Design 1

Standard of Practice 1: Understand the sketching process used in concept development.
- Apply sketching techniques to a variety of architectural models
- Present conceptual ideas, and design concepts using a computer-aided drafting (CAD) program

Standard of Practice 2: Understand the use of CAD in developing architectural designs.
- Develop preliminary shapes and basic designs using CAD software
- Create detailed design plans for an interest driven project

Standard of Practice 3: Apply dimension to various objects and features.
- Produce proportional three-dimensional shapes, objects, and designs
- Develop preliminary architectural designs
- Create detailed design plans for an interest driven project

Standard of Practice 4: Demonstrate creative thinking, construct knowledge and develop innovation products and processes using technology, and problem solving. (International Society for Technology in Education (ISTE) – Creativity and Innovation & 21st Century Skills – Technology (21.6-8.TL.1))
- Apply exiting knowledge to generate new ideas, products or processes
- Create original works as a means of personal expression
- Use models and simulations to explore complex systems and issues
- Design, develop, and create digital technology products
- Use simulation to help understand complex, real-work systems and identify problems and develop models

Standard of Practice 5: Apply essential technical knowledge and skills common to the engineering and architecture field
- Interpret and explain terminology and practices specific to the engineering and architecture field
- Construct projects and products specific to engineering and architecture expectations

Standard of Practice 6: Understand the underlying structure and application of technology systems. (21st Century Skills – Technology (21.6-8.TL.6))
- Utilize technology for everyday use and understand how technology systems can be applied to various situations
- Select and use technology applications to conduct research, solve problems and produce finished products.
Design 2

Standard of Practice 1: Understand the use of CAD in developing architectural designs.
  • Develop complete detailed architectural designs using CAD software
  • Read and interpret architectural construction plans, drawing, diagrams and specifications

Standard of Practice 2: Apply dimension to various objects and features.
  • Produce three-dimensional shapes and objects to develop the techniques of orthographic projection process
  • Develop an architectural layout then create a 3-D model of the layout in a CAD software program
  • Create detailed design plans for a town that is self supported

Standard of Practice 3: Demonstrate creative thinking, construct knowledge and develop innovation products and processes using technology, and problem solving. (International Society for Technology in Education (ISTE) – Creativity and Innovation & 21st Century Skills – Technology (21.6-8.TL.1))
  • Apply exiting knowledge to generate new ideas, products or processes
  • Create original works as a means of personal expression
  • Critique and evaluate digital technology products
  • Investigate global issues and make informed choices based on knowledge of technology systems, resources and services.

Standard of Practice 4: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. (ISTE – Critical Thinking, Problem Solving, and Decision Making)
  • Plan and manage activities to develop a solution or complete a project
  • Collect and analyze data to identify solutions and/or make informed decisions
  • Use multiple processes and diverse perspectives to explore alternative solutions

Standard of Practice 5: Apply essential technical knowledge and skills common to the engineering and architecture field
  • Interpret and explain terminology and practices specific to the engineering and architecture field
  • Construct projects and products specific to engineering and architecture expectations
  • Understand the concepts and procedures necessary for producing drawing
  • Develop multi-view drawings using the orthographic projection process

Standard of Practice 6: Create alternative solutions to answer a question or solve a problem unique to engineering and architecture using critical and creative thinking, logical reasoning, analysis, enquiry, and problem-solving techniques.
  • Identify and ask significant questions that clarify various points of view to solve problems
  • Solve predictable and unpredictable work-related problems using various types of reasoning
Introduction to Coding 1

Standard of Practice 1: Demonstrate creative thinking in the design and development of innovative technology products and problem solving. (21st Century Skills – Technology (21.6-8.TL.1) & International Society for Technology in Education (ISTE) – Creativity and Innovation)

- Use digital technology products to complete a task
- Use simulations to help understand complex, real-world systems, identify problems, and develop models
- Break down a complex question to complete a project

Standard of Practice 2: Collaborate with peers, experts, and others using interactive technology. (21st Century Skills – Technology Literacy (21.6-8.TL.2) & Employability Skills (21.6-8.ES.1))

- Interact and collaborate with peers, experts, and others using technology in person
- Contribute to a content knowledge base by creating, producing, and sharing information, models, and other creative works
- Manage and resolve conflict as appropriate
- Contribute to a team by expressing ideas
- Collaborate with others toward a common goal


- Select and use technology applications to conduct research, solve problems or produce finished products
- Identify the source of a problem with technology
- Apply knowledge of technology to explore other technologies and be able to identify commonalities among them

Standard of Practice 4: Use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using appropriate digital tools and resources. (ISTE – Critical Thinking, Problem Solving, and Decision Making)

- Plan and manage activities to develop a solution or complete a project
- Collect data to make informed decisions
- Use multiple processes to explore alternative solutions

Standard of Practice 5: Engage in computational thinking to solve problems and create new knowledge. (Computer Science Teachers Association (CSTA) – Computational Thinking & Computing Practice & Programming)

- Define an algorithm as a sequence of instructions that can be processed by a computer and their practical application
- Evaluate ways that different algorithms may be used to solve the same problem
- Represent data in a variety of ways including text and symbols


- Implement solutions using a programming language, including: looping behavior and conditional statements
• Use developmentally appropriate, accurate terminology when communicating about technology
• Transfer current knowledge to learning of new technologies
# Introduction to Coding 2

## Standard of Practice 1: Demonstrate creative thinking in the design and development of innovative technology products and problem solving.  

**21st Century Skills – Technology (21.6-8.TL.1) & International Society for Technology in Education (ISTE) – Creativity and Innovation**

- Design, develop, create, and/or test digital technology products
- Use multiple processes and diverse perspectives to explore alternative solutions
- Plan and manage activities to develop a solution or complete a project
- Apply existing knowledge to generate new ideas, products, or processes
- Originates, integrates and combines ideas into a new product

## Standard of Practice 2: Collaborate with peers, experts, and others using interactive technology.  

**21st Century Skills – Technology Literacy (21.6-8.TL.2) & Employability Skills (21.6-8.ES.1) ISTE – Communication and Collaboration**

- Effectively use technology tools and resources for communication and to access remote information and exchange it with a variety of audiences
- Contribute to project teams to product original works or solve problems
- Manage and resolve conflict as appropriate
- Create, design and develop computing applications

## Standard of Practice 3: Understand the underlying structure and application of technology systems.  


- Utilize technology for everyday use and understand how technology systems can be applied to various situations
- Implement problem solutions using a programming language, including: looping behavior, conditional statements, logic, variables, and functions
- Recognized, identify and develop appropriate strategies when working with technology
- Compare and contrast ways in which computers use models of intelligent behavior (robot motion, speech and language understanding)

## Standard of Practice 4: Use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using appropriate digital tools and resources.  

**ISTE – Critical Thinking, Problem Solving, and Decision Making**

- Identify and define authentic problems and significant questions for investigation
- Plan and manage activities to develop a solution or complete a project
- Collect and analyze data to identify solutions and/or make informed decisions
- Compare and contrast diverse perspectives to explore alternative solutions

## Standard of Practice 5: Engage in computational thinking to solve problems and create new knowledge.  

**CSTA – Computational Thinking & Computing Practice & Programming**

- Use the basic steps in algorithmic problem solving to design solutions (Design, Implementing a Solution, Testing, Evaluation)
• Use predefined function and parameters, classes and methods to divide a complex problem into simpler parts
• Represent data in a variety of ways including text, sounds, picture and numbers
• Examine connections between elements of mathematics and computer science including logic, sets and functions


• Implement solutions using a programming language, including: looping behavior, conditional statements, logic, variables, and functions
• Use developmentally appropriate, accurate terminology when communicating about technology
• Transfer current knowledge to learning of new technologies
• Demonstrate dispositions amenable to open-ended problem solving and programming (comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)
• Identify interdisciplinary careers that are enhanced by computer science
• Use mobile devices to design, develop, and implement mobile computing applications
Next Generation STEM (NGS)

Standard of Practice 1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (Next Generation Science Standards (NGSS) MS-ETS1-1)

- Break down a complex question, challenge, problem or global issue into smaller pieces to identify the essential components
- Adapt or extend concepts from science, technology, engineering, mathematics and other disciplines to formulate creative answers or solutions to complex questions and real world problems
- Develop creative answers or solutions, which make allowances for global constraints, to complex questions or real world problems
- Optimize performance of a design by prioritizing criteria, making tradeoffs, testing, revising, and retesting

Standard of Practice 2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (NGSS – MS-ETS1-2)

- Employ critical thinking strategies to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems
- Collect data about the performance of a proposed object, tool, process or system under a range of conditions

Standard of Practice 3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (NGSS – MS-ETS1-3)

- Employ higher order thinking skills in the application of content knowledge
- Adapt or extend concepts from science, technology, engineering, mathematics and other disciplines to formulate creative answers or solutions to complex questions and real world problems
- Collect data about the performance of a proposed object, tool, process or system under a range of conditions
- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how much data is needed to support a claim

Standard of Practice 4: Demonstrate creative thinking in the design and development of innovative technology products and problem solving. (21st Century Skills – Technology (21.6-8.TL.1) & International Society for Technology in Education (ISTE) – Creativity and Innovation)

- Design, develop, create, and/or test digital technology products
- Access diverse perspectives to explore alternative solutions
- Plan and manage activities to develop a solution or complete a project
- Apply existing knowledge to generate new ideas, products, or processes
- Demonstrate dispositions amenable to open-ended problem solving and programming (comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)
Standard of Practice 5: Collaborate with peers, experts, and others using interactive technology. (21st Century Skills – Technology Literacy (21.6-8.TL.2) & Employability Skills (21.6-8.ES.1) ISTE – Communication and Collaboration)

- Interact and collaborate with peers, experts, and others using technology
- Contribute to a content knowledge base by creating, producing, and sharing information, models, and other creative works
- Contribute to a team by expressing ideas, solving problems and producing original works with a common goal
- Design, develop, and present products using technology resources that demonstrate and communicate concepts


- Utilize technology for everyday use and understand how technology systems can be applied to various situations
- Identify the source of a problem with technology
- Implement problem solutions using a programming language, including: looping behavior, conditional statements, logic, variables, and functions
- Compare and contrast ways in which computers use models of intelligent behavior (robot motion, speech and language understanding)
- Use developmentally appropriate, accurate terminology when communicating about technology

Standard of Practice 7: Use critical thinking skills to plan and conduct research, manage projects, solve problems and make informed decisions using appropriate digital tools and resources. (ISTE – Critical Thinking, Problem Solving, and Decision Making)

- Identify and define authentic problems and significant questions for investigation
- Plan and manage activities to develop a solution or complete a project
- Collect and analyze data to identify solutions and/or make informed decisions
- Access multiple processes and diverse perspectives to explore alternative solutions

Standard of Practice 8: Engage in computational thinking to solve problems and create new knowledge. (CSTA) – Computational Thinking & Computing Practice & Programming)

- Use the basic steps in algorithmic problem solving to design solutions (Design, Implementing a Solution, Testing, Evaluation)
- Evaluate ways that different algorithms may be used to solve the same problem
- Examine connections between elements of mathematics and computer science including logic, sets and functions
Standard of Practice 1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (Next Generation Science Standards (NGSS) MS-ETS1-1)

- Break down complex questions, challenges, problems or global issues into parts
- Describe how scientific, technological, engineering and mathematics concepts apply to real world situations

Standard of Practice 2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (NGSS – MS-ETS1-2)

- Employ critical thinking strategies to answer complex questions, investigate global issues, and develop solutions for challenges and real world problems
- Identify limitations of models
- Conduct short research projects to answer a question, drawing on several sources that allow for multiple avenues of exploration

Standard of Practice 3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (NGSS – MS-ETS1-3)

- Employ higher order thinking skills in the application of content knowledge
- Evaluate selected information for accuracy, validity, and reliability
- Develop or modify a model, based on evidence, to match what happens if a variable or component of a system is changed
- Collect data about the performance of a proposed object, tool, process or system under a range of conditions

Standard of Practice 4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (NGSS – MS-ETS1-4)

- Develop a plan of action or strategy for answering, or solving a real world problem
- Compare concepts from science, technology, engineering, mathematics and other disciplines to formulate creative answers or solutions to complex questions and real world problems
- Evaluate limitations of a model for a proposed object or tool
- Develop or modify a model, based on evidence, to match what happens if a variable or component of a system is changed

Standard of Practice 5: Communicate and work productively with others, considering different perspectives, and cultural views to increase the quality of work. (21st Century Skills – Employability Skills (21.6-8.ES.1)

- Demonstrate the ability to accept all views and work effectively with a team
- Perform a team management role (Challenge Coordinator, Materials Master, Rapid Reporter, etc.) as a contributing member of a team
- Recognize the work of others
Standard of Practice 6: Understand the sketching process used in concept development.

- Apply sketching techniques to a variety of architectural models
- Produce proportional two- and three-dimensional sketches and designs
- Present conceptual ideas, and design concepts using a computer-aided drafting (CAD) program


- Implement solutions using a programming language, including: algorithms and looping behavior
- Use developmentally appropriate, accurate terminology when communicating about technology
- Transfer current knowledge to learning of new technologies
STEM 8

Standard of Practice 1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (Next Generation Science Standards (NGSS) MS-ETS1-1)

- Break down a complex question, challenge, problem or global issue into smaller pieces to identify the essential components
- Construct new knowledge from prior knowledge using higher order thinking skills
- Develop creative answers or solutions, which make allowances for constraints, to complex questions or real world problems
- Undertake a design project, engaging in the 5-Step Design Process, to construct and/or implement a solution that meets specific design criteria and constraints

Standard of Practice 2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (NGSS – MS-ETS1-2)

- Develop or modify a model, based on evidence, to match what happens if a variable or component of a system is changed
- Collect data about the performance of a proposed object, tool, process or system under a range of conditions
- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how much data is needed to support a claim

Standard of Practice 3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (NGSS – MS-ETS1-3)

- Adapt or extend concepts from science, technology, engineering, mathematics and other disciplines to formulate creative answers or solutions to complex questions and real world problems
- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how much data is needed to support a claim
- Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success

Standard of Practice 4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. (NGSS – MS-ETS1-4)

- Develop a plan of action or strategy for answering, or solving a real world problem
- Adapt or extend concepts from science, technology, engineering, mathematics and other disciplines to formulate creative answers or solutions to complex questions and real world problems
- Devise a solution that can to be tested and then modified on the basis of the test results, in order to improve it
- Collect data about the performance of a proposed object, tool, process or system under a range of conditions
- Critique testing and modifications to a model for real world application
Standard of Practice 5: Communicate and work productively with others, considering different perspectives, and cultural views to increase the quality of work. (21st Century Skills – Employability Skills (21.6-8.ES.1)
- Evaluate the work of teammates in a supportive environment
- Select and operate as a team using the team management’s role (Challenge Coordinator, Materials Master, Rapid Reporter, etc.)
- Recognize and expand on the work of others
- Use appropriate principles of communication effectively

Standard of Practice 6: Demonstrate critical and creative thinking to generate new ideas and to develop solutions to complex real world problems. (Universal Constructs for the 21st Century)
- Apply questions that challenges assumptions and promote higher order thinking
- Reflect on one’s judgment while collecting evidence to make decisions
- Engage in formal and informal learning experiences
- Diagnose open-ended challenges that reflect multiple approaches and results
- Apply a combination of seemingly unrelated ideas into something new
- Utilize brainstorming strategies to creatively solve real world problems, answer complex questions or investigate global issues