West Windsor-Plainsboro Regional School District
Computer Programming Grade 8 Practical

Unit 0: Technology Education

Content Area: Technology Education

Course & Grade Level: Technology Education - Grade 8

Summary and Rationale

The West Windsor-Plainsboro Regional School District recognizes the importance of the study 21st Century Life and Careers standards. Additionally, it is also believed this learning should not be taught in isolation and cross curricular and career ready practices are embedded in every unit of study. Unit 0 is incorporated into each unit of study of this curricular document.

Recommended Pacing:

ELA Companion Standards and Career Ready Practices will be integrated throughout all units of study.

Interdisciplinary Connections

Grades 6-8

Progress Indicators Reading Science and Technical Subjects

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Range of Reading and Level of Text Complexity

RST.6-8.10. By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.

Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP10. Plan education and career paths aligned to personal goals.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

Competencies for 21st Century Learners			
X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner

Unit 1: Programming

Content Area: Technology

Course & Grade Level: Computer Programming, Grade 8

Summary and Rationale

The course goals for Middle School Computer are designed to further the student's knowledge of the computer and its applications. They support the idea that computer literate students can reason, think critically, solve problems, obtain information electronically, and communicate effectively. Students will understand the interdisciplinary connections with computers as well as their individual responsibility as a citizen of an increasingly technologically literate society.

Recommended Pacing

45 days

State Standards

Standard 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Strand A. Technology Operations and Concepts

Strand B. Creativity and Innovation

Standard 8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

Strand B. Design: Critical Thinking, Problem Solving, and Decision-Making

Strand G. The Designed World

CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.3	Create a multimedia presentation including sound and images.
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
8.2.8.B.1	Design and create a product that addresses a real-world problem using the design process and working with specific criteria and constraints.
8.2.8.B.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation.
8.2.8.B.3	Solve a science-based design challenge and build a prototype using science and math principles throughout the design process.
8.2.8.G.1	Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
8.2.8.G.2	Explain the interdependence of a subsystem that operates as part of a system.

Instructional Focus

Unit Enduring Understandings

- Students should be able to become engaged in critical reasoning and systems thinking in order to build programming projects. They should have the ability to problem solve in a meaningful context. Students should

know how to implement steps in solving problems by thinking of an idea and breaking it into components of design, programming, testing and debugging.

Unit Essential Questions

- How will students use the 21st Century learning skills (information and communication skills, thinking and problem-solving skills, interpersonal and self-directional skills) in the design and creation of their computer programming projects?

Objectives: Students will problem solve, use critical thinking skills, demonstrate creative design technique, be able to work independently and as part of a collaborative team and effectively communicate with peers.

Students will know:

- How to plan, design, program, test and debug using a variety of computer programming technique, concepts and languages.

Students will be able to:

- Design and plan prior to creating a project
- Think logically by creating sequential code
- Streamline by using repetition
- Program a variety of procedures
- Use variables
- Create a game prototype
- Design and paint backgrounds and characters
- Incorporate appropriate sounds into a project
- Add animation and interactivity into a project
- Import and manipulate graphic images from a variety of sources
- Incorporating GUI concepts (i.e. forms, controls, properties, events and code)
- Use of basic programming functionality (i.e. mathematical operators, data types, variables, decision making, selection)

Evidence of Learning

Assessment

Common Assessment 2.1

Competencies for 21st Century Learners

X	Collaborative Team Member	X	Effective Communicator
X	Globally Aware, Active, & Responsible Student/Citizen	X	Information Literate Researcher
X	Innovative & Practical Problem Solver	X	Self-Directed Learner

Resources

Suggested Resources:

- Terrapin LOGO
- Scratch
- Visual Basic

Unit 2: HTML

Content Area: Technology

Course & Grade Level: Computer Programming, Grade 8

Summary and Rationale

The course goals for Middle School Computer are designed to further the student's knowledge of the computer and its applications. They support the idea that computer literate students can reason, think critically, solve problems, obtain information electronically, and communicate effectively. Students will understand the interdisciplinary connections with computers as well as their individual responsibility as a citizen of an increasingly technologically literate society.

Recommended Pacing

30 days

State Standards

Standard 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Strand A. Technology Operations and Concepts

Strand B. Creativity and Innovation

Strand D. Digital Citizenship

Standard 8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

Strand B. Design: Critical Thinking, Problem Solving, and Decision-Making

CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
8.1.8.B.1	Synthesize and publish information about a local or global issue or event on a collaborative, web-based service (also known as a shared hosted service).
8.1.8.D.1	Model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics.
8.2.8.B.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation.

Instructional Focus

Unit Enduring Understandings

- Students should be able to become engaged in critical reasoning and systems thinking in order to author an HTML web page. They should have the ability to problem solve and implement steps by design, programming, testing the web page.
- Students should be able to access and retrieve information using a Web Browser and an on line Internet Service Provider.

- Students should be able to create Web pages using a web authoring software.

Unit Essential Questions

- How does one author a web page using HTML?
- How does one construct a web page aesthetically pleasing?
- How does one follow guidelines of proper etiquette when authoring a web page?

Objectives: Students will problem solve, use critical thinking skills, demonstrate creative design technique, be able to work independently and as part of a collaborative team and effectively communicate with peers.

Students will know:

- How to plan, design and program a web page using HTML.

Students will be able to:

- Design and plan prior to creating a project
- Think logically by creating sequential code
- Design and format a web using proper tag syntax and attributes including text, hyperlinks and graphic images
- Import and manipulate graphic images from a variety of sources
- Convert graphics, animations, and sounds so they will be able to be used in an HTML web page.
- Use tables in web page design
- Proper use of document sections (head, body…)
- Use proper HTML formatting commands
- To link to other web sites from their web page using a web authoring tool.

Evidence of Learning

Assessment

Common Assessment 2.1

Competencies for 21st Century Learners

x	Collaborative Team Member	x	Effective Communicator
x	Globally Aware, Active, & Responsible Student/Citizen	x	Information Literate Researcher
x	Innovative & Practical Problem Solver	x	Self-Directed Learner

Resources

Suggested Resources:

- HTML
- Notepad
- Photo editing software
- Microsoft Word

Unit 3: Robotics

Content Area: Technology

Course & Grade Level: Computer Programming, Grade 8

Summary and Rationale

The course goals for Middle School Computer are designed to further the student's knowledge of the computer and its applications. They support the idea that computer literate students can reason, think critically, solve problems, obtain information electronically, and communicate effectively. Students will understand the interdisciplinary connections with computers as well as their individual responsibility as a citizen of an increasingly technologically literate society.

Recommended Pacing

15 days

State Standards

Standard 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Strand A. Technology Operations and Concepts

Standard 8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

Strand B. Design**:** Critical Thinking, Problem Solving, and Decision-Making

Strand E. Communication and Collaboration

Strand F. Resources for a Technological World

CPI #	Cumulative Progress Indicator (CPI)
8.1.8.A.5	Select and use appropriate tools and digital resources to accomplish a variety of tasks and to solve problems.
8.1.8.E.1	Gather and analyze findings using data collection technology to produce a possible solution for a content-related or real-world problem.
8.2.8.B.1	Design and create a product that addresses a real-world problem using the design process and working with specific criteria and constraints.
8.2.8.B.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation.
8.2.8.B.3	Solve a science-based design challenge and build a prototype using science and math principles throughout the design process.
8.2.8.E.1	Work in collaboration with peers and experts in the field to develop a product using the design process, data analysis, and trends, and maintain a digital log with annotated sketches to record the development cycle.
8.2.8.F.1	Explain the impact of resource selection and processing in the development of a common technological product or system.

Unit Enduring Understandings

- Students should be able to design and create a robot
- Students will program and control the robot using a computer.

Unit Essential Questions

- How does one use programming techniques and skills while creating and giving commands to a robot?
- How does one adapt programming skills used in previous units to program a robot?

Objectives: Students will problem solve, use critical thinking skills, demonstrate creative design technique, be able to work independently and as part of a collaborative team and effectively communicate with peers.

Students will know:

- How to plan, design, program, test and debug using robotic software
- How to create a robot and run it by programming a series of instructions on the computer.

Students will be able to:

- Design and plan prior to creating a project
- Think logically by creating sequential code
- Engaged in critical reasoning and systems thinking in order to build a robot.
- Build machines using building blocks
- Properly connect equipment to the computer
- Write a program which will control the motors, lights and sensors of their machine
- Run tests on a machine during various steps of the creation process debugging where necessary
- Use of hands-on exploration and discovery in engineering models and building inventions
- Program, download, test, record, and evaluate a model's programmed behavior
- Perform a series of tasks using the machine
- Work cooperatively with other members of the class
- Take leadership roles during various stages of the project

Evidence of Learning

Assessment

Common Assessment 2.1

Competencies for 21st Century Learners

x	Collaborative Team Member	x	Effective Communicator
x	Globally Aware, Active, & Responsible Student/Citizen	x	Information Literate Researcher
x	Innovative & Practical Problem Solver	x	Self-Directed Learner

Resources

Suggested Resources:

- LEGO Mindstorms
- Microsoft Office