Main Criteria: Forward Education
Secondary Criteria: Arkansas Standards
Subjects: Mathematics, Science, Technology Education
Grades: 11, 12, Key Stage 4

Forward Education

Autonomous Electric Vehicles of the Future

Arkansas Standards
Mathematics
Grade **11** - Adopted: **2023**

STRAND / TOPIC		**Algebra I Mathematics Standards**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Graphing & Transformations - Students graph linear functions, equations, and inequalities.**
BENCHMARK / PROFICIENCY	A1.LFE.15.	Write linear equations that model the relationship between two quantities and produce a graph of the equation.
BENCHMARK / PROFICIENCY	A1.LFE.16.	Graph linear functions expressed as an equation and show intercepts of the graph without technology.

STRAND / TOPIC		**Geometry Mathematics Standards**
CONTENT STANDARD	**G.LA.**	**Lines & Angles**
PERFORMANCE EXPECTATION		**Parallel & Perpendicular Lines - Students solve problems involving parallel and perpendicular lines.**
BENCHMARK / PROFICIENCY	G.LA.6.	Write an equation of a line that is parallel or perpendicular to a given line and passing through a given point.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.FN.**	**Functions**
PERFORMANCE EXPECTATION		**Construct & Compare – Students construct and compare linear, quadratic, and exponential models and solve problems.**
BENCHMARK / PROFICIENCY	A1.FN.5.	Differentiate between real-world scenarios that can be modeled by exponential or linear functions by determining whether the relationship has a common difference or a common ratio.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Create & Solve – Students create and solve equations that model linear relationships.**

BENCHMARK / PROFICIENCY	A1.LFE.3.	Solve linear formulas for a specified variable.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Systems of Equations & Inequalities – Students solve systems of equations and inequalities.**
BENCHMARK / PROFICIENCY	A1.LFE.12.	Solve a system of equations consisting of a linear equation and a quadratic equation in two variables graphically with the assistance of technology.
BENCHMARK / PROFICIENCY	A1.LFE.13.	Explain why a solution to the equation f(x) = g(x) is the x-coordinate where the y-coordinate of f(x) and g(x) are the same using graphs, tables, or approximations. Include cases where f(x) and/or g(x) are linear, quadratic, absolute value, and exponential.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Graphing & Transformations – Students graph linear functions, equations, and inequalities.**
BENCHMARK / PROFICIENCY	A1.LFE.15.	Write linear equations that model the relationship between two quantities and produce a graph of the equation.
BENCHMARK / PROFICIENCY	A1.LFE.16.	Graph linear functions expressed as an equation and show intercepts of the graph without technology.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Statistical Relationships – Students explore linear statistical relationships.**
BENCHMARK / PROFICIENCY	A1.LFE.20.	Write linear functions that provide a reasonable fit to data and use them to make predictions, with and without technology; interpret the slope and y-intercept in context.

Arkansas Standards

Mathematics

Grade **12** - Adopted: **2023**

STRAND / TOPIC		**Algebra I Mathematics Standards**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Graphing & Transformations - Students graph linear functions, equations, and inequalities.**

BENCHMARK / PROFICIENCY	A1.LFE.15.	Write linear equations that model the relationship between two quantities and produce a graph of the equation.
BENCHMARK / PROFICIENCY	A1.LFE.16.	Graph linear functions expressed as an equation and show intercepts of the graph without technology.

STRAND / TOPIC		**Geometry Mathematics Standards**
CONTENT STANDARD	**G.LA.**	**Lines & Angles**
PERFORMANCE EXPECTATION		**Parallel & Perpendicular Lines - Students solve problems involving parallel and perpendicular lines.**
BENCHMARK / PROFICIENCY	G.LA.6.	Write an equation of a line that is parallel or perpendicular to a given line and passing through a given point.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.FN.**	**Functions**
PERFORMANCE EXPECTATION		**Construct & Compare – Students construct and compare linear, quadratic, and exponential models and solve problems.**
BENCHMARK / PROFICIENCY	A1.FN.5.	Differentiate between real-world scenarios that can be modeled by exponential or linear functions by determining whether the relationship has a common difference or a common ratio.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Create & Solve – Students create and solve equations that model linear relationships.**
BENCHMARK / PROFICIENCY	A1.LFE.3.	Solve linear formulas for a specified variable.

STRAND / TOPIC		**CRITICAL ALGEBRA I MATH STANDARDS**
CONTENT STANDARD	**A1.LFE.**	**Linear Functions, Equations, & Inequalities**
PERFORMANCE EXPECTATION		**Systems of Equations & Inequalities – Students solve systems of equations and inequalities.**
BENCHMARK / PROFICIENCY	A1.LFE.12.	Solve a system of equations consisting of a linear equation and a quadratic equation in two variables graphically with the assistance of technology.
BENCHMARK / PROFICIENCY	A1.LFE.13.	Explain why a solution to the equation f(x) = g(x) is the x-coordinate where the y-coordinate of f(x) and g(x) are the same using graphs, tables, or approximations. Include cases where f(x) and/or g(x) are linear, quadratic, absolute value, and exponential.

STRAND / TOPIC		CRITICAL ALGEBRA I MATH STANDARDS
CONTENT STANDARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANCE EXPECTATION		Graphing & Transformations – Students graph linear functions, equations, and inequalities.
BENCHMARK / PROFICIENCY	A1.LFE.15.	Write linear equations that model the relationship between two quantities and produce a graph of the equation.
BENCHMARK / PROFICIENCY	A1.LFE.16.	Graph linear functions expressed as an equation and show intercepts of the graph without technology.

STRAND / TOPIC		CRITICAL ALGEBRA I MATH STANDARDS
CONTENT STANDARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANCE EXPECTATION		Statistical Relationships – Students explore linear statistical relationships.
BENCHMARK / PROFICIENCY	A1.LFE.20.	Write linear functions that provide a reasonable fit to data and use them to make predictions, with and without technology; interpret the slope and y-intercept in context.

Arkansas Standards

Science

Grade **11** - Adopted: **2016**

STRAND / TOPIC	AR.BI.	Biology – Integrated
CONTENT STANDARD		Biodiversity and Population Dynamics
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	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.

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-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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.CI.**	**Chemistry – Integrated**
CONTENT STANDARD		**Energy Flow**

PERFORMANCE EXPECTATION	CI-PS1-4.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
PERFORMANCE EXPECTATION	CI-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
STRAND / TOPIC	**AR.CII.**	**Chemistry II**
CONTENT STANDARD		**Reactions**
PERFORMANCE EXPECTATION	CII-PS3-3AR.	Plan and carry out an investigation to predict the outcome of a chemical reaction based on patterns of chemical properties.
PERFORMANCE EXPECTATION	CII3-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.CII.**	**Chemistry II**
CONTENT STANDARD		**Thermochemistry**
PERFORMANCE EXPECTATION	CII-PS1-4.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
STRAND / TOPIC	**AR.ES.**	**Earth Science**
CONTENT STANDARD		**Earth's Systems**
PERFORMANCE EXPECTATION	ES2-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	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.
PERFORMANCE EXPECTATION	ES3-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	ES3-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	ES3-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.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.
PERFORMANCE EXPECTATION	ES4-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		**Systems**
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-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of 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		**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	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		**Elements, Matter, and Interactions**
PERFORMANCE EXPECTATION	PSI-PS1-4.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Matter in Organisms**

PERFORMANCE EXPECTATION	PSI2-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.
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		**Energy**
PERFORMANCE EXPECTATION	PSI-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
PERFORMANCE EXPECTATION	PSI4-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		**Waves**
PERFORMANCE EXPECTATION	PSI-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.
PERFORMANCE EXPECTATION	PSI-5-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.
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-ETS1-2.	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	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		**Motion**
PERFORMANCE EXPECTATION	P1-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.
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	P-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
PERFORMANCE EXPECTATION	P3-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	P3-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	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.

PERFORMANCE EXPECTATION	P3-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		**Electricity**
PERFORMANCE EXPECTATION	P5-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Grade **11** - Adopted: **2010**

STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Key Ideas and Details**
PERFORMANCE EXPECTATION	RST.11-12.2.	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
PERFORMANCE EXPECTATION	RST.11-12.3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Craft and Structure**
PERFORMANCE EXPECTATION	RST.11-12.4.	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 11-12 texts and topics.
PERFORMANCE EXPECTATION	RST.11-12.5.	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
PERFORMANCE EXPECTATION	RST.11-12.6.	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Integration of Knowledge and Ideas**
PERFORMANCE EXPECTATION	RST.11-12.9.	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**

CONTENT STANDARD		**Range of Reading and Level of Text Complexity**
PERFORMANCE EXPECTATION	RST.11-12.10.	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.
STRAND / TOPIC	**AR.WHST.11-12.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Text Types and Purposes**
PERFORMANCE EXPECTATION	**WHST.11-12.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
BENCHMARK / PROFICIENCY	WHST.11-12.2(d)	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
STRAND / TOPIC	**AR.WHST.11-12.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Production and Distribution of Writing**
PERFORMANCE EXPECTATION	WHST.11-12.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
PERFORMANCE EXPECTATION	WHST.11-12.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Arkansas Standards

Science

Grade **12** - Adopted: **2016**

STRAND / TOPIC	**AR.BI.**	**Biology – Integrated**
CONTENT STANDARD		**Biodiversity and Population Dynamics**
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	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.
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-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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.CI.**	**Chemistry – Integrated**
CONTENT STANDARD		**Energy Flow**
PERFORMANCE EXPECTATION	CI-PS1-4.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
PERFORMANCE EXPECTATION	CI-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
STRAND / TOPIC	**AR.CII.**	**Chemistry II**
CONTENT STANDARD		**Reactions**
PERFORMANCE EXPECTATION	CII-PS3-3AR.	Plan and carry out an investigation to predict the outcome of a chemical reaction based on patterns of chemical properties.
PERFORMANCE EXPECTATION	CII3-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.CII.**	**Chemistry II**
CONTENT STANDARD		**Thermochemistry**
PERFORMANCE EXPECTATION	CII-PS1-4.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
STRAND / TOPIC	**AR.ES.**	**Earth Science**
CONTENT STANDARD		**Earth's Systems**
PERFORMANCE EXPECTATION	ES2-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	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.
PERFORMANCE EXPECTATION	ES3-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	ES3-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	ES3-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.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.
PERFORMANCE EXPECTATION	ES4-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		**Systems**
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-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of 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		**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	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		**Elements, Matter, and Interactions**

PERFORMANCE EXPECTATION	PSI-PS1-4.	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
STRAND / TOPIC	**AR.PSI.**	**Physical Science – Integrated**
CONTENT STANDARD		**Matter in Organisms**
PERFORMANCE EXPECTATION	PSI2-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.
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		**Energy**
PERFORMANCE EXPECTATION	PSI-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.
PERFORMANCE EXPECTATION	PSI4-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		**Waves**
PERFORMANCE EXPECTATION	PSI-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.
PERFORMANCE EXPECTATION	PSI-5-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.
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-ETS1-2.	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	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		**Motion**
PERFORMANCE EXPECTATION	P1-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.
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	P-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

PERFORMANCE EXPECTATION	P3-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	P3-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	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.
PERFORMANCE EXPECTATION	P3-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		**Electricity**
PERFORMANCE EXPECTATION	P5-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Grade **12** - Adopted: **2010**

STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Key Ideas and Details**
PERFORMANCE EXPECTATION	RST.11-12.2.	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
PERFORMANCE EXPECTATION	RST.11-12.3.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Craft and Structure**
PERFORMANCE EXPECTATION	RST.11-12.4.	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 11-12 texts and topics.
PERFORMANCE EXPECTATION	RST.11-12.5.	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
PERFORMANCE EXPECTATION	RST.11-12.6.	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Integration of Knowledge and Ideas**
PERFORMANCE EXPECTATION	RST.11-12.9.	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

STRAND / TOPIC	**AR.RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Range of Reading and Level of Text Complexity**
PERFORMANCE EXPECTATION	RST.11-12.10.	By the end of grade 12, read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.

STRAND / TOPIC	**AR.WHST.11-12.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Text Types and Purposes**
PERFORMANCE EXPECTATION	**WHST.11-12.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
BENCHMARK / PROFICIENCY	WHST.11-12.2(d)	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

STRAND / TOPIC	**AR.WHST.11-12.**	**Writing Standards for Literacy in Science and Technical Subjects**
CONTENT STANDARD		**Production and Distribution of Writing**
PERFORMANCE EXPECTATION	WHST.11-12.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
PERFORMANCE EXPECTATION	WHST.11-12.6.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Arkansas Standards

Technology Education

Grade **11** - 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
BENCHMARK / PROFICIENCY	CSRB.Y2.2.7.	Explain how concepts of mechanical engineering including, but not limited to, gear ratios, speed, stability, and torque relate to the implementation of robotics systems and subsystems
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 **12** - 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
BENCHMARK / PROFICIENCY	CSRB.Y2 .2.7.	Explain how concepts of mechanical engineering including, but not limited to, gear ratios, speed, stability, and torque relate to the implementation of robotics systems and subsystems

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