Main Criteria: Forward Education

Secondary Criteria: Alabama Courses of Study, Alaska Content and Performance Standards, Arizona's College and Career Ready Standards, Arkansas Standards, California Content Standards, Colorado Academic Standards (CAS), Connecticut State Standards, Delaware Standards and Instruction, Florida Standards, Georgia Standards of Excellence, Hawaii Content and Performance Standards

Subjects: Mathematics, Science, Technology Education

Grades: 9, 10, Key Stage 3, Key Stage 4

Forward Education

Replanting our Forests with Automated Tree Seeders

Alabama Courses of Study

Mathematics

Grade **9** - Adopted: **2019/Impl. 2020**

STRAND / DOMAIN		Mathematical Practices
OBJECTIVE / CATEGORY	MP1	Make sense of problems and persevere in solving them.
OBJECTIVE / CATEGORY	MP2	Reason abstractly and quantitatively.
OBJECTIVE / CATEGORY	MP3	Construct viable arguments and critique the reasoning of others.
OBJECTIVE / CATEGORY	MP4	Model with mathematics.
OBJECTIVE / CATEGORY	MP6	Attend to precision.
OBJECTIVE / CATEGORY	MP7	Look for and make use of structure.
OBJECTIVE / CATEGORY	MP8	Look for and express regularity in repeated reasoning.

STRAND / DOMAIN		Geometry with Data Analysis Content Standards
OBJECTIVE / CATEGORY		**Data Analysis, Statistics, and Probability - Focus 2: Visualizing and Summarizing Data**
STANDARD		**Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.**
RELATED CONTENT / EXPECTATION	**10.**	**Use statistics appropriate to the shape of the data distribution to compare and contrast two or more data sets, utilizing the mean and median for center and the interquartile range and standard deviation for variability.**
GRADE EXPECTATION	10.a.	Explain how standard deviation develops from mean absolute deviation.

STRAND / DOMAIN		Geometry with Data Analysis Content Standards
OBJECTIVE / CATEGORY		**Data Analysis, Statistics, and Probability - Focus 2: Visualizing and Summarizing Data**

STANDARD		**Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.**
RELATED CONTENT / EXPECTATION	11.	Interpret differences in shape, center, and spread in the context of data sets, accounting for possible effects of extreme data points (outliers) on mean and standard deviation.

STRAND / DOMAIN		**Mathematical Modeling Content Standards**
OBJECTIVE / CATEGORY		**Modeling**
STANDARD		**Mathematical modeling and statistical problem-solving are extensive, cyclical processes that can be used to answer significant real-world problems.**
RELATED CONTENT / EXPECTATION	1.	Use the full Mathematical Modeling Cycle or Statistical Problem-Solving Cycle to answer a real-world problem of particular student interest, incorporating standards from across the course.

STRAND / DOMAIN		**Mathematical Modeling Content Standards**
OBJECTIVE / CATEGORY		**Financial Planning and Management**
STANDARD		**Mathematical models involving growth and decay are useful in solving real-world problems involving borrowing and investing; spreadsheets are a frequently-used and powerful tool to assist with modeling financial situations.**
RELATED CONTENT / EXPECTATION	2.	Use elements of the Mathematical Modeling Cycle to solve real-world problems involving finances.

STRAND / DOMAIN		**Mathematical Modeling Content Standards**
OBJECTIVE / CATEGORY		**Modeling to Interpret Statistical Studies**
STANDARD		**Statistical studies allow a conclusion to be drawn about a population that is too large to survey completely or about cause and effect in an experiment.**
RELATED CONTENT / EXPECTATION	**18.**	**Construct a probability distribution based on empirical observations of a variable.**
GRADE EXPECTATION	18.c.	Find the mean, standard deviation, median, and interquartile range of a probability distribution and make long-term predictions about future possibilities. Determine which measures are most appropriate based upon the shape of the distribution.

Alabama Courses of Study

Mathematics

Grade **10** - Adopted: **2019/Impl. 2020**

STRAND / DOMAIN		**Mathematical Practices**
OBJECTIVE / CATEGORY	MP1	Make sense of problems and persevere in solving them.

OBJECTIVE / CATEGORY	MP2	Reason abstractly and quantitatively.
OBJECTIVE / CATEGORY	MP3	Construct viable arguments and critique the reasoning of others.
OBJECTIVE / CATEGORY	MP4	Model with mathematics.
OBJECTIVE / CATEGORY	MP6	Attend to precision.
OBJECTIVE / CATEGORY	MP7	Look for and make use of structure.
OBJECTIVE / CATEGORY	MP8	Look for and express regularity in repeated reasoning.
STRAND / DOMAIN		**Geometry with Data Analysis Content Standards**
OBJECTIVE / CATEGORY		**Data Analysis, Statistics, and Probability - Focus 2: Visualizing and Summarizing Data**
STANDARD		**Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.**
RELATED CONTENT / EXPECTATION	**10.**	**Use statistics appropriate to the shape of the data distribution to compare and contrast two or more data sets, utilizing the mean and median for center and the interquartile range and standard deviation for variability.**
GRADE EXPECTATION	10.a.	Explain how standard deviation develops from mean absolute deviation.
STRAND / DOMAIN		**Geometry with Data Analysis Content Standards**
OBJECTIVE / CATEGORY		**Data Analysis, Statistics, and Probability - Focus 2: Visualizing and Summarizing Data**
STANDARD		**Distributions of quantitative data (continuous or discrete) in one variable should be described in the context of the data with respect to what is typical (the shape, with appropriate measures of center and variability, including standard deviation) and what is not (outliers), and these characteristics can be used to compare two or more subgroups with respect to a variable.**
RELATED CONTENT / EXPECTATION	11.	Interpret differences in shape, center, and spread in the context of data sets, accounting for possible effects of extreme data points (outliers) on mean and standard deviation.
STRAND / DOMAIN		**Mathematical Modeling Content Standards**
OBJECTIVE / CATEGORY		**Modeling**
STANDARD		**Mathematical modeling and statistical problem-solving are extensive, cyclical processes that can be used to answer significant real-world problems.**

RELATED CONTENT / EXPECTATION	1.	Use the full Mathematical Modeling Cycle or Statistical Problem-Solving Cycle to answer a real-world problem of particular student interest, incorporating standards from across the course.

STRAND / DOMAIN		**Mathematical Modeling Content Standards**
OBJECTIVE / CATEGORY		**Financial Planning and Management**
STANDARD		**Mathematical models involving growth and decay are useful in solving real-world problems involving borrowing and investing; spreadsheets are a frequently-used and powerful tool to assist with modeling financial situations.**

RELATED CONTENT / EXPECTATION	2.	Use elements of the Mathematical Modeling Cycle to solve real-world problems involving finances.

STRAND / DOMAIN		**Mathematical Modeling Content Standards**
OBJECTIVE / CATEGORY		**Modeling to Interpret Statistical Studies**
STANDARD		**Statistical studies allow a conclusion to be drawn about a population that is too large to survey completely or about cause and effect in an experiment.**
RELATED CONTENT / EXPECTATION	**18.**	**Construct a probability distribution based on empirical observations of a variable.**
GRADE EXPECTATION	18.c.	Find the mean, standard deviation, median, and interquartile range of a probability distribution and make long-term predictions about future possibilities. Determine which measures are most appropriate based upon the shape of the distribution.

Alabama Courses of Study

Science

Grade **9** - Adopted: **2015**

STRAND / DOMAIN	**AL.HS.PS.**	**PHYSICAL SCIENCE**
OBJECTIVE / CATEGORY		**Waves and Their Applications in Technologies for Information Transfer**
STANDARD	HS.PS.15.	Obtain and communicate information from published materials to explain how transmitting and receiving devices (e.g., cellular telephones, medical-imaging technology, solar cells, wireless Internet, scanners, Sound Navigation and Ranging [SONAR]) use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

STRAND / DOMAIN	**AL.HS.B.**	**BIOLOGY**
OBJECTIVE / CATEGORY		**Ecosystems: Interactions, Energy, and Dynamics**
STANDARD	HS.B.8.	Develop and use models to describe the cycling of matter (e.g., carbon, nitrogen, water) and flow of energy (e.g., food chains, food webs, biomass pyramids, ten percent law) between abiotic and biotic factors in ecosystems.

STRAND / DOMAIN	**AL.HS.ES.**	**ENVIRONMENTAL SCIENCE**
OBJECTIVE / CATEGORY		**Earth and Human Activity**

STANDARD	HS.ES.2.	Use models to illustrate and communicate the role of photosynthesis and cellular respiration as carbon cycles through the biosphere, atmosphere, hydrosphere, and geosphere.
STANDARD	HS.ES.3.	Use mathematics and graphic models to compare factors affecting biodiversity and populations in ecosystems.
STANDARD	HS.ES.4.	Engage in argument from evidence to evaluate how biological or physical changes within ecosystems (e.g., ecological succession, seasonal flooding, volcanic eruptions) affect the number and types of organisms, and that changing conditions may result in a new or altered ecosystem.
STANDARD	HS.ES.6.	Obtain, evaluate, and communicate information to describe how human activity may affect biodiversity and genetic variation of organisms, including threatened and endangered species.
STANDARD	HS.ES.12.	Analyze and interpret data and climate models to predict how global or regional climate change can affect Earth's systems (e.g., precipitation and temperature and their associated impacts on sea level, glacial ice volumes, and atmosphere and ocean composition).
STANDARD	HS.ES.13.	Obtain, evaluate, and communicate information based on evidence to explain how key natural resources (e.g., water sources, fertile soils, concentrations of minerals and fossil fuels), natural hazards, and climate changes influence human activity (e.g., mass migrations).
STANDARD	HS.ES.15.	Construct an explanation based on evidence to determine the relationships among management of natural resources, human sustainability, and biodiversity (e.g., resources, waste management, per capita consumption, agricultural efficiency, urban planning).
STANDARD	HS.ES.16.	Obtain and evaluate information from published results of scientific computational models to illustrate the relationships among Earth's systems and how these relationships may be impacted by human activity (e.g., effects of an increase in atmospheric carbon dioxide on photosynthetic biomass, effect of ocean acidification on marine populations).

Grade **9** - Adopted: **2014**

STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
OBJECTIVE / CATEGORY		**Key Ideas and Details**
STANDARD	RH.9-10.2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
STANDARD	RH.9-10.3.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
OBJECTIVE / CATEGORY		**Craft and Structure**
STANDARD	RH.9-10.4.	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 9-10 texts and topics.
STANDARD	RH.9-10.5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**

OBJECTIVE / CATEGORY		**Integration of Knowledge and Ideas**
STANDARD	RH.9-10.9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
OBJECTIVE / CATEGORY		**Range of Reading and Level of Text Complexity**
STANDARD	RH.9-10.10.	By the end of Grade 10, read and comprehend science/technical texts in the Grades 9-10 text complexity band independently and proficiently.
STRAND / DOMAIN	**AL.WHST.9-10.**	**Writing Standards for Literacy in Science, and Technical Subjects**
OBJECTIVE / CATEGORY		**Text Types and Purposes**
STANDARD	**WHST.9-10.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
RELATED CONTENT / EXPECTATION	WHST.9-10.2.d.	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
STRAND / DOMAIN	**AL.WHST.9-10.**	**Writing Standards for Literacy in Science, and Technical Subjects**
OBJECTIVE / CATEGORY		**Production and Distribution of Writing**
STANDARD	WHST.9-10.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
STANDARD	WHST.9-10.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Alabama Courses of Study

Science

Grade **10** - Adopted: **2015**

STRAND / DOMAIN	**AL.HS.PS.**	**PHYSICAL SCIENCE**
OBJECTIVE / CATEGORY		**Waves and Their Applications in Technologies for Information Transfer**
STANDARD	HS.PS.15.	Obtain and communicate information from published materials to explain how transmitting and receiving devices (e.g., cellular telephones, medical-imaging technology, solar cells, wireless Internet, scanners, Sound Navigation and Ranging [SONAR]) use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.
STRAND / DOMAIN	**AL.HS.B.**	**BIOLOGY**
OBJECTIVE / CATEGORY		**Ecosystems: Interactions, Energy, and Dynamics**

STANDARD	HS.B.8.	Develop and use models to describe the cycling of matter (e.g., carbon, nitrogen, water) and flow of energy (e.g., food chains, food webs, biomass pyramids, ten percent law) between abiotic and biotic factors in ecosystems.
STRAND / DOMAIN	**AL.HS.ES.**	**ENVIRONMENTAL SCIENCE**
OBJECTIVE / CATEGORY		**Earth and Human Activity**
STANDARD	HS.ES.2.	Use models to illustrate and communicate the role of photosynthesis and cellular respiration as carbon cycles through the biosphere, atmosphere, hydrosphere, and geosphere.
STANDARD	HS.ES.3.	Use mathematics and graphic models to compare factors affecting biodiversity and populations in ecosystems.
STANDARD	HS.ES.4.	Engage in argument from evidence to evaluate how biological or physical changes within ecosystems (e.g., ecological succession, seasonal flooding, volcanic eruptions) affect the number and types of organisms, and that changing conditions may result in a new or altered ecosystem.
STANDARD	HS.ES.6.	Obtain, evaluate, and communicate information to describe how human activity may affect biodiversity and genetic variation of organisms, including threatened and endangered species.
STANDARD	HS.ES.12.	Analyze and interpret data and climate models to predict how global or regional climate change can affect Earth's systems (e.g., precipitation and temperature and their associated impacts on sea level, glacial ice volumes, and atmosphere and ocean composition).
STANDARD	HS.ES.13.	Obtain, evaluate, and communicate information based on evidence to explain how key natural resources (e.g., water sources, fertile soils, concentrations of minerals and fossil fuels), natural hazards, and climate changes influence human activity (e.g., mass migrations).
STANDARD	HS.ES.15.	Construct an explanation based on evidence to determine the relationships among management of natural resources, human sustainability, and biodiversity (e.g., resources, waste management, per capita consumption, agricultural efficiency, urban planning).
STANDARD	HS.ES.16.	Obtain and evaluate information from published results of scientific computational models to illustrate the relationships among Earth's systems and how these relationships may be impacted by human activity (e.g., effects of an increase in atmospheric carbon dioxide on photosynthetic biomass, effect of ocean acidification on marine populations).

Grade **10** - Adopted: **2014**

STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
OBJECTIVE / CATEGORY		**Key Ideas and Details**
STANDARD	RH.9-10.2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
STANDARD	RH.9-10.3.	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
OBJECTIVE / CATEGORY		**Craft and Structure**

STANDARD	RH.9-10.4.	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 9-10 texts and topics.
STANDARD	RH.9-10.5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
OBJECTIVE / CATEGORY		**Integration of Knowledge and Ideas**
STANDARD	RH.9-10.9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
STRAND / DOMAIN	**AL.RH.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
OBJECTIVE / CATEGORY		**Range of Reading and Level of Text Complexity**
STANDARD	RH.9-10.10.	By the end of Grade 10, read and comprehend science/technical texts in the Grades 9-10 text complexity band independently and proficiently.
STRAND / DOMAIN	**AL.WHST.9-10.**	**Writing Standards for Literacy in Science, and Technical Subjects**
OBJECTIVE / CATEGORY		**Text Types and Purposes**
STANDARD	**WHST.9-10.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
RELATED CONTENT / EXPECTATION	WHST.9-10.2.d.	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
STRAND / DOMAIN	**AL.WHST.9-10.**	**Writing Standards for Literacy in Science, and Technical Subjects**
OBJECTIVE / CATEGORY		**Production and Distribution of Writing**
STANDARD	WHST.9-10.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
STANDARD	WHST.9-10.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Alabama Courses of Study
Technology Education
Grade **9** - Adopted: **2018**

STRAND / DOMAIN	**AL.DLCS.9-12.**	**Digital Literacy and Computer Science**
OBJECTIVE / CATEGORY	**9-12.1.**	**Computational Thinker**
STANDARD		**Algorithms**

RELATED CONTENT / EXPECTATION	**9-12.1.3.**	**Differentiate between a generalized expression of an algorithm in pseudocode and its concrete implementation in a programming language.**
GRADE EXPECTATION	9-12.1.3.a.	Explain that some algorithms do not lead to exact solutions in a reasonable amount of time and thus approximations are acceptable.
GRADE EXPECTATION	9-12.1.3.c.	Distinguish when a problem solution requires decisions to be made among alternatives, such as selection constructs, or when a solution needs to be iteratively processed to arrive at a result, such as iterative “loop” constructs or recursion.
GRADE EXPECTATION	9-12.1.3.d.	Evaluate and select algorithms based on performance, reusability, and ease of implementation.
GRADE EXPECTATION	9-12.1.3.e.	Explain how more than one algorithm may solve the same problem and yet be characterized with different priorities.

STRAND / DOMAIN	**AL.DLCS.9-12.**	**Digital Literacy and Computer Science**
OBJECTIVE / CATEGORY	**9-12.1.**	**Computational Thinker**
STANDARD		**Algorithms**
RELATED CONTENT / EXPECTATION	9-12.1.4.	Use and adapt classic algorithms to solve computational problems.

STRAND / DOMAIN	**AL.DLCS.9-12.**	**Digital Literacy and Computer Science**
OBJECTIVE / CATEGORY	**9-12.5.**	**Innovative Designer**
STANDARD		**Human/Computer Partnerships**
RELATED CONTENT / EXPECTATION	9-12.5.39.	Identify a problem that cannot be solved by either humans or machines alone and discuss a solution for it by decomposing the task into sub-problems suited for a human or machine to accomplish.

Alabama Courses of Study

Technology Education

Grade **10** - Adopted: **2018**

STRAND / DOMAIN	**AL.DLCS.9-12.**	**Digital Literacy and Computer Science**
OBJECTIVE / CATEGORY	**9-12.1.**	**Computational Thinker**
STANDARD		**Algorithms**
RELATED CONTENT / EXPECTATION	**9-12.1.3.**	**Differentiate between a generalized expression of an algorithm in pseudocode and its concrete implementation in a programming language.**
GRADE EXPECTATION	9-12.1.3.a.	Explain that some algorithms do not lead to exact solutions in a reasonable amount of time and thus approximations are acceptable.

GRADE EXPECTATION	9-12.1.3.c.	Distinguish when a problem solution requires decisions to be made among alternatives, such as selection constructs, or when a solution needs to be iteratively processed to arrive at a result, such as iterative “loop” constructs or recursion.
GRADE EXPECTATION	9-12.1.3.d.	Evaluate and select algorithms based on performance, reusability, and ease of implementation.
GRADE EXPECTATION	9-12.1.3.e.	Explain how more than one algorithm may solve the same problem and yet be characterized with different priorities.
STRAND / DOMAIN	**AL.DLCS.9-12.**	**Digital Literacy and Computer Science**
OBJECTIVE / CATEGORY	**9-12.1.**	**Computational Thinker**
STANDARD		**Algorithms**
RELATED CONTENT / EXPECTATION	9-12.1.4.	Use and adapt classic algorithms to solve computational problems.
STRAND / DOMAIN	**AL.DLCS.9-12.**	**Digital Literacy and Computer Science**
OBJECTIVE / CATEGORY	**9-12.5.**	**Innovative Designer**
STANDARD		**Human/Computer Partnerships**
RELATED CONTENT / EXPECTATION	9-12.5.39.	Identify a problem that cannot be solved by either humans or machines alone and discuss a solution for it by decomposing the task into sub-problems suited for a human or machine to accomplish.

Alaska Content and Performance Standards

Mathematics

Grade **9** - Adopted: **2012**

PERFORMANCE / CONTENT STANDARD	**AK.MP.**	**Mathematical Practices**
GRADE LEVEL EXPECTATION / STRAND	MP.1.	Make sense of problems and persevere in solving them.
GRADE LEVEL EXPECTATION / STRAND	MP.2.	Reason abstractly and quantitatively.
GRADE LEVEL EXPECTATION / STRAND	MP.3.	Construct viable arguments and critique the reasoning of others.
GRADE LEVEL EXPECTATION / STRAND	MP.4.	Model with mathematics.

GRADE LEVEL EXPECTATION / STRAND	MP.6.	Attend to precision.
GRADE LEVEL EXPECTATION / STRAND	MP.7.	Look for and make use of structure.
GRADE LEVEL EXPECTATION / STRAND	MP.8.	Look for and express regularity in repeated reasoning.

PERFORMANCE / CONTENT STANDARD	AK.HS.F.	Functions
GRADE LEVEL EXPECTATION / STRAND	**F-IF.**	**Interpreting Functions**
GOAL		**Interpret functions that arise in applications in terms of the context.**
INDICATOR	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Alaska Content and Performance Standards

Mathematics

Grade **10** - Adopted: **2012**

PERFORMANCE / CONTENT STANDARD	AK.MP.	Mathematical Practices
GRADE LEVEL EXPECTATION / STRAND	MP.1.	Make sense of problems and persevere in solving them.
GRADE LEVEL EXPECTATION / STRAND	MP.2.	Reason abstractly and quantitatively.
GRADE LEVEL EXPECTATION / STRAND	MP.3.	Construct viable arguments and critique the reasoning of others.
GRADE LEVEL EXPECTATION / STRAND	MP.4.	Model with mathematics.
GRADE LEVEL EXPECTATION / STRAND	MP.6.	Attend to precision.
GRADE LEVEL EXPECTATION / STRAND	MP.7.	Look for and make use of structure.

GRADE LEVEL EXPECTATION / STRAND	MP.8.	Look for and express regularity in repeated reasoning.

PERFORMANCE / CONTENT STANDARD	**AK.HS.F.**	**Functions**
GRADE LEVEL EXPECTATION / STRAND	**F-IF.**	**Interpreting Functions**
GOAL		**Interpret functions that arise in applications in terms of the context.**
INDICATOR	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Alaska Content and Performance Standards

Science

Grade **9** - Adopted: **2019**

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL PHYSICAL SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Waves and Electromagnetic Radiation**
GOAL	HS-PS4-2.	Evaluate questions about the advantages and disadvantages of using digital transmission and storage of information with respect to that of forms other than digital, including analog.

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL LIFE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Matter and Energy in Organisms and Ecosystems**
GOAL	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
GOAL	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL LIFE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Interdependent Relationships in Ecosystems**
GOAL	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
GOAL	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
GOAL	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		**Earth's Systems**
GOAL	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		**Weather and Climate**
GOAL	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.

PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		**Human Sustainability**
GOAL	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
GOAL	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
GOAL	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
GOAL	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

PERFORMANCE / CONTENT STANDARD		HIGH SCHOOL EARTH AND SPACE SCIENCES
GRADE LEVEL EXPECTATION / STRAND		**Engineering Design**
GOAL	HS-ETS1-1.	Analyze major global challenges to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
GOAL	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.
GOAL	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Science

Grade **10** - Adopted: **2019**

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL PHYSICAL SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Waves and Electromagnetic Radiation**
GOAL	HS-PS4-2.	Evaluate questions about the advantages and disadvantages of using digital transmission and storage of information with respect to that of forms other than digital, including analog.

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL LIFE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Matter and Energy in Organisms and Ecosystems**
GOAL	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
GOAL	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL LIFE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Interdependent Relationships in Ecosystems**
GOAL	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
GOAL	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
GOAL	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL EARTH AND SPACE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Earth's Systems**
GOAL	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL EARTH AND SPACE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Weather and Climate**

GOAL	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.
PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL EARTH AND SPACE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Human Sustainability**
GOAL	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
GOAL	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
GOAL	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
GOAL	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
PERFORMANCE / CONTENT STANDARD		**HIGH SCHOOL EARTH AND SPACE SCIENCES**
GRADE LEVEL EXPECTATION / STRAND		**Engineering Design**
GOAL	HS-ETS1-1.	Analyze major global challenges to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
GOAL	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.
GOAL	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Alaska Content and Performance Standards

Technology Education

Grade **9** - Adopted: **2019**

PERFORMANCE / CONTENT STANDARD		**Alaska Computer Science Standards**
GRADE LEVEL EXPECTATION / STRAND		**Entry Level Employment Competence**
GOAL		**Algorithms and Programming**
INDICATOR		**Algorithms**
INDICATOR	L1.AP.A.01.	Use algorithms (e.g., sequencing, selection, iteration, recursion, etc.) to create a prototype to provide a possible solution for a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Entry Level Employment Competence
GOAL		Algorithms and Programming
INDICATOR		Control
INDICATOR	L1.AP.C.02.	Develop an event□based program that will solve a practical problem, or allow self□expression.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Post-Secondary Education
GOAL		Algorithms and Programming
INDICATOR		Algorithms
INDICATOR	L2.AP.A.02.	Develop an artificial intelligence algorithm to play a game against a human opponent or solve a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Post-Secondary Education
GOAL		Algorithms and Programming
INDICATOR		Program Development
INDICATOR	L2.AP.PD.02.	Using the software life cycle process, create software that will provide solutions for a variety of users.

PERFORMANCE / CONTENT STANDARD		Alaska Digital Literacy Standards
GRADE LEVEL EXPECTATION / STRAND		Innovative Design
GOAL	6-12.ID.1.	Students engage in a design process and employ it to generate ideas, create innovative products or solve authentic problems.
GOAL	6-12.ID.3.	Students engage in a design process to develop, test and revise prototypes, embracing the cyclical process of trial and error and understanding problems or setbacks as potential opportunities for improvement.
GOAL	6-12.ID.4.	Students demonstrate an ability to persevere and handle greater ambiguity as they work to solve open-ended problems.

PERFORMANCE / CONTENT STANDARD		Alaska Digital Literacy Standards
GRADE LEVEL EXPECTATION / STRAND		**Computational Thinking**
GOAL	6-12.CT.1.	Students practice defining problems to solve by computing for data analysis, modeling or algorithmic thinking.
GOAL	6-12.CT.3.	Students break problems into component parts, identify key pieces and use that information to problem solve.
GOAL	6-12.CT.4.	Students demonstrate an understanding of how automation works and use algorithmic thinking to design and automate solutions.

Alaska Content and Performance Standards

Technology Education

Grade **10** - Adopted: **2019**

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		**Entry Level Employment Competence**
GOAL		**Algorithms and Programming**
INDICATOR		**Algorithms**
INDICATOR	L1.AP.A.01.	Use algorithms (e.g., sequencing, selection, iteration, recursion, etc.) to create a prototype to provide a possible solution for a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		**Entry Level Employment Competence**
GOAL		**Algorithms and Programming**
INDICATOR		**Control**
INDICATOR	L1.AP.C.02.	Develop an event‐based program that will solve a practical problem, or allow self‐expression.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		**Post-Secondary Education**
GOAL		**Algorithms and Programming**
INDICATOR		**Algorithms**
INDICATOR	L2.AP.A.02.	Develop an artificial intelligence algorithm to play a game against a human opponent or solve a common problem.

PERFORMANCE / CONTENT STANDARD		Alaska Computer Science Standards
GRADE LEVEL EXPECTATION / STRAND		Post-Secondary Education
GOAL		Algorithms and Programming
INDICATOR		Program Development
INDICATOR	L2.AP.PD.02.	Using the software life cycle process, create software that will provide solutions for a variety of users.

PERFORMANCE / CONTENT STANDARD		Alaska Digital Literacy Standards
GRADE LEVEL EXPECTATION / STRAND		Innovative Design
GOAL	6-12.ID.1.	Students engage in a design process and employ it to generate ideas, create innovative products or solve authentic problems.
GOAL	6-12.ID.3.	Students engage in a design process to develop, test and revise prototypes, embracing the cyclical process of trial and error and understanding problems or setbacks as potential opportunities for improvement.
GOAL	6-12.ID.4.	Students demonstrate an ability to persevere and handle greater ambiguity as they work to solve open-ended problems.

PERFORMANCE / CONTENT STANDARD		Alaska Digital Literacy Standards
GRADE LEVEL EXPECTATION / STRAND		Computational Thinking
GOAL	6-12.CT.1.	Students practice defining problems to solve by computing for data analysis, modeling or algorithmic thinking.
GOAL	6-12.CT.3.	Students break problems into component parts, identify key pieces and use that information to problem solve.
GOAL	6-12.CT.4.	Students demonstrate an understanding of how automation works and use algorithmic thinking to design and automate solutions.

Arizona's College and Career Ready Standards

Mathematics

Grade **9** - Adopted: **2018**

STRAND		Standards for Mathematical Practice
CONCEPT / STANDARD	MP.1	Make sense of problems and persevere in solving them.
CONCEPT / STANDARD	MP.2	Reason abstractly and quantitatively.

CONCEPT / STANDARD	MP.3	Construct viable arguments and critique the reasoning of others.
CONCEPT / STANDARD	MP.4	Model with mathematics.
CONCEPT / STANDARD	MP.6	Attend to precision.
CONCEPT / STANDARD	MP.7	Look for and make use of structure.
CONCEPT / STANDARD	MP.8	Look for and express regularity in repeated reasoning.

STRAND		**Algebra 1**
CONCEPT / STANDARD	**A1.F-IF**	**Functions – Interpreting Functions (F-IF)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**A1.F-IF.B**	**Interpret functions that arise in applications in terms of the context.**
OBJECTIVE / GRADE LEVEL EXPECTATION	A1.F-IF.B.6	Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Focus on linear, absolute value, quadratic, and exponential functions.

STRAND		**Algebra 2**
CONCEPT / STANDARD	**A2.F-IF**	**Functions – Interpreting Functions (F-IF)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**A2.F-IF.B**	**Interpret functions that arise in applications in terms of the context.**
OBJECTIVE / GRADE LEVEL EXPECTATION	A2.F-IF.B.6	Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Extend from linear, quadratic and exponential functions to include polynomial, radical, logarithmic, rational, sine, cosine, tangent, exponential, and piecewise-defined functions.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.1**	**Make sense of problems and persevere in solving them.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students explain to themselves the meaning of a problem, look for entry points to begin work on the problem, and plan and choose a solution pathway. While engaging in productive struggle to solve a problem, they continually ask themselves, “Does this make sense?" to monitor and evaluate their progress and change course if necessary. Once they have a solution, they look back at the problem to determine if the solution is reasonable and accurate. Mathematically proficient students check their solutions to problems using different methods, approaches, or representations. They also compare and understand different representations of problems and different solution pathways, both their own and those of others.

STRAND		Precalculus
CONCEPT / STANDARD	PC.MP	Standards for Mathematical Practice
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	PC.MP.2	Reason abstractly and quantitatively.

OBJECTIVE / GRADE LEVEL EXPECTATION

Mathematically proficient students make sense of quantities and their relationships in problem situations. Students can contextualize and decontextualize problems involving quantitative relationships. They contextualize quantities, operations, and expressions by describing a corresponding situation. They decontextualize a situation by representing it symbolically. As they manipulate the symbols, they can pause as needed to access the meaning of the numbers, the units, and the operations that the symbols represent. Mathematically proficient students know and flexibly use different properties of operations, numbers, and geometric objects and when appropriate they interpret their solution in terms of the context.

STRAND		Precalculus
CONCEPT / STANDARD	PC.MP	Standards for Mathematical Practice
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	PC.MP.3	Construct viable arguments and critique the reasoning of others.

OBJECTIVE / GRADE LEVEL EXPECTATION

Mathematically proficient students construct mathematical arguments (explain the reasoning underlying a strategy, solution, or conjecture) using concrete, pictorial, or symbolic referents. Arguments may also rely on definitions, assumptions, previously established results, properties, or structures. Mathematically proficient students make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. Mathematically proficient students present their arguments in the form of representations, actions on those representations, and explanations in words (oral or written). Students critique others by affirming or questioning the reasoning of others. They can listen to or read the reasoning of others, decide whether it makes sense, ask questions to clarify or improve the reasoning, and validate or build on it. Mathematically proficient students can communicate their arguments, compare them to others, and reconsider their own arguments in response to the critiques of others.

STRAND		Precalculus
CONCEPT / STANDARD	PC.MP	Standards for Mathematical Practice
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	PC.MP.4	Model with mathematics.

OBJECTIVE / GRADE LEVEL EXPECTATION

Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. When given a problem in a contextual situation, they identify the mathematical elements of a situation and create a mathematical model that represents those mathematical elements and the relationships among them. Mathematically proficient students use their model to analyze the relationships and draw conclusions. They interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

STRAND		Precalculus
CONCEPT / STANDARD	PC.MP	Standards for Mathematical Practice
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	PC.MP.6	Attend to precision.

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students clearly communicate to others using appropriate mathematical terminology, and craft explanations that convey their reasoning. When making mathematical arguments about a solution, strategy, or conjecture, they describe mathematical relationships and connect their words clearly to their representations. Mathematically proficient students understand meanings of symbols used in mathematics, calculate accurately and efficiently, label quantities appropriately, and record their work clearly and concisely.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.7**	**Look for and make use of structure.**

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notations into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.8**	**Look for and express regularity in repeated reasoning.**

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students look for and describe regularities as they solve multiple related problems. They formulate conjectures about what they notice and communicate observations with precision. While solving problems, students maintain oversight of the process and continually evaluate the reasonableness of their results. This informs and strengthens their understanding of the structure of mathematics which leads to fluency.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Statistical and Probabilistic Reasoning (SPR)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.SPR.4:	Represent center, shape, and spread of two or more data sets. Reason, communicate, and compare data sets in context.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.1**	**Make sense of problems and persevere in solving them.**

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students explain to themselves the meaning of a problem, look for entry points to begin work on the problem, and plan and choose a solution pathway. While engaging in productive struggle to solve a problem, they continually ask themselves, “Does this make sense?" to monitor and evaluate their progress and change course if necessary. Once they have a solution, they look back at the problem to determine if the solution is reasonable and accurate. Mathematically proficient students check their solutions to problems using different methods, approaches, or representations. They also compare and understand different representations of problems and different solution pathways, both their own and those of others.

STRAND		Quantitative Reasoning
CONCEPT / STANDARD	QR.MP	Standards for Mathematical Practice (MP)
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.MP.2	Reason abstractly and quantitatively.

OBJECTIVE / GRADE LEVEL EXPECTATION

Mathematically proficient students make sense of quantities and their relationships in problem situations. Students can contextualize and decontextualize problems involving quantitative relationships. They contextualize quantities, operations, and expressions by describing a corresponding situation. They decontextualize a situation by representing it symbolically. As they manipulate the symbols, they can pause as needed to access the meaning of the numbers, the units, and the operations that the symbols represent. Mathematically proficient students know and flexibly use different properties of operations, numbers, and geometric objects and when appropriate they interpret their solution in terms of the context.

STRAND		Quantitative Reasoning
CONCEPT / STANDARD	QR.MP	Standards for Mathematical Practice (MP)
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.MP.3	Construct viable arguments and critique the reasoning of others.

OBJECTIVE / GRADE LEVEL EXPECTATION

Mathematically proficient students construct mathematical arguments (explain the reasoning underlying a strategy, solution, or conjecture) using concrete, pictorial, or symbolic referents. Arguments may also rely on definitions, assumptions, previously established results, properties, or structures. Mathematically proficient students make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. Mathematically proficient students present their arguments in the form of representations, actions on those representations, and explanations in words (oral or written). Students critique others by affirming or questioning the reasoning of others. They can listen to or read the reasoning of others, decide whether it makes sense, ask questions to clarify or improve the reasoning, and validate or build on it. Mathematically proficient students can communicate their arguments, compare them to others, and reconsider their own arguments in response to the critiques of others.

STRAND		Quantitative Reasoning
CONCEPT / STANDARD	QR.MP	Standards for Mathematical Practice (MP)
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.MP.4	Model with mathematics.

OBJECTIVE / GRADE LEVEL EXPECTATION

Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. When given a problem in a contextual situation, they identify the mathematical elements of a situation and create a mathematical model that represents those mathematical elements and the relationships among them. Mathematically proficient students use their model to analyze the relationships and draw conclusions. They interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

STRAND		Quantitative Reasoning
CONCEPT / STANDARD	QR.MP	Standards for Mathematical Practice (MP)
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.MP.6	Attend to precision.

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students clearly communicate to others using appropriate mathematical terminology, and craft explanations that convey their reasoning. When making mathematical arguments about a solution, strategy, or conjecture, they describe mathematical relationships and connect their words clearly to their representations. Mathematically proficient students understand meanings of symbols used in mathematics, calculate accurately and efficiently, label quantities appropriately, and record their work clearly and concisely.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.7**	**Look for and make use of structure.**

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notations into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.8**	**Look for and express regularity in repeated reasoning.**

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students look for and describe regularities as they solve multiple related problems. They formulate conjectures about what they notice and communicate observations with precision. While solving problems, students maintain oversight of the process and continually evaluate the reasonableness of their results. This informs and strengthens their understanding of the structure of mathematics which leads to fluency.

Arizona's College and Career Ready Standards

Mathematics

Grade **10** - Adopted: **2018**

STRAND		**Standards for Mathematical Practice**
CONCEPT / STANDARD	MP.1	Make sense of problems and persevere in solving them.
CONCEPT / STANDARD	MP.2	Reason abstractly and quantitatively.
CONCEPT / STANDARD	MP.3	Construct viable arguments and critique the reasoning of others.
CONCEPT / STANDARD	MP.4	Model with mathematics.
CONCEPT / STANDARD	MP.6	Attend to precision.
CONCEPT / STANDARD	MP.7	Look for and make use of structure.

CONCEPT / STANDARD	MP.8	Look for and express regularity in repeated reasoning.

STRAND		**Algebra 1**
CONCEPT / STANDARD	**A1.F-IF**	**Functions – Interpreting Functions (F-IF)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**A1.F-IF.B**	**Interpret functions that arise in applications in terms of the context.**
OBJECTIVE / GRADE LEVEL EXPECTATION	A1.F-IF.B.6	Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Focus on linear, absolute value, quadratic, and exponential functions.

STRAND		**Algebra 2**
CONCEPT / STANDARD	**A2.F-IF**	**Functions – Interpreting Functions (F-IF)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**A2.F-IF.B**	**Interpret functions that arise in applications in terms of the context.**
OBJECTIVE / GRADE LEVEL EXPECTATION	A2.F-IF.B.6	Calculate and interpret the average rate of change of a continuous function (presented symbolically or as a table) on a closed interval. Estimate the rate of change from a graph. Include problem-solving opportunities utilizing real-world context. Extend from linear, quadratic and exponential functions to include polynomial, radical, logarithmic, rational, sine, cosine, tangent, exponential, and piecewise-defined functions.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.1**	**Make sense of problems and persevere in solving them.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students explain to themselves the meaning of a problem, look for entry points to begin work on the problem, and plan and choose a solution pathway. While engaging in productive struggle to solve a problem, they continually ask themselves, “Does this make sense?" to monitor and evaluate their progress and change course if necessary. Once they have a solution, they look back at the problem to determine if the solution is reasonable and accurate. Mathematically proficient students check their solutions to problems using different methods, approaches, or representations. They also compare and understand different representations of problems and different solution pathways, both their own and those of others.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.2**	**Reason abstractly and quantitatively.**

OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students make sense of quantities and their relationships in problem situations. Students can contextualize and decontextualize problems involving quantitative relationships. They contextualize quantities, operations, and expressions by describing a corresponding situation. They decontextualize a situation by representing it symbolically. As they manipulate the symbols, they can pause as needed to access the meaning of the numbers, the units, and the operations that the symbols represent. Mathematically proficient students know and flexibly use different properties of operations, numbers, and geometric objects and when appropriate they interpret their solution in terms of the context.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.3**	**Construct viable arguments and critique the reasoning of others.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students construct mathematical arguments (explain the reasoning underlying a strategy, solution, or conjecture) using concrete, pictorial, or symbolic referents. Arguments may also rely on definitions, assumptions, previously established results, properties, or structures. Mathematically proficient students make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. Mathematically proficient students present their arguments in the form of representations, actions on those representations, and explanations in words (oral or written). Students critique others by affirming or questioning the reasoning of others. They can listen to or read the reasoning of others, decide whether it makes sense, ask questions to clarify or improve the reasoning, and validate or build on it. Mathematically proficient students can communicate their arguments, compare them to others, and reconsider their own arguments in response to the critiques of others.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.4**	**Model with mathematics.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. When given a problem in a contextual situation, they identify the mathematical elements of a situation and create a mathematical model that represents those mathematical elements and the relationships among them. Mathematically proficient students use their model to analyze the relationships and draw conclusions. They interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.6**	**Attend to precision.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students clearly communicate to others using appropriate mathematical terminology, and craft explanations that convey their reasoning. When making mathematical arguments about a solution, strategy, or conjecture, they describe mathematical relationships and connect their words clearly to their representations. Mathematically proficient students understand meanings of symbols used in mathematics, calculate accurately and efficiently, label quantities appropriately, and record their work clearly and concisely.

STRAND		**Precalculus**

CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.7**	**Look for and make use of structure.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notations into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.

STRAND		**Precalculus**
CONCEPT / STANDARD	**PC.MP**	**Standards for Mathematical Practice**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**PC.MP.8**	**Look for and express regularity in repeated reasoning.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students look for and describe regularities as they solve multiple related problems. They formulate conjectures about what they notice and communicate observations with precision. While solving problems, students maintain oversight of the process and continually evaluate the reasonableness of their results. This informs and strengthens their understanding of the structure of mathematics which leads to fluency.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Statistical and Probabilistic Reasoning (SPR)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.SPR.4:	Represent center, shape, and spread of two or more data sets. Reason, communicate, and compare data sets in context.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.1**	**Make sense of problems and persevere in solving them.**
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students explain to themselves the meaning of a problem, look for entry points to begin work on the problem, and plan and choose a solution pathway. While engaging in productive struggle to solve a problem, they continually ask themselves, “Does this make sense?" to monitor and evaluate their progress and change course if necessary. Once they have a solution, they look back at the problem to determine if the solution is reasonable and accurate. Mathematically proficient students check their solutions to problems using different methods, approaches, or representations. They also compare and understand different representations of problems and different solution pathways, both their own and those of others.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.2**	**Reason abstractly and quantitatively.**

OBJECTIVE / GRADE LEVEL EXPECTATION	Mathematically proficient students make sense of quantities and their relationships in problem situations. Students can contextualize and decontextualize problems involving quantitative relationships. They contextualize quantities, operations, and expressions by describing a corresponding situation. They decontextualize a situation by representing it symbolically. As they manipulate the symbols, they can pause as needed to access the meaning of the numbers, the units, and the operations that the symbols represent. Mathematically proficient students know and flexibly use different properties of operations, numbers, and geometric objects and when appropriate they interpret their solution in terms of the context.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.3**	**Construct viable arguments and critique the reasoning of others.**

OBJECTIVE / GRADE LEVEL EXPECTATION	Mathematically proficient students construct mathematical arguments (explain the reasoning underlying a strategy, solution, or conjecture) using concrete, pictorial, or symbolic referents. Arguments may also rely on definitions, assumptions, previously established results, properties, or structures. Mathematically proficient students make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. Mathematically proficient students present their arguments in the form of representations, actions on those representations, and explanations in words (oral or written). Students critique others by affirming or questioning the reasoning of others. They can listen to or read the reasoning of others, decide whether it makes sense, ask questions to clarify or improve the reasoning, and validate or build on it. Mathematically proficient students can communicate their arguments, compare them to others, and reconsider their own arguments in response to the critiques of others.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.4**	**Model with mathematics.**

OBJECTIVE / GRADE LEVEL EXPECTATION	Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. When given a problem in a contextual situation, they identify the mathematical elements of a situation and create a mathematical model that represents those mathematical elements and the relationships among them. Mathematically proficient students use their model to analyze the relationships and draw conclusions. They interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

STRAND		**Quantitative Reasoning**
CONCEPT / STANDARD	**QR.MP**	**Standards for Mathematical Practice (MP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**QR.MP.6**	**Attend to precision.**

OBJECTIVE / GRADE LEVEL EXPECTATION	Mathematically proficient students clearly communicate to others using appropriate mathematical terminology, and craft explanations that convey their reasoning. When making mathematical arguments about a solution, strategy, or conjecture, they describe mathematical relationships and connect their words clearly to their representations. Mathematically proficient students understand meanings of symbols used in mathematics, calculate accurately and efficiently, label quantities appropriately, and record their work clearly and concisely.

STRAND		**Quantitative Reasoning**

CONCEPT / STANDARD	QR.MP	Standards for Mathematical Practice (MP)
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.MP.7	Look for and make use of structure.
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notations into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.

STRAND		Quantitative Reasoning
CONCEPT / STANDARD	QR.MP	Standards for Mathematical Practice (MP)
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	QR.MP.8	Look for and express regularity in repeated reasoning.
OBJECTIVE / GRADE LEVEL EXPECTATION		Mathematically proficient students look for and describe regularities as they solve multiple related problems. They formulate conjectures about what they notice and communicate observations with precision. While solving problems, students maintain oversight of the process and continually evaluate the reasonableness of their results. This informs and strengthens their understanding of the structure of mathematics which leads to fluency.

Arizona's College and Career Ready Standards

Science

Grade **9** - Adopted: **2018**

STRAND		Core Ideas for Knowing Science
CONCEPT / STANDARD		Earth and Space Science
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	E1:	The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.

STRAND		Core Ideas for Using Science
CONCEPT / STANDARD	U2:	The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.
CONCEPT / STANDARD	U3:	Applications of science often have both positive and negative ethical, social, economic, and/or political implications.

STRAND		High School Earth and Space Sciences
CONCEPT / STANDARD		Earth and Space – E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		Weather & Climate

OBJECTIVE / GRADE LEVEL EXPECTATION	HS+E.E1 U1.2.	Develop and use models to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

STRAND		**High School Earth and Space Sciences**
CONCEPT / STANDARD		**Earth and Space – E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Roles of Water in Earth's Surface Processes**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.E1U1.12.	Develop and use models of the Earth that explains the role of energy and matter in Earth's constantly changing internal and external systems (geosphere, hydrosphere, atmosphere, biosphere).

STRAND		**High School Earth and Space Sciences**
CONCEPT / STANDARD		**Earth and Space – E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Earth and Human Activity**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.E1U3.14.	Engage in argument from evidence about the availability of natural resources, occurrence of natural hazards, changes in climate, and human activity and how they influence each other.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+E.E1 U3.9.	Construct an explanation, based on evidence, for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+E.E1 U3.11.	Develop and use a quantitative model to illustrate the relationship among Earth systems and the degree to which those relationships are being modified due to human activity.

STRAND		**High School Life Sciences**
CONCEPT / STANDARD		**Life Science – L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms & L4: The unity and diversity of organisms, living and extinct, is the result of evolution.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Ecosystems**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.L2U3.18.	Obtain, evaluate, and communicate about the positive and negative ethical, social, economic, and political implications of human activity on the biodiversity of an ecosystem.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+B.L4 U1.2.	Engage in argument from evidence that changes in environmental conditions or human interventions may change species diversity in an ecosystem.

STRAND		**High School Life Sciences**
CONCEPT / STANDARD		**Life Science – L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.**

PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Ecosystems**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.L2U1.19.	Develop and use models that show how changes in the transfer of matter and energy within an ecosystem and interactions between species may affect organisms and their environment.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+B.L2U1.3.	Use mathematics and computational thinking to support claims for the cycling of matter and flow of energy through trophic levels in an ecosystem.
STRAND		**High School Life Sciences**
CONCEPT / STANDARD		**Life Science – L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Cells & Organisms**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.L2U1.21.	Obtain, evaluate, and communicate data showing the relationship of photosynthesis and cellular respiration; flow of energy and cycling of matter.

Arizona's College and Career Ready Standards

Science

Grade **10** - Adopted: **2018**

STRAND		**Core Ideas for Knowing Science**
CONCEPT / STANDARD		**Earth and Space Science**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	E1:	The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.
STRAND		**Core Ideas for Using Science**
CONCEPT / STANDARD	U2:	The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.
CONCEPT / STANDARD	U3:	Applications of science often have both positive and negative ethical, social, economic, and/or political implications.
STRAND		**High School Earth and Space Sciences**
CONCEPT / STANDARD		**Earth and Space – E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Weather & Climate**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+E.E1U1.2.	Develop and use models to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

STRAND		**High School Earth and Space Sciences**
CONCEPT / STANDARD		**Earth and Space – E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Roles of Water in Earth's Surface Processes**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.E1U1.12.	Develop and use models of the Earth that explains the role of energy and matter in Earth's constantly changing internal and external systems (geosphere, hydrosphere, atmosphere, biosphere).

STRAND		**High School Earth and Space Sciences**
CONCEPT / STANDARD		**Earth and Space – E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Earth and Human Activity**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.E1U3.14.	Engage in argument from evidence about the availability of natural resources, occurrence of natural hazards, changes in climate, and human activity and how they influence each other.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+E.E1U3.9.	Construct an explanation, based on evidence, for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+E.E1U3.11.	Develop and use a quantitative model to illustrate the relationship among Earth systems and the degree to which those relationships are being modified due to human activity.

STRAND		**High School Life Sciences**
CONCEPT / STANDARD		**Life Science – L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms & L4: The unity and diversity of organisms, living and extinct, is the result of evolution.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Ecosystems**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.L2U3.18.	Obtain, evaluate, and communicate about the positive and negative ethical, social, economic, and political implications of human activity on the biodiversity of an ecosystem.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+B.L4U1.2.	Engage in argument from evidence that changes in environmental conditions or human interventions may change species diversity in an ecosystem.

STRAND		**High School Life Sciences**
CONCEPT / STANDARD		**Life Science – L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Ecosystems**

OBJECTIVE / GRADE LEVEL EXPECTATION	HS.L2U1.19.	Develop and use models that show how changes in the transfer of matter and energy within an ecosystem and interactions between species may affect organisms and their environment.
OBJECTIVE / GRADE LEVEL EXPECTATION	HS+B.L2U1.3.	Use mathematics and computational thinking to support claims for the cycling of matter and flow of energy through trophic levels in an ecosystem.
STRAND		**High School Life Sciences**
CONCEPT / STANDARD		**Life Science – L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Cells & Organisms**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.L2U1.21.	Obtain, evaluate, and communicate data showing the relationship of photosynthesis and cellular respiration; flow of energy and cycling of matter.

Arizona's College and Career Ready Standards

Technology Education

Grade **9** - Adopted: **2022**

STRAND		**Arizona Educational Technology Standards 2022**
CONCEPT / STANDARD	**Standard 4.**	**Innovative Designer - Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.4.a.	Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.4.b.	Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
STRAND		**Arizona Educational Technology Standards 2022**
CONCEPT / STANDARD	**Standard 5.**	**Computational Thinker - Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.5.a.	Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.5.b.	Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.5.c.	Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

Grade **9** - Adopted: **2018**

STRAND		**Computer Science**
CONCEPT / STANDARD		**Practices**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**Practice 3.**	**Recognizing and Defining Computational Problems: The ability to recognize appropriate and worthwhile opportunities to apply computation is a skill that develops over time and is central to computing. Solving a problem with a computational approach requires defining the problem, breaking it down into parts, and evaluating each part to determine whether a computational solution is appropriate.**
OBJECTIVE / GRADE LEVEL EXPECTATION	3.1.	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
OBJECTIVE / GRADE LEVEL EXPECTATION	3.2.	Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.

STRAND		**Computer Science**
CONCEPT / STANDARD		**Practices**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**Practice 5.**	**Creating Computational Artifacts: The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Students create artifacts that are personally relevant or beneficial to their community and beyond. Computational artifacts can be created by combining and modifying existing artifacts or by developing new artifacts. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps.**
OBJECTIVE / GRADE LEVEL EXPECTATION	5.2.	Create a computational artifact for practical intent, personal expression, or to address a societal issue.

STRAND		**Computer Science**
CONCEPT / STANDARD		**Practices**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**Practice 6.**	**Testing and Refining Computational Artifacts: Testing and refinement is the deliberate and iterative process of improving a computational artifact. This process includes debugging (identifying and fixing errors) and comparing actual outcomes to intended outcomes. Students also respond to the changing needs and expectations of end users and improve the performance, reliability, usability, and accessibility of artifacts.**
OBJECTIVE / GRADE LEVEL EXPECTATION	6.1.	Systematically test computational artifacts by considering all scenarios and using test cases.
OBJECTIVE / GRADE LEVEL EXPECTATION	6.3.	Evaluate and refine a computational artifact multiple times to enhance its performance, reliability, usability, and accessibility.

STRAND		**Computer Science**
CONCEPT / STANDARD		**Concept: Algorithms and Programming (AP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Subconcept: Algorithms (A)**

OBJECTIVE / GRADE LEVEL EXPECTATION	HS.AP.A.1.	Create prototypes that use algorithms for practical intent, personal expression, or to address a societal issue. Practice(s): Creating Computational Artifacts: 5.2

STRAND		**Computer Science**
CONCEPT / STANDARD		**Concept: Impacts of Computing (IC)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Subconcept: Culture (C)**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.IC.C.3.	Demonstrate ways a given algorithm applies to problems across disciplines. Practice(s): Recognizing and Defining Computational Problems: 3.1

Arizona's College and Career Ready Standards

Technology Education

Grade **10** - Adopted: **2022**

STRAND		**Arizona Educational Technology Standards 2022**
CONCEPT / STANDARD	**Standard 4.**	**Innovative Designer - Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.4.a.	Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.4.b.	Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

STRAND		**Arizona Educational Technology Standards 2022**
CONCEPT / STANDARD	**Standard 5.**	**Computational Thinker - Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.5.a.	Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.5.b.	Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	9-12.5.c.	Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

Grade **10** - Adopted: **2018**

STRAND		**Computer Science**

CONCEPT / STANDARD		**Practices**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**Practice 3.**	**Recognizing and Defining Computational Problems: The ability to recognize appropriate and worthwhile opportunities to apply computation is a skill that develops over time and is central to computing. Solving a problem with a computational approach requires defining the problem, breaking it down into parts, and evaluating each part to determine whether a computational solution is appropriate.**
OBJECTIVE / GRADE LEVEL EXPECTATION	3.1.	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
OBJECTIVE / GRADE LEVEL EXPECTATION	3.2.	Decompose complex real-world problems into manageable subproblems that could integrate existing solutions or procedures.
STRAND		**Computer Science**
CONCEPT / STANDARD		**Practices**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**Practice 5.**	**Creating Computational Artifacts: The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Students create artifacts that are personally relevant or beneficial to their community and beyond. Computational artifacts can be created by combining and modifying existing artifacts or by developing new artifacts. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps.**
OBJECTIVE / GRADE LEVEL EXPECTATION	5.2.	Create a computational artifact for practical intent, personal expression, or to address a societal issue.
STRAND		**Computer Science**
CONCEPT / STANDARD		**Practices**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL	**Practice 6.**	**Testing and Refining Computational Artifacts: Testing and refinement is the deliberate and iterative process of improving a computational artifact. This process includes debugging (identifying and fixing errors) and comparing actual outcomes to intended outcomes. Students also respond to the changing needs and expectations of end users and improve the performance, reliability, usability, and accessibility of artifacts.**
OBJECTIVE / GRADE LEVEL EXPECTATION	6.1.	Systematically test computational artifacts by considering all scenarios and using test cases.
OBJECTIVE / GRADE LEVEL EXPECTATION	6.3.	Evaluate and refine a computational artifact multiple times to enhance its performance, reliability, usability, and accessibility.
STRAND		**Computer Science**
CONCEPT / STANDARD		**Concept: Algorithms and Programming (AP)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Subconcept: Algorithms (A)**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.AP.A.1.	Create prototypes that use algorithms for practical intent, personal expression, or to address a societal issue. Practice(s): Creating Computational Artifacts: 5.2

STRAND		**Computer Science**
CONCEPT / STANDARD		**Concept: Impacts of Computing (IC)**
PERFORMANCE OBJECTIVE / PROFICIENCY LEVEL		**Subconcept: Culture (C)**
OBJECTIVE / GRADE LEVEL EXPECTATION	HS.IC.C.3.	Demonstrate ways a given algorithm applies to problems across disciplines. Practice(s): Recognizing and Defining Computational Problems: 3.1

Arkansas Standards

Mathematics

Grade **9** - Adopted: **2023**

STRAND / TOPIC		**Algebra I Mathematics Standards**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Interpret Key Features - Students interpret key features of equations that model linear relationships.**
BENCHMARK / PROFICIENCY	A1.LFE.8.	Flexibly use different representations of a linear function, including graphs, tables, and equations.
BENCHMARK / PROFICIENCY	A1.LFE.9.	Calculate and interpret the rate of change of a linear function represented in a table, graph, or as an equation in context of real-world and mathematical problems.

Grade **9** - Adopted: **2016**

STRAND / TOPIC		**Algebra I Part A**
CONTENT STANDARD		**Interpreting Functions**
PERFORMANCE EXPECTATION		**Interpret functions that arise in applications in terms of the context**
BENCHMARK / PROFICIENCY	HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

STRAND / TOPIC		**Algebra I Part B**
CONTENT STANDARD		**Interpreting Functions**
PERFORMANCE EXPECTATION		**Interpret functions that arise in applications in terms of the context**
BENCHMARK / PROFICIENCY	HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

STRAND / TOPIC		**Algebra II**
CONTENT STANDARD		**Interpreting Functions**

PERFORMANCE EXPECTATION		**Interpret functions that arise in applications in terms of the context**
BENCHMARK / PROFICIENCY	HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.
STRAND / TOPIC		**Bridge to Algebra II**
CONTENT STANDARD		**Function Modeling**
PERFORMANCE EXPECTATION		**Create equations that describe numbers or relationships, interpret functions that arise in applications in terms of a context, analyze functions using different representations, build a function that models a relationship between two quantities, and build new functions from existing functions.**
BENCHMARK / PROFICIENCY	FM.3.BTAII.7	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.
STRAND / TOPIC		**Pre-Calculus**
CONTENT STANDARD		**Functions**
PERFORMANCE EXPECTATION		**Students will be able to interpret different types of functions and their key characteristics including polynomial, exponential, logarithmic, power, trigonometric, rational, and other types of functions.**
BENCHMARK / PROFICIENCY	F.7.PC.5	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

Grade **9** - Adopted: **2017**

STRAND / TOPIC		**Quantitative Literacy**
CONTENT STANDARD		**Modeling**
PERFORMANCE EXPECTATION		**Students will use appropriate mathematical models to solve problems.**
BENCHMARK / PROFICIENCY	M.1.QL.2	Analyze mathematical models, describe limitations, and suggest improvements
STRAND / TOPIC		**Quantitative Literacy**
CONTENT STANDARD		**Numerical Reasoning**
PERFORMANCE EXPECTATION		**Students will use number sense and proportional reasoning in real world settings to make and communicate decisions in order to draw conclusions based on quantitative analysis.**
BENCHMARK / PROFICIENCY	NR.2.QL.6	Solve real world problems requiring interpretation and comparison of various representations of rates and ratios
STRAND / TOPIC		**Quantitative Literacy**
CONTENT STANDARD		**Statistics and Probability**

PERFORMANCE EXPECTATION		**Students will apply statistical and probabilistic reasoning to draw conclusions, to make decisions, and to evaluate outcomes of decisions.**
BENCHMARK / PROFICIENCY	SP.3.QL.4	Make decisions about data summarized numerically using measures of center: compare measures of center of two or more data sets; interpret the differences in context; justify the use of a chosen measure

Grade **9** - Adopted: **2019**

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Numerical and Proportional Reasoning**
PERFORMANCE EXPECTATION	**NPR.1.**	**Students will use number sense and proportional reasoning in real-world scenarios to make and communicate decisions in order to draw conclusions.**
BENCHMARK / PROFICIENCY	NPR.1.TM.5	Utilize real-world scenarios requiring interpretation and comparison of various representations of rates, ratios, and proportions including scale drawings

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Mathematical Processes and Models**
PERFORMANCE EXPECTATION	**MPM.2.**	**Students will use mathematical processes and models to acquire, demonstrate, and communicate mathematical understanding in real-world scenarios.**
BENCHMARK / PROFICIENCY	**MPM.2.TM.3**	**Create mathematical models and use problem-solving skills, independently and as a collaborative team, for real-world scenarios to**
DESCRIPTOR		formulate a plan or strategy
DESCRIPTOR		describe limitations
DESCRIPTOR		identify how results are affected by changing parameters(e.g., cost of materials, cost of labor, work time required to improve the overall cost of a project)
DESCRIPTOR		suggest improvements

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Mathematical Processes and Models**
PERFORMANCE EXPECTATION	**MPM.2.**	**Students will use mathematical processes and models to acquire, demonstrate, and communicate mathematical understanding in real-world scenarios.**
BENCHMARK / PROFICIENCY	MPM.2.TM.5	Demonstrate effective use of resources (e.g., faculty, other students, reference materials, industry resources, the internet)

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Algebraic Relationships**

PERFORMANCE EXPECTATION	**AR.3.**	**Students will use mathematical concepts of algebra to explain linear and non-linear applications in real-world scenarios.**
BENCHMARK / PROFICIENCY	AR.3.TM.1	Analyze and apply rate of change in terms of real-world scenarios (e.g., rise and run of stair stringers, roof pitch)

Arkansas Standards

Mathematics

Grade **10** - Adopted: **2023**

STRAND / TOPIC		**Algebra I Mathematics Standards**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Interpret Key Features - Students interpret key features of equations that model linear relationships.**
BENCHMARK / PROFICIENCY	A1.LFE.8.	Flexibly use different representations of a linear function, including graphs, tables, and equations.
BENCHMARK / PROFICIENCY	A1.LFE.9.	Calculate and interpret the rate of change of a linear function represented in a table, graph, or as an equation in context of real-world and mathematical problems.

Grade **10** - Adopted: **2016**

STRAND / TOPIC		**Algebra I Part A**
CONTENT STANDARD		**Interpreting Functions**
PERFORMANCE EXPECTATION		**Interpret functions that arise in applications in terms of the context**
BENCHMARK / PROFICIENCY	HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

STRAND / TOPIC		**Algebra I Part B**
CONTENT STANDARD		**Interpreting Functions**
PERFORMANCE EXPECTATION		**Interpret functions that arise in applications in terms of the context**
BENCHMARK / PROFICIENCY	HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

STRAND / TOPIC		**Algebra II**
CONTENT STANDARD		**Interpreting Functions**
PERFORMANCE EXPECTATION		**Interpret functions that arise in applications in terms of the context**

BENCHMARK / PROFICIENCY	HSF.IF.B.6	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

STRAND / TOPIC		**Bridge to Algebra II**
CONTENT STANDARD		**Function Modeling**
PERFORMANCE EXPECTATION		**Create equations that describe numbers or relationships, interpret functions that arise in applications in terms of a context, analyze functions using different representations, build a function that models a relationship between two quantities, and build new functions from existing functions.**

BENCHMARK / PROFICIENCY	FM.3.BTA II.7	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

STRAND / TOPIC		**Pre-Calculus**
CONTENT STANDARD		**Functions**
PERFORMANCE EXPECTATION		**Students will be able to interpret different types of functions and their key characteristics including polynomial, exponential, logarithmic, power, trigonometric, rational, and other types of functions.**

BENCHMARK / PROFICIENCY	F.7.PC.5	Calculate and interpret the average rate of change of a function (presented algebraically or as a table) over a specified interval. Estimate the rate of change from a graph.

Grade **10** - Adopted: **2017**

STRAND / TOPIC		**Quantitative Literacy**
CONTENT STANDARD		**Modeling**
PERFORMANCE EXPECTATION		**Students will use appropriate mathematical models to solve problems.**

BENCHMARK / PROFICIENCY	M.1.QL.2	Analyze mathematical models, describe limitations, and suggest improvements

STRAND / TOPIC		**Quantitative Literacy**
CONTENT STANDARD		**Numerical Reasoning**
PERFORMANCE EXPECTATION		**Students will use number sense and proportional reasoning in real world settings to make and communicate decisions in order to draw conclusions based on quantitative analysis.**

BENCHMARK / PROFICIENCY	NR.2.QL.6	Solve real world problems requiring interpretation and comparison of various representations of rates and ratios

STRAND / TOPIC		**Quantitative Literacy**
CONTENT STANDARD		**Statistics and Probability**
PERFORMANCE EXPECTATION		**Students will apply statistical and probabilistic reasoning to draw conclusions, to make decisions, and to evaluate outcomes of decisions.**

BENCHMARK / PROFICIENCY	SP.3.QL.4	Make decisions about data summarized numerically using measures of center: compare measures of center of two or more data sets; interpret the differences in context; justify the use of a chosen measure

Grade **10** - Adopted: **2019**

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Numerical and Proportional Reasoning**
PERFORMANCE EXPECTATION	**NPR.1.**	**Students will use number sense and proportional reasoning in real-world scenarios to make and communicate decisions in order to draw conclusions.**
BENCHMARK / PROFICIENCY	NPR.1.TM.5	Utilize real-world scenarios requiring interpretation and comparison of various representations of rates, ratios, and proportions including scale drawings

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Mathematical Processes and Models**
PERFORMANCE EXPECTATION	**MPM.2.**	**Students will use mathematical processes and models to acquire, demonstrate, and communicate mathematical understanding in real-world scenarios.**
BENCHMARK / PROFICIENCY	**MPM.2.TM.3**	**Create mathematical models and use problem-solving skills, independently and as a collaborative team, for real-world scenarios to**
DESCRIPTOR		formulate a plan or strategy
DESCRIPTOR		describe limitations
DESCRIPTOR		identify how results are affected by changing parameters(e.g., cost of materials, cost of labor, work time required to improve the overall cost of a project)
DESCRIPTOR		suggest improvements

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Mathematical Processes and Models**
PERFORMANCE EXPECTATION	**MPM.2.**	**Students will use mathematical processes and models to acquire, demonstrate, and communicate mathematical understanding in real-world scenarios.**
BENCHMARK / PROFICIENCY	MPM.2.TM.5	Demonstrate effective use of resources (e.g., faculty, other students, reference materials, industry resources, the internet)

STRAND / TOPIC		**Technical Math for College and Career**
CONTENT STANDARD		**Algebraic Relationships**
PERFORMANCE EXPECTATION	**AR.3.**	**Students will use mathematical concepts of algebra to explain linear and non-linear applications in real-world scenarios.**

BENCHMARK / PROFICIENCY	AR.3.TM.1	Analyze and apply rate of change in terms of real-world scenarios (e.g., rise and run of stair stringers, roof pitch)

Arkansas Standards

Science

Grade **9** - Adopted: **2016**

STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Cycling of Matter and Energy**
PERFORMANCE EXPECTATION	BI-LS2-3.	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
PERFORMANCE EXPECTATION	BI-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
PERFORMANCE EXPECTATION	BI-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
PERFORMANCE EXPECTATION	BI-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Biodiversity and Population Dynamics**
PERFORMANCE EXPECTATION	BI-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
PERFORMANCE EXPECTATION	BI-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANCE EXPECTATION	BI-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on Biodiversity.
PERFORMANCE EXPECTATION	BI3-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
PERFORMANCE EXPECTATION	BI3-ETS1-4.	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**

CONTENT STANDARD		**Life and Earth's Systems**
PERFORMANCE EXPECTATION	BI-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.
PERFORMANCE EXPECTATION	BI-ESS3-5.	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
PERFORMANCE EXPECTATION	BI6-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.
PERFORMANCE EXPECTATION	BI6-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Human Impacts on Earth's Systems**
PERFORMANCE EXPECTATION	BI-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	BI-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	BI-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANCE EXPECTATION	BI-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
PERFORMANCE EXPECTATION	BI7-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
PERFORMANCE EXPECTATION	BI7-ETS1-4.	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
STRAND / TOPIC	**AR.CI.**	**Chemistry – Integrated**
CONTENT STANDARD		**Nuclear Reactions**
PERFORMANCE EXPECTATION	CI2-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

STRAND / TOPIC	AR.ES.	Earth Science
CONTENT STANDARD		Earth's Systems
PERFORMANCE EXPECTATION	ES-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
PERFORMANCE EXPECTATION	ES2-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

STRAND / TOPIC	AR.ES.	Earth Science
CONTENT STANDARD		Human Sustainability
PERFORMANCE EXPECTATION	ES-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	ES-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	ES-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANCE EXPECTATION	ES-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANCE EXPECTATION	ES-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

STRAND / TOPIC	AR.ES.	Earth Science
CONTENT STANDARD		Weather and Climate
PERFORMANCE EXPECTATION	ES-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.

STRAND / TOPIC	AR.EVS.	Environmental Science
CONTENT STANDARD		Systems
PERFORMANCE EXPECTATION	EVS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

PERFORMANCE EXPECTATION	EVS-ESS3-5.	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
PERFORMANCE EXPECTATION	EVS1-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
STRAND / TOPIC	**AR.EVS.**	**Environmental Science**
CONTENT STANDARD		**Energy**
PERFORMANCE EXPECTATION	EVS-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.
STRAND / TOPIC	**AR.EVS.**	**Environmental Science**
CONTENT STANDARD		**Populations**
PERFORMANCE EXPECTATION	EVS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
PERFORMANCE EXPECTATION	EVS3-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.EVS.**	**Environmental Science**
CONTENT STANDARD		**Sustainability**
PERFORMANCE EXPECTATION	EVS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrences of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	EVS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	EVS-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANCE EXPECTATION	EVS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANCE EXPECTATION	EVS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

PERFORMANCE EXPECTATION	EVS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity
PERFORMANCE EXPECTATION	EVS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
PERFORMANCE EXPECTATION	EVS4-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Matter in Organisms**
PERFORMANCE EXPECTATION	PSI-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Forces and Motion**
PERFORMANCE EXPECTATION	PSI3-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Waves**
PERFORMANCE EXPECTATION	PSI-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Interactions of Humans and the Environment**
PERFORMANCE EXPECTATION	PSI-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANCE EXPECTATION	PSI-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	PSI-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

PERFORMANCE EXPECTATION	PSI6-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
PERFORMANCE EXPECTATION	PSI6-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
PERFORMANCE EXPECTATION	PSI6-ETS1-4.	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
STRAND / TOPIC	**AR.P.**	**Physics**
CONTENT STANDARD		**Work and Energy**
PERFORMANCE EXPECTATION	P2-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.P.**	**Physics**
CONTENT STANDARD		**Heat and Thermodynamics**
PERFORMANCE EXPECTATION	P3-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Grade **9** - Adopted: **2010**

STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Key Ideas and Details**
PERFORMANCE EXPECTATION	RST.9-10.2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
PERFORMANCE EXPECTATION	RST.9-10.3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions defined in the text.
STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Craft and Structure**
PERFORMANCE EXPECTATION	RST.9-10.4.	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 9-10 texts and topics.

PERFORMANCE EXPECTATION	RST.9-10.5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Integration of Knowledge and Ideas**

PERFORMANCE EXPECTATION	RST.9-10.9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Range of Reading and Level of Text Complexity**

PERFORMANCE EXPECTATION	RST.9-10.10.	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

STRAND / TOPIC	**AR.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Text Types and Purposes**
PERFORMANCE EXPECTATION	**WHST.9-10.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**

BENCHMARK / PROFICIENCY	WHST.9-10.2(d)	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

STRAND / TOPIC	**AR.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Production and Distribution of Writing**

PERFORMANCE EXPECTATION	WHST.9-10.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

PERFORMANCE EXPECTATION	WHST.9-10.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Arkansas Standards

Science

Grade **10** - Adopted: **2016**

STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Cycling of Matter and Energy**

PERFORMANCE EXPECTATION	BI-LS2-3.	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.
PERFORMANCE EXPECTATION	BI-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
PERFORMANCE EXPECTATION	BI-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
PERFORMANCE EXPECTATION	BI-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Biodiversity and Population Dynamics**
PERFORMANCE EXPECTATION	BI-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
PERFORMANCE EXPECTATION	BI-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANCE EXPECTATION	BI-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on Biodiversity.
PERFORMANCE EXPECTATION	BI3-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
PERFORMANCE EXPECTATION	BI3-ETS1-4.	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Life and Earth's Systems**
PERFORMANCE EXPECTATION	BI-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.
PERFORMANCE EXPECTATION	BI-ESS3-5.	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

PERFORMANCE EXPECTATION	BI6-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.
PERFORMANCE EXPECTATION	BI6-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Human Impacts on Earth's Systems**
PERFORMANCE EXPECTATION	BI-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	BI-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	BI-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANCE EXPECTATION	BI-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
PERFORMANCE EXPECTATION	BI7-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
PERFORMANCE EXPECTATION	BI7-ETS1-4.	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
STRAND / TOPIC	**AR.CI.**	**Chemistry – Integrated**
CONTENT STANDARD		**Nuclear Reactions**
PERFORMANCE EXPECTATION	CI2-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.ES.**	**Earth Science**
CONTENT STANDARD		**Earth's Systems**
PERFORMANCE EXPECTATION	ES-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

PERFORMANCE EXPECTATION	ES2-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.ES.**	**Earth Science**
CONTENT STANDARD		**Human Sustainability**
PERFORMANCE EXPECTATION	ES-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	ES-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	ES-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANCE EXPECTATION	ES-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANCE EXPECTATION	ES-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
STRAND / TOPIC	**AR.ES.**	**Earth Science**
CONTENT STANDARD		**Weather and Climate**
PERFORMANCE EXPECTATION	ES-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.
STRAND / TOPIC	**AR.EVS.**	**Environmental Science**
CONTENT STANDARD		**Systems**
PERFORMANCE EXPECTATION	EVS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
PERFORMANCE EXPECTATION	EVS-ESS3-5.	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.
PERFORMANCE EXPECTATION	EVS1-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

STRAND / TOPIC	AR.EVS.	Environmental Science
CONTENT STANDARD		**Energy**
PERFORMANCE EXPECTATION	EVS-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.

STRAND / TOPIC	AR.EVS.	Environmental Science
CONTENT STANDARD		**Populations**
PERFORMANCE EXPECTATION	EVS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
PERFORMANCE EXPECTATION	EVS3-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

STRAND / TOPIC	AR.EVS.	Environmental Science
CONTENT STANDARD		**Sustainability**
PERFORMANCE EXPECTATION	EVS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrences of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	EVS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	EVS-ESS3-3.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANCE EXPECTATION	EVS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANCE EXPECTATION	EVS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
PERFORMANCE EXPECTATION	EVS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity
PERFORMANCE EXPECTATION	EVS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

PERFORMANCE EXPECTATION	EVS4-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Matter in Organisms**
PERFORMANCE EXPECTATION	PSI-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Forces and Motion**
PERFORMANCE EXPECTATION	PSI3-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Waves**
PERFORMANCE EXPECTATION	PSI-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Interactions of Humans and the Environment**
PERFORMANCE EXPECTATION	PSI-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANCE EXPECTATION	PSI-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
PERFORMANCE EXPECTATION	PSI-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANCE EXPECTATION	PSI6-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
PERFORMANCE EXPECTATION	PSI6-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

PERFORMANCE EXPECTATION	PSI6-ETS1-4.	Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

STRAND / TOPIC	**AR.P.**	**Physics**
CONTENT STANDARD		**Work and Energy**
PERFORMANCE EXPECTATION	P2-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

STRAND / TOPIC	**AR.P.**	**Physics**
CONTENT STANDARD		**Heat and Thermodynamics**
PERFORMANCE EXPECTATION	P3-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Grade **10** - Adopted: **2010**

STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Key Ideas and Details**
PERFORMANCE EXPECTATION	RST.9-10.2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
PERFORMANCE EXPECTATION	RST.9-10.3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions defined in the text.

STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Craft and Structure**
PERFORMANCE EXPECTATION	RST.9-10.4.	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 9-10 texts and topics.
PERFORMANCE EXPECTATION	RST.9-10.5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Integration of Knowledge and Ideas**

PERFORMANCE EXPECTATION	RST.9-10.9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

STRAND / TOPIC	**AR.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Range of Reading and Level of Text Complexity**
PERFORMANCE EXPECTATION	RST.9-10.10.	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

STRAND / TOPIC	**AR.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Text Types and Purposes**
PERFORMANCE EXPECTATION	**WHST.9-10.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
BENCHMARK / PROFICIENCY	WHST.9-10.2(d)	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

STRAND / TOPIC	**AR.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Production and Distribution of Writing**
PERFORMANCE EXPECTATION	WHST.9-10.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
PERFORMANCE EXPECTATION	WHST.9-10.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Arkansas Standards

Technology Education

Grade **9** - Adopted: **2020/Beginning 2021**

STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	AIML.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

BENCHMARK / PROFICIENCY	AIML.Y1. 1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	AIML.Y1. 5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	AIML.Y1. 5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms
BENCHMARK / PROFICIENCY	AIML.Y1. 5.4.	Use a systematic approach to detect and resolve errors in a given algorithm
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	AIML.Y1. 6.1.	Create programs using procedures to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y1. 6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	AIML.Y2. 1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML Y2:	Include solving problems by backtracking, pattern recognition, and searching through classic searches including, but not limited to, heuristic search strategies
BENCHMARK / PROFICIENCY	AIML.Y2. 1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	AIML Y2:	Include representations of backtracking of constraint satisfaction problems, decision trees with and without operator costs, and game-based adversarial searches

BENCHMARK / PROFICIENCY	AIML.Y2.1.5.	Decompose problems, including constraint satisfaction problems, of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y2.1.6.	Analyze and utilize decision theory techniques (e.g., adversarial searches, decision networks, game theory, influence diagrams, Markov decision processes, probability theory, satisficing, utility theory) to represent and solve problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	AIML.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	AIML.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
BENCHMARK / PROFICIENCY	AIML.Y2.5.5.	Identify and utilize the metrics for measuring artificial intelligence and machine learning algorithms
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	AIML Y2:	Programs must also utilize supervised learning algorithms, unsupervised learning algorithms, or reinforcement learning algorithms at an appropriate level
BENCHMARK / PROFICIENCY	AIML.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	AIML.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**

PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	AIML.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity, including but not limited to, utilizing advanced pattern recognition strategies; advanced search techniques (e.g., continuous space searches, nondeterministic actions, partial observations); backtracking; and searches within complex environments and online environments
BENCHMARK / PROFICIENCY	AIML.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity including, but not limited to, backtracking of constraint satisfaction problems and game-based adversarial searches
BENCHMARK / PROFICIENCY	AIML.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y3.1.5.	Decompose problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y3.1.6.	Utilize decision theory techniques (e.g., adversarial searches, decision networks, game theory, influence diagrams, information value theory, Markov decision processes, multi-attribute utility theory, noncooperative game theory, probability theory, satisficing, utility theory) to represent and solve problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	AIML.Y3.5.1.	Design and implement level-appropriate algorithms that use appropriate techniques (e.g., dynamic programming, linear programming, policy iteration, value iteration) to solve Markov decision process problems and other complex decisions
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	AIML.Y3.6.1.	Create level-appropriate programs that utilize supervised learning algorithms, unsupervised learning algorithms, and reinforcement learning algorithms to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y3.6.2.	Apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**

BENCHMARK / PROFICIENCY	CSCE.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCE.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCE.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCE.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y2.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**

BENCHMARK / PROFICIENCY	CSCE.Y2.2.9.	Solve problems of level-appropriate complexity using fundamental laws of electricity (e.g., Faraday, Kirchhoff, Ohms)
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCE.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSCE Y2:	Include evaluation of scheduling algorithms on system performance; algorithms used in application domains including control applications; discrete event simulation applications; encryption/decryption algorithms; and location-aware or mobile applications
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCE.Y2.6.1.	Create programs to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
BENCHMARK / PROFICIENCY	CSCE.Y2.6.8.	Describe the sampling theorem and related concepts of the aliasing and Nyquist frequency
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSCE.Y2.9.10.	Define important engineering constraints such as cost, performance, power, size, timing, and weight and their tradeoffs in the context of digital systems design
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**

PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSCE.Y2.10.9.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCE.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSCE.Y3.2.9.	Solve problems of level-appropriate complexity using fundamental laws of electricity (e.g., Faraday, Kirchhoff, Ohms)
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCE.Y3.5.1.	Design and implement level-appropriate algorithms including, but not limited to, brute force, divide and conquer, and greedy algorithms
BENCHMARK / PROFICIENCY	CSCE.Y3.5.2.	Illustrate the flow of execution of algorithms in level-appropriate programs including high-impedance state and logic gate implementation including a tristate buffer
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**

BENCHMARK / PROFICIENCY	CSCE.Y3.6.2.	Apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**

BENCHMARK / PROFICIENCY	CSCE.Y3.9.11.	Create programs that use one or more external sensors for monitoring physical properties

STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**

BENCHMARK / PROFICIENCY	CSCE.Y3.10.9.	Create and maintain a professional digital portfolio comprised of self-created work

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**

BENCHMARK / PROFICIENCY	CSCS.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**

BENCHMARK / PROFICIENCY	CSCS.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

BENCHMARK / PROFICIENCY	CSCS.Y1.5.2.	Illustrate the flow of execution of algorithms in level-appropriate programs including branching and looping

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCS.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCS.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCS Y2:	Extend problem-solving strategies to include an understanding of adversarial thinking
BENCHMARK / PROFICIENCY	CSCS.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y2.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSCS.Y2.2.3.	Research and implement level-appropriate common cryptography algorithms and concepts such as random number generation and hashing functions

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCS.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCS.Y2.6.1.	Create programs to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
BENCHMARK / PROFICIENCY	CSCS Y2:	Discuss the vulnerabilities of not applying best practices of program design, format, and distribution
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSCS.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCS.Y3.1.1.	Leverage adversarial thinking and risk concepts to solve complex cybersecurity problems
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCS.Y3.5.1.	Design and implement algorithms that solve level-appropriate, student-identified problems
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**

CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCS.Y3.6.1.	Create programs to solve problems of level-appropriate complexity that obtain data from external sources

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSCS.Y3.10.7.	Create and maintain a professional digital portfolio comprised of self-created work

STRAND / TOPIC		**Computer Science: Data Science – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSDS.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSDS.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSDS.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Data Science – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSDS.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

STRAND / TOPIC		**Computer Science: Data Science – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**

PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSDS.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Data Science – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSDS.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSDS.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Data Science – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSDS.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
STRAND / TOPIC		**Computer Science: Data Science – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSDS.Y2.10.10.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Data Science – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSDS.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Data Science – Year 3**

CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSDS.Y3.10.10.	Create and maintain a professional digital portfolio comprised of self-created work
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSGD.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSGD.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSGD.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSGD.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**

PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSGD.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y2.1.5.	Decompose problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSGD.Y2.2.7.	Research physics and mathematical principles to adapt to more immersive game mechanics
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSGD.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSGD.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
BENCHMARK / PROFICIENCY	CSGD.Y2.5.5.	Analyze game elements of analog games (e.g., board, card, dice) and how those elements can be represented as algorithms for digital games
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSGD.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**

CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSGD.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSGD.Y2.10.10.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSGD.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y3.1.5.	Decompose problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSGD.Y3.2.7.	Research and utilize physics and mathematical principles to adapt to more immersive game mechanics
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**

PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSGD.Y3.5.1.	Design and implement algorithms to solve student-identified problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSGD.Y3.9.2.	Contribute to team collaboration in the development of a computational artifact (e.g, creating and managing repositories)
STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSGD.Y3.10.10.	Create and maintain a professional digital portfolio comprised of self-created work
BENCHMARK / PROFICIENCY	CSGD.Y3.10.11.	Utilize and model effective professional project management tools
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSMD.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSMD.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSMD.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSMD.Y 1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSMD.Y 2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSMD.Y 2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSMD.Y 2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSMD.Y 2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSMD.Y 2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**

PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSMD.Y 2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSMD.Y 2.9.5.	Discuss mobile device limitations (e.g., memory, processing power, screen resolution) that affect mobile application development
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSMD.Y 2.10.9.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSMD.Y 3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 3: Students will analyze and utilize data through the use of computing devices.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.3.3.	Create and evaluate models and simulations to answer student-identified questions and scenarios
BENCHMARK / PROFICIENCY	CSMD.Y 3.3.4.	Create mobile applications that visually represent level-appropriate data based on user input through interfacing with the application

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 4: Students will analyze and utilize concepts of cybersecurity.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.4.5.	Apply digital methods in securely transmitting data by using libraries and/or student-created algorithms

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.5.1.	Design and implement level-appropriate algorithms that solve student-identified problems

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.10.9.	Create and maintain a professional digital portfolio comprised of self-created work

STRAND / TOPIC		**Computer Science: Networking – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSNT.Y1. 1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y1. 1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

STRAND / TOPIC		**Computer Science: Networking – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**

BENCHMARK / PROFICIENCY	CSNT.Y1. 5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSNT.Y1. 5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms
STRAND / TOPIC		**Computer Science: Networking – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSNT.Y1. 6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSNT.Y2. 1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y2. 1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSNT.Y2. 5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSNT.Y2. 5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSNT.Y2. 6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSNT.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems

STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 8: Students will analyze communication methods and systems used to transmit information among computing devices.**
BENCHMARK / PROFICIENCY	CSNT.Y2.8.3.	Design and implement a physical or virtual network of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSNT.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 4: Students will analyze and utilize concepts of cybersecurity.**
BENCHMARK / PROFICIENCY	CSNT.Y3.4.2.	Perform and present a network vulnerabilities assessment
BENCHMARK / PROFICIENCY	CSNT.Y3.4.3.	Orchestrate an attack against a controlled network/network environment and provide a findings assessment

STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**

CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSNT.Y3.5.1.	Design and implement algorithms for automation of level-appropriate tasks (e.g., adding hosts to a network/domain, setting switch/router configurations, utilizing DevOps)
STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSNT.Y3.6.1.	Create scripts to solve problems and troubleshoot network issues of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y3.6.4.	Create scripts that generate, capture, and analyze network traffic
STRAND / TOPIC		**Computer Science: Programming – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSPG.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Programming – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSPG.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSPG.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms
STRAND / TOPIC		**Computer Science: Programming – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**

PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSPG.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSPG.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y2.1.5.	Decompose problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSPG.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSPG.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSPG.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**

BENCHMARK / PROFICIENCY	CSPG.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems

STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**

BENCHMARK / PROFICIENCY	CSPG.Y2.10.9.	Create and maintain a digital collection of self-created work

STRAND / TOPIC		**Computer Science: Programming – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**

BENCHMARK / PROFICIENCY	CSPG.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y3.1.5.	Decompose problems of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Programming – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**

BENCHMARK / PROFICIENCY	CSPG.Y3.5.1.	Design and implement level-appropriate algorithms that solve student-identified problems

STRAND / TOPIC		**Computer Science: Programming – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**

BENCHMARK / PROFICIENCY	CSPG.Y3.10.9.	Create and maintain a professional digital portfolio comprised of self-created work

STRAND / TOPIC		**Computer Science: Robotics – Year 1**

CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSRB.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSRB.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Robotics – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSRB.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSRB.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms
STRAND / TOPIC		**Computer Science: Robotics – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSRB.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSRB.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSRB.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSRB Y2:	Develop schematics relevant to robotics system architecture
STRAND / TOPIC		**Computer Science: Robotics – Year 2**

CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSRB.Y2.2.2.	Classify and utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 3: Students will analyze and utilize data through the use of computing devices.**
BENCHMARK / PROFICIENCY	CSRB Y2:	Create programs to store, access, and manipulate level-appropriate robotics system data (e.g., position, sensor input)
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSRB.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSRB.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSRB.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
BENCHMARK / PROFICIENCY	CSRB.Y2.6.6.	Create programs that utilize various robotics system operations to solve problems
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**

PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSRB.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSRB Y2:	Use collaborative tools and processes to configure level-appropriate robotic hardware components
BENCHMARK / PROFICIENCY	CSRB.Y2.9.3.	Analyze the importance and effect of updating firmware and drivers within robotic systems
BENCHMARK / PROFICIENCY	CSRB.Y2.9.4.	Utilize robotic hardware components to create level-appropriate robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y2.9.5.	Discuss and apply autonomous and manual robotic control by coding in various robotic programming languages (e.g., C++, Karel, Python)
BENCHMARK / PROFICIENCY	CSRB.Y2.9.6.	Compare and contrast different types of industry-relevant robotic systems (e.g., 3-axis, 6-axis, AMR, cobot, delta, SCARA, T-700)
BENCHMARK / PROFICIENCY	CSRB.Y2.9.7.	Utilize breadboarding in the creation of a level-appropriate closed-loop robot
BENCHMARK / PROFICIENCY	CSRB.Y2.9.8.	Utilize hardware diagnostic tools to design, test, and troubleshoot robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y2.9.9.	Discuss hardware and software requirements and limitations of various robotics systems
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSRB.Y2.10.10.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**

PERFORMANCE EXPECTATION		**Content Cluster 11: Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.**
BENCHMARK / PROFICIENCY	CSRB.Y2.11.2.	Utilize level-appropriate robotic system data for storytelling
BENCHMARK / PROFICIENCY	CSRB.Y2.11.6.	Communicate conditions of a robotic system in terms of performance, diagnostics, troubleshooting, and repair
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSRB.Y3.1.1.	Utilize the engineering design process to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSRB.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of level-appropriate complexity, such as schematics and 3D modeling
BENCHMARK / PROFICIENCY	CSRB.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSRB.Y3.2.2.	Utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 3: Students will analyze and utilize data through the use of computing devices.**
BENCHMARK / PROFICIENCY	CSRB.Y3.3.1.	Create programs to store, access, and manipulate, with a high level of efficiency, level-appropriate robotics system data
BENCHMARK / PROFICIENCY	CSRB.Y3.3.2.	Analyze how quantitative and qualitative data are utilized in robotic systems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**

PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSRB.Y3.5.1.	Design and implement algorithms that solve student-identified problems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSRB.Y3.6.1.	Create programs that utilize robotic systems to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSRB.Y3.6.4.	Create programs of level-appropriate complexity that leverage real-time sensory input to make decisions for completing physical tasks
BENCHMARK / PROFICIENCY	CSRB.Y3.6.6.	Create programs that utilize various robotics system operations to solve real-world problems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSRB.Y3.9.2.	Use collaborative tools and processes to configure level-appropriate robotic hardware components
BENCHMARK / PROFICIENCY	CSRB.Y3.9.4.	Utilize robotic hardware components to create level-appropriate robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y3.9.7.	Utilize breadboarding and prototyping in the creation of a level-appropriate closed-loop robot
BENCHMARK / PROFICIENCY	CSRB.Y3.9.8.	Utilize hardware diagnostic tools to design, test, and troubleshoot robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y3.9.9.	Analyze hardware and software requirements and limitations of various robotics systems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**

PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSRB.Y3.10.10.	Create and maintain a professional digital portfolio comprised of self-created work
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 11: Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.**
BENCHMARK / PROFICIENCY	CSRB.Y3.11.2.	Utilize level-appropriate robotic system data for storytelling
BENCHMARK / PROFICIENCY	CSRB.Y3.11.6.	Communicate conditions of a robotic system in terms of performance, diagnostics, troubleshooting, and repair

Arkansas Standards

Technology Education

Grade **10** - Adopted: **2020/Beginning 2021**

STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	AIML.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	AIML.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	AIML.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms

BENCHMARK / PROFICIENCY	AIML.Y1.5.4.	Use a systematic approach to detect and resolve errors in a given algorithm
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	AIML.Y1.6.1.	Create programs using procedures to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	AIML.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML Y2:	Include solving problems by backtracking, pattern recognition, and searching through classic searches including, but not limited to, heuristic search strategies
BENCHMARK / PROFICIENCY	AIML.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	AIML Y2:	Include representations of backtracking of constraint satisfaction problems, decision trees with and without operator costs, and game-based adversarial searches
BENCHMARK / PROFICIENCY	AIML.Y2.1.5.	Decompose problems, including constraint satisfaction problems, of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y2.1.6.	Analyze and utilize decision theory techniques (e.g., adversarial searches, decision networks, game theory, influence diagrams, Markov decision processes, probability theory, satisficing, utility theory) to represent and solve problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	AIML.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence

BENCHMARK / PROFICIENCY	AIML.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
BENCHMARK / PROFICIENCY	AIML.Y2.5.5.	Identify and utilize the metrics for measuring artificial intelligence and machine learning algorithms
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	AIML Y2:	Programs must also utilize supervised learning algorithms, unsupervised learning algorithms, or reinforcement learning algorithms at an appropriate level
BENCHMARK / PROFICIENCY	AIML.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	AIML.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	AIML.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity, including but not limited to, utilizing advanced pattern recognition strategies; advanced search techniques (e.g., continuous space searches, nondeterministic actions, partial observations); backtracking; and searches within complex environments and online environments
BENCHMARK / PROFICIENCY	AIML.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity including, but not limited to, backtracking of constraint satisfaction problems and game-based adversarial searches
BENCHMARK / PROFICIENCY	AIML.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y3.1.5.	Decompose problems of level-appropriate complexity

BENCHMARK / PROFICIENCY	AIML.Y3.1.6.	Utilize decision theory techniques (e.g., adversarial searches, decision networks, game theory, influence diagrams, information value theory, Markov decision processes, multi-attribute utility theory, noncooperative game theory, probability theory, satisficing, utility theory) to represent and solve problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	AIML.Y3.5.1.	Design and implement level-appropriate algorithms that use appropriate techniques (e.g., dynamic programming, linear programming, policy iteration, value iteration) to solve Markov decision process problems and other complex decisions
STRAND / TOPIC		**Computer Science: Artificial Intelligence and Machine Learning – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	AIML.Y3.6.1.	Create level-appropriate programs that utilize supervised learning algorithms, unsupervised learning algorithms, and reinforcement learning algorithms to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	AIML.Y3.6.2.	Apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCE.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**

BENCHMARK / PROFICIENCY	CSCE.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

STRAND / TOPIC		**Computer Science: Computer Engineering – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**

BENCHMARK / PROFICIENCY	CSCE.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**

BENCHMARK / PROFICIENCY	CSCE.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y2.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**

BENCHMARK / PROFICIENCY	CSCE.Y2.2.9.	Solve problems of level-appropriate complexity using fundamental laws of electricity (e.g., Faraday, Kirchhoff, Ohms)

STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**

BENCHMARK / PROFICIENCY	CSCE.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence

BENCHMARK / PROFICIENCY	CSCE Y2:	Include evaluation of scheduling algorithms on system performance; algorithms used in application domains including control applications; discrete event simulation applications; encryption/decryption algorithms; and location-aware or mobile applications
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCE.Y2.6.1.	Create programs to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
BENCHMARK / PROFICIENCY	CSCE.Y2.6.8.	Describe the sampling theorem and related concepts of the aliasing and Nyquist frequency
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSCE.Y2.9.10.	Define important engineering constraints such as cost, performance, power, size, timing, and weight and their tradeoffs in the context of digital systems design
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSCE.Y2.10.9.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCE.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity

BENCHMARK / PROFICIENCY	CSCE.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCE.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSCE.Y3.2.9.	Solve problems of level-appropriate complexity using fundamental laws of electricity (e.g., Faraday, Kirchhoff, Ohms)
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCE.Y3.5.1.	Design and implement level-appropriate algorithms including, but not limited to, brute force, divide and conquer, and greedy algorithms
BENCHMARK / PROFICIENCY	CSCE.Y3.5.2.	Illustrate the flow of execution of algorithms in level-appropriate programs including high-impedance state and logic gate implementation including a tristate buffer
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCE.Y3.6.2.	Apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSCE.Y3.9.11.	Create programs that use one or more external sensors for monitoring physical properties
STRAND / TOPIC		**Computer Science: Computer Engineering – Year 3**

CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSCE.Y3.10.9.	Create and maintain a professional digital portfolio comprised of self-created work
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCS.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCS.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSCS.Y1.5.2.	Illustrate the flow of execution of algorithms in level-appropriate programs including branching and looping
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCS.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**

PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCS.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCS Y2:	Extend problem-solving strategies to include an understanding of adversarial thinking
BENCHMARK / PROFICIENCY	CSCS.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y2.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSCS.Y2.2.3.	Research and implement level-appropriate common cryptography algorithms and concepts such as random number generation and hashing functions
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCS.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCS.Y2.6.1.	Create programs to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSCS.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
BENCHMARK / PROFICIENCY	CSCS Y2:	Discuss the vulnerabilities of not applying best practices of program design, format, and distribution

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSCS.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSCS.Y3.1.1.	Leverage adversarial thinking and risk concepts to solve complex cybersecurity problems

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSCS.Y3.5.1.	Design and implement algorithms that solve level-appropriate, student-identified problems

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSCS.Y3.6.1.	Create programs to solve problems of level-appropriate complexity that obtain data from external sources

STRAND / TOPIC		**Computer Science: Cybersecurity – Year 3**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSCS.Y3.10.7.	Create and maintain a professional digital portfolio comprised of self-created work

STRAND / TOPIC		**Computer Science: Data Science – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSDS.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSDS.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSDS.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Data Science – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSDS.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

STRAND / TOPIC		**Computer Science: Data Science – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSDS.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Data Science – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSDS.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSDS.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

STRAND / TOPIC		**Computer Science: Data Science – Year 2**

CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSDS.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence

STRAND / TOPIC		**Computer Science: Data Science – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSDS.Y2.10.10.	Create and maintain a digital collection of self-created work

STRAND / TOPIC		**Computer Science: Data Science – Year 3**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSDS.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Data Science – Year 3**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSDS.Y3.10.10.	Create and maintain a professional digital portfolio comprised of self-created work

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSGD.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

BENCHMARK / PROFICIENCY	CSGD.Y1.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**

BENCHMARK / PROFICIENCY	CSGD.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSGD.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**

BENCHMARK / PROFICIENCY	CSGD.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**

BENCHMARK / PROFICIENCY	CSGD.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y2.1.5.	Decompose problems of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**

BENCHMARK / PROFICIENCY	CSGD.Y2.2.7.	Research physics and mathematical principles to adapt to more immersive game mechanics

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSGD.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSGD.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
BENCHMARK / PROFICIENCY	CSGD.Y2.5.5.	Analyze game elements of analog games (e.g., board, card, dice) and how those elements can be represented as algorithms for digital games

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSGD.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSGD.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSGD.Y2.10.10.	Create and maintain a digital collection of self-created work

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**

CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSGD.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSGD.Y3.1.5.	Decompose problems of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSGD.Y3.2.7.	Research and utilize physics and mathematical principles to adapt to more immersive game mechanics

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSGD.Y3.5.1.	Design and implement algorithms to solve student-identified problems of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSGD.Y3.9.2.	Contribute to team collaboration in the development of a computational artifact (e.g, creating and managing repositories)

STRAND / TOPIC		**Computer Science: Game Development and Design – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**

PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSGD.Y3.10.10.	Create and maintain a professional digital portfolio comprised of self-created work
BENCHMARK / PROFICIENCY	CSGD.Y3.10.11.	Utilize and model effective professional project management tools
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSMD.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSMD.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSMD.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSMD.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSMD.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity

BENCHMARK / PROFICIENCY	CSMD.Y 2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**

BENCHMARK / PROFICIENCY	CSMD.Y 2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence

BENCHMARK / PROFICIENCY	CSMD.Y 2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**

BENCHMARK / PROFICIENCY	CSMD.Y 2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**

BENCHMARK / PROFICIENCY	CSMD.Y 2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**

BENCHMARK / PROFICIENCY	CSMD.Y 2.9.5.	Discuss mobile device limitations (e.g., memory, processing power, screen resolution) that affect mobile application development

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**

PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSMD.Y 2.10.9.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSMD.Y 3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 3: Students will analyze and utilize data through the use of computing devices.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.3.3.	Create and evaluate models and simulations to answer student-identified questions and scenarios
BENCHMARK / PROFICIENCY	CSMD.Y 3.3.4.	Create mobile applications that visually represent level-appropriate data based on user input through interfacing with the application
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 4: Students will analyze and utilize concepts of cybersecurity.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.4.5.	Apply digital methods in securely transmitting data by using libraries and/or student-created algorithms
STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSMD.Y 3.5.1.	Design and implement level-appropriate algorithms that solve student-identified problems

STRAND / TOPIC		**Computer Science: Mobile Application Development – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSMD.Y3.10.9.	Create and maintain a professional digital portfolio comprised of self-created work

STRAND / TOPIC		**Computer Science: Networking – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSNT.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

STRAND / TOPIC		**Computer Science: Networking – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSNT.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSNT.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms

STRAND / TOPIC		**Computer Science: Networking – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSNT.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**

PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSNT.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSNT.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSNT.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSNT.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSNT.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Networking – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 8: Students will analyze communication methods and systems used to transmit information among computing devices.**
BENCHMARK / PROFICIENCY	CSNT.Y2.8.3.	Design and implement a physical or virtual network of level-appropriate complexity

STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSNT.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity

STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 4: Students will analyze and utilize concepts of cybersecurity.**
BENCHMARK / PROFICIENCY	CSNT.Y3.4.2.	Perform and present a network vulnerabilities assessment
BENCHMARK / PROFICIENCY	CSNT.Y3.4.3.	Orchestrate an attack against a controlled network/network environment and provide a findings assessment

STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSNT.Y3.5.1.	Design and implement algorithms for automation of level-appropriate tasks (e.g., adding hosts to a network/domain, setting switch/router configurations, utilizing DevOps)

STRAND / TOPIC		**Computer Science: Networking – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSNT.Y3.6.1.	Create scripts to solve problems and troubleshoot network issues of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSNT.Y3.6.4.	Create scripts that generate, capture, and analyze network traffic

STRAND / TOPIC		**Computer Science: Programming – Year 1**

CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSPG.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Programming – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSPG.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence
BENCHMARK / PROFICIENCY	CSPG.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms
STRAND / TOPIC		**Computer Science: Programming – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSPG.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSPG.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y2.1.5.	Decompose problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Programming – Year 2**

CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSPG.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSPG.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSPG.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSPG.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems
STRAND / TOPIC		**Computer Science: Programming – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSPG.Y2.10.9.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Programming – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**

BENCHMARK / PROFICIENCY	CSPG.Y3.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSPG.Y3.1.5.	Decompose problems of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Programming – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSPG.Y3.5.1.	Design and implement level-appropriate algorithms that solve student-identified problems
STRAND / TOPIC		**Computer Science: Programming – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSPG.Y3.10.9.	Create and maintain a professional digital portfolio comprised of self-created work
STRAND / TOPIC		**Computer Science: Robotics – Year 1**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSRB.Y1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSRB.Y1.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC		**Computer Science: Robotics – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSRB.Y1.5.1.	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

BENCHMARK / PROFICIENCY	CSRB.Y1.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms

STRAND / TOPIC		**Computer Science: Robotics – Year 1**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSRB.Y1.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)

STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**
BENCHMARK / PROFICIENCY	CSRB.Y2.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSRB.Y2.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
BENCHMARK / PROFICIENCY	CSRB Y2:	Develop schematics relevant to robotics system architecture

STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSRB.Y2.2.2.	Classify and utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data

STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 3: Students will analyze and utilize data through the use of computing devices.**
BENCHMARK / PROFICIENCY	CSRB Y2:	Create programs to store, access, and manipulate level-appropriate robotics system data (e.g., position, sensor input)

STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSRB.Y2.5.1.	Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequence
BENCHMARK / PROFICIENCY	CSRB.Y2.5.3.	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic search and sort algorithms

STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSRB.Y2.6.2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation, indentation, user experience design, whitespace)
BENCHMARK / PROFICIENCY	CSRB.Y2.6.6.	Create programs that utilize various robotics system operations to solve problems

STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 7: Students will analyze the utilization of computers within industry.**
BENCHMARK / PROFICIENCY	CSRB.Y2.7.1.	Utilize hardware and/or software to solve level-appropriate industry-based problems

STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSRB Y2:	Use collaborative tools and processes to configure level-appropriate robotic hardware components
BENCHMARK / PROFICIENCY	CSRB.Y2.9.3.	Analyze the importance and effect of updating firmware and drivers within robotic systems

BENCHMARK / PROFICIENCY	CSRB.Y2.9.4.	Utilize robotic hardware components to create level-appropriate robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y2.9.5.	Discuss and apply autonomous and manual robotic control by coding in various robotic programming languages (e.g., C++, Karel, Python)
BENCHMARK / PROFICIENCY	CSRB.Y2.9.6.	Compare and contrast different types of industry-relevant robotic systems (e.g., 3-axis, 6-axis, AMR, cobot, delta, SCARA, T-700)
BENCHMARK / PROFICIENCY	CSRB.Y2.9.7.	Utilize breadboarding in the creation of a level-appropriate closed-loop robot
BENCHMARK / PROFICIENCY	CSRB.Y2.9.8.	Utilize hardware diagnostic tools to design, test, and troubleshoot robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y2.9.9.	Discuss hardware and software requirements and limitations of various robotics systems
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSRB.Y2.10.10.	Create and maintain a digital collection of self-created work
STRAND / TOPIC		**Computer Science: Robotics – Year 2**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 11: Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.**
BENCHMARK / PROFICIENCY	CSRB.Y2.11.2.	Utilize level-appropriate robotic system data for storytelling
BENCHMARK / PROFICIENCY	CSRB.Y2.11.6.	Communicate conditions of a robotic system in terms of performance, diagnostics, troubleshooting, and repair
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 1: Students will analyze and utilize problem-solving strategies.**

BENCHMARK / PROFICIENCY	CSRB.Y3.1.1.	Utilize the engineering design process to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSRB.Y3.1.2.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of level-appropriate complexity, such as schematics and 3D modeling
BENCHMARK / PROFICIENCY	CSRB.Y3.1.3.	Analyze and utilize collaborative methods in problem solving of level-appropriate complexity
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computational Thinking and Problem Solving**
PERFORMANCE EXPECTATION		**Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.**
BENCHMARK / PROFICIENCY	CSRB.Y3.2.2.	Utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Data, Information, and Security**
PERFORMANCE EXPECTATION		**Content Cluster 3: Students will analyze and utilize data through the use of computing devices.**
BENCHMARK / PROFICIENCY	CSRB.Y3.3.1.	Create programs to store, access, and manipulate, with a high level of efficiency, level-appropriate robotics system data
BENCHMARK / PROFICIENCY	CSRB.Y3.3.2.	Analyze how quantitative and qualitative data are utilized in robotic systems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 5: Students will create, evaluate, and modify algorithms.**
BENCHMARK / PROFICIENCY	CSRB.Y3.5.1.	Design and implement algorithms that solve student-identified problems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Algorithms and Programs**
PERFORMANCE EXPECTATION		**Content Cluster 6: Students will create programs to solve problems.**
BENCHMARK / PROFICIENCY	CSRB.Y3.6.1.	Create programs that utilize robotic systems to solve problems of level-appropriate complexity

BENCHMARK / PROFICIENCY	CSRB.Y3.6.4.	Create programs of level-appropriate complexity that leverage real-time sensory input to make decisions for completing physical tasks
BENCHMARK / PROFICIENCY	CSRB.Y3.6.6.	Create programs that utilize various robotics system operations to solve real-world problems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Computers and Communications**
PERFORMANCE EXPECTATION		**Content Cluster 9: Students will utilize appropriate hardware and software.**
BENCHMARK / PROFICIENCY	CSRB.Y3.9.2.	Use collaborative tools and processes to configure level-appropriate robotic hardware components
BENCHMARK / PROFICIENCY	CSRB.Y3.9.4.	Utilize robotic hardware components to create level-appropriate robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y3.9.7.	Utilize breadboarding and prototyping in the creation of a level-appropriate closed-loop robot
BENCHMARK / PROFICIENCY	CSRB.Y3.9.8.	Utilize hardware diagnostic tools to design, test, and troubleshoot robotic systems and subsystems
BENCHMARK / PROFICIENCY	CSRB.Y3.9.9.	Analyze hardware and software requirements and limitations of various robotics systems
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.**
BENCHMARK / PROFICIENCY	CSRB.Y3.10.10.	Create and maintain a professional digital portfolio comprised of self-created work
STRAND / TOPIC		**Computer Science: Robotics – Year 3—Advanced**
CONTENT STANDARD		**Strand: Professionalism and Impacts of Computing**
PERFORMANCE EXPECTATION		**Content Cluster 11: Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.**
BENCHMARK / PROFICIENCY	CSRB.Y3.11.2.	Utilize level-appropriate robotic system data for storytelling

BENCHMARK / PROFICIENCY	CSRB.Y3.11.6.	Communicate conditions of a robotic system in terms of performance, diagnostics, troubleshooting, and repair

California Content Standards

Mathematics

Grade **9** - Adopted: **2013**

CONTENT STANDARD / DOMAIN / PART	CA.CC.MP.	Standards for Mathematical Practice
PERFORMANCE STANDARD / MODE	MP.1.	Make sense of problems and persevere in solving them.
PERFORMANCE STANDARD / MODE	MP.2.	Reason abstractly and quantitatively.
PERFORMANCE STANDARD / MODE	MP.3.	Construct viable arguments and critique the reasoning of others.
PERFORMANCE STANDARD / MODE	MP.4.	Model with mathematics.
PERFORMANCE STANDARD / MODE	MP.6.	Attend to precision.
PERFORMANCE STANDARD / MODE	MP.7.	Look for and make use of structure.
PERFORMANCE STANDARD / MODE	MP.8.	Look for and express regularity in repeated reasoning.
CONTENT STANDARD / DOMAIN / PART	**CA.AI.**	**Algebra I**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Linear, exponential, and quadratic]**
FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
CONTENT STANDARD / DOMAIN / PART	**CA.AII.**	**Algebra II**

PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Emphasize selection of appropriate models.]**
FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.MI.**	**Mathematics I**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Linear and exponential (linear domain)]**
FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.MII.**	**Mathematics II**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Quadratic]**
FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.MIII.**	**Mathematics III**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Include rational, square root and cube root; emphasize selection of appropriate models.]**
FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.PS.**	**Advanced Placement Probability and Statistics Standards**
PERFORMANCE STANDARD / MODE	PS.5.0.	Students know the definition of the mean of a discrete random variable and can determine the mean for a particular discrete random variable.

CONTENT STANDARD / DOMAIN / PART	CA.CC.MP.	Standards for Mathematical Practice
PERFORMANCE STANDARD / MODE	MP.1.	Make sense of problems and persevere in solving them.
PERFORMANCE STANDARD / MODE	MP.2.	Reason abstractly and quantitatively.
PERFORMANCE STANDARD / MODE	MP.3.	Construct viable arguments and critique the reasoning of others.
PERFORMANCE STANDARD / MODE	MP.4.	Model with mathematics.
PERFORMANCE STANDARD / MODE	MP.6.	Attend to precision.
PERFORMANCE STANDARD / MODE	MP.7.	Look for and make use of structure.
PERFORMANCE STANDARD / MODE	MP.8.	Look for and express regularity in repeated reasoning.

CONTENT STANDARD / DOMAIN / PART	**CA.AI.**	**Algebra I**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Linear, exponential, and quadratic]**
FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.AII.**	**Algebra II**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Emphasize selection of appropriate models.]**

FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.MI.**	**Mathematics I**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Linear and exponential (linear domain)]**

FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.MII.**	**Mathematics II**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Quadratic]**

FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.MIII.**	**Mathematics III**
PERFORMANCE STANDARD / MODE	**F-IF.**	**Functions: Interpreting Functions**
EXPECTATION / SUBSTRAND		**Interpret functions that arise in applications in terms of the context. [Include rational, square root and cube root; emphasize selection of appropriate models.]**

FOUNDATION / PROFICIENCY LEVEL	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CONTENT STANDARD / DOMAIN / PART	**CA.PS.**	**Advanced Placement Probability and Statistics Standards**
PERFORMANCE STANDARD / MODE	PS.5.0.	Students know the definition of the mean of a discrete random variable and can determine the mean for a particular discrete random variable.

California Content Standards

Science

Grade **9** - Adopted: **2013**

CONTENT STANDARD / DOMAIN / PART	**CA.HS-PS.**	**PHYSICAL SCIENCE**

PERFORMANCE STANDARD / MODE	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

CONTENT STANDARD / DOMAIN / PART	**CA.HS-LS.**	**LIFE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

CONTENT STANDARD / DOMAIN / PART	**CA.HS-LS.**	**LIFE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-LS4.**	**Biological Evolution: Unity and Diversity**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

CONTENT STANDARD / DOMAIN / PART	**CA.HS-ESS.**	**EARTH AND SPACE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-ESS2.**	**Earth's Systems**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**

FOUNDATION / PROFICIENCY LEVEL	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.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
CONTENT STANDARD / DOMAIN / PART	**CA.HS-ESS.**	**EARTH AND SPACE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-ESS3.**	**Earth and Human Activity**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
CONTENT STANDARD / DOMAIN / PART	**CA.HS-ETS.**	**ENGINEERING DESIGN**
PERFORMANCE STANDARD / MODE	**HS-ETS1.**	**Engineering Design**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
FOUNDATION / PROFICIENCY LEVEL	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.
FOUNDATION / PROFICIENCY LEVEL	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**

PERFORMANCE STANDARD / MODE		**Key Ideas and Details**
EXPECTATION / SUBSTRAND	RST.9-10.2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
EXPECTATION / SUBSTRAND	RST.9-10.3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Craft and Structure**
EXPECTATION / SUBSTRAND	RST.9-10.4.	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 9–10 texts and topics.
EXPECTATION / SUBSTRAND	RST.9-10.5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Integration of Knowledge and Ideas**
EXPECTATION / SUBSTRAND	RST.9-10.9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Range of Reading and Level of Text Complexity**
EXPECTATION / SUBSTRAND	RST.9-10.10.	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.
CONTENT STANDARD / DOMAIN / PART	**CA.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Text Types and Purposes**
EXPECTATION / SUBSTRAND	**WHST.9-10.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
FOUNDATION / PROFICIENCY LEVEL	WHST.9-10.2.d.	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
CONTENT STANDARD / DOMAIN / PART	**CA.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**

PERFORMANCE STANDARD / MODE		**Production and Distribution of Writing**
EXPECTATION / SUBSTRAND	WHST.9-10.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
EXPECTATION / SUBSTRAND	WHST.9-10.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

California Content Standards

Science

Grade **10** - Adopted: **2013**

CONTENT STANDARD / DOMAIN / PART	**CA.HS-PS.**	**PHYSICAL SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

CONTENT STANDARD / DOMAIN / PART	**CA.HS-LS.**	**LIFE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
FOUNDATION / PROFICIENCY LEVEL	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

CONTENT STANDARD / DOMAIN / PART	**CA.HS-LS.**	**LIFE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-LS4.**	**Biological Evolution: Unity and Diversity**

EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
CONTENT STANDARD / DOMAIN / PART	**CA.HS-ESS.**	**EARTH AND SPACE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-ESS2.**	**Earth's Systems**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	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.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
CONTENT STANDARD / DOMAIN / PART	**CA.HS-ESS.**	**EARTH AND SPACE SCIENCE**
PERFORMANCE STANDARD / MODE	**HS-ESS3.**	**Earth and Human Activity**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
FOUNDATION / PROFICIENCY LEVEL	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
CONTENT STANDARD / DOMAIN / PART	**CA.HS-ETS.**	**ENGINEERING DESIGN**
PERFORMANCE STANDARD / MODE	**HS-ETS1.**	**Engineering Design**
EXPECTATION / SUBSTRAND		**Students who demonstrate understanding can:**

FOUNDATION / PROFICIENCY LEVEL	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
FOUNDATION / PROFICIENCY LEVEL	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.
FOUNDATION / PROFICIENCY LEVEL	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Key Ideas and Details**
EXPECTATION / SUBSTRAND	RST.9-10.2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
EXPECTATION / SUBSTRAND	RST.9-10.3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Craft and Structure**
EXPECTATION / SUBSTRAND	RST.9-10.4.	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 9–10 texts and topics.
EXPECTATION / SUBSTRAND	RST.9-10.5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Integration of Knowledge and Ideas**
EXPECTATION / SUBSTRAND	RST.9-10.9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
CONTENT STANDARD / DOMAIN / PART	**CA.RST.9-10.**	**Reading Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Range of Reading and Level of Text Complexity**
EXPECTATION / SUBSTRAND	RST.9-10.10.	By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

CONTENT STANDARD / DOMAIN / PART	**CA.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Text Types and Purposes**
EXPECTATION / SUBSTRAND	**WHST.9-10.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
FOUNDATION / PROFICIENCY LEVEL	WHST.9-10.2.d.	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

CONTENT STANDARD / DOMAIN / PART	**CA.WHST.9-10.**	**Writing Standards for Literacy in Science and Technical Subjects**
PERFORMANCE STANDARD / MODE		**Production and Distribution of Writing**
EXPECTATION / SUBSTRAND	WHST.9-10.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
EXPECTATION / SUBSTRAND	WHST.9-10.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

California Content Standards

Technology Education

Grade **9** - Adopted: **2018**

CONTENT STANDARD / DOMAIN / PART		**Computer Science Core Practices**
PERFORMANCE STANDARD / MODE	**P3.**	**Core Practice 3 – Recognizing and Defining Computational Problems**
EXPECTATION / SUBSTRAND	P3.1.	Identify complex, interdisciplinary, real-world problems that can be solved computationally.

CONTENT STANDARD / DOMAIN / PART		**Computer Science Core Practices**
PERFORMANCE STANDARD / MODE	**P7.**	**Core Practice 7 – Communicating About Computing**
EXPECTATION / SUBSTRAND	P7.1.	Select, organize, and interpret large data sets from multiple sources to support a claim.

CONTENT STANDARD / DOMAIN / PART		**Computer Science Standards – Core**
PERFORMANCE STANDARD / MODE		**Algorithms & Programming**
EXPECTATION / SUBSTRAND		**Algorithms**

FOUNDATION / PROFICIENCY LEVEL	9-12.AP.12.	Design algorithms to solve computational problems using a combination of original and existing algorithms. (P4.2, P5.1)

CONTENT STANDARD / DOMAIN / PART		**Computer Science Standards – Specialty**
PERFORMANCE STANDARD / MODE		**Algorithms & Programming**
EXPECTATION / SUBSTRAND		**Modularity**
FOUNDATION / PROFICIENCY LEVEL	9-12S.AP.17.	Construct solutions to problems using student-created components, such as procedures, modules, and/or objects. (P4.3, P5.2)

California Content Standards

Technology Education

Grade **10** - Adopted: **2018**

CONTENT STANDARD / DOMAIN / PART		**Computer Science Core Practices**
PERFORMANCE STANDARD / MODE	**P3.**	**Core Practice 3 – Recognizing and Defining Computational Problems**
EXPECTATION / SUBSTRAND	P3.1.	Identify complex, interdisciplinary, real-world problems that can be solved computationally.

CONTENT STANDARD / DOMAIN / PART		**Computer Science Core Practices**
PERFORMANCE STANDARD / MODE	**P7.**	**Core Practice 7 – Communicating About Computing**
EXPECTATION / SUBSTRAND	P7.1.	Select, organize, and interpret large data sets from multiple sources to support a claim.

CONTENT STANDARD / DOMAIN / PART		**Computer Science Standards – Core**
PERFORMANCE STANDARD / MODE		**Algorithms & Programming**
EXPECTATION / SUBSTRAND		**Algorithms**
FOUNDATION / PROFICIENCY LEVEL	9-12.AP.12.	Design algorithms to solve computational problems using a combination of original and existing algorithms. (P4.2, P5.1)

CONTENT STANDARD / DOMAIN / PART		**Computer Science Standards – Specialty**

PERFORMANCE STANDARD / MODE		Algorithms & Programming
EXPECTATION / SUBSTRAND		Modularity
FOUNDATION / PROFICIENCY LEVEL	9-12S.AP.17.	Construct solutions to problems using student-created components, such as procedures, modules, and/or objects. (P4.3, P5.2)

Colorado Academic Standards (CAS)

Mathematics

Grade **9** - Adopted: **2018**

CONTENT AREA		Prepared Graduates in Mathematics
STANDARD	MP1.	Make sense of problems and persevere in solving them.
STANDARD	MP2.	Reason abstractly and quantitatively.
STANDARD	MP3.	Construct viable arguments and critique the reasoning of others.
STANDARD	MP4.	Model with mathematics.
STANDARD	MP6.	Attend to precision.
STANDARD	MP7.	Look for and make use of structure.
STANDARD	MP8.	Look for and express regularity in repeated reasoning.

Colorado Academic Standards (CAS)

Mathematics

Grade **10** - Adopted: **2018**

CONTENT AREA		Prepared Graduates in Mathematics
STANDARD	MP1.	Make sense of problems and persevere in solving them.
STANDARD	MP2.	Reason abstractly and quantitatively.
STANDARD	MP3.	Construct viable arguments and critique the reasoning of others.
STANDARD	MP4.	Model with mathematics.
STANDARD	MP6.	Attend to precision.
STANDARD	MP7.	Look for and make use of structure.
STANDARD	MP8.	Look for and express regularity in repeated reasoning.

Colorado Academic Standards (CAS)

Science

Grade **9** - Adopted: **2018**

CONTENT AREA		Prepared Graduates in Science
STANDARD	1	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding structure, properties and interactions of matter.
STANDARD	2	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding interactions between objects and within systems of objects.
STANDARD	3	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how energy is transferred and conserved.
STANDARD	4	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how waves are used to transfer energy and information.
STANDARD	5	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how individual organisms are configured and how these structures function to support life, growth, behavior and reproduction.
STANDARD	6	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how living systems interact with the biotic and abiotic environment.
STANDARD	7	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how genetic and environmental factors influence variation of organisms across generations.
STANDARD	8	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how natural selection drives biological evolution accounting for the unity and diversity of organisms.
STANDARD	9	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding the universe and Earth's place in it.
STANDARD	10	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how and why Earth is constantly changing.
STANDARD	11	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how human activities and the Earth's surface processes interact.

CONTENT AREA	**SC.HS.1.**	**Physical Science**
STANDARD	**SC.HS.1.10.**	**Waves have characteristic properties and behaviors.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**

INDICATOR	SC.HS.1.10.b.	Evaluate questions about the advantages of using a digital transmission and storage of information. (HS-PS4-2)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.4.**	**Organisms interact with the living and nonliving components of the environment to obtain matter and energy.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.4.b.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. (HS-LS2-2)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.5.**	**Matter and energy necessary for life are conserved as they move through ecosystems.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.5.b.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. (HS-LS2-4)
INDICATOR	SC.HS.2.5.c.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. (HS-LS2-5)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.6.**	**A complex set of interactions determine how ecosystems respond to disturbances.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.6.b.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. (HS-LS2-7)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.13.**	**Humans have complex interactions with ecosystems and have the ability to influence biodiversity on the planet.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**

EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.13.a.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. (HS-LS4-6)
CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.4.**	**Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes, and these effects occur on different time scales, from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.4.d.	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-ESS2-4)
CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.7.**	**The role of radiation from the sun and its interactions with the atmosphere, ocean, and land are the foundation for the global climate system. Global climate models are used to predict future changes, including changes influenced by human behavior and natural factors.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.7.b.	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-ESS2-4)
INDICATOR	SC.HS.3.7.c.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. (HS-ESS2-6)
CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.9.**	**Resource availability has guided the development of human society and use of natural resources has associated costs, risks, and benefits.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.9.a.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (HS-ESS3-1)
INDICATOR	SC.HS.3.9.b.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. (HS-ESS3-2)

CONTENT AREA	SC.HS.3.	Earth and Space Science
STANDARD	SC.HS.3.10.	Natural hazards and other geological events have shaped the course of human history at local, regional, and global scales.
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		Evidence Outcomes
EVIDENCE OUTCOMES		Students Can:
INDICATOR	SC.HS.3.10.a.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (HS-ESS3-1)

CONTENT AREA	SC.HS.3.	Earth and Space Science
STANDARD	SC.HS.3.11.	Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies.
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		Evidence Outcomes
EVIDENCE OUTCOMES		Students Can:
INDICATOR	SC.HS.3.11.a.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity. (HS-ESS3-3)

CONTENT AREA	SC.HS.3.	Earth and Space Science
STANDARD	SC.HS.3.12.	Global climate models used to predict future climate change continue to improve our understanding of the impact of human activities on the global climate system.
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		Evidence Outcomes
EVIDENCE OUTCOMES		Students Can:
INDICATOR	SC.HS.3.12.b.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (HS-ESS3-6)

Colorado Academic Standards (CAS)

Science

Grade **10** - Adopted: **2018**

CONTENT AREA		Prepared Graduates in Science
STANDARD	1	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding structure, properties and interactions of matter.
STANDARD	2	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding interactions between objects and within systems of objects.
STANDARD	3	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how energy is transferred and conserved.

STANDARD	4	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how waves are used to transfer energy and information.
STANDARD	5	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how individual organisms are configured and how these structures function to support life, growth, behavior and reproduction.
STANDARD	6	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how living systems interact with the biotic and abiotic environment.
STANDARD	7	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how genetic and environmental factors influence variation of organisms across generations.
STANDARD	8	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how natural selection drives biological evolution accounting for the unity and diversity of organisms.
STANDARD	9	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding the universe and Earth's place in it.
STANDARD	10	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how and why Earth is constantly changing.
STANDARD	11	Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how human activities and the Earth's surface processes interact.

CONTENT AREA	**SC.HS.1.**	**Physical Science**
STANDARD	**SC.HS.1.10.**	**Waves have characteristic properties and behaviors.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.1.10.b.	Evaluate questions about the advantages of using a digital transmission and storage of information. (HS-PS4-2)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.4.**	**Organisms interact with the living and nonliving components of the environment to obtain matter and energy.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.4.b.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. (HS-LS2-2)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.5.**	**Matter and energy necessary for life are conserved as they move through ecosystems.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.5.b.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. (HS-LS2-4)
INDICATOR	SC.HS.2.5.c.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. (HS-LS2-5)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.6.**	**A complex set of interactions determine how ecosystems respond to disturbances.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.6.b.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. (HS-LS2-7)

CONTENT AREA	**SC.HS.2.**	**Life Science**
STANDARD	**SC.HS.2.13.**	**Humans have complex interactions with ecosystems and have the ability to influence biodiversity on the planet.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.2.13.a.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. (HS-LS4-6)

CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.4.**	**Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes, and these effects occur on different time scales, from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**

INDICATOR	SC.HS.3.4.d.	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-ESS2-4)

CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.7.**	**The role of radiation from the sun and its interactions with the atmosphere, ocean, and land are the foundation for the global climate system. Global climate models are used to predict future changes, including changes influenced by human behavior and natural factors.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.7.b.	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-ESS2-4)
INDICATOR	SC.HS.3.7.c.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. (HS-ESS2-6)

CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.9.**	**Resource availability has guided the development of human society and use of natural resources has associated costs, risks, and benefits.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.9.a.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (HS-ESS3-1)
INDICATOR	SC.HS.3.9.b.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios. (HS-ESS3-2)

CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.10.**	**Natural hazards and other geological events have shaped the course of human history at local, regional, and global scales.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.10.a.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (HS-ESS3-1)

CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**

STANDARD	**SC.HS.3.11.**	**Sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources, including the development of technologies.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.11.a.	Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity. (HS-ESS3-3)
CONTENT AREA	**SC.HS.3.**	**Earth and Space Science**
STANDARD	**SC.HS.3.12.**	**Global climate models used to predict future climate change continue to improve our understanding of the impact of human activities on the global climate system.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	SC.HS.3.12.b.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (HS-ESS3-6)

Colorado Academic Standards (CAS)

Technology Education

Grade **9** - Adopted: **2018**

CONTENT AREA		**Prepared Graduates in Computer Science**
STANDARD	1	Develop, utilize and evaluate algorithms, to model and solve problems.
CONTENT AREA		**High School, Standard 1. Computational Thinking**
STANDARD	**CS.HS.1.1**	**Computational thinking is used to create algorithmic solutions to real-world problems.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.1.1.a.	Identify and create different types of algorithms (sort, search, etc.).
INDICATOR	CS.HS.1.1.c.	Create or adapt algorithms to solve problems for multiple purposes (e.g., personal interests, client needs).
INDICATOR	CS.HS.1.1.f.	Recognize problems that cannot be solved computationally.
INDICATOR	CS.HS.1.1.g.	Identify and describe algorithms that exist within their personal lives.

CONTENT AREA		**High School, Standard 1. Computational Thinking**
STANDARD	**CS.HS.1.5**	**Abstraction is used to reduce complexity of larger problems by focusing on main ideas.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.1.5.a.	Describe how abstraction is central to computational thinking.
INDICATOR	CS.HS.1.5.b.	Identify and prioritize the most relevant parts of a problem while filtering out extraneous details.
INDICATOR	CS.HS.1.5.c.	Demonstrate different ways to represent key problem components.

CONTENT AREA		**High School, Standard 2. Computing Systems and Networks**
STANDARD	**CS.HS.2.5**	**Client considerations drive system design.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.2.5.a.	Identify client's problems/needs.
INDICATOR	CS.HS.2.5.b.	Articulate design requirements back to client.

CONTENT AREA		**High School, Standard 3. Computer Programming**
STANDARD	**CS.HS.3.1**	**The creation of a computer program requires a design process.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.3.1.a.	Analyze and apply a design methodology to identify constraints and requirements of an identified problem.

CONTENT AREA		**High School, Standard 3. Computer Programming**
STANDARD	**CS.HS.3.4**	**Client-based design requirements and feedback are essential to a quality computational product or service.**

CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.3.4.a.	Understand and apply principles of client-based design.

Colorado Academic Standards (CAS)
Technology Education
Grade **10** - Adopted: **2018**

CONTENT AREA		**Prepared Graduates in Computer Science**
STANDARD	1	Develop, utilize and evaluate algorithms, to model and solve problems.
CONTENT AREA		**High School, Standard 1. Computational Thinking**
STANDARD	**CS.HS.1.1**	**Computational thinking is used to create algorithmic solutions to real-world problems.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.1.1.a.	Identify and create different types of algorithms (sort, search, etc.).
INDICATOR	CS.HS.1.1.c.	Create or adapt algorithms to solve problems for multiple purposes (e.g., personal interests, client needs).
INDICATOR	CS.HS.1.1.f.	Recognize problems that cannot be solved computationally.
INDICATOR	CS.HS.1.1.g.	Identify and describe algorithms that exist within their personal lives.
CONTENT AREA		**High School, Standard 1. Computational Thinking**
STANDARD	**CS.HS.1.5**	**Abstraction is used to reduce complexity of larger problems by focusing on main ideas.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.1.5.a.	Describe how abstraction is central to computational thinking.

INDICATOR	CS.HS.1.5.b.	Identify and prioritize the most relevant parts of a problem while filtering out extraneous details.
INDICATOR	CS.HS.1.5.c.	Demonstrate different ways to represent key problem components.

CONTENT AREA		**High School, Standard 2. Computing Systems and Networks**
STANDARD	**CS.HS.2.5**	**Client considerations drive system design.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.2.5.a.	Identify client's problems/needs.
INDICATOR	CS.HS.2.5.b.	Articulate design requirements back to client.

CONTENT AREA		**High School, Standard 3. Computer Programming**
STANDARD	**CS.HS.3.1**	**The creation of a computer program requires a design process.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.3.1.a.	Analyze and apply a design methodology to identify constraints and requirements of an identified problem.

CONTENT AREA		**High School, Standard 3. Computer Programming**
STANDARD	**CS.HS.3.4**	**Client-based design requirements and feedback are essential to a quality computational product or service.**
CONCEPTS AND SKILLS / EVIDENCE OUTCOMES		**Evidence Outcomes**
EVIDENCE OUTCOMES		**Students Can:**
INDICATOR	CS.HS.3.4.a.	Understand and apply principles of client-based design.

DOMAIN / CONTENT STANDARD	CT.CC.M P.	Mathematical Practices
STATE FRAMEWORK	MP-1.	Make sense of problems and persevere in solving them.
STATE FRAMEWORK	MP-2.	Reason abstractly and quantitatively.
STATE FRAMEWORK	MP-3.	Construct viable arguments and critique the reasoning of others.
STATE FRAMEWORK	MP-4.	Model with mathematics.
STATE FRAMEWORK	MP-6.	Attend to precision.
STATE FRAMEWORK	MP-7.	Look for and make use of structure.
STATE FRAMEWORK	MP-8.	Look for and express regularity in repeated reasoning.

DOMAIN / CONTENT STANDARD	CT.CC.F.	Functions
STATE FRAMEWORK	**F-IF.**	**Interpreting Functions**
GRADE LEVEL EXPECTATION		**Interpret functions that arise in applications in terms of the context.**
INDICATOR	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Connecticut State Standards

Mathematics

Grade **10** - Adopted: **2010**

DOMAIN / CONTENT STANDARD	CT.CC.M P.	Mathematical Practices
STATE FRAMEWORK	MP-1.	Make sense of problems and persevere in solving them.
STATE FRAMEWORK	MP-2.	Reason abstractly and quantitatively.
STATE FRAMEWORK	MP-3.	Construct viable arguments and critique the reasoning of others.
STATE FRAMEWORK	MP-4.	Model with mathematics.

STATE FRAMEWORK	MP-6.	Attend to precision.
STATE FRAMEWORK	MP-7.	Look for and make use of structure.
STATE FRAMEWORK	MP-8.	Look for and express regularity in repeated reasoning.

DOMAIN / CONTENT STANDARD	**CT.CC.F.**	**Functions**
STATE FRAMEWORK	**F-IF.**	**Interpreting Functions**
GRADE LEVEL EXPECTATION		**Interpret functions that arise in applications in terms of the context.**
INDICATOR	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Connecticut State Standards

Science

Grade **9** - Adopted: **2015**

DOMAIN / CONTENT STANDARD	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STATE FRAMEWORK	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

DOMAIN / CONTENT STANDARD	**NGSS.HS-LS.**	**LIFE SCIENCE**
STATE FRAMEWORK	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
INDICATOR	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
INDICATOR	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
INDICATOR	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

DOMAIN / CONTENT STANDARD	**NGSS.HS-LS.**	**LIFE SCIENCE**
STATE FRAMEWORK	**HS-LS4.**	**Biological Evolution: Unity and Diversity**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

DOMAIN / CONTENT STANDARD	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STATE FRAMEWORK	**HS-ESS2.**	**Earth's Systems**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	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.
INDICATOR	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

DOMAIN / CONTENT STANDARD	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STATE FRAMEWORK	**HS-ESS3.**	**Earth and Human Activity**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
INDICATOR	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
INDICATOR	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
INDICATOR	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

DOMAIN / CONTENT STANDARD	**NGSS.HS-ETS.**	**ENGINEERING DESIGN**
STATE FRAMEWORK	**HS-ETS1.**	**Engineering Design**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**

INDICATOR	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
INDICATOR	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.
INDICATOR	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Connecticut State Standards

Science

Grade **10** - Adopted: **2015**

DOMAIN / CONTENT STANDARD	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STATE FRAMEWORK	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

DOMAIN / CONTENT STANDARD	**NGSS.HS-LS.**	**LIFE SCIENCE**
STATE FRAMEWORK	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
INDICATOR	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
INDICATOR	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
INDICATOR	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

DOMAIN / CONTENT STANDARD	**NGSS.HS-LS.**	**LIFE SCIENCE**
STATE FRAMEWORK	**HS-LS4.**	**Biological Evolution: Unity and Diversity**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

DOMAIN / CONTENT STANDARD	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STATE FRAMEWORK	**HS-ESS2.**	**Earth's Systems**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	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.
INDICATOR	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

DOMAIN / CONTENT STANDARD	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STATE FRAMEWORK	**HS-ESS3.**	**Earth and Human Activity**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
INDICATOR	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
INDICATOR	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
INDICATOR	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

DOMAIN / CONTENT STANDARD	**NGSS.HS-ETS.**	**ENGINEERING DESIGN**
STATE FRAMEWORK	**HS-ETS1.**	**Engineering Design**
GRADE LEVEL EXPECTATION		**Students who demonstrate understanding can:**
INDICATOR	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
INDICATOR	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.
INDICATOR	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

DOMAIN / CONTENT STANDARD		**CSTA K-12 Computer Science Standards**
STATE FRAMEWORK	**CSTA.3 A.**	**Level 3A (Ages 14-16)**
GRADE LEVEL EXPECTATION	**3A-AP.**	**Algorithms & Programming**
INDICATOR		**Algorithms**
INDICATOR	3A-AP-13.	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. (P5.2)

DOMAIN / CONTENT STANDARD		**CSTA K-12 Computer Science Standards**
STATE FRAMEWORK	**CSTA.3 A.**	**Level 3A (Ages 14-16)**
GRADE LEVEL EXPECTATION	**3A-IC.**	**Impacts of Computing**
INDICATOR		**Culture**
INDICATOR	3A-IC-25.	Test and refine computational artifacts to reduce bias and equity deficits. (P1.2)

Grade **9** - Adopted: **2016**

DOMAIN / CONTENT STANDARD		**ISTE for Students (ISTE-S)**
STATE FRAMEWORK	**CO.ISTE-S.3.**	**Knowledge Constructors: Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.**
GRADE LEVEL EXPECTATION	ISTE-S.3.d.	Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

DOMAIN / CONTENT STANDARD		**ISTE for Students (ISTE-S)**
STATE FRAMEWORK	**CO.ISTE-S.4.**	**Innovative Designers: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.**
GRADE LEVEL EXPECTATION	ISTE-S.4.a.	Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
GRADE LEVEL EXPECTATION	ISTE-S.4.b.	Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

DOMAIN / CONTENT STANDARD		**ISTE for Students (ISTE-S)**
STATE FRAMEWORK	**CO.ISTE-S.5.**	**Computational Thinkers: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.**
GRADE LEVEL EXPECTATION	ISTE-S.5.a.	Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.

GRADE LEVEL EXPECTATION	ISTE-S.5.b.	Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
GRADE LEVEL EXPECTATION	ISTE-S.5.d.	Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

Connecticut State Standards

Technology Education

Grade **10** - Adopted: **2017**

DOMAIN / CONTENT STANDARD		**CSTA K-12 Computer Science Standards**
STATE FRAMEWORK	**CSTA.3 A.**	**Level 3A (Ages 14-16)**
GRADE LEVEL EXPECTATION	**3A-AP.**	**Algorithms & Programming**
INDICATOR		**Algorithms**
INDICATOR	3A-AP-13.	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. (P5.2)

DOMAIN / CONTENT STANDARD		**CSTA K-12 Computer Science Standards**
STATE FRAMEWORK	**CSTA.3 A.**	**Level 3A (Ages 14-16)**
GRADE LEVEL EXPECTATION	**3A-IC.**	**Impacts of Computing**
INDICATOR		**Culture**
INDICATOR	3A-IC-25.	Test and refine computational artifacts to reduce bias and equity deficits. (P1.2)

Grade **10** - Adopted: **2016**

DOMAIN / CONTENT STANDARD		**ISTE for Students (ISTE-S)**
STATE FRAMEWORK	**CO.ISTE-S.3.**	**Knowledge Constructors: Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.**
GRADE LEVEL EXPECTATION	ISTE-S.3.d.	Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

DOMAIN / CONTENT STANDARD		**ISTE for Students (ISTE-S)**
STATE FRAMEWORK	**CO.ISTE-S.4.**	**Innovative Designers: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.**
GRADE LEVEL EXPECTATION	ISTE-S.4.a.	Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
GRADE LEVEL EXPECTATION	ISTE-S.4.b.	Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

DOMAIN / CONTENT STANDARD		ISTE for Students (ISTE-S)
STATE FRAMEWORK	**CO.ISTE-S.5.**	**Computational Thinkers: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.**
GRADE LEVEL EXPECTATION	ISTE-S.5.a.	Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.
GRADE LEVEL EXPECTATION	ISTE-S.5.b.	Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
GRADE LEVEL EXPECTATION	ISTE-S.5.d.	Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

Delaware Standards and Instruction

Mathematics

Grade **9** - Adopted: **2010**

STANDARD / STRAND	DE.CC.9-12.MP.	Mathematical Practices
STRAND / INDICATOR	CC.9-12.MP-1.	Make sense of problems and persevere in solving them.
STRAND / INDICATOR	CC.9-12.MP-2.	Reason abstractly and quantitatively.
STRAND / INDICATOR	CC.9-12.MP-3.	Construct viable arguments and critique the reasoning of others.
STRAND / INDICATOR	CC.9-12.MP-4.	Model with mathematics.
STRAND / INDICATOR	CC.9-12.MP-6.	Attend to precision.
STRAND / INDICATOR	CC.9-12.MP-7.	Look for and make use of structure.
STRAND / INDICATOR	CC.9-12.MP-8.	Look for and express regularity in repeated reasoning.

STANDARD / STRAND	DE.CC.9-12.F.	Functions
STRAND / INDICATOR	**CC.9-12.F-IF.**	**Interpreting Functions**
ENDURING UNDERSTANDING		**Interpret functions that arise in applications in terms of the context.**
BENCHMARK	CC.9-12.F.IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Mathematics

Grade **10** - Adopted: **2010**

STANDARD / STRAND	DE.CC.9-12.MP.	Mathematical Practices
STRAND / INDICATOR	CC.9-12.MP-1.	Make sense of problems and persevere in solving them.
STRAND / INDICATOR	CC.9-12.MP-2.	Reason abstractly and quantitatively.
STRAND / INDICATOR	CC.9-12.MP-3.	Construct viable arguments and critique the reasoning of others.
STRAND / INDICATOR	CC.9-12.MP-4.	Model with mathematics.
STRAND / INDICATOR	CC.9-12.MP-6.	Attend to precision.
STRAND / INDICATOR	CC.9-12.MP-7.	Look for and make use of structure.
STRAND / INDICATOR	CC.9-12.MP-8.	Look for and express regularity in repeated reasoning.

STANDARD / STRAND	DE.CC.9-12.F.	Functions
STRAND / INDICATOR	**CC.9-12.F-IF.**	**Interpreting Functions**
ENDURING UNDERSTANDING		**Interpret functions that arise in applications in terms of the context.**
BENCHMARK	CC.9-12.F.IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Delaware Standards and Instruction

Science

Grade **9** - Adopted: **2013**

STANDARD / STRAND	DE.HS-PS.	PHYSICAL SCIENCE
STRAND / INDICATOR	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

STANDARD / STRAND	DE.HS-LS.	LIFE SCIENCE

STRAND / INDICATOR	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
BENCHMARK	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
BENCHMARK	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
BENCHMARK	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
STANDARD / STRAND	**DE.HS-LS.**	**LIFE SCIENCE**
STRAND / INDICATOR	**HS-LS4.**	**Biological Evolution: Unity and Diversity**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
STANDARD / STRAND	**DE.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STRAND / INDICATOR	**HS-ESS2.**	**Earth's Systems**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	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.
BENCHMARK	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
STANDARD / STRAND	**DE.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STRAND / INDICATOR	**HS-ESS3.**	**Earth and Human Activity**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

BENCHMARK	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
BENCHMARK	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
BENCHMARK	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
STANDARD / STRAND	**DE.HS-ETS.**	**ENGINEERING DESIGN**
STRAND / INDICATOR	**HS-ETS1.**	**Engineering Design**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
BENCHMARK	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.
BENCHMARK	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Grade **9** - Adopted: **2010**

STANDARD / STRAND	**DE.CC9-10RS/TS.**	**Reading Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Key Ideas and Details**
ENDURING UNDERSTANDING	CC9-10RS/TS2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
ENDURING UNDERSTANDING	CC9-10RS/TS3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions defined in the text.
STANDARD / STRAND	**DE.CC9-10RS/TS.**	**Reading Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Craft and Structure**
ENDURING UNDERSTANDING	CC9-10RS/TS4.	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 9-10 texts and topics.
ENDURING UNDERSTANDING	CC9-10RS/TS5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

STANDARD / STRAND	DE.CC9-10RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		Integration of Knowledge and Ideas
ENDURING UNDERSTANDING	CC9-10RS/TS9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

STANDARD / STRAND	DE.CC9-10RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		Range of Reading and Level of Text Complexity
ENDURING UNDERSTANDING	CC9-10RS/TS10.	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.

STANDARD / STRAND	DE.CC9-10WH/S/TS.	Writing Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		Text Types and Purposes
ENDURING UNDERSTANDING	CC9-10WH/S/TS2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
BENCHMARK	CC9-10WH/S/TS2d.	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

STANDARD / STRAND	DE.CC9-10WH/S/TS.	Writing Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		Production and Distribution of Writing
ENDURING UNDERSTANDING	CC9-10WH/S/TS4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
ENDURING UNDERSTANDING	CC9-10WH/S/TS6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Delaware Standards and Instruction

Science

Grade **10** - Adopted: **2013**

STANDARD / STRAND	DE.HS-PS.	PHYSICAL SCIENCE
STRAND / INDICATOR	HS-PS4.	Waves and Their Applications in Technologies for Information Transfer
ENDURING UNDERSTANDING		Students who demonstrate understanding can:

BENCHMARK	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.
STANDARD / STRAND	**DE.HS-LS.**	**LIFE SCIENCE**
STRAND / INDICATOR	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
BENCHMARK	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
BENCHMARK	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
BENCHMARK	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
STANDARD / STRAND	**DE.HS-LS.**	**LIFE SCIENCE**
STRAND / INDICATOR	**HS-LS4.**	**Biological Evolution: Unity and Diversity**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
STANDARD / STRAND	**DE.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STRAND / INDICATOR	**HS-ESS2.**	**Earth's Systems**
ENDURING UNDERSTANDING		**Students who demonstrate understanding can:**
BENCHMARK	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.
BENCHMARK	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
STANDARD / STRAND	**DE.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STRAND / INDICATOR	**HS-ESS3.**	**Earth and Human Activity**

ENDURING UNDERSTANDING		Students who demonstrate understanding can:
BENCHMARK	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
BENCHMARK	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
BENCHMARK	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
BENCHMARK	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

STANDARD / STRAND	DE.HS-ETS.	ENGINEERING DESIGN
STRAND / INDICATOR	HS-ETS1.	Engineering Design
ENDURING UNDERSTANDING		Students who demonstrate understanding can:
BENCHMARK	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
BENCHMARK	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.
BENCHMARK	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Grade **10** - Adopted: **2010**

STANDARD / STRAND	DE.CC9-10RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		Key Ideas and Details
ENDURING UNDERSTANDING	CC9-10RS/TS2.	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
ENDURING UNDERSTANDING	CC9-10RS/TS3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks attending to special cases or exceptions defined in the text.

STANDARD / STRAND	DE.CC9-10RS/TS.	Reading Standards for Literacy in Science and Technical Subjects 6-12
STRAND / INDICATOR		Craft and Structure

ENDURING UNDERSTANDING	CC9-10RS/TS 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 9-10 texts and topics.
ENDURING UNDERSTANDING	CC9-10RS/TS 5.	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
STANDARD / STRAND	**DE.CC9-10RS/TS.**	**Reading Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Integration of Knowledge and Ideas**
ENDURING UNDERSTANDING	CC9-10RS/TS 9.	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
STANDARD / STRAND	**DE.CC9-10RS/TS.**	**Reading Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Range of Reading and Level of Text Complexity**
ENDURING UNDERSTANDING	CC9-10RS/TS10.	By the end of grade 10, read and comprehend science/technical texts in the grades 9-10 text complexity band independently and proficiently.
STANDARD / STRAND	**DE.CC9-10WH/S/TS.**	**Writing Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Text Types and Purposes**
ENDURING UNDERSTANDING	**CC9-10WH/S/TS2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
BENCHMARK	CC9-10WH/S/TS2d.	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
STANDARD / STRAND	**DE.CC9-10WH/S/TS.**	**Writing Standards for Literacy in Science and Technical Subjects 6-12**
STRAND / INDICATOR		**Production and Distribution of Writing**
ENDURING UNDERSTANDING	CC9-10WH/S/TS4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
ENDURING UNDERSTANDING	CC9-10WH/S/TS6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

STANDARD / STRAND		Computer Science Content Standards
STRAND / INDICATOR	CSTA.3 A.	Level 3A (Ages 14-16)
ENDURING UNDERSTANDING	3A-AP.	Algorithms & Programming
BENCHMARK		Algorithms
EXPECTATION	3A-AP-13.	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. (P5.2)

STANDARD / STRAND		Computer Science Content Standards
STRAND / INDICATOR	CSTA.3 A.	Level 3A (Ages 14-16)
ENDURING UNDERSTANDING	3A-IC.	Impacts of Computing
BENCHMARK		Culture
EXPECTATION	3A-IC-25.	Test and refine computational artifacts to reduce bias and equity deficits. (P1.2)

Delaware Standards and Instruction

Technology Education

Grade **10** - Adopted: **2018**

STANDARD / STRAND		Computer Science Content Standards
STRAND / INDICATOR	CSTA.3 A.	Level 3A (Ages 14-16)
ENDURING UNDERSTANDING	3A-AP.	Algorithms & Programming
BENCHMARK		Algorithms
EXPECTATION	3A-AP-13.	Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. (P5.2)

STANDARD / STRAND		Computer Science Content Standards
STRAND / INDICATOR	CSTA.3 A.	Level 3A (Ages 14-16)
ENDURING UNDERSTANDING	3A-IC.	Impacts of Computing
BENCHMARK		Culture
EXPECTATION	3A-IC-25.	Test and refine computational artifacts to reduce bias and equity deficits. (P1.2)

Florida Standards

Mathematics

Grade **9** - Adopted: **2020**

BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 1: Actively participate in effortful learning both individually and collectively.**
BENCHMARK	**MA.K12.MTR.1.1**	**Mathematicians who participate in effortful learning both individually and with others:**
INDICATOR	MA.K12.MTR.1.1a	Analyze the problem in a way that makes sense given the task.
INDICATOR	MA.K12.MTR.1.1b	Ask questions that will help with solving the task.
INDICATOR	MA.K12.MTR.1.1c	Build perseverance by modifying methods as needed while solving a challenging task.
INDICATOR	MA.K12.MTR.1.1d	Stay engaged and maintain a positive mindset when working to solve tasks.
INDICATOR	MA.K12.MTR.1.1e	Help and support each other when attempting a new method or approach.

BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 2: Demonstrate understanding by representing problems in multiple ways.**
BENCHMARK	**MA.K12.MTR.2.1**	**Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:**
INDICATOR	MA.K12.MTR.2.1a	Build understanding through modeling and using manipulatives.
INDICATOR	MA.K12.MTR.2.1b	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
INDICATOR	MA.K12.MTR.2.1d	Express connections between concepts and representations.
INDICATOR	MA.K12.MTR.2.1e	Choose a representation based on the given context or purpose.

BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 3: Complete tasks with mathematical fluency.**
BENCHMARK	**MA.K12.MTR.3.1**	**Complete tasks with mathematical fluency.Mathematicians who complete tasks with mathematical fluency:**
INDICATOR	MA.K12.MTR.3.1a	Select efficient and appropriate methods for solving problems within the given context.
INDICATOR	MA.K12.MTR.3.1b	Maintain flexibility and accuracy while performing procedures and mental calculations.

INDICATOR	MA.K12.MTR.3.1c	Complete tasks accurately and with confidence.
INDICATOR	MA.K12.MTR.3.1e	Use feedback to improve efficiency when performing calculations.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 4: Engage in discussions that reflect on the mathematical thinking of self and others.**
BENCHMARK	**MA.K12.MTR.4.1**	**Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:**
INDICATOR	MA.K12.MTR.4.1a	Communicate mathematical ideas, vocabulary and methods effectively.
INDICATOR	MA.K12.MTR.4.1b	Analyze the mathematical thinking of others.
INDICATOR	MA.K12.MTR.4.1c	Compare the efficiency of a method to those expressed by others.
INDICATOR	MA.K12.MTR.4.1d	Recognize errors and suggest how to correctly solve the task.
INDICATOR	MA.K12.MTR.4.1e	Justify results by explaining methods and processes.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 5: Use patterns and structure to help understand and connect mathematical concepts.**
BENCHMARK	**MA.K12.MTR.5.1**	**Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:**
INDICATOR	MA.K12.MTR.5.1a	Focus on relevant details within a problem.
INDICATOR	MA.K12.MTR.5.1b	Create plans and procedures to logically order events, steps or ideas to solve problems.
INDICATOR	MA.K12.MTR.5.1c	Decompose a complex problem into manageable parts.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 6: Assess the reasonableness of solutions.**
BENCHMARK	**MA.K12.MTR.6.1**	**Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:**
INDICATOR	MA.K12.MTR.6.1c	Check calculations when solving problems.

INDICATOR	MA.K12.MTR.6.1d	Verify possible solutions by explaining the methods used.
INDICATOR	MA.K12.MTR.6.1e	Evaluate results based on the given context.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 7: Apply mathematics to real-world contexts.**
BENCHMARK	**MA.K12.MTR.7.1**	**Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:**
INDICATOR	MA.K12.MTR.7.1a	Connect mathematical concepts to everyday experiences.
INDICATOR	MA.K12.MTR.7.1b	Use models and methods to understand, represent and solve problems.
INDICATOR	MA.K12.MTR.7.1c	Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
BODY OF KNOWLEDGE		**Financial Literacy**
BIG IDEA		**Standard 1: Build mathematical foundations for financial literacy.**
BENCHMARK	MA.912.FL.1.2	Extend previous knowledge of ratios and proportional relationships to solve real-world problems involving money and business.
BODY OF KNOWLEDGE		**Data Analysis and Probability**
BIG IDEA		**Standard 2: Solve problems involving univariate and bivariate numerical data.**
BENCHMARK	MA.912.DP.2.1	For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers. Interpret any notable features of the shape of the data distribution.
BENCHMARK	MA.912.DP.2.2	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate.
BODY OF KNOWLEDGE		**Logic and Discrete Theory**
BIG IDEA		**Standard 4: Develop an understanding of the fundamentals of propositional logic, arguments and methods of proof.**
BENCHMARK	MA.912.LT.4.7	Identify and give examples of undefined terms; axioms; theorems; proofs, including proofs using mathematical induction; and inductive and deductive reasoning.

Florida Standards

Mathematics

Grade **10** - Adopted: **2020**

BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**

BIG IDEA		**Standard 1: Actively participate in effortful learning both individually and collectively.**
BENCHMARK	**MA.K12.MTR.1.1**	**Mathematicians who participate in effortful learning both individually and with others:**
INDICATOR	MA.K12.MTR.1.1a	Analyze the problem in a way that makes sense given the task.
INDICATOR	MA.K12.MTR.1.1b	Ask questions that will help with solving the task.
INDICATOR	MA.K12.MTR.1.1c	Build perseverance by modifying methods as needed while solving a challenging task.
INDICATOR	MA.K12.MTR.1.1d	Stay engaged and maintain a positive mindset when working to solve tasks.
INDICATOR	MA.K12.MTR.1.1e	Help and support each other when attempting a new method or approach.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 2: Demonstrate understanding by representing problems in multiple ways.**
BENCHMARK	**MA.K12.MTR.2.1**	**Demonstrate understanding by representing problems in multiple ways. Mathematicians who demonstrate understanding by representing problems in multiple ways:**
INDICATOR	MA.K12.MTR.2.1a	Build understanding through modeling and using manipulatives.
INDICATOR	MA.K12.MTR.2.1b	Represent solutions to problems in multiple ways using objects, drawings, tables, graphs and equations.
INDICATOR	MA.K12.MTR.2.1d	Express connections between concepts and representations.
INDICATOR	MA.K12.MTR.2.1e	Choose a representation based on the given context or purpose.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 3: Complete tasks with mathematical fluency.**
BENCHMARK	**MA.K12.MTR.3.1**	**Complete tasks with mathematical fluency.Mathematicians who complete tasks with mathematical fluency:**
INDICATOR	MA.K12.MTR.3.1a	Select efficient and appropriate methods for solving problems within the given context.
INDICATOR	MA.K12.MTR.3.1b	Maintain flexibility and accuracy while performing procedures and mental calculations.
INDICATOR	MA.K12.MTR.3.1c	Complete tasks accurately and with confidence.

INDICATOR	MA.K12.MTR.3.1e	Use feedback to improve efficiency when performing calculations.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 4: Engage in discussions that reflect on the mathematical thinking of self and others.**
BENCHMARK	**MA.K12.MTR.4.1**	**Engage in discussions that reflect on the mathematical thinking of self and others. Mathematicians who engage in discussions that reflect on the mathematical thinking of self and others:**
INDICATOR	MA.K12.MTR.4.1a	Communicate mathematical ideas, vocabulary and methods effectively.
INDICATOR	MA.K12.MTR.4.1b	Analyze the mathematical thinking of others.
INDICATOR	MA.K12.MTR.4.1c	Compare the efficiency of a method to those expressed by others.
INDICATOR	MA.K12.MTR.4.1d	Recognize errors and suggest how to correctly solve the task.
INDICATOR	MA.K12.MTR.4.1e	Justify results by explaining methods and processes.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 5: Use patterns and structure to help understand and connect mathematical concepts.**
BENCHMARK	**MA.K12.MTR.5.1**	**Use patterns and structure to help understand and connect mathematical concepts. Mathematicians who use patterns and structure to help understand and connect mathematical concepts:**
INDICATOR	MA.K12.MTR.5.1a	Focus on relevant details within a problem.
INDICATOR	MA.K12.MTR.5.1b	Create plans and procedures to logically order events, steps or ideas to solve problems.
INDICATOR	MA.K12.MTR.5.1c	Decompose a complex problem into manageable parts.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 6: Assess the reasonableness of solutions.**
BENCHMARK	**MA.K12.MTR.6.1**	**Assess the reasonableness of solutions. Mathematicians who assess the reasonableness of solutions:**
INDICATOR	MA.K12.MTR.6.1c	Check calculations when solving problems.
INDICATOR	MA.K12.MTR.6.1d	Verify possible solutions by explaining the methods used.

INDICATOR	MA.K12.MTR.6.1e	Evaluate results based on the given context.
BODY OF KNOWLEDGE		**Mathematical Thinking and Reasoning**
BIG IDEA		**Standard 7: Apply mathematics to real-world contexts.**
BENCHMARK	**MA.K12.MTR.7.1**	**Apply mathematics to real-world contexts. Mathematicians who apply mathematics to real-world contexts:**
INDICATOR	MA.K12.MTR.7.1a	Connect mathematical concepts to everyday experiences.
INDICATOR	MA.K12.MTR.7.1b	Use models and methods to understand, represent and solve problems.
INDICATOR	MA.K12.MTR.7.1c	Perform investigations to gather data or determine if a method is appropriate. • Redesign models and methods to improve accuracy or efficiency.
BODY OF KNOWLEDGE		**Financial Literacy**
BIG IDEA		**Standard 1: Build mathematical foundations for financial literacy.**
BENCHMARK	MA.912.FL.1.2	Extend previous knowledge of ratios and proportional relationships to solve real-world problems involving money and business.
BODY OF KNOWLEDGE		**Data Analysis and Probability**
BIG IDEA		**Standard 2: Solve problems involving univariate and bivariate numerical data.**
BENCHMARK	MA.912.DP.2.1	For two or more sets of numerical univariate data, calculate and compare the appropriate measures of center and measures of variability, accounting for possible effects of outliers. Interpret any notable features of the shape of the data distribution.
BENCHMARK	MA.912.DP.2.2	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate.
BODY OF KNOWLEDGE		**Logic and Discrete Theory**
BIG IDEA		**Standard 4: Develop an understanding of the fundamentals of propositional logic, arguments and methods of proof.**
BENCHMARK	MA.912.LT.4.7	Identify and give examples of undefined terms; axioms; theorems; proofs, including proofs using mathematical induction; and inductive and deductive reasoning.

Florida Standards

Science

Grade **9** - Adopted: **2008**

BODY OF KNOWLEDGE	**FL.SC.912.N.**	**Nature of Science**

BIG IDEA	**SC.912.N.1.**	**The Practice of Science - A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation. B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method." C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge. D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.**
BENCHMARK	**SC.912.N.1.1.**	**Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:**
INDICATOR	SC.912.N.1.1.6.	Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs)
INDICATOR	SC.912.N.1.1.7.	Pose answers, explanations, or descriptions of events
BODY OF KNOWLEDGE	**FL.SC.912.N.**	**Nature of Science**
BIG IDEA	**SC.912.N.1.**	**The Practice of Science - A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation. B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method." C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge. D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.**
BENCHMARK	SC.912.N.1.3.	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
BENCHMARK	SC.912.N.1.7.	Recognize the role of creativity in constructing scientific questions, methods and explanations.
BODY OF KNOWLEDGE	**FL.SC.912.N.**	**Nature of Science**
BIG IDEA	**SC.912.N.4.**	**Science and Society - As tomorrows citizens, students should be able to identify issues about which society could provide input, formulate scientifically investigable questions about those issues, construct investigations of their questions, collect and evaluate data from their investigations, and develop scientific recommendations based upon their findings.**
BENCHMARK	SC.912.N.4.2.	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
BODY OF KNOWLEDGE	**FL.SC.912.E.**	**Earth and Space Science**
BIG IDEA	**SC.912.E.7.**	**Earth Systems and Patterns - The scientific theory of the evolution of Earth states that changes in our planet are driven by the flow of energy and the cycling of matter through dynamic interactions among the atmosphere, hydrosphere, cryosphere, geosphere, and biosphere, and the resources used to sustain human civilization on Earth.**
BENCHMARK	SC.912.E.7.7.	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
BODY OF KNOWLEDGE	**FL.SC.912.L.**	**Life Science**

BIG IDEA	**SC.912.L.15.**	**Diversity and Evolution of Living Organisms - A. The scientific theory of evolution is the fundamental concept underlying all of biology. B. The scientific theory of evolution is supported by multiple forms of scientific evidence. C. Organisms are classified based on their evolutionary history. D. Natural selection is a primary mechanism leading to evolutionary change.**
BENCHMARK	SC.912.L.15.3.	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
BODY OF KNOWLEDGE	**FL.SC.912.L.**	**Life Science**
BIG IDEA	**SC.912.L.17.**	**Interdependence - A. The distribution and abundance of organisms is determined by the interactions between organisms, and between organisms and the non-living environment. B. Energy and nutrients move within and between biotic and abiotic components of ecosystems via physical, chemical and biological processes. C. Human activities and natural events can have profound effects on populations, biodiversity and ecosystem processes.**
BENCHMARK	SC.912.L.17.4.	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
BENCHMARK	SC.912.L.17.8.	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
BENCHMARK	SC.912.L.17.10.	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
BENCHMARK	SC.912.L.17.11.	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
BENCHMARK	SC.912.L.17.12.	Discuss the political, social, and environmental consequences of sustainable use of land.
BENCHMARK	SC.912.L.17.15.	Discuss the effects of technology on environmental quality.
BENCHMARK	SC.912.L.17.16.	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
BENCHMARK	SC.912.L.17.17.	Assess the effectiveness of innovative methods of protecting the environment.
BENCHMARK	SC.912.L.17.19.	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
BENCHMARK	SC.912.L.17.20.	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

Florida Standards

Science

Grade **10** - Adopted: **2008**

BODY OF KNOWLEDGE	**FL.SC.912.N.**	**Nature of Science**

BIG IDEA	**SC.912.N.1.**	**The Practice of Science - A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation. B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method." C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge. D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.**
BENCHMARK	**SC.912.N.1.1.**	**Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:**
INDICATOR	SC.912.N.1.1.6.	Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs)
INDICATOR	SC.912.N.1.1.7.	Pose answers, explanations, or descriptions of events
BODY OF KNOWLEDGE	**FL.SC.912.N.**	**Nature of Science**
BIG IDEA	**SC.912.N.1.**	**The Practice of Science - A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation. B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method." C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge. D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.**
BENCHMARK	SC.912.N.1.3.	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
BENCHMARK	SC.912.N.1.7.	Recognize the role of creativity in constructing scientific questions, methods and explanations.
BODY OF KNOWLEDGE	**FL.SC.912.N.**	**Nature of Science**
BIG IDEA	**SC.912.N.4.**	**Science and Society - As tomorrows citizens, students should be able to identify issues about which society could provide input, formulate scientifically investigable questions about those issues, construct investigations of their questions, collect and evaluate data from their investigations, and develop scientific recommendations based upon their findings.**
BENCHMARK	SC.912.N.4.2.	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
BODY OF KNOWLEDGE	**FL.SC.912.E.**	**Earth and Space Science**
BIG IDEA	**SC.912.E.7.**	**Earth Systems and Patterns - The scientific theory of the evolution of Earth states that changes in our planet are driven by the flow of energy and the cycling of matter through dynamic interactions among the atmosphere, hydrosphere, cryosphere, geosphere, and biosphere, and the resources used to sustain human civilization on Earth.**
BENCHMARK	SC.912.E.7.7.	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
BODY OF KNOWLEDGE	**FL.SC.912.L.**	**Life Science**

BIG IDEA	**SC.912.L.15.**	**Diversity and Evolution of Living Organisms - A. The scientific theory of evolution is the fundamental concept underlying all of biology. B. The scientific theory of evolution is supported by multiple forms of scientific evidence. C. Organisms are classified based on their evolutionary history. D. Natural selection is a primary mechanism leading to evolutionary change.**
BENCHMARK	SC.912.L.15.3.	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
BODY OF KNOWLEDGE	**FL.SC.912.L.**	**Life Science**
BIG IDEA	**SC.912.L.17.**	**Interdependence - A. The distribution and abundance of organisms is determined by the interactions between organisms, and between organisms and the non-living environment. B. Energy and nutrients move within and between biotic and abiotic components of ecosystems via physical, chemical and biological processes. C. Human activities and natural events can have profound effects on populations, biodiversity and ecosystem processes.**
BENCHMARK	SC.912.L.17.4.	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
BENCHMARK	SC.912.L.17.8.	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.
BENCHMARK	SC.912.L.17.10.	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
BENCHMARK	SC.912.L.17.11.	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
BENCHMARK	SC.912.L.17.12.	Discuss the political, social, and environmental consequences of sustainable use of land.
BENCHMARK	SC.912.L.17.15.	Discuss the effects of technology on environmental quality.
BENCHMARK	SC.912.L.17.16.	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
BENCHMARK	SC.912.L.17.17.	Assess the effectiveness of innovative methods of protecting the environment.
BENCHMARK	SC.912.L.17.19.	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
BENCHMARK	SC.912.L.17.20.	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

Florida Standards

Technology Education

Grade **9** - Adopted: **2016**

BODY OF KNOWLEDGE	**FL.SC.912.CS-CS.**	**COMPUTER SCIENCE - COMMUNICATION SYSTEMS AND COMPUTING**
BIG IDEA	**SC.912.CS-CS.2.**	**Problem solving and algorithms**

BENCHMARK	SC.912.CS-CS.2.5	Evaluate a classical algorithm and implement an original algorithm.
BENCHMARK	SC.912.CS-CS.2.7	Explain how sequence, selection, iteration, and recursion are building blocks of algorithms.
BODY OF KNOWLEDGE	**FL.SC.912.CS-CP.**	**COMPUTER SCIENCE - COMPUTER PRACTICES AND PROGRAMMING**
BIG IDEA	**SC.912.CS-CP.1.**	**Data analysis**
BENCHMARK	SC.912.CS-CP.1.4	Collect real-time data from sources such as simulations, scientific and robotic sensors, and device emulators, using this data to formulate strategies or algorithms to solve advanced problems.

Florida Standards

Technology Education

Grade **10** - Adopted: **2016**

BODY OF KNOWLEDGE	**FL.SC.912.CS-CS.**	**COMPUTER SCIENCE - COMMUNICATION SYSTEMS AND COMPUTING**
BIG IDEA	**SC.912.CS-CS.2.**	**Problem solving and algorithms**
BENCHMARK	SC.912.CS-CS.2.5	Evaluate a classical algorithm and implement an original algorithm.
BENCHMARK	SC.912.CS-CS.2.7	Explain how sequence, selection, iteration, and recursion are building blocks of algorithms.
BODY OF KNOWLEDGE	**FL.SC.912.CS-CP.**	**COMPUTER SCIENCE - COMPUTER PRACTICES AND PROGRAMMING**
BIG IDEA	**SC.912.CS-CP.1.**	**Data analysis**
BENCHMARK	SC.912.CS-CP.1.4	Collect real-time data from sources such as simulations, scientific and robotic sensors, and device emulators, using this data to formulate strategies or algorithms to solve advanced problems.

Georgia Standards of Excellence

Mathematics

Grade **9** - Adopted: **2021**

STRAND/TOPIC		**Algebra: Concepts & Connections**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**A.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	A.MM.1.1.	Explain applicable, mathematical problems using a mathematical model.
ELEMENT/GLE	A.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**Algebra: Concepts & Connections**
STANDARD / DESCRIPTION		**DATA & STATISTICAL REASONING – univariate data and single quantitative variables; bivariate data**
ELEMENT	**A.DSR.10:**	**Collect, analyze, and interpret univariate quantitative data to answer statistical investigative questions that compare groups to solve real-life problems; Represent bivariate data on a scatter plot and fit a function to the data to answer statistical questions and solve real-life problems.**
ELEMENT/GLE	A.DSR.10.1.	Use statistics appropriate to the shape of the data distribution to compare and represent center (median and mean) and variability (interquartile range, standard deviation) of two or more distributions by hand and using technology.

STRAND/TOPIC		**Advanced Algebra (Algebra II): Concepts and Connections**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AA.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	AA.MM.1.1.	Explain applicable, mathematical problems using a mathematical model.
ELEMENT/GLE	AA.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a mathematical, applicable situation.
ELEMENT/GLE	AA.MM.1.4.	Use various mathematical representations and structures to represent and solve real-life problems.

STRAND/TOPIC		**Advanced Financial Algebra**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AFA.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	AFA.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	AFA.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	AFA.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	AFA.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**Advanced Financial Algebra**
STANDARD / DESCRIPTION		**NUMERICAL (QUANTITATIVE) REASONING – Fractions, Decimals, Percents, and Ratios**
ELEMENT	**AFA.NR.2:**	**Utilize fractions, decimals, percents, and ratios to write and solve a variety of financial problems.**

ELEMENT/GLE	AFA.NR.2.1.	Use fractions, decimals, percents, and ratios to solve problems related to budgets, income tax rates, payroll deductions, pie charts, percent yield, sales tax, percent populations, rent increase, cost savings, debt-to-income ratios, stock splits, floor plans and scale models, trigonometric calculations, banking services, and other business and financial applications.
ELEMENT/GLE	AFA.NR.2.4.	Construct, solve, and interpret algebraic ratios and proportions.
STRAND/TOPIC		**Advanced Financial Algebra**
STANDARD / DESCRIPTION		**DATA & STATISTICAL REASONING – Data Displays**
ELEMENT	**AFA.DSR.7:**	**Collect, analyze, interpret, summarize, and construct displays of data to make predictions within real-world applications.**
ELEMENT/GLE	AFA.DSR.7.1.	Interpret measures of central tendency (mean, median, mode) and spread (range, interquartile range, variance, standard deviation) to analyze contextualized data sets.
ELEMENT/GLE	AFA.DSR.7.8.	Apply the Arithmetic Average Formula to calculate and interpret a d-day simple moving average given a set of n data points, p(1), p(2), p(3), ..., p(n-1), p(n).
STRAND/TOPIC		**Linear Algebra with Computer Science Applications**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**LACS.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	LACS.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	LACS.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	LACS.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	LACS.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Geometry: Concepts & Connections**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**G.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	G.MM.1.1.	Explain mathematically applicable problems using a mathematical model.
ELEMENT/GLE	G.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	G.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a mathematically applicable situation.

ELEMENT/GLE	G.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Advanced Finite Mathematics**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AFM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	AFM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	AFM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	AFM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	AFM.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Advanced Mathematical Decision Making**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AMDM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	AMDM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	AMDM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	AMDM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	AMDM.MM.1.4.	Use relevant information to create various mathematical representations and structures to solve real-life problems.
STRAND/TOPIC		**Advanced Mathematical Decision Making**
STANDARD / DESCRIPTION		**QUANTITATIVE & PROPORTIONAL REASONING – Ratios, Rates, & Percents**
ELEMENT	**AMDM.QPR.2:**	**Make decisions and solve problems using ratios, rates, and percents in a variety of real-world applications.**
ELEMENT/GLE	AMDM.QPR.2.1.	Apply proportions, ratios, rates, and percentages to various settings, including business, media, and consumerism.
ELEMENT/GLE	AMDM.QPR.2.2.	Solve problems involving ratios in mechanical and agricultural contexts.

STRAND/TOPIC		Precalculus
STANDARD / DESCRIPTION		MATHEMATICAL MODELING
ELEMENT	PC.MM.1:	Apply mathematics to real-life situations; model real-life phenomena using mathematics.
ELEMENT/GLE	PC.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	PC.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	PC.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	PC.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		Calculus
STANDARD / DESCRIPTION		MATHEMATICAL MODELING
ELEMENT	C.MM.1:	Apply mathematics to real-life situations; model real-life phenomena using mathematics.
ELEMENT/GLE	C.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	C.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	C.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	C.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		Multivariable Calculus
STANDARD / DESCRIPTION		MATHEMATICAL MODELING
ELEMENT	MVC.MM.1:	Apply mathematics to real-life situations; model real-life phenomena using mathematics.
ELEMENT/GLE	MVC.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	MVC.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	MVC.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	MVC.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		Differential Equations
STANDARD / DESCRIPTION		MATHEMATICAL MODELING
ELEMENT	DE.MM.1:	Apply mathematics to real-life situations; model real-life phenomena using mathematics.
ELEMENT/GLE	DE.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	DE.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	DE.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	DE.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		Engineering Calculus
STANDARD / DESCRIPTION		MATHEMATICAL MODELING
ELEMENT	EC.MM.1:	Apply mathematics to real-life situations; model real-life phenomena using mathematics.
ELEMENT/GLE	EC.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	EC.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	EC.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	EC.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		Engineering Calculus
STANDARD / DESCRIPTION		ABSTRACT REASONING – Impact of Engineering in Mathematics
ELEMENT	EC.AR.2:	Using the engineering design process, apply mathematical concepts and procedures to solve problems in engineering contexts and research the impact of engineering and technological advancement on mathematics and society.
ELEMENT/GLE		Solve and explain engineering-based calculus problems; use mathematical and engineering models to explain real-life phenomena, using appropriate terminology and technology.
EXPECTATION	EC.AR.2.3.	Apply and adapt a variety of appropriate strategies to solve problems.
EXPECTATION	EC.AR.2.4.	Use visual and written communication to organize, record, and articulate coherent, mathematical thinking and to express basic design elements.

EXPECTATION	EC.AR.2.5.	Monitor and reflect on the process of mathematical problem solving and interpret solutions that arise in engineering contexts.
EXPECTATION	EC.AR.2.6.	Produce multiple representations for mathematics presented in engineering contexts.
EXPECTATION	EC.AR.2.8.	Use mathematical representations to model and interpret physical and engineering phenomena.

STRAND/TOPIC		**College Readiness Mathematics**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**CRM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	CRM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	CRM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	CRM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	CRM.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**College Readiness Mathematics**
STANDARD / DESCRIPTION		**NUMERICAL & QUANTITATIVE REASONING – Real Number System**
ELEMENT	**CRM.NR.2:**	**Utilize exact and approximate calculations to quantify real-world phenomena and solve problems.**
ELEMENT/GLE	CRM.NR.2.2.	Represent and solve problems using proportional reasoning with ratios, rates, proportions, and scaling.

STRAND/TOPIC		**College Readiness Mathematics**
STANDARD / DESCRIPTION		**DATA & STATISTICAL REASONING – Interpreting Data & Calculating Probabilities of Compound Events**
ELEMENT	**CRM.DSR.6:**	**Make sense of and reason about variation in data using graphs, tables and probability models to solve problems and draw appropriate conclusions from solutions.**
ELEMENT/GLE	CRM.DSR.6.2.	Calculate, compare, and interpret shape, center, and spread of two or more univariate data sets, accounting for possible effects of extreme data points.

STRAND/TOPIC		**Mathematics of Industry and Government**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**MIG.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**

ELEMENT/GLE	MIG.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	MIG.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	MIG.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	MIG.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Statistical Reasoning**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**SR.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	SR.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	SR.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or the humanities.
ELEMENT/GLE	SR.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a real-life situation.
ELEMENT/GLE	SR.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**History of Mathematics**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**HM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	HM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	HM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	HM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	HM.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**History of Mathematics**
STANDARD / DESCRIPTION		**LOGICAL, MATHEMATICAL & INVESTIGATIVE REASONING – Ancient Greek Mathematics**

ELEMENT	**HM.LMIR.3:**	**Engage in the mathematical and cultural accomplishments of the ancient Greeks in order to grasp the foundational aspects of modern mathematics.**
ELEMENT/GLE		**Greek geometry**
EXPECTATION	HM.LMIR.3.1.	Prove statements in a deductive system by using its definitions, postulates, and axioms

Georgia Standards of Excellence

Mathematics

Grade **10** - Adopted: **2021**

STRAND/TOPIC		**Algebra: Concepts & Connections**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**A.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	A.MM.1.1.	Explain applicable, mathematical problems using a mathematical model.
ELEMENT/GLE	A.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**Algebra: Concepts & Connections**
STANDARD / DESCRIPTION		**DATA & STATISTICAL REASONING – univariate data and single quantitative variables; bivariate data**
ELEMENT	**A.DSR.10:**	**Collect, analyze, and interpret univariate quantitative data to answer statistical investigative questions that compare groups to solve real-life problems; Represent bivariate data on a scatter plot and fit a function to the data to answer statistical questions and solve real-life problems.**
ELEMENT/GLE	A.DSR.10.1.	Use statistics appropriate to the shape of the data distribution to compare and represent center (median and mean) and variability (interquartile range, standard deviation) of two or more distributions by hand and using technology.

STRAND/TOPIC		**Advanced Algebra (Algebra II): Concepts and Connections**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AA.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	AA.MM.1.1.	Explain applicable, mathematical problems using a mathematical model.
ELEMENT/GLE	AA.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a mathematical, applicable situation.
ELEMENT/GLE	AA.MM.1.4.	Use various mathematical representations and structures to represent and solve real-life problems.

STRAND/TOPIC		**Advanced Financial Algebra**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AFA.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**

ELEMENT/GLE	AFA.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	AFA.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	AFA.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	AFA.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Advanced Financial Algebra**
STANDARD / DESCRIPTION		**NUMERICAL (QUANTITATIVE) REASONING – Fractions, Decimals, Percents, and Ratios**
ELEMENT	**AFA.NR.2:**	**Utilize fractions, decimals, percents, and ratios to write and solve a variety of financial problems.**
ELEMENT/GLE	AFA.NR.2.1.	Use fractions, decimals, percents, and ratios to solve problems related to budgets, income tax rates, payroll deductions, pie charts, percent yield, sales tax, percent populations, rent increase, cost savings, debt-to-income ratios, stock splits, floor plans and scale models, trigonometric calculations, banking services, and other business and financial applications.
ELEMENT/GLE	AFA.NR.2.4.	Construct, solve, and interpret algebraic ratios and proportions.
STRAND/TOPIC		**Advanced Financial Algebra**
STANDARD / DESCRIPTION		**DATA & STATISTICAL REASONING – Data Displays**
ELEMENT	**AFA.DSR.7:**	**Collect, analyze, interpret, summarize, and construct displays of data to make predictions within real-world applications.**
ELEMENT/GLE	AFA.DSR.7.1.	Interpret measures of central tendency (mean, median, mode) and spread (range, interquartile range, variance, standard deviation) to analyze contextualized data sets.
ELEMENT/GLE	AFA.DSR.7.8.	Apply the Arithmetic Average Formula to calculate and interpret a d-day simple moving average given a set of n data points, p(1), p(2), p(3), ..., p(n-1), p(n).
STRAND/TOPIC		**Linear Algebra with Computer Science Applications**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**LACS.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	LACS.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	LACS.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	LACS.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.

ELEMENT/GLE	LACS.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Geometry: Concepts & Connections**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**G.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	G.MM.1.1.	Explain mathematically applicable problems using a mathematical model.
ELEMENT/GLE	G.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	G.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a mathematically applicable situation.
ELEMENT/GLE	G.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Advanced Finite Mathematics**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AFM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	AFM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	AFM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	AFM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	AFM.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Advanced Mathematical Decision Making**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**AMDM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	AMDM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	AMDM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	AMDM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.

ELEMENT/GLE	AMDM.MM.1.4.	Use relevant information to create various mathematical representations and structures to solve real-life problems.
STRAND/TOPIC		**Advanced Mathematical Decision Making**
STANDARD / DESCRIPTION		**QUANTITATIVE & PROPORTIONAL REASONING – Ratios, Rates, & Percents**
ELEMENT	**AMDM.QPR.2:**	**Make decisions and solve problems using ratios, rates, and percents in a variety of real-world applications.**
ELEMENT/GLE	AMDM.QPR.2.1.	Apply proportions, ratios, rates, and percentages to various settings, including business, media, and consumerism.
ELEMENT/GLE	AMDM.QPR.2.2.	Solve problems involving ratios in mechanical and agricultural contexts.
STRAND/TOPIC		**Precalculus**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**PC.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	PC.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	PC.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	PC.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	PC.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Calculus**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**C.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	C.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	C.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	C.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	C.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Multivariable Calculus**

STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**MVC.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	MVC.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	MVC.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	MVC.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	MVC.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Differential Equations**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**DE.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	DE.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	DE.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	DE.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	DE.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**Engineering Calculus**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**EC.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	EC.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	EC.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	EC.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	EC.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**Engineering Calculus**
STANDARD / DESCRIPTION		**ABSTRACT REASONING – Impact of Engineering in Mathematics**
ELEMENT	**EC.AR.2:**	**Using the engineering design process, apply mathematical concepts and procedures to solve problems in engineering contexts and research the impact of engineering and technological advancement on mathematics and society.**
ELEMENT/GLE		**Solve and explain engineering-based calculus problems; use mathematical and engineering models to explain real-life phenomena, using appropriate terminology and technology.**
EXPECTATION	EC.AR.2.3.	Apply and adapt a variety of appropriate strategies to solve problems.
EXPECTATION	EC.AR.2.4.	Use visual and written communication to organize, record, and articulate coherent, mathematical thinking and to express basic design elements.
EXPECTATION	EC.AR.2.5.	Monitor and reflect on the process of mathematical problem solving and interpret solutions that arise in engineering contexts.
EXPECTATION	EC.AR.2.6.	Produce multiple representations for mathematics presented in engineering contexts.
EXPECTATION	EC.AR.2.8.	Use mathematical representations to model and interpret physical and engineering phenomena.
STRAND/TOPIC		**College Readiness Mathematics**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**CRM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	CRM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	CRM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	CRM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	CRM.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.
STRAND/TOPIC		**College Readiness Mathematics**
STANDARD / DESCRIPTION		**NUMERICAL & QUANTITATIVE REASONING – Real Number System**
ELEMENT	**CRM.NR.2:**	**Utilize exact and approximate calculations to quantify real-world phenomena and solve problems.**
ELEMENT/GLE	CRM.NR.2.2.	Represent and solve problems using proportional reasoning with ratios, rates, proportions, and scaling.
STRAND/TOPIC		**College Readiness Mathematics**

STANDARD / DESCRIPTION		**DATA & STATISTICAL REASONING – Interpreting Data & Calculating Probabilities of Compound Events**
ELEMENT	**CRM.DSR.6:**	**Make sense of and reason about variation in data using graphs, tables and probability models to solve problems and draw appropriate conclusions from solutions.**
ELEMENT/GLE	CRM.DSR.6.2.	Calculate, compare, and interpret shape, center, and spread of two or more univariate data sets, accounting for possible effects of extreme data points.

STRAND/TOPIC		**Mathematics of Industry and Government**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**MIG.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	MIG.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	MIG.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	MIG.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	MIG.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**Statistical Reasoning**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**SR.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	SR.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.
ELEMENT/GLE	SR.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or the humanities.
ELEMENT/GLE	SR.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a real-life situation.
ELEMENT/GLE	SR.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**History of Mathematics**
STANDARD / DESCRIPTION		**MATHEMATICAL MODELING**
ELEMENT	**HM.MM.1:**	**Apply mathematics to real-life situations; model real-life phenomena using mathematics.**
ELEMENT/GLE	HM.MM.1.1.	Explain contextual, mathematical problems using a mathematical model.

ELEMENT/GLE	HM.MM.1.2.	Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.
ELEMENT/GLE	HM.MM.1.3.	Using abstract and quantitative reasoning, make decisions about information and data from a contextual situation.
ELEMENT/GLE	HM.MM.1.4.	Use various mathematical representations and structures with this information to represent and solve real-life problems.

STRAND/TOPIC		**History of Mathematics**
STANDARD / DESCRIPTION		**LOGICAL, MATHEMATICAL & INVESTIGATIVE REASONING – Ancient Greek Mathematics**
ELEMENT	**HM.LMIR.3:**	**Engage in the mathematical and cultural accomplishments of the ancient Greeks in order to grasp the foundational aspects of modern mathematics.**
ELEMENT/GLE		**Greek geometry**
EXPECTATION	HM.LMIR.3.1.	Prove statements in a deductive system by using its definitions, postulates, and axioms

Georgia Standards of Excellence

Science

Grade **9** - Adopted: **2016**

STRAND/TOPIC	**26.01200.**	**Biology**
STANDARD / DESCRIPTION	**SB5.**	**Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.**
ELEMENT	SB5.a.	Plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems.

STRAND/TOPIC	**26.01200.**	**Biology**
STANDARD / DESCRIPTION	**SB5.**	**Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.**
ELEMENT	**SB5.b.**	**Develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration.**
ELEMENT/GLE	SB5.b.3.	Explaining the need for cycling of major biochemical elements (C, O, N, P, and H).

STRAND/TOPIC	**26.01200.**	**Biology**
STANDARD / DESCRIPTION	**SB5.**	**Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.**
ELEMENT	SB5.d.	Design a solution to reduce the impact of a human activity on the environment.

STRAND/TOPIC	**40.06400.**	**Earth Systems**
STANDARD / DESCRIPTION	**SES5.**	**Obtain, evaluate, and communicate information to investigate the interaction of solar energy and Earth's systems to produce weather and climate.**
ELEMENT	SES5.f.	Construct an argument relating changes in global climate to variation to Earth/sun relationships and atmospheric composition.

STRAND/TOPIC	**40.06400.**	**Earth Systems**
STANDARD / DESCRIPTION	**SES6.**	**Obtain, evaluate, and communicate information about how life on Earth responds to and shapes Earth's systems.**
ELEMENT	SES6.d.	Analyze and interpret data that relates changes in global climate to natural and anthropogenic modification of Earth's atmosphere and oceans.

STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV1.**	**Obtain, evaluate, and communicate information to investigate the flow of energy and cycling of matter within an ecosystem.**
ELEMENT	SEV1.c.	Analyze and interpret data to construct an argument of the necessity of biogeochemical cycles (hydrologic, nitrogen, phosphorus, oxygen, and carbon) to support a sustainable ecosystem.

STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV2.**	**Obtain, evaluate, and communicate information to construct explanations of stability and change in Earth's ecosystems.**
ELEMENT	SEV2.b.	Analyze and interpret data to determine how changes in atmospheric chemistry (carbon dioxide and methane) impact the greenhouse effect.
ELEMENT	SEV2.d.	Construct an argument to support a claim about the value of biodiversity in ecosystem resilience including keystone, invasive, native, endemic, indicator, and endangered species.

STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV4.**	**Obtain, evaluate, and communicate information to analyze human impact on natural resources.**
ELEMENT	SEV4.a.	Construct and revise a claim based on evidence on the effects of human activities on natural resources.
ELEMENT	SEV4.b.	Design, evaluate, and refine solutions to reduce human impact on the environment including, but not limited to, smog, ozone depletion, urbanization, and ocean acidification.

STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV5.**	**Obtain, evaluate, and communicate information about the effects of human population growth on global ecosystems.**
ELEMENT	SEV5.c.	Construct an argument from evidence regarding the ecological effects of human innovations (Agricultural, Industrial, Medical, and Technological Revolutions) on global ecosystems.
ELEMENT	SEV5.d.	Design and defend a sustainability plan to reduce your individual contribution to environmental impacts, taking into account how market forces and societal demands (including political, legal, social, and economic) influence personal choices.

Grade **9** - Adopted: **2019**

STRAND/TOPIC	**26.03100.**	**Botany (2019)**
STANDARD / DESCRIPTION	**SBO3.**	**Obtain, evaluate, and communicate information to describe Georgia's major physiographic ecoregions, their representative natural plant communities, and their conservation.**
ELEMENT	SBO3.d.	Design a solution to create sustainable plant communities within Georgia's ecoregions and reduce negative human impact.

STRAND/TOPIC	**26.03100.**	**Botany (2019)**
STANDARD / DESCRIPTION	**SBO5.**	**Obtain, evaluate, and communicate information to analyze the diversity of plant adaptations and responses to changing environmental conditions.**
ELEMENT	SBO5.c.	Develop and use models to analyze how change and disruptions in major nutrient cycles (i.e., C, H, O, N, P) might affect plant responses.

STRAND/TOPIC	**26.06100.**	**Ecology (2019)**
STANDARD / DESCRIPTION	**SEC3.**	**Obtain, evaluate, and communicate information to construct explanations of community interactions.**
ELEMENT	SEC3.c.	Construct an explanation based on evidence that describes the impact of keystone, invasive, native, indicator, and rare species in Georgia ecosystems.
ELEMENT	SEC3.d.	Construct an explanation about species diversity and how it relates to the stability of ecosystems and communities.

STRAND/TOPIC	**26.06100.**	**Ecology (2019)**
STANDARD / DESCRIPTION	**SEC4.**	**Obtain, evaluate, and communicate information about biogeochemical cycles and how the flow of energy influences ecosystems.**
ELEMENT	SEC4.b.	Construct an explanation of the movement of carbon through an ecosystem.

STRAND/TOPIC	**26.06100.**	**Ecology (2019)**
STANDARD / DESCRIPTION	**SEC5.**	**Obtain, evaluate, and communicate information on the impact of natural and anthropogenic activities on ecological systems.**
ELEMENT	SEC5.a.	Analyze and interpret data on the ecological impacts of sustainable and non-sustainable use of natural resources and predict the cause and effect of unsustainable use of natural resources on ecosystems.
ELEMENT	SEC5.b.	Construct an argument based on evidence to predict the impact of climate change on an ecosystem.
ELEMENT	SEC5.d.	Obtain, evaluate, and communicate mitigation strategies to reduce the impacts of non-sustainable activities on Georgia ecosystems.

STRAND/TOPIC	**40.06300.**	**Geology (2019)**
STANDARD / DESCRIPTION	**SG6.**	**Obtain, evaluate, and communicate information to investigate the distribution, extraction, and use of resources on the Earth and other bodies in the Solar System.**
ELEMENT	SG6.a.	Ask questions to investigate the origin, distribution, and economic importance of geologic resources, including those mined in Georgia.

STRAND/TOPIC	**40.04100.**	**Meteorology (2019)**
STANDARD / DESCRIPTION	**SM2.**	**Obtain, evaluate, and communicate information about energy transfer and its role in precipitation, cloud formation, and air mass formation.**
ELEMENT	SM2.d.	Develop and use models to construct an explanation of the role that pressure differences have on energy transfer and the development of wind systems (e.g., sea breeze, land breeze, Hadley cells, Ferrel cells, prevailing winds, jet stream, ENSO, global scale winds).

STRAND/TOPIC	**40.04100.**	**Meteorology (2019)**
STANDARD / DESCRIPTION	**SM5.**	**Obtain, evaluate, and communicate information about climate and climate change.**
ELEMENT	SM5.b.	Ask questions and communicate information about factors impacting global climate change (e.g., Milankovitch and ENSO cycles, greenhouse gases, changes in physical geography).

STRAND/TOPIC	**26.07100.**	**Zoology (2019)**
STANDARD / DESCRIPTION	**SZ5.**	**Obtain, evaluate, and communicate information to analyze the relationship between humans and animals within various phyla.**
ELEMENT	SZ5.a.	Ask questions and define problems identifying the cause and effect of human activities on the biodiversity of organisms (including habitat destruction, overharvesting, water consumption, and pollution).
ELEMENT	SZ5.b.	Design a solution to preserve species diversity in natural and captive environments with regard to conservation, habitat restoration, breeding programs and management of genetic diversity at local and global levels.
ELEMENT	SZ5.c.	Construct an argument based on evidence of the short-term and long-term impacts of legal, societal, political, ethical, and economic decisions on animal diversity.

Georgia Standards of Excellence

Science

Grade **10** - Adopted: **2016**

STRAND/TOPIC	**26.01200.**	**Biology**
STANDARD / DESCRIPTION	**SB5.**	**Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.**
ELEMENT	SB5.a.	Plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems.

STRAND/TOPIC	**26.01200.**	**Biology**
STANDARD / DESCRIPTION	**SB5.**	**Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.**
ELEMENT	**SB5.b.**	**Develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration.**
ELEMENT/GLE	SB5.b.3.	Explaining the need for cycling of major biochemical elements (C, O, N, P, and H).

STRAND/TOPIC	**26.01200.**	**Biology**
STANDARD / DESCRIPTION	**SB5.**	**Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.**
ELEMENT	SB5.d.	Design a solution to reduce the impact of a human activity on the environment.

STRAND/TOPIC	**40.06400.**	**Earth Systems**
STANDARD / DESCRIPTION	**SES5.**	**Obtain, evaluate, and communicate information to investigate the interaction of solar energy and Earth's systems to produce weather and climate.**

ELEMENT	SES5.f.	Construct an argument relating changes in global climate to variation to Earth/sun relationships and atmospheric composition.
STRAND/TOPIC	**40.06400.**	**Earth Systems**
STANDARD / DESCRIPTION	**SES6.**	**Obtain, evaluate, and communicate information about how life on Earth responds to and shapes Earth's systems.**
ELEMENT	SES6.d.	Analyze and interpret data that relates changes in global climate to natural and anthropogenic modification of Earth's atmosphere and oceans.
STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV1.**	**Obtain, evaluate, and communicate information to investigate the flow of energy and cycling of matter within an ecosystem.**
ELEMENT	SEV1.c.	Analyze and interpret data to construct an argument of the necessity of biogeochemical cycles (hydrologic, nitrogen, phosphorus, oxygen, and carbon) to support a sustainable ecosystem.
STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV2.**	**Obtain, evaluate, and communicate information to construct explanations of stability and change in Earth's ecosystems.**
ELEMENT	SEV2.b.	Analyze and interpret data to determine how changes in atmospheric chemistry (carbon dioxide and methane) impact the greenhouse effect.
ELEMENT	SEV2.d.	Construct an argument to support a claim about the value of biodiversity in ecosystem resilience including keystone, invasive, native, endemic, indicator, and endangered species.
STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV4.**	**Obtain, evaluate, and communicate information to analyze human impact on natural resources.**
ELEMENT	SEV4.a.	Construct and revise a claim based on evidence on the effects of human activities on natural resources.
ELEMENT	SEV4.b.	Design, evaluate, and refine solutions to reduce human impact on the environment including, but not limited to, smog, ozone depletion, urbanization, and ocean acidification.
STRAND/TOPIC	**26.06110.**	**Environmental Science**
STANDARD / DESCRIPTION	**SEV5.**	**Obtain, evaluate, and communicate information about the effects of human population growth on global ecosystems.**
ELEMENT	SEV5.c.	Construct an argument from evidence regarding the ecological effects of human innovations (Agricultural, Industrial, Medical, and Technological Revolutions) on global ecosystems.
ELEMENT	SEV5.d.	Design and defend a sustainability plan to reduce your individual contribution to environmental impacts, taking into account how market forces and societal demands (including political, legal, social, and economic) influence personal choices.

Grade **10** - Adopted: **2019**

STRAND/TOPIC	**26.03100.**	**Botany (2019)**
STANDARD / DESCRIPTION	**SBO3.**	**Obtain, evaluate, and communicate information to describe Georgia's major physiographic ecoregions, their representative natural plant communities, and their conservation.**

ELEMENT	SBO3.d.	Design a solution to create sustainable plant communities within Georgia's ecoregions and reduce negative human impact.
STRAND/TOPIC	**26.03100.**	**Botany (2019)**
STANDARD / DESCRIPTION	**SBO5.**	**Obtain, evaluate, and communicate information to analyze the diversity of plant adaptations and responses to changing environmental conditions.**
ELEMENT	SBO5.c.	Develop and use models to analyze how change and disruptions in major nutrient cycles (i.e., C, H, O, N, P) might affect plant responses.
STRAND/TOPIC	**26.06100.**	**Ecology (2019)**
STANDARD / DESCRIPTION	**SEC3.**	**Obtain, evaluate, and communicate information to construct explanations of community interactions.**
ELEMENT	SEC3.c.	Construct an explanation based on evidence that describes the impact of keystone, invasive, native, indicator, and rare species in Georgia ecosystems.
ELEMENT	SEC3.d.	Construct an explanation about species diversity and how it relates to the stability of ecosystems and communities.
STRAND/TOPIC	**26.06100.**	**Ecology (2019)**
STANDARD / DESCRIPTION	**SEC4.**	**Obtain, evaluate, and communicate information about biogeochemical cycles and how the flow of energy influences ecosystems.**
ELEMENT	SEC4.b.	Construct an explanation of the movement of carbon through an ecosystem.
STRAND/TOPIC	**26.06100.**	**Ecology (2019)**
STANDARD / DESCRIPTION	**SEC5.**	**Obtain, evaluate, and communicate information on the impact of natural and anthropogenic activities on ecological systems.**
ELEMENT	SEC5.a.	Analyze and interpret data on the ecological impacts of sustainable and non-sustainable use of natural resources and predict the cause and effect of unsustainable use of natural resources on ecosystems.
ELEMENT	SEC5.b.	Construct an argument based on evidence to predict the impact of climate change on an ecosystem.
ELEMENT	SEC5.d.	Obtain, evaluate, and communicate mitigation strategies to reduce the impacts of non-sustainable activities on Georgia ecosystems.
STRAND/TOPIC	**40.06300.**	**Geology (2019)**
STANDARD / DESCRIPTION	**SG6.**	**Obtain, evaluate, and communicate information to investigate the distribution, extraction, and use of resources on the Earth and other bodies in the Solar System.**
ELEMENT	SG6.a.	Ask questions to investigate the origin, distribution, and economic importance of geologic resources, including those mined in Georgia.
STRAND/TOPIC	**40.04100.**	**Meteorology (2019)**
STANDARD / DESCRIPTION	**SM2.**	**Obtain, evaluate, and communicate information about energy transfer and its role in precipitation, cloud formation, and air mass formation.**

ELEMENT	SM2.d.	Develop and use models to construct an explanation of the role that pressure differences have on energy transfer and the development of wind systems (e.g., sea breeze, land breeze, Hadley cells, Ferrel cells, prevailing winds, jet stream, ENSO, global scale winds).
STRAND/TOPIC	**40.04100.**	**Meteorology (2019)**
STANDARD / DESCRIPTION	**SM5.**	**Obtain, evaluate, and communicate information about climate and climate change.**
ELEMENT	SM5.b.	Ask questions and communicate information about factors impacting global climate change (e.g., Milankovitch and ENSO cycles, greenhouse gases, changes in physical geography).
STRAND/TOPIC	**26.07100.**	**Zoology (2019)**
STANDARD / DESCRIPTION	**SZ5.**	**Obtain, evaluate, and communicate information to analyze the relationship between humans and animals within various phyla.**
ELEMENT	SZ5.a.	Ask questions and define problems identifying the cause and effect of human activities on the biodiversity of organisms (including habitat destruction, overharvesting, water consumption, and pollution).
ELEMENT	SZ5.b.	Design a solution to preserve species diversity in natural and captive environments with regard to conservation, habitat restoration, breeding programs and management of genetic diversity at local and global levels.
ELEMENT	SZ5.c.	Construct an argument based on evidence of the short-term and long-term impacts of legal, societal, political, ethical, and economic decisions on animal diversity.

Georgia Standards of Excellence

Technology Education

Grade **9** - Adopted: **2013**

STRAND/TOPIC		**Information Technology Career Cluster - Introduction to Digital Technology (Course Number 11.41500)**
STANDARD / DESCRIPTION	**IT-IDT-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-IDT-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Introduction to Cybersecurity (Course Number: 11.48100)**
STANDARD / DESCRIPTION	**IT-ICS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-ICS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Advanced Cybersecurity (Course Number: 11.48200)**
STANDARD / DESCRIPTION	**IT-ACS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-ACS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Computer Science Principles (Course Number: 11.47100)**
STANDARD / DESCRIPTION	**IT-CSP-1.**	**Demonstrate employability skills required by business and industry.**

ELEMENT	IT-CSP-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Computer Science Principles (Course Number: 11.47100)**
STANDARD / DESCRIPTION	**IT-CSP-5.**	**Develop, express, implement, and analyze algorithms analytically and empirically.**
ELEMENT	IT-CSP-5.1.	Develop an algorithm designed to be implemented to run on a computer.
ELEMENT	IT-CSP-5.2.	Explain the building blocks of algorithms: sequencing, selection, iteration, and recursion.
ELEMENT	IT-CSP-5.3.	Express an algorithm in a language.
ELEMENT	IT-CSP-5.5.	Connect problems to potential algorithmic solutions and explain an example of problems that cannot be solved using algorithms.
STRAND/TOPIC		**Information Technology Career Cluster - Computer Science Principles (Course Number: 11.47100)**
STANDARD / DESCRIPTION	**IT-CSP-6.**	**Create programs that translate human intention into computational artifacts including music, images, visualizations, and more while exploring the concepts, techniques and development used in writing programs.**
ELEMENT	IT-CSP-6.1.	Explain how programs implement algorithms.
STRAND/TOPIC		**Information Technology Career Cluster - Game Design: Animation and Simulation Course Number: 11.42900**
STANDARD / DESCRIPTION	**IT-GDAS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-GDAS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Embedded Computing (Course Number: 11.42700)**
STANDARD / DESCRIPTION	**IT-EP-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-EP-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Embedded Computing (Course Number: 11.42700)**
STANDARD / DESCRIPTION	**IT-EP-10.**	**Design an embedded computing application that solves a current problem (e.g., robotics, artbotics, visual, and kinetic art).**
ELEMENT	IT-EP-10.1.	Design, develop, and debug an embedded computing application interfacing to an external sensor, switch, LED, or other device.
STRAND/TOPIC		**Information Technology Career Cluster - Programming, Games, Apps, and Society (Course Number: 11.47200)**

STANDARD / DESCRIPTION	**IT-PGAS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-PGAS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Web Development (Course Number: 11.42500)**
STANDARD / DESCRIPTION	**IT-WDEV-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-WDEV-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Information Technology Essentials (Course Number: 11.41400)**
STANDARD / DESCRIPTION	**IT-ITE-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-ITE-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Information Technology Support (Course Number: 11.42000)**
STANDARD / DESCRIPTION	**IT-ITS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-ITS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Networking Fundamentals (Course Number: 11.46100)**
STANDARD / DESCRIPTION	**IT-NF-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-NF-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Networking Systems and Support (Course Number: 11.46200)**
STANDARD / DESCRIPTION	**IT-NSS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-NSS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Web Design (Course Number: 11.45200)**
STANDARD / DESCRIPTION	**IT-WD-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-WD-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Digital Design (Course Number 11.45100)**
STANDARD / DESCRIPTION	**IT-DD-1.**	**Demonstrate employability skills required by business and industry.**

ELEMENT	IT-DD-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

Georgia Standards of Excellence
Technology Education
Grade **10** - Adopted: **2013**

STRAND/TOPIC		**Information Technology Career Cluster - Introduction to Digital Technology (Course Number 11.41500)**
STANDARD / DESCRIPTION	**IT-IDT-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-IDT-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Introduction to Cybersecurity (Course Number: 11.48100)**
STANDARD / DESCRIPTION	**IT-ICS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-ICS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Advanced Cybersecurity (Course Number: 11.48200)**
STANDARD / DESCRIPTION	**IT-ACS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-ACS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Computer Science Principles (Course Number: 11.47100)**
STANDARD / DESCRIPTION	**IT-CSP-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-CSP-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Computer Science Principles (Course Number: 11.47100)**
STANDARD / DESCRIPTION	**IT-CSP-5.**	**Develop, express, implement, and analyze algorithms analytically and empirically.**
ELEMENT	IT-CSP-5.1.	Develop an algorithm designed to be implemented to run on a computer.
ELEMENT	IT-CSP-5.2.	Explain the building blocks of algorithms: sequencing, selection, iteration, and recursion.
ELEMENT	IT-CSP-5.3.	Express an algorithm in a language.
ELEMENT	IT-CSP-5.5.	Connect problems to potential algorithmic solutions and explain an example of problems that cannot be solved using algorithms.
STRAND/TOPIC		**Information Technology Career Cluster - Computer Science Principles (Course Number: 11.47100)**

STANDARD / DESCRIPTION	**IT-CSP-6.**	**Create programs that translate human intention into computational artifacts including music, images, visualizations, and more while exploring the concepts, techniques and development used in writing programs.**
ELEMENT	IT-CSP-6.1.	Explain how programs implement algorithms.
STRAND/TOPIC		**Information Technology Career Cluster - Game Design: Animation and Simulation Course Number: 11.42900**
STANDARD / DESCRIPTION	**IT-GDAS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-GDAS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Embedded Computing (Course Number: 11.42700)**
STANDARD / DESCRIPTION	**IT-EP-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-EP-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Embedded Computing (Course Number: 11.42700)**
STANDARD / DESCRIPTION	**IT-EP-10.**	**Design an embedded computing application that solves a current problem (e.g., robotics, artbotics, visual, and kinetic art).**
ELEMENT	IT-EP-10.1.	Design, develop, and debug an embedded computing application interfacing to an external sensor, switch, LED, or other device.
STRAND/TOPIC		**Information Technology Career Cluster - Programming, Games, Apps, and Society (Course Number: 11.47200)**
STANDARD / DESCRIPTION	**IT-PGAS-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-PGAS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Web Development (Course Number: 11.42500)**
STANDARD / DESCRIPTION	**IT-WDEV-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-WDEV-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.
STRAND/TOPIC		**Information Technology Career Cluster - Information Technology Essentials (Course Number: 11.41400)**
STANDARD / DESCRIPTION	**IT-ITE-1.**	**Demonstrate employability skills required by business and industry.**
ELEMENT	IT-ITE-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

STRAND/TOPIC		Information Technology Career Cluster - Information Technology Support (Course Number: 11.42000)
STANDARD / DESCRIPTION	IT-ITS-1.	Demonstrate employability skills required by business and industry.
ELEMENT	IT-ITS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

STRAND/TOPIC		Information Technology Career Cluster - Networking Fundamentals (Course Number: 11.46100)
STANDARD / DESCRIPTION	IT-NF-1.	Demonstrate employability skills required by business and industry.
ELEMENT	IT-NF-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

STRAND/TOPIC		Information Technology Career Cluster - Networking Systems and Support (Course Number: 11.46200)
STANDARD / DESCRIPTION	IT-NSS-1.	Demonstrate employability skills required by business and industry.
ELEMENT	IT-NSS-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

STRAND/TOPIC		Information Technology Career Cluster - Web Design (Course Number: 11.45200)
STANDARD / DESCRIPTION	IT-WD-1.	Demonstrate employability skills required by business and industry.
ELEMENT	IT-WD-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

STRAND/TOPIC		Information Technology Career Cluster - Digital Design (Course Number 11.45100)
STANDARD / DESCRIPTION	IT-DD-1.	Demonstrate employability skills required by business and industry.
ELEMENT	IT-DD-1.3.	Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

Hawaii Content and Performance Standards

Mathematics

Grade **9** - Adopted: **2010**

CONTENT STANDARD / COURSE	HI.CC.MP.	Mathematical Practices
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-1.	Make sense of problems and persevere in solving them.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-2.	Reason abstractly and quantitatively.

STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-3.	Construct viable arguments and critique the reasoning of others.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-4.	Model with mathematics.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-6.	Attend to precision.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-7.	Look for and make use of structure.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-8.	Look for and express regularity in repeated reasoning.
CONTENT STANDARD / COURSE	**HI.CC.F.**	**Functions**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**F-IF.**	**Interpreting Functions**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Interpret functions that arise in applications in terms of the context.**
EXPECTATION / TOPIC	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Hawaii Content and Performance Standards

Mathematics

Grade **10** - Adopted: **2010**

CONTENT STANDARD / COURSE	**HI.CC.MP.**	**Mathematical Practices**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-1.	Make sense of problems and persevere in solving them.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-2.	Reason abstractly and quantitatively.

STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-3.	Construct viable arguments and critique the reasoning of others.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-4.	Model with mathematics.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-6.	Attend to precision.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-7.	Look for and make use of structure.
STANDARD / PERFORMANCE INDICATOR / DOMAIN	MP-8.	Look for and express regularity in repeated reasoning.

CONTENT STANDARD / COURSE	**HI.CC.F.**	**Functions**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**F-IF.**	**Interpreting Functions**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Interpret functions that arise in applications in terms of the context.**
EXPECTATION / TOPIC	F-IF.6.	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Hawaii Content and Performance Standards

Science

Grade **9** - Adopted: **2016**

CONTENT STANDARD / COURSE	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

CONTENT STANDARD / COURSE	**NGSS.HS-LS.**	**LIFE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
EXPECTATION / TOPIC	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
EXPECTATION / TOPIC	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
EXPECTATION / TOPIC	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

CONTENT STANDARD / COURSE	**NGSS.HS-LS.**	**LIFE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-LS4.**	**Biological Evolution: Unity and Diversity**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

CONTENT STANDARD / COURSE	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-ESS2.**	**Earth's Systems**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	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.
EXPECTATION / TOPIC	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

CONTENT STANDARD / COURSE	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-ESS3.**	**Earth and Human Activity**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
EXPECTATION / TOPIC	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
EXPECTATION / TOPIC	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
EXPECTATION / TOPIC	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
CONTENT STANDARD / COURSE	**NGSS.HS-ETS.**	**ENGINEERING DESIGN**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-ETS1.**	**Engineering Design**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
EXPECTATION / TOPIC	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.
EXPECTATION / TOPIC	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Hawaii Content and Performance Standards

Science

Grade **10** - Adopted: **2016**

CONTENT STANDARD / COURSE	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**

INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.
CONTENT STANDARD / COURSE	**NGSS.HS-LS.**	**LIFE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-LS2-2.	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
EXPECTATION / TOPIC	HS-LS2-4.	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
EXPECTATION / TOPIC	HS-LS2-5.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
EXPECTATION / TOPIC	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
CONTENT STANDARD / COURSE	**NGSS.HS-LS.**	**LIFE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-LS4.**	**Biological Evolution: Unity and Diversity**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-LS4-6.	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.
CONTENT STANDARD / COURSE	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-ESS2.**	**Earth's Systems**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**

EXPECTATION / TOPIC	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.
EXPECTATION / TOPIC	HS-ESS2-6.	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
CONTENT STANDARD / COURSE	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-ESS3.**	**Earth and Human Activity**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
EXPECTATION / TOPIC	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
EXPECTATION / TOPIC	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
EXPECTATION / TOPIC	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
CONTENT STANDARD / COURSE	**NGSS.HS-ETS.**	**ENGINEERING DESIGN**
STANDARD / PERFORMANCE INDICATOR / DOMAIN	**HS-ETS1.**	**Engineering Design**
INDICATOR / GRADE LEVEL EXPECTATION / BENCHMARK		**Students who demonstrate understanding can:**
EXPECTATION / TOPIC	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
EXPECTATION / TOPIC	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.
EXPECTATION / TOPIC	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.