.org--CS Discoveries Problem Solving and Computing, Unit 1
- Common Sense Media Activities
- EdPuzzle
- Unplugged activities

Assessments:

- Formative:
 - Discussions
 - Observation
 - Self Evaluations
 - Peer Evaluations
 - Google Classroom assignments
- Summative
 - Completed unplugged worksheets
 - Completed online forms/guided questions
 - Projects

Curriculum Scope & Sequence

Title of planned course: 6th Grade Computer Science

Unit: Networks and the Internet

Time frame: 4 classes

State Standards: CSTA 1A-NI-04, 2-NI-05, 2-NI-06

Essential content/objectives: At end of the unit, students will be able to:

- Recall/review the paths that data or information travels within and between computing devices or systems using a basic framework of understanding the purpose of protocols with some vocabulary.
- Describe and analyze reasons and methods for protecting information and devices from real world cyber security problems---private networks, backup copies, external storage.
- Draw connections to how and why personal, organizational, and/or governmental information can and should be protected.
- Describe and analyze other methods for protecting or securing information: encryption, firewalls, two-step verification.

Core Activities: Students will complete/participate in the following:

- Analyze and identify in a very basic way how information/data travels throughout the computer and between computing devices
- Analyze and explain how data is broken into smaller pieces, transmitted, and reassembled as packets between devices, over networks, and over the Internet
- Define and explain the concept of networking protocol
- Gain some background of how networking protocols work to ensure that clients can communicate and share information across computer networks in a secure manner.
- Students should model how data is sent using protocols to choose the fastest path, to deal with missing information, and to deliver sensitive data securely.
- Participate in an activity plugged or unplugged that requires students to create their own protocol or encode and decode information.

Instructional Methods:

- Direct instruction
- Discussion
- Independent practice
- Scaffolding and group work
- Review

Materials & Resources:

- Computing Device and attached peripherals
- Google applications
- Code.org--CS Discoveries Problem Solving and Computing, Unit 1
- Common Sense Media Activities
- EdPuzzle assignments
- TechnoInternet Lessons & worksheets
- Other Unplugged activities

Assessments:

- Formative:
 - Discussions
 - Observation
 - Self Evaluations
 - Peer Evaluations
 - Google Classroom assignments
- Summative
 - Completed unplugged worksheets
 - Completed online forms/guided questions
 - Projects

Curriculum Scope & Sequence

Title of planned course: 6th Grade Computer Science

Unit: Data and Analysis

Time frame: 4 classes

State Standards: CSTA 2-DA-07, 2-DA-08, 2-DA-09

Essential content/objectives: At end of the unit, students will be able to:

- Describe, analyze and model the functions of computing devices input, processing, storage, and output
- Understand the importance of grouping and arranging data to make communication with others easier
- Refer to and use data when communicating an idea

Core Activities: Students will complete/participate in the following:

- Describe the underlying function of a computer and how that relates to data---Input, Processing, Storage, Output
- Input--Determine ways that computers receives or collects data/information
- Processing--Determine ways that computers process, organize, or calculate data to solve problems
- Output--Determine ways that computers display information
- Explain how data is used to highlight relationships between theories and claims, predict outcomes, or just to communicate ideas.
- Practice using computing technology to input, process, and output data for a specific purpose.
For example:
 - Create a table to organize data
 - Sort data on a specific topic making it easier for a user to use

Instructional Methods:

- Direct instruction
- Discussion
- Independent practice
- Scaffolding and group work
- Review

Materials & Resources:

- Computing Device and attached peripherals
- Google applications--Google Sheets for Organizing Data
- Code.org Course F--Data & Simulations Unit
- EdPuzzle assignments
- Other Unplugged resources (i.e.Sorting Legos)

Assessments:

- Formative:
 - Discussions
 - Observation
 - Self Evaluations
 - Peer Evaluations
 - Google Classroom assignments
- Summative
 - Completed unplugged worksheets
 - Completed online forms/guided questions
 - Projects

Curriculum Scope & Sequence

Title of planned course: 6th Grade Computer Science

Unit: Algorithms and Programming

Time frame: 20 classes (This is the largest section of the instructional objectives. Students will build on their previous elementary computer science coding experiences.)

State Standards: CSTA 2-AP-10, 2-AP-11, 2-AP-12, 2-AP-13, 2-AP-14, 2-AP-15, 2-AP-16, 2-AP-17, 2-AP-18, 2-AP-19

Essential content/objectives: At end of the unit, students will be able to:

- Look at different ways to solve the same task and decide which would be the best solution.
- Understand variables and how to use them
- Use programs such as Code.org and CSFirst to create programs that use sequence, events, loops and conditionals
- Break down events into smaller pieces as well as test and debug programs and outline and discuss program development
- Communicate their choices to others using journaling, storyboarding and projects
- Observe intellectual properties and give attribution to owners

Core Activities: Students will complete/participate in the following:

- Define and analyze algorithms using both unplugged and plugged activities to experiment with task sequencing and efficiency
- Define, explain and model/experiment with
 - Variables
 - Sequences
 - Events
 - Loops
 - Conditionals
 - Decomposition
- Create modifications to portions of an existing program to develop something new or add more advanced features
- Design a new program using an interactive & iterative process with peer evaluation
- Test and debug the project /program
- Use self-evaluation and project presentation or description with completed project/program. (For example: Outline key features of program development and explain their choices made using a storyboard, journaling, or summative presentation.)

Instructional Methods:

- Direct instruction
- Discussion
- Independent practice
- Scaffolding and group work
- Review

Materials & Resources:

- Computing Device and attached peripherals
- Google applications
- Code.org-(Course F)

- EdPuzzle assignments
- TechnoCode lessons and activities
- CSFirst by Google (Scratch 3.0 interface)
- Other Unplugged activities

Assessments:

- Formative:
 - Discussions
 - Observation
 - Self Evaluations
 - Peer Evaluations
 - Google Classroom assignments
- Summative
 - Completed unplugged worksheets
 - Completed online forms/guided questions
 - Coding Projects

Curriculum Scope & Sequence

Title of planned course: 6th Grade Computer Science

Unit: Impacting of Computing

Time frame: 4 classes

State Standards: Impacts of Computing 2-IC-20, 2-IC-21, 2-IC-22, 2-IC-23

Essential content/objectives: At end of the unit, students will be able to:

- Discuss and model aspects of computing technology history, especially since the introduction of connected computing systems.
- Practice appropriate laws and ethics while creating materials and projects while giving attribution for ideas and materials used.
- Make connections between historical, current and futures computing technologies/systems.

Core Activities: Students will complete/participate in the following:

- Analyze and discuss how computing technologies have impacted the world and influenced cultural and societal practices. (the Internet, AI, GPS, etc.)
- Brainstorm ways to improve computing technology for diverse users
- Choose a Google application to create and showcase either a significant historical figure, event or technology with care to use only public domain or creative commons media sources for images.
- Collaborate and seek feedback from others with the purpose to make improvements to projects.

Instructional Methods:

- Direct instruction
- Discussion
- Independent practice
- Scaffolding and group work
- Review

Materials & Resources:

- Computing Device and attached peripherals
- Common Sense Media materials
- Code.org Course F Lesson 13 & 14
- EdPuzzle assignments
- Other Unplugged activities

Assessments:

- **Formative:**
 - Discussions
 - Observation
 - Self Evaluations
 - Peer Evaluations
 - Google Classroom assignments
- **Summative**
 - Completed unplugged worksheets
 - Completed online forms/guided questions

- o Projects

PA Computer Science Standards

Computing Systems

- Devices: 2-CS-01 Recommend improvements to the design of computing devices, based on an analysis of how users interact with the devices.
- Hardware & Software: 2-CS-02 Design projects that combine hardware and software components to collect and exchange data.
- Troubleshooting: 2-CS-03 Systematically identify and fix problems with computing devices and their components.

Networks and the Internet

- Network Communication & Organization: 2-NI-04 Model the role of protocols in transmitting data across networks and the Internet.
- Cybersecurity: 2-NI-05 Explain how physical and digital security measures protect electronic information.

Data and Analysis

- Storage: 2-DA-07 Represent data using multiple encoding schemes.
- Collection Visualization & Transformation: 2-DA-08 Collect data using computational tools and transform the data to make it more useful and reliable.
- Inference & Models: 2-DA-09 Refine computational models based on the data they have generated.

Algorithms and Programming

- Algorithms: 2-AP-10 Use flowcharts and/or pseudocode to address complex problems as algorithms.
- Variables: 2-AP-11 Create clearly named variables that represent different data types and perform operations on their values.
- Control: 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
- Modularity:
 - 2-AP-13 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
 - 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse.
- Program Development:
 - 2-AP-15 Seek and incorporate feedback from team members and users to refine a solution that meets user needs.
 - 2-AP-16 Incorporate existing code, media, and libraries into original programs, and give attribution.
 - 2-AP-17 Systematically test and refine programs using a range of test cases.
 - 2-AP-18 Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.
 - 2-AP-19 Document programs in order to make them easier to follow, test, and debug.

Impacts of Computing

- Culture:
 - 2-IC-20 Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.

- 2-IC-21 Discuss issues of bias and accessibility in the design of existing technologies.
- Social Interactions: 2-IC-22 Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact.
- Safety Law & Ethics: 2-IC-23 Describe tradeoffs between allowing information to be public and keeping information private and secure.

Other Related PA State Standards/Anchors

- 15.3.8.M. Demonstrate proper etiquette when networking either face-to-face or online
- 15.3.8.S. Apply appropriate electronic communication based on message requirements.
- 15.3.8.T. Discuss the rules of digital citizenship.
- 15.3.12.W. Use electronic communication with peers and/or educators to produce a work product.
- 15.4.8.B. Interpret and apply appropriate social, legal, ethical, and safe behaviors of digital citizenship.
- 15.4.8.C. Compare and contrast peripheral devices of computing systems for specific needs.
- 15.4.8.D. Create projects using emerging input technologies.
- 15.4.8.G. Create an advanced digital project using appropriate software/application for an authentic task.
- 15.4.8.H. Explain the differences between a scripting language and a coding language.
- 15.4.8.I. Solve a problem with an algorithm.
- 15.4.8.J. Explain the basic differences between encoding and decoding.
- 15.4.8.K. Create a multimedia project using student created digital media.
- 15.6.8.L. Evaluate the accuracy and bias of online sources of information; appropriately cite online resources.
- 15.4.8.D. Create projects using emerging input technologies.
- 15.4.8.B. Interpret and apply appropriate social, legal, ethical, and safe behaviors of digital citizenship.
- 15.4.8.A. Analyze the influence of emerging technologies on daily life.

6th Grade Keyboarding Standards:

- K1 Use correct posture when keyboarding and demonstrate proper keyboarding technique for each letter of the alphabet.
- K2 Keyboard word lists and sentences using correct posture and proper keyboarding technique.
- K3 Use language skills including capitalization, punctuation, spelling, word division, and the use of numbers and symbols as grade-level appropriate.
- K6 Use a variety of software applications to produce, proofread, and correct errors within documents.
- K5 Students will keyboard 20 words per minute with 94% accuracy by the end of the fifth grade.
- K6 Use one space after all punctuation marks.
- K7 Keyboard from copy (documents, textbooks, or other printed sources of information).