



2027 NATIONAL SCIENCE OLYMPIAD

DIVISION C (HIGH SCHOOL; GRADES 9-12)

EVENT ALIGNMENT TO NATIONAL EDUCATIONAL STANDARDS

The alignments below identify the strongest direct connections between each 2027 Division C event and national standards. They are not intended as an exhaustive curriculum map. Performance expectations and practices are selected according to the actual content and work required by the 2027 event rules.

ANATOMY AND PHYSIOLOGY - Participants will be assessed on their understanding of the anatomy and physiology of the respiratory, digestive, and immune systems of the human body.

High School Life Science

HS. Structure and Function

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS. Matter and Energy in Organisms and Ecosystems

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process in which bonds are broken, bonds form, and a net transfer of energy results.

ASTRONOMY - Teams will demonstrate an understanding of stellar evolution in normal and starburst galaxies.

High School Earth and Space Science

HS. Space Systems

HS-ESS1-1. Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in releasing energy that reaches Earth as radiation.

HS-ESS1-2. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

HS-ESS1-3. Communicate scientific ideas about the way stars, over their life cycle, produce elements.

HS-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

High School Physical Science

HS. Waves and Their Applications in Technologies for Information Transfer

HS-PS4-1. Use mathematical representations to support a claim about relationships among frequency, wavelength, and speed of waves traveling in various media.

HS-PS4-3. Evaluate evidence, arguments, and claims to determine whether light is described by a wave model or a particle model in a given situation.

BOOMILEVER - Teams will build a cantilevered beam or truss structure that extends from a vertical Testing Wall and supports a load at a specified height and distance from the Testing Wall.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

BOTANY - Participants will demonstrate their knowledge of plant life and general botany principles.

High School Life Science

HS. Structure and Function

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins that carry out essential functions of life through systems of specialized cells.

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS. Matter and Energy in Organisms and Ecosystems

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6. Construct and revise an explanation for how carbon, hydrogen, and oxygen from sugars may combine with other elements to form amino acids and other large carbon-based molecules.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process in which bonds are broken, bonds form, and a net transfer of energy results.

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS. Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-6. Evaluate claims, evidence, and reasoning that ecosystem interactions maintain stability under stable conditions but may produce a new ecosystem when conditions change.

HS. Inheritance and Variation of Traits

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding instructions for characteristic traits passed from parents to offspring.

HS. Natural Selection and Evolution

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2. Construct an explanation that evolution primarily results from reproductive potential, heritable variation, competition for limited resources, and differential survival and reproduction.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

CHEMISTRY LAB - Teams will complete tasks and answer questions involving chemistry processes focused on kinetics and gases.

High School Physical Science

HS. Structure and Properties of Matter

HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on patterns of electrons in the outermost energy level of atoms.

HS. Chemical Reactions

HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on outermost electron states, periodic trends, and patterns of chemical properties.

HS-PS1-4. Develop a model to illustrate that energy released or absorbed by a chemical reaction system depends on changes in total bond energy.

HS-PS1-5. Apply scientific principles and evidence to explain how temperature or concentration of reacting particles affects the rate at which a reaction occurs.

HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

High School Earth and Space Science

HS. Weather and Climate

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

NGSS Science and Engineering Practices

Middle School Practices

NGSS SEP 3. Planning and Carrying Out Investigations.

NGSS SEP 4. Analyzing and Interpreting Data.

CIRCUIT LAB - Participants will complete hands-on tasks and answer questions about electricity and electronics.

High School Physical Science

HS. Motion and Stability: Forces and Interactions

HS-PS2-4. Use mathematical representations of Newton's law of gravitation and Coulomb's law to describe and predict gravitational and electrostatic forces between objects.

HS-PS2-5. Plan and conduct an investigation to show that electric current can produce a magnetic field and that a changing magnetic field can produce electric current.

HS. Energy

HS-PS3-1. Create a computational model to calculate the change in energy of one component in a system when changes in other components and energy flows are known.

HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as motion of particles and energy stored in fields.

HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate forces and changes in the objects' energy.

CODEBUSTERS - Participants will cryptanalyze and decode encrypted messages using techniques for historical and modern advanced ciphers.

K-12 Computer Science Framework

9-12 Computing Systems

CSF 9-12 Devices. Computing devices are integrated with biological, mechanical, and social systems; usability, dependability, security, and accessibility are important design

considerations.

9-12 Algorithms and Programming

CSF 9-12 Algorithms. People evaluate and select algorithms based on performance, reusability, and ease of implementation; knowledge of common algorithms supports software development and data security.

9-12 Networks and the Internet

CSF 9-12 Cybersecurity. Network security depends on hardware, software, and practices that control access to data and systems, with safeguards matched to user needs and data sensitivity.

DESIGNER GENES - Teams will answer questions, solve problems, and analyze data pertaining to classic, evolutionary, and molecular genetics.

High School Life Science

HS. Inheritance and Variation of Traits

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding instructions for characteristic traits passed from parents to offspring.

HS-LS3-2. Make and defend a claim that inheritable genetic variation may result from meiosis, viable replication errors, or mutations caused by environmental factors.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

HS. Natural Selection and Evolution

HS-LS4-2. Construct an explanation that evolution primarily results from reproductive potential, heritable variation, competition for limited resources, and differential survival and reproduction.

HS-LS4-3. Apply concepts of statistics and probability to explain how organisms with advantageous heritable traits tend to increase in proportion.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

DISEASE DETECTIVES - Participants will use investigative skills in the scientific study of disease, injury, health, and disability in populations or groups of people.

High School Life Science

HS. Interdependent Relationships in Ecosystems

HS-LS2-1. Use mathematical or computational representations to support explanations of factors that affect the carrying capacity of ecosystems at different scales.

HS-LS2-2. Use mathematical representations to support and revise explanations about factors affecting biodiversity and populations in ecosystems of different scales.

HS. Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-6. Evaluate claims, evidence, and reasoning that ecosystem interactions maintain stability under stable conditions but may produce a new ecosystem when conditions change.

NGSS Science and Engineering Practices

Middle School Practices

NGSS SEP 3. Planning and Carrying Out Investigations.

NGSS SEP 4. Analyzing and Interpreting Data.

NGSS SEP 5. Using Mathematics and Computational Thinking.

NGSS SEP 6. Constructing Explanations and Designing Solutions.

NGSS SEP 7. Engaging in Argument from Evidence.

DYNAMIC PLANET - Teams will complete tasks related to the properties and processes of Earth's fresh waters.

High School Earth and Space Science

HS. Earth's Systems

HS-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

HS. Weather and Climate

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS. Earth and Human Activity

HS-ESS3-1. Construct an explanation for how natural resources, natural hazards, and changes in climate have influenced human activity.

HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

HS-ESS3-6. Use a computational representation to illustrate relationships among Earth systems and how human activity is modifying those relationships.

ELECTRIC VEHICLE - Teams will design, build, and test a vehicle using electrical energy to travel for a set time, push a bottle past a line, reverse, and stop near a Target Point.

High School Physical Science

HS. Motion and Stability: Forces and Interactions

HS-PS2-1. Analyze data to support the claim that Newton's Second Law describes the mathematical relationship among net force, mass, and acceleration.

HS. Energy

HS-PS3-1. Create a computational model to calculate the change in energy of one component in a system when changes in other components and energy flows are known.

HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and

environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

ENGINEERING CAD - Teams will read engineering drawings, collaborate to CAD parts in Onshape, and combine those parts with provided components to create an assembly.

High School Engineering Design

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HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

EXPERIMENTAL DESIGN - Participants will be assessed on the ability to design, conduct, and report the findings of an experiment entirely on-site.

NGSS Science and Engineering Practices

Middle School Practices

NGSS SEP 1. Asking Questions and Defining Problems.

NGSS SEP 3. Planning and Carrying Out Investigations.

NGSS SEP 4. Analyzing and Interpreting Data.

NGSS SEP 5. Using Mathematics and Computational Thinking.

NGSS SEP 6. Constructing Explanations and Designing Solutions.

NGSS SEP 7. Engaging in Argument from Evidence.

NGSS SEP 8. Obtaining, Evaluating, and Communicating Information.

FORENSICS - Given a scenario and possible suspects, students will perform tests and use the results with other evidence to solve a crime.

High School Physical Science

HS. Structure and Properties of Matter

HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on patterns of electrons in the outermost energy level of atoms.

HS-PS1-3. Plan and conduct an investigation to compare the structure of substances at the bulk scale and infer the strength of electrical forces between particles.

HS. Chemical Reactions

HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on outermost electron states, periodic trends, and patterns of chemical properties.

High School Life Science

HS. Inheritance and Variation of Traits

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding instructions for characteristic traits passed from parents to offspring.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

NGSS Science and Engineering Practices

Middle School Practices

NGSS SEP 3. Planning and Carrying Out Investigations.

NGSS SEP 4. Analyzing and Interpreting Data.

NGSS SEP 6. Constructing Explanations and Designing Solutions.

HOVERCRAFT - Participants will design, construct, and calibrate a self-propelled, air-levitated vehicle to carry nickels down a track.

High School Physical Science

HS. Motion and Stability: Forces and Interactions

HS-PS2-1. Analyze data to support the claim that Newton's Second Law describes the mathematical relationship among net force, mass, and acceleration.

HS. Energy

HS-PS3-1. Create a computational model to calculate the change in energy of one component in a system when changes in other components and energy flows are known.

HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

MISSION POSSIBLE - Competitors will design, build, test, and document a Rube Goldberg-like device that completes specified Start and Final Actions and optional intermediate actions.

High School Physical Science

HS. Motion and Stability: Forces and Interactions

HS-PS2-1. Analyze data to support the claim that Newton's Second Law describes the mathematical relationship among net force, mass, and acceleration.

HS. Energy

HS-PS3-1. Create a computational model to calculate the change in energy of one component in a system when changes in other components and energy flows are known.

HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as motion of particles and energy stored in fields.

HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

PING PONG PARACHUTE - Teams will design, build, and bring up to two bottle rockets to launch a ping pong ball attached to a parachute for maximum time aloft.

High School Physical Science

HS. Motion and Stability: Forces and Interactions

HS-PS2-1. Analyze data to support the claim that Newton's Second Law describes the mathematical relationship among net force, mass, and acceleration.

HS. Energy

HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as motion of particles and energy stored in fields.

HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

PROTEIN MODELING - Participants will complete a written exam and use computer visualization and online resources to construct a physical model of the sialic acid binding site of the 2009 H1N1 influenza hemagglutinin protein.

High School Life Science

HS. Structure and Function

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins that carry out essential functions of life through systems of specialized cells.

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS. Inheritance and Variation of Traits

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding instructions for characteristic traits passed from parents to offspring.

NGSS Science and Engineering Practices

Middle School Practices

NGSS SEP 2. Developing and Using Models.

NGSS SEP 8. Obtaining, Evaluating, and Communicating Information.

REMOTE SENSING - Participants will use remote sensing imagery, data, and computational process skills to complete tasks related to climate-change processes in the Earth system.

High School Physical Science

HS. Waves and Their Applications in Technologies for Information Transfer

HS-PS4-1. Use mathematical representations to support a claim about relationships among frequency, wavelength, and speed of waves traveling in various media.

HS-PS4-2. Evaluate questions about the advantages of using digital transmission and storage of information.

HS-PS4-5. Communicate technical information about how technological devices use wave behavior and interactions with matter to transmit and capture information and energy.

High School Earth and Space Science

HS. Earth's Systems

HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

HS. Weather and Climate

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS. Earth and Human Activity

HS-ESS3-1. Construct an explanation for how natural resources, natural hazards, and changes in climate have influenced human activity.

HS-ESS3-5. Analyze geoscience data and global climate model results to forecast current climate-change rates and associated future impacts to Earth's systems.

HS-ESS3-6. Use a computational representation to illustrate relationships among Earth systems and how human activity is modifying those relationships.

ROCKS AND MINERALS - Teams will identify and classify rocks and minerals and demonstrate how they reveal geologic processes, Earth's history, natural resources, and uses by society.

High School Physical Science

HS. Structure and Properties of Matter

HS-PS1-1. Use the periodic table as a model to predict the relative properties of elements based on patterns of electrons in the outermost energy level of atoms.

High School Earth and Space Science

HS. History of Earth

HS-ESS1-6. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and planetary surfaces to construct an account of Earth's formation and early history.

HS. Earth's Systems

HS-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.

HS-ESS2-3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.

HS. Earth and Human Activity

HS-ESS3-1. Construct an explanation for how natural resources, natural hazards, and changes in climate have influenced human activity.

THERMODYNAMICS - Teams will construct a device designed to collect heat and complete a written test on thermodynamic concepts.

High School Physical Science

HS. Chemical Reactions

HS-PS1-4. Develop a model to illustrate that energy released or absorbed by a chemical reaction system depends on changes in total bond energy.

HS. Energy

HS-PS3-1. Create a computational model to calculate the change in energy of one component in a system when changes in other components and energy flows are known.

HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as motion of particles and energy stored in fields.

HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

HS-PS3-4. Plan and conduct an investigation showing that thermal energy transfer in a closed system moves components toward a more uniform energy distribution.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

WATER QUALITY - Participants will be assessed on their understanding and evaluation of marine and estuary aquatic environments.

High School Life Science

HS. Interdependent Relationships in Ecosystems

HS-LS2-1. Use mathematical or computational representations to support explanations of factors that affect the carrying capacity of ecosystems at different scales.

HS-LS2-2. Use mathematical representations to support and revise explanations about factors affecting biodiversity and populations in ecosystems of different scales.

HS. Matter and Energy in Organisms and Ecosystems

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS. Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-6. Evaluate claims, evidence, and reasoning that ecosystem interactions maintain stability under stable conditions but may produce a new ecosystem when conditions change.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

High School Earth and Space Science

HS. Earth's Systems

HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

HS. Earth and Human Activity

HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

WRIGHT STUFF - Teams will construct, collect flight-test data, analyze, and optimize free-flight rubber-powered airplanes to achieve maximum time aloft.

High School Physical Science

HS. Motion and Stability: Forces and Interactions

HS-PS2-1. Analyze data to support the claim that Newton's Second Law describes the mathematical relationship among net force, mass, and acceleration.

HS. Energy

HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as motion of particles and energy stored in fields.

HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

High School Engineering Design

HS. Engineering Design

HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for constraints and possible social, cultural, and environmental impacts.

HS-ETS1-4. Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints.

SOURCE DOCUMENTS AND ALIGNMENT NOTES

[Next Generation Science Standards - DCI Arrangements](#)

[Next Generation Science Standards - High School by Topic](#)

[Next Generation Science Standards - Read the Standards](#)

[K-12 Computer Science Framework](#)

Method: 2027 event descriptions and content scopes were reviewed against the attached 2027 Division C Rules Manual. Only official national tournament events are included; trial events are excluded to match the prior-year documents. Science and Engineering Practices are used where an event's central investigative or modeling work is not captured by one disciplinary performance expectation. Codebusters retains the relevant K-12 Computer Science Framework alignment.