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 ST AND ARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANC E EXPECTATION		Graphing & Transformations - Students graph linear functions, equations, and inequalities.
BENCHMARK / PROFICIENCY	A1.LFE.1 5.	Write linear equations that model the relationship between two quantities and produce a graph of the equation.

BENCHMARK / A1.LFE.1 Graph linear functions expressed as an equation and show intercepts of the graph without technology. PROFICIENCY 6.

STRAND / TOPIC		Geometry Mathematics Standards
CONTENT ST ANDARD	G.LA.	Lines & Angles
PERFORMANC E EXPECTATION		Parallel & Perpendicular Lines - Students solve problems involving parallel and perpendicular lines.

BENCHMARK / G.LA.6. Write an equation of a line that is parallel or perpendicular to a given line and passing through a given point. PROFICIENCY

STRAND / TOPIC		CRITICAL ALGEBRA I MATH STANDARDS
CONTENT STANDARD	A1.FN.	Functions
PERFORMANC E 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 ST ANDARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANC E EXPECT AT ION		Create & Solve – Students create and solve equations that model linear relationships.

BENCHMARK / PROFICIENCY

A1.LFE.3. Solve linear formulas for a specified variable.

PROFICIENCY		
STRAND / TOPIC		CRITICAL ALGEBRA I MATH STANDARDS
CONTENT STANDARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANC E EXPECT AT ION		Systems of Equations & Inequalities – Students solve systems of equations and inequalities.
BENCHMARK / PROFICIENCY	A1.LFE.1 2.	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.1 3.	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
PERFORMANC E EXPECTATION		Graphing & Transformations – Students graph linear functions, equations, and inequalities.
BENCHMARK / PROFICIENCY	A1.LFE.1 5.	Write linear equations that model the relationship between two quantities and produce a graph of the equation.
BENCHMARK / PROFICIENCY	A1.LFE.1 6.	Graph linear functions expressed as an equation and show intercepts of the graph without technology.
STRAND / TOPIC		CRITICAL ALGEBRA I MATH STANDARDS
CONTENT ST ANDARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANC E EXPECTATION		Statistical Relationships – Students explore linear statistical relationships.
BENCHMARK /		Write linear functions that provide a reasonable fit to data and use them to make predictions, with and without

BENCHMARK / A1.LFE.2 Write linear functions that provide a reasonable fit to data and use them to make predictions, with and without PROFICIENCY 0. technology; interpret the slope and y-intercept in context.

Arkansas Standards Mathematics

Grade 12 - Adopted: 2023

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

BENCHMARK /	A1.LFE.1	Write linear equations that model the relationship between two quantities and produce a graph of the equation.
PROFICIENCY	5.	

BENCHMARK /A1.LFE.1Graph linear functions expressed as an equation and show intercepts of the graph without technology.PROFICIENCY6.

STRAND / TOPIC		Geometry Mathematics Standards
CONTENT STANDARD	G.LA.	Lines & Angles
PERFORMANC E EXPECTATION		Parallel & Perpendicular Lines - Students solve problems involving parallel and perpendicular lines.

BENCHMARK / C

/ 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
PERFORMANC E EXPECT AT ION		Construct & Compare – Students construct and compare linear, quadratic, and exponential models and solve problems.

BENCHMARK / A 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
PERFORMANC E EXPECTATION		Create & Solve – Students create and solve equations that model linear relationships.

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

STRAND / TOPIC		CRITICAL ALGEBRA I MATH STANDARDS
CONTENT STANDARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANC E EXPECTATION		Systems of Equations & Inequalities – Students solve systems of equations and inequalities.
BENCHMARK / PROFICIENCY	A1.LFE.1 2.	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.1 3.	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
PERFORMANC E EXPECTATION		Graphing & Transformations – Students graph linear functions, equations, and inequalities.

BENCHMARK /A1.LFE.1Write linear equations that model the relationship between two quantities and produce a graph of the equation.PROFICIENCY5.

BENCHMARK /A1.LFE.1Graph linear functions expressed as an equation and show intercepts of the graph without technology.PROFICIENCY6.

STRAND / TOPIC		CRITICAL ALGEBRA I MATH STANDARDS
CONTENT STANDARD	A1.LFE.	Linear Functions, Equations, & Inequalities
PERFORMANC E EXPECTATION		Statistical Relationships – Students explore linear statistical relationships.
BENCHMARK /	A1.LFE.2	Write linear functions that provide a reasonable fit to data and use them to make predictions, with and without

Arkansas Standards

Science

technology; interpret the slope and y-intercept in context.

PROFICIENCY 0.

Grade 11 - Adopted: 2016

STRAND / TOPIC	AR.BI.	Biology – Integrated
CONTENT STANDARD		Biodiversity and Population Dynamics
PERFORMANC E EXPECTATION	BI-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANC E 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
	AR.BI.	Biology – Integrated Life and Earth's Systems
TOPIC		

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E ETS1-3. 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 Energy Flow			Nuclear Reactions
TOPIC Image: Content CONTENT Energy Flow	E		range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and
		AR.CI.	Chemistry – Integrated
			Energy Flow

PERFORMANC	CI-PS1-	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends
E	4.	upon the changes in total bond energy.
EXPECTATION		

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

EXPECTATION

STRAND / TOPIC	AR.CII.	Chemistry II
CONTENT STANDARD		Reactions
PERFORMANC E EXPECTATION	CII-PS3- 3AR.	Plan and carry out an investigation to predict the outcome of a chemical reaction based on patterns of chemical properties.
PERFORMANC E 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 ST ANDARD		Thermochemistry

 PERFORMANC
 CII-PS1 Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends

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 upon the changes in total bond energy.

EXPECTATION

STRAND / TOPIC	AR.ES.	Earth Science
CONTENT STANDARD		Earth's Systems
PERFORMANC E 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.

PERFORMANC	ES2-	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a
E	ETS1-3.	range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and
EXPECTATION		environmental impacts.

STRAND / TOPIC	AR.ES.	Earth Science
CONTENT STANDARD		Human Sustainability
PERFORMANC E 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.
PERFORMANC E EXPECTATION	ES- ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

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TOPIC Systems	E		range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and
	STRAND / TOPIC	AR.EVS.	Environmental Science
			Systems

PERFORMANC	EVS-	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the
E	ESS3-5.	current rate of global or regional climate change and associated future impacts to Earth systems.
EXPECTATION		

PERFORMANC	EVS1-	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that
E	ETS1-1.	account for societal needs and wants.
EXPECTATION		

STRAND / TOPIC	AR.EVS.	Environmental Science
CONTENT STANDARD		Energy

PERFORMANC E 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.
PERFORMANC E 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 ST AND ARD		Sustainability
PERFORMANC E 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.
PERFORMANC E EXPECTATION	EVS- ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANC E 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.
PERFORMANC E EXPECTATION	EVS- ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANC E 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.
PERFORMANC E EXPECTATION	EVS- LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity
PERFORMANC E 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 ST ANDARD		Elements, Matter, and Interactions
PERFORMANC E 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 ST AND ARD		Matter in Organisms

PERFORMANC PSI2-E ETS1-2. EXPECTATION

Е

EXPECTATION

ESS3-2.

cost-benefit ratios.

SI2- Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problemsS1-2. that can be solved through engineering.

STRAND /
TOPICAR.PSI.Physical Science - IntegratedCONTENT
STANDARDForces and MotionPERFORMANC
E
EXPECTATIONPSI3-
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 /
DPICAR.PSI.Physical Science - Integrated

STRAND / TOPIC	AR.PSI.	Physical Science – Integrated	
CONTENT ST ANDARD		Energy	
PERFORMANC E 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.	
PERFORMANC E 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 ST AND ARD		Waves	
PERFORMANC E EXPECTATION	PSI- PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.	
PERFORMANC E 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 ST AND ARD		Interactions of Humans and the Environment	
PERFORMANC E EXPECTATION	PSI-LS2- 7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	
PERFORMANC E 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.	
PERFORMANC	PSI-	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on	

PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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 ST ANDARD		Motion
PERFORMANC	P1-	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems

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

STRAND / TOPIC	AR.P.	Physics
CONTENT ST ANDARD		Work and Energy
PERFORMANC E	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

	J	- /
EXPECTATION	environmental imp	acts.

STRAND / TOPIC	AR.P.	Physics
CONTENT STANDARD		Heat and Thermodynamics
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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.

PERFORMANC P3-Е EXPECTATION

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

STRAND / TOPIC	AR.P.	Physics
CONTENT ST ANDARD		Electricity
PERFORMANC E	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.

EXPECTATION

Grade 11 - Adopted: 2010			
STRAND / TOPIC	AR.RST.1 1-12.	Reading Standards for Literacy in Science and Technical Subjects	
CONTENT STANDARD		Key Ideas and Details	
PERFORMANC E EXPECTATION	RST.11- Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information 12.2. presented in a text by paraphrasing them in simpler but still accurate terms.		
PERFORMANC E EXPECTATION	RST.11- 12.3.		
STRAND / TOPIC	AR.RST.1 1-12.	Reading Standards for Literacy in Science and Technical Subjects	
CONTENT STANDARD		Craft and Structure	
PERFORMANC E 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.	
PERFORMANC E EXPECTATION	RST.11- 12.5.	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	
PERFORMANC E 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.1 1-12.	Reading Standards for Literacy in Science and Technical Subjects	
CONTENT STANDARD		Integration of Knowledge and Ideas	
PERFORMANC E 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.1 1-12.	Reading Standards for Literacy in Science and Technical Subjects	

CONTENT STANDARD		Range of Reading and Level of Text Complexity
PERFORMANC E 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
PERFORMANC E EXPECTATION	1-12.2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
BENCHMARK /	WHST.11	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to

PROFICIENCY -12.2(d) 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
PERFORMANC E EXPECTATION	WHST.11 -12.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
PERFORMANC	WUST11	Use technology including the Internet to produce, publish and undate individual or shared writing products in

PERFORMANC	WHST.11	Use technology, including the Internet, to produce, publish, and update individual or shared writing products in
E	-12.6.	response to ongoing feedback, including new arguments or information.
EXPECTATION		

Arkansas Standards

Science

Grade 12 - Adopted: 2016

STRAND / TOPIC	AR.BI.	Biology – Integrated
CONTENT STANDARD		Biodiversity and Population Dynamics
PERFORMANC E EXPECTATION	BI-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANC E 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	I	AR.BI.	Biology – Integrated
CONTEN ST ANDA			Life and Earth's Systems
PERFORI E EXPECTA		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.

PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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
PERFORMANC E 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.
PERFORMANC E EXPECTATION	BI-ESS3- 2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANC E EXPECTATION	BI-ESS3- 3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
PERFORMANC E EXPECTATION	BI-ESS3- 4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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 ST AND ARD		Nuclear Reactions
PERFORMANC E EXPECTATION	Cl2- 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
PERFORMANC E 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.

PERFORMANC	CI-ESS3-	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
E	4.	
EXPECTATION		

STRAND / AR.CII. Chemistry II TOPIC CONTENT Reactions **STANDARD** PERFORMANC CII-PS3-Plan and carry out an investigation to predict the outcome of a chemical reaction based on patterns of chemical Е 3AR. properties. EXPECTATION Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a PERFORMANC CII3-Е ETS1-3. range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and EXPECTATION environmental impacts. STRAND / AR.CII. Chemistry II TOPIC CONTENT Thermochemistry STANDARD

PERFORMANC	CII-PS1-	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends
E	4.	upon the changes in total bond energy.
EXPECTATION		

STRAND / TOPIC	AR.ES.	Earth Science
CONTENT ST ANDARD		Earth's Systems
PERFORMANC E 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.
PERFORMANC E 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

PERFORMANC E 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.
PERFORMANC E EXPECTATION	ES- ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANC E 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.
PERFORMANC E EXPECTATION	ES- ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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 ST ANDARD		Weather and Climate
PERFORMANC E 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.
PERFORMANC E 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 ST ANDARD		Systems
PERFORMANC		

PERFORMANCEVS1-Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions thatEETS1-1.account for societal needs and wants.EXPECTATION

STRAND / TOPIC	AR.EVS.	Environmental Science
CONTENT ST AND ARD		Energy
PERFORMANC	EVS-	Design, build, and refine a device that works within given constraints to convert one form of energy into another form

 PERFORMANC
 EVS Design, build, and refine a device that works within given constraints to convert one form of energy into another form

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 PS3-3.
 of energy.

 EXPECTATION
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PERFORMANCEVS-Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes inEESS2-4.climate.EXPECTATION

STRAND / TOPIC	AR.EVS.	Environmental Science
CONTENT STANDARD		Sustainability
PERFORMANC E 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.
PERFORMANC E EXPECTATION	EVS- ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANC E 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.
PERFORMANC E EXPECTATION	EVS- ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
PERFORMANC E 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.
PERFORMANC E EXPECTATION	EVS- LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity
PERFORMANC E 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
		Elements, Matter, and Interactions

PERFORMANCPSI-PS1-Develop a model to illustrate that the release or absorption of energy from a chemical reaction system dependsE4.upon the changes in total bond energy.EXPECTATION

STRAND / TOPIC	AR.PSI.	Physical Science – Integrated
CONTENT STANDARD		Matter in Organisms
PERFORMANC E	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.

EXPECTATION

STRAND / TOPIC	AR.PSI.	Physical Science – Integrated
CONTENT ST ANDARD		Forces and Motion
PERFORMANC	PSI3-	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that

E ETS1-1. account for societal needs and wants. EXPECTATION

STRAND / TOPIC	AR.PSI.	Physical Science – Integrated
CONTENT STANDARD		Energy
PERFORMANC E 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.
PERFORMANC E 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
PERFORMANC E EXPECTATION	PSI- PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.
PERFORMANC E 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

PERFORMANC E EXPECTATION	PSI-LS2- 7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
PERFORMANC E 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.
PERFORMANC E EXPECTATION	PSI- ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E	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.

PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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.
PERFORMANC E 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 ST AND ARD		Electricity
PERFORMANC E 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.1 1-12.	Reading Standards for Literacy in Science and Technical Subjects
CONTENT ST ANDARD		Key Ideas and Details
	RST.11- 12.2.	Key Ideas and Details 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.
ST AND ARD PERFORMANC E		Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information
ST AND ARD PERFORMANC E EXPECTATION PERFORMANC E	12.2. RST.11- 12.3.	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.
ST AND ARD PERFORMANC E EXPECTATION PERFORMANC E EXPECTATION ST RAND /	12.2. RST.11- 12.3.	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. 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.
ST AND ARD PERFORMANC E EXPECTATION PERFORMANC E EXPECTATION ST RAND / TOPIC CONT ENT	12.2. RST.11- 12.3.	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. 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. Reading Standards for Literacy in Science and Technical Subjects
ST AND ARDPERFORMANCEEXPECTATIONPERFORMANCEEXPECTATIONST RAND /CONT ENTST AND ARDPERFORMANCE	12.2. RST.11- 12.3. AR.RST.11 1-12. RST.11-	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. 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. Reading Standards for Literacy in Science and Technical Subjects Craft and Structure Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a

STRAND / TOPIC	AR.RST.1 1-12.	Reading Standards for Literacy in Science and Technical Subjects
CONTENT STANDARD		Integration of Knowledge and Ideas
PERFORMANC E	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.

EXPECTATION

STRAND / TOPIC	AR.RST.1 1-12.	Reading Standards for Literacy in Science and Technical Subjects
CONTENT STANDARD		Range of Reading and Level of Text Complexity
PERFORMANC E 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
PERFORMANC E EXPECTATION	WHST.1 1-12.2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
BENCHMARK /	WHST.11	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to

PROFICIENCY -12.2(d) 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
PERFORMANC E EXPECTATION	WHST.11 -12.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
PERFORMANC E	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.

EXPECTATION

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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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. 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
PERFORMANC E EXPECT AT ION		Content Cluster 5: Students will create, evaluate, and modify algorithms.

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

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
PROFICIENC	5.5.	search and soft algorithms

BENCHMARK /	AIML.Y2.	Identify and utilize the metrics for measuring artificial intelligence and machine learning algorithms
PROFICIENCY	5.5.	

STRAND / TOPIC		Computer Science: Artificial Intelligence and Machine Learning – Year 2
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 /	AIML.Y2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,
PROFICIENCY	6.2.	indentation, user experience design, whitespace)

STRAND / TOPIC	Computer Science: Artificial Intelligence and Machine Learning – Year 2
CONTENT STANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 7: Students will analyze the utilization of computers within industry.

BENCHMARK /AIML.Y2.Utilize hardware and/or software to solve level-appropriate industry-based problemsPROFICIENCY7.1.

STRAND / TOPIC		Computer Science: Artificial Intelligence and Machine Learning – Year 3
CONTENT ST AND ARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E EXPECTATION		Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSCE.Y1Design and implement level-appropriate algorithms that use iteration, selection, and sequencePROFICIENCY.5.1.

STRAND / TOPIC	Computer Science: Computer Engineering – Year 1
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT ATION	Content Cluster 6: Students will create programs to solve problems.

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

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

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

 PROFICIENCY
 .29.

STRAND / TOPIC		Computer Science: Computer Engineering – Year 2
CONTENT ST AND ARD		Strand: Algorithms and Programs
PERFORMANC E 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
CONT ENT ST AND ARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST AND ARD		Strand: Computers and Communications
PERFORMANC E EXPECTATION		Content Cluster 9: Students will utilize appropriate hardware and software.
BENCHMARK /	CSCE.Y2	Define important engineering constraints such as cost, performance, power, size, timing, and weight and their

PROFICIENCY .9.10. tradeoffs in the context of digital systems design

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

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

STRAND / TOPIC		Computer Science: Computer Engineering – Year 3
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E EXPECTATION		Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.

BENCHMARK /CSCE.Y3Solve problems of level-appropriate complexity using fundamental laws of electricity (e.g., Faraday, Kirchhoff, Ohms)PROFICIENCY.2.9.

STRAND / TOPIC		Computer Science: Computer Engineering – Year 3
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST ANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK /CSCE.Y3Apply best practices of program design and format (e.g., descriptive names, documentation, indentation, userPROFICIENCY.6.2.experience design, whitespace)

TRAND / OPIC	Computer Science: Computer Engineering – Year 3
CONTENT STANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 9: Students will utilize appropriate hardware and software.

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

 PROFICIENCY
 .9.11.

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

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

STRAND / TOPIC		Computer Science: Cybersecurity – Year 1
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 /		Computer Science: Cybersecurity – Year 1

	Computer Science: Cybersecurity – Year 1
CONTENT ST AND ARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

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

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

 PROFICIENCY
 .5.2.

STRAND / TOPIC	Computer Science: Cybersecurity – Year 1
CONTENT ST AND ARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK / CSCS. PROFICIENCY .6.2.

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

STRAND / TOPIC		Computer Science: Cybersecurity – Year 2
CONT ENT ST AND ARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 /
 CSCS.Y2
 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

 PROFICIENCY
 .1.3.

STRAND / TOPIC	Computer Science: Cybersecurity – Year 2
CONTENT STANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION	Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.

BENCHMARK /CSCS.Y2Research and implement level-appropriate common cryptography algorithms and concepts such as random numberPROFICIENCY.2.3.generation and hashing functions

STRAND / TOPIC	Computer Science: Cybersecurity – Year 2
CONTENT STANDARD	Strand: Algorithms and Programs

PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.
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BENCHMARK /CSCS.Y2Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequencePROFICIENCY.5.1.

STRAND / TOPIC		Computer Science: Cybersecurity – Year 2
CONTENT ST AND ARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST AND ARD		Strand: Computers and Communications
PERFORMANC E EXPECT AT ION		Content Cluster 7: Students will analyze the utilization of computers within industry.

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

STRAND / TOPIC	Computer Science: Cybersecurity – Year 3
CONTENT ST ANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECTATION	Content Cluster 1: Students will analyze and utilize problem-solving strategies.

 BENCHMARK /
 CSCS.Y3
 Leverage adversarial thinking and risk concepts to solve complex cybersecurity problems

 PROFICIENCY
 .1.1.

STRAND / TOPIC	Computer Science: Cybersecurity – Year 3
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSCS.Y3Design and implement algorithms that solve level-appropriate, student-identified problemsPROFICIENCY.5.1.

STRAND / TOPIC	Computer Science: Cybersecurity – Year 3
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK /CSCS.Y3Create programs to solve problems of level-appropriate complexity that obtain data from external sourcesPROFICIENCY.6.1.

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

BENCHMARK /CSCS.Y3Create and maintain a professional digital portfolio comprised of self-created workPROFICIENCY.10.7.

STRAND / TOPIC		Computer Science: Data Science – Year 1
CONTENT ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 /
 CSDS.Y1
 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

 PROFICIENCY
 .1.3.

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

BENCHMARK /CSDS.Y1Design and implement level-appropriate algorithms that use iteration, selection, and sequencePROFICIENCY.5.1.

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

	PERFORMANC E EXPECTATION	Content Cluster 6: Students will create programs to solve problems.
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BENCHMARK / CSDS.Y1 PROFICIENCY .6.2.

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

STRAND / TOPIC	Computer Science: Data Science – Year 2
CONTENT STANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION	Content Cluster 1: Students will analyze and utilize problem-solving strategies.

 BENCHMARK /
 CSDS.Y2
 Leverage problem-solving strategies to solve problems of level-appropriate complexity

 PROFICIENCY
 .1.1.

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BENCHMARK /CSDS.Y2Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriatePROFICIENCY.1.2.complexity
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STRAND / TOPIC	Computer Science: Data Science – Year 2
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSDS.Y2Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequencePROFICIENCY.5.1.

STRAND / TOPIC	Computer Science: Data Science – Year 2
CONTENT STANDARD	Strand: Professionalism and Impacts of Computing
PERFORMAN E EXPECTATIO	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

 BENCHMARK /
 CSDS.Y2
 Create and maintain a digital collection of self-created work

 PROFICIENCY
 .10.10.

STRAND / TOPIC	Computer Science: Data Science – Year 3
CONTENT STANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECTATION	Content Cluster 1: Students will analyze and utilize problem-solving strategies.

BENCHMARK /CSDS.Y3Analyze and utilize collaborative methods in problem solving of level-appropriate complexityPROFICIENCY.1.3.

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CONTENT		Strand: Professionalism and Impacts of Computing
ST ANDARD PERFORMANC E EXPECT AT ION		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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST AND ARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST AND ARD		Strand: Computational Thinking and Problem Solving

PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E 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
PERFORMANC E 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 ST ANDARD	Strand: Computers and Communications
PERFORMANC E EXPECT AT ION	Content Cluster 7: Students will analyze the utilization of computers within industry.

BENCHMARK /CSGD.Y2Utilize hardware and/or software to solve level-appropriate industry-based problemsPROFICIENCY.7.1.

STRAND / TOPIC		Computer Science: Game Development and Design – Year 2
CONTENT STANDARD		Strand: Professionalism and Impacts of Computing
PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E EXPECTATION		Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.

BENCHMARK /CSGD.Y3Research and utilize physics and mathematical principles to adapt to more immersive game mechanicsPROFICIENCY.2.7.

STRAND / TOPIC	Computer Science: Game Development and Design – Year 3—Advanced
CONTENT STANDARD	Strand: Algorithms and Programs

PERFORMANC Content Cluster 5: Students will create, evaluate, and modify algorithms. E EXPECT ATION

BENCHMARK /CSGD.Y3Design and implement algorithms to solve student-identified problems of level-appropriate complexityPROFICIENCY.5.1.

STRAND / TOPIC		Computer Science: Game Development and Design – Year 3—Advanced
CONTENT STANDARD		Strand: Computers and Communications
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E EXPECT AT ION		Content Cluster 1: Students will analyze and utilize problem-solving strategies.
BENCHMARK / PROFICIENCY	CSMD.Y 1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSMD.Y 1.1.2.	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
PERFORMANC E EXPECTATION		Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSMD.YDesign and implement level-appropriate algorithms that use iteration, selection, and sequencePROFICIENCY1.5.1.

STRAND / TOPIC		Computer Science: Mobile Application Development – Year 1
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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

PERFORMANC E E Content Cluster 7: Students will analyze the utilization of computers within industry. E EXPECT ATION	
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CSMD.Y Utilize hardware and/or software to solve level-appropriate industry-based problems **BENCHMARK /** PROFICIENCY 2.7.1.

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

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

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

BENCHMARK / PROFICIENCY

CSMD.Y Create and maintain a digital collection of self-created work 2.10.9.

STRAND / TOPIC		Computer Science: Mobile Application Development – Year 3—Advanced
CONTENT ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECTATION		Content Cluster 1: Students will analyze and utilize problem-solving strategies.
BENCHMARK /	CSMD.Y	Leverage problem-solving strategies to solve problems of level-appropriate complexity

PROFICIENCY 3.1.1.

BENCHMARK / CSMD.Y Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate PROFICIENCY 3.1.2. complexity

STRAND / TOPIC		Computer Science: Mobile Application Development – Year 3—Advanced
CONTENT STANDARD		Strand: Data, Information, and Security
PERFORMANC E 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 / CSMD.Y Create mobile applications that visually represent level-appropriate data based on user input through interfacing with PROFICIENCY 3.3.4. the application

STRAND / TOPIC	Computer Science: Mobile Application Development – Year 3—Advanced
CONTENT ST ANDARD	Strand: Data, Information, and Security
PERFORMANC E EXPECTATION	Content Cluster 4: Students will analyze and utilize concepts of cybersecurity.

CSMD.Y Apply digital methods in securely transmitting data by using libraries and/or student-created algorithms **BENCHMARK /** PROFICIENCY 3.4.5.

STRAND / TOPIC	Computer Science: Mobile Application Development – Year 3—Advanced
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /

CSMD.Y Design and implement level-appropriate algorithms that solve student-identified problems PROFICIENCY 3.5.1.

STRAND / TOPIC	Computer Science: Mobile Application Development – Year 3—Advanced
CONTENT ST AND ARD	Strand: Professionalism and Impacts of Computing
PERFORMANC E EXPECTATION	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

BENCHMARK / CSMD.Y Create and maintain a professional digital portfolio comprised of self-created work PROFICIENCY 3.10.9.

STRAND / TOPIC		Computer Science: Networking – Year 1
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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

CSNT.Y1. Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate **BENCHMARK /** PROFICIENCY 1.2. complexity

STRAND / TOPIC	Computer Science: Networking – Year 1
CONTENT ST ANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

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

BENCHMARK /CSNT.Y1.Evaluate the qualities of level-appropriate student-created and non-student-created algorithmsPROFICIENCY5.3.

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

BENCHMARK / CSN PROFICIENCY 6.2.

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

STRAND / TOPIC	Computer Science: Networking – Year 2
CONTENT STANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECTATION	Content Cluster 1: Students will analyze and utilize problem-solving strategies.
	l everage problem solving strategies to solve problems of level appropriate complexity

 BENCHMARK /
 CSNT.Y2.
 Leverage problem-solving strategies to solve problems of level-appropriate complexity

 PROFICIENCY
 1.1.

BENCHMARK /CSNT.Y2.Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriatePROFICIENCY1.2.complexity

STRAND / TOPIC		Computer Science: Networking – Year 2
CONTENT ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION		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 /CSNT.Y2.Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classicPROFICIENCY5.3.search and sort algorithms

STRAND / TOPIC	Computer Science: Networking – Year 2
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT ATION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK /CSNT.Y2.Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,PROFICIENCY6.2.indentation, user experience design, whitespace)

STRAND / TOPIC	Computer Science: Networking – Year 2
CONTENT ST ANDARD	Strand: Computers and Communications
PERFORMANC E EXPECT AT ION	Content Cluster 7: Students will analyze the utilization of computers within industry.

BENCHMARK /CSNT.Y2.Utilize hardware and/or software to solve level-appropriate industry-based problemsPROFICIENCY7.1.

STRAND / TOPIC	Computer Science: Networking – Year 2
CONTENT STANDARD	Strand: Computers and Communications
PERFORMANC E EXPECT AT ION	Content Cluster 8: Students will analyze communication methods and systems used to transmit information among computing devices.

BENCHMARK /CSNT.Y2.Design and implement a physical or virtual network of level-appropriate complexityPROFICIENCY8.3.

STRAND / TOPIC		Computer Science: Networking – Year 3—Advanced
CONTENT ST AND ARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 /	CSNT.Y3.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate
PROFICIENCY	1.2.	complexity

STRAND / TOPIC		Computer Science: Networking – Year 3—Advanced
CONTENT STANDARD		Strand: Data, Information, and Security
PERFORMANC E 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
PERFORMANC E EXPECT AT ION		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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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

PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E EXPECT AT ION		Content Cluster 7: Students will analyze the utilization of computers within industry.

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

 PROFICIENCY
 .7.1.

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

BENCHMARK /CSPG.Y2Create and maintain a digital collection of self-created workPROFICIENCY.10.9.

STRAND / TOPIC		Computer Science: Programming – Year 3—Advanced
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E 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
PERFORMANC E EXPECTATION	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

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

 PROFICIENCY
 .10.9.

Computer Science: Robotics – Year 1

CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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

I OPIC		
CONTENT ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECTATION		Content Cluster 5: Students will create, evaluate, and modify algorithms.
BENCHMARK /	CSRB.Y1	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

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PROFICIENCY .5.1.
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BENCHMARK /CSRB.Y1Evaluate the qualities of level-appropriate student-created and non-student-created algorithmsPROFICIENCY.5.3.

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

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

STRAND / TOPIC		Computer Science: Robotics – Year 2
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E EXPECTATION		Content Cluster 3: Students will analyze and utilize data through the use of computing devices.
BENCHMARK /	CSRB	Create programs to store, access, and manipulate level-appropriate robotics system data (e.g., position, sensor

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

BENCHMARK /CSRB.Y2Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequencePROFICIENCY.5.1.

PROFICIENCY Y2:

input)

BENCHMARK /	CSRB.Y2	Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classic
PROFICIENCY	.5.3.	search and sort algorithms

STRAND / TOPIC		Computer Science: Robotics – Year 2
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST ANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 7: Students will analyze the utilization of computers within industry.

BENCHMARK /CSRB.Y2Utilize hardware and/or software to solve level-appropriate industry-based problemsPROFICIENCY.7.1.

STRAND / TOPIC		Computer Science: Robotics – Year 2
CONTENT STANDARD		Strand: Computers and Communications
PERFORMANC E 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
CONT ENT ST AND ARD		Strand: Professionalism and Impacts of Computing
PERFORMANC E 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

CONT ENT ST ANDARD		Strand: Professionalism and Impacts of Computing
PERFORMANC E 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
PERFORMANC E 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
		Analyze and utilize collaborative methods in problem solving of level-appropriate complexity Computer Science: Robotics – Year 3—Advanced
PROFICIENCY		
PROFICIENCY STRAND / TOPIC CONTENT		Computer Science: Robotics – Year 3—Advanced
PROFICIENCY STRAND / TOPIC CONTENT STANDARD PERFORMANC E	.1.3.	Computer Science: Robotics – Year 3—Advanced Strand: Computational Thinking and Problem Solving Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics
PROFICIENCY STRAND / TOPIC CONTENT STANDARD PERFORMANC E EXPECT AT ION BENCHMARK /	.1.3.	Computer Science: Robotics - Year 3—Advanced Strand: Computational Thinking and Problem Solving Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science. Utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate
PROFICIENCY STRAND / CONTENT STANDARD PERFORMANC E EXPECTATION BENCHMARK / PROFICIENCY STRAND /	.1.3.	Computer Science: Robotics – Year 3—Advanced Strand: Computational Thinking and Problem Solving Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science. Utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data
PROFICIENCY STRAND / CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY STRAND / CONTENT	.1.3.	Computer Science: Robotics - Year 3—Advanced Strand: Computational Thinking and Problem Solving Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science. Utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data Computer Science: Robotics - Year 3—Advanced
PROFICIENCY STRAND / CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY STRAND / CONTENT STANDARD PERFORMANC E	.1.3.	Computer Science: Robotics – Year 3—Advanced Strand: Computational Thinking and Problem Solving Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science. Utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data Computer Science: Robotics – Year 3—Advanced Strand: Data, Information, and Security
PROFICIENCY STRAND / CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY STRAND / CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK /	.1.3.	Computer Science: Robotics - Year 3—Advanced Strand: Computational Thinking and Problem Solving Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science. Utilize types of information that are stored in robotics systems including, but not limited to, 2D and 3D coordinate system and sensor data Computer Science: Robotics - Year 3—Advanced Strand: Data, Information, and Security Content Cluster 3: Students will analyze and utilize data through the use of computing devices. Create programs to store, access, and manipulate, with a high level of efficiency, level-appropriate robotics system

CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION		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
PERFORMANC E 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
PERFORMANC E		Content Cluster 9: Students will utilize appropriate hardware and software.
EXPECTATION		
BENCHMARK / PROFICIENCY	CSRB.Y3 .9.2.	Use collaborative tools and processes to configure level-appropriate robotic hardware components
BENCHMARK /	.9.2.	
BENCHMARK / PROFICIENCY BENCHMARK /	.9.2. CSRB.Y3 .9.4.	Use collaborative tools and processes to configure level-appropriate robotic hardware components
BENCHMARK / PROFICIENCY BENCHMARK / PROFICIENCY BENCHMARK /	.9.2. CSRB.Y3 .9.4. CSRB.Y3 .9.7.	Use collaborative tools and processes to configure level-appropriate robotic hardware components Utilize robotic hardware components to create level-appropriate robotic systems and subsystems
BENCHMARK / PROFICIENCY BENCHMARK / PROFICIENCY BENCHMARK / PROFICIENCY BENCHMARK /	.9.2. CSRB.Y3 .9.4. CSRB.Y3 .9.7. CSRB.Y3 .9.8.	Use collaborative tools and processes to configure level-appropriate robotic hardware components Utilize robotic hardware components to create level-appropriate robotic systems and subsystems Utilize breadboarding and prototyping in the creation of a level-appropriate closed-loop robot

CONTENT STANDARD	Strand: Professionalism and Impacts of Computing
PERFORMANC E EXPECTATION	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

BENCHMARK /CSRB.Y3Create and maintain a professional digital portfolio comprised of self-created workPROFICIENCY.10.10.

STRAND / TOPIC		Computer Science: Robotics – Year 3—Advanced
CONTENT STANDARD		Strand: Professionalism and Impacts of Computing
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E EXPECTATION		Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /AIML.Y1.Design and implement level-appropriate algorithms that use iteration, selection, and sequencePROFICIENCY5.1.

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
PERFORMANC E 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 ST AND ARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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 /		Computer Science: Artificial Intelligence and Machine Learning – Year 2

ТОРІС		
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 /	AIML.Y2.	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,

STRAND / TOPIC	Computer Science: Artificial Intelligence and Machine Learning – Year 2
CONTENT ST ANDARD	Strand: Computers and Communications
PERFORMANC E EXPECT AT ION	Content Cluster 7: Students will analyze the utilization of computers within industry.

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

indentation, user experience design, whitespace)

PROFICIENCY 6.2.

STRAND / TOPIC		Computer Science: Artificial Intelligence and Machine Learning – Year 3
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST ANDARD		Strand: Algorithms and Programs

PERFORMANC E Content Cluster 5: Students will create, evaluate, and modify algorithms. E EXPECT ATION	
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BENCHMARK /CSCE.Y1Design and implement level-appropriate algorithms that use iteration, selection, and sequencePROFICIENCY.5.1.

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

BENCHMARK /CSCE.Y1Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,PROFICIENCY.6.2.indentation, user experience design, whitespace)

STRAND / TOPIC	Computer Science: Computer Engineering – Year 2
CONTENT STANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECTATION	Content Cluster 1: Students will analyze and utilize problem-solving strategies.
	Leverage problem solving strategies to solve problems of level appropriate complexity

 BENCHMARK /
 CSCE.Y2
 Leverage problem-solving strategies to solve problems of level-appropriate complexity

 PROFICIENCY
 .1.1.

BENCHMARK /	CSCE.Y2	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate
PROFICIENCY	.1.2.	complexity

BENCHMARK /
 CSCE.Y2
 Analyze and utilize collaborative methods in problem solving of level-appropriate complexity

 PROFICIENCY
 .1.3.

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

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

 PROFICIENCY
 .29.

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

BENCHMARK /CSCE.Y2Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequencePROFICIENCY.5.1.

BENCHMARK /CSCEInclude evaluation of scheduling algorithms on system performance; algorithms used in application domainsPROFICIENCYY2: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 ST AND ARD		Strand: Algorithms and Programs
PERFORMANC E 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 ST ANDARD		Strand: Computers and Communications
PERFORMANC E 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
PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECTATION		Content Cluster 1: Students will analyze and utilize problem-solving strategies.

BENCHMARK / CSCE.Y3 Leverage problem-solving strategies to solve problems of level-appropriate complexity PROFICIENCY .1.1.

BENCHMARK /	CSCE.Y3	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate
PROFICIENCY	.1.2.	complexity

BENCHMARK /CSCE.Y3Analyze and utilize collaborative methods in problem solving of level-appropriate complexityPROFICIENCY.1.3.

STRAND / TOPIC	Computer Science: Computer Engineering – Year 3
CONTENT ST ANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION	Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.

BENCHMARK /CSCE.Y3Solve problems of level-appropriate complexity using fundamental laws of electricity (e.g., Faraday, Kirchhoff, Ohms)PROFICIENCY.2.9.

STRAND / TOPIC		Computer Science: Computer Engineering – Year 3
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 /CSCE.Y3Illustrate the flow of execution of algorithms in level-appropriate programs including high-impedance state and logicPROFICIENCY.5.2.gate implementation including a tristate buffer

STRAND / TOPIC	Computer Science: Computer Engineering – Year 3
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK /CSCE.Y3Apply best practices of program design and format (e.g., descriptive names, documentation, indentation, userPROFICIENCY.6.2.experience design, whitespace)

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

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

 PROFICIENCY
 .9.11.

STRAND /	
ТОРІС	

CONTENT STANDARD		Strand: Professionalism and Impacts of Computing
PERFORMANC E 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
PERFORMANC E 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 /	CSCS.Y1	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate
PROFICIENCY	.1.2.	complexity

BENCHMARK /CSCS.Y1Analyze and utilize collaborative methods in problem solving of level-appropriate complexityPROFICIENCY.1.3.

STRAND / TOPIC		Computer Science: Cybersecurity – Year 1
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECTATION		Content Cluster 5: Students will create, evaluate, and modify algorithms.
BENCHMARK /	CSCS.Y1	Design and implement level-appropriate algorithms that use iteration, selection, and sequence

PROFICIENCY .5.1.

BENCHMARK /CSCS.Y1Illustrate the flow of execution of algorithms in level-appropriate programs including branching and loopingPROFICIENCY.5.2.

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

BENCHMARK /CSCS.Y1Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,PROFICIENCY.6.2.indentation, user experience design, whitespace)

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

PERFORMANC E EXPECT ATION		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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION		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
PERFORMANC E 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 /	CSCS.Y2	Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,

BENCHMARK /CSCS.Y2Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,PROFICIENCY.6.2.indentation, user experience design, whitespace)

BENCHMARK /CSCSDiscuss the vulnerabilities of not applying best practices of program design, format, and distributionPROFICIENCYY2:

STRAND / TOPIC	Computer Science: Cybersecurity – Year 2
CONTENT ST ANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 7: Students will analyze the utilization of computers within industry.

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

STRAND / TOPIC	Computer Science: Cybersecurity – Year 3
CONTENT ST ANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION	Content Cluster 1: Students will analyze and utilize problem-solving strategies.

 BENCHMARK /
 CSCS.Y3
 Leverage adversarial thinking and risk concepts to solve complex cybersecurity problems

 PROFICIENCY
 .1.1.

STRAND / TOPIC	Computer Science: Cybersecurity – Year 3
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

 BENCHMARK /
 CSCS.Y3
 Design and implement algorithms that solve level-appropriate, student-identified problems

 PROFICIENCY
 .5.1.

STRAND / TOPIC	Computer Science: Cybersecurity – Year 3
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK / CSCS.Y3 Create programs to solve problems of level-appropriate complexity that obtain data from external sources PROFICIENCY .6.1.

STRAND / TOPIC	Computer Science: Cybersecurity – Year 3
CONTENT ST AND ARD	Strand: Professionalism and Impacts of Computing
PERFORMANC E EXPECTATION	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

BENCHMARK / CSCS.Y3 Create and maintain a professional digital portfolio comprised of self-created work PROFICIENCY .10.7.

STRAND / TOPIC		Computer Science: Data Science – Year 1
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
CONT ENT ST AND ARD		Strand: Algorithms and Programs
PERFORMANC E 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
PERFORMANC E EXPECTATION	Content Cluster 6: Students will create programs to solve problems.

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

STRAND / TOPIC		Computer Science: Data Science – Year 2
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST ANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSDS.Y2Design and implement level-appropriate algorithms that use iteration, recursion, selection, and sequencePROFICIENCY.5.1.

STRAND / TOPIC	Computer Science: Data Science – Year 2
CONTENT ST ANDARD	Strand: Professionalism and Impacts of Computing
PERFORMANC E EXPECT AT ION	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

BENCHMARK /CSDS.Y2Create and maintain a digital collection of self-created workPROFICIENCY.10.10.

STRAND / TOPIC	Computer Science: Data Science – Year 3
CONTENT ST AND ARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION	Content Cluster 1: Students will analyze and utilize problem-solving strategies.

BENCHMARK /CSDS.Y3Analyze and utilize collaborative methods in problem solving of level-appropriate complexityPROFICIENCY.1.3.

STRAND / TOPIC	Computer Science: Data Science – Year 3
CONTENT ST ANDARD	Strand: Professionalism and Impacts of Computing
PERFORMANC E EXPECT AT ION	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

BENCHMARK /CSDS.Y3Create and maintain a professional digital portfolio comprised of self-created workPROFICIENCY.10.10.

STRAND / TOPIC		Computer Science: Game Development and Design – Year 1
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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)
	.0.2.	
STRAND / TOPIC	.0.2.	Computer Science: Game Development and Design – Year 2
STRAND /	.0.2.	
STRAND / TOPIC CONTENT		Computer Science: Game Development and Design – Year 2
STRAND / TOPIC CONTENT STANDARD PERFORMANC E		Computer Science: Game Development and Design – Year 2 Strand: Computational Thinking and Problem Solving
STRAND / TOPIC CONTENT STANDARD PERFORMANC E EXPECTATION BENCHMARK /	CSGD.Y2 .1.1.	Computer Science: Game Development and Design – Year 2 Strand: Computational Thinking and Problem Solving Content Cluster 1: Students will analyze and utilize problem-solving strategies.
STRAND / TOPIC CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY BENCHMARK /	CSGD.Y2 .1.1. CSGD.Y2 .1.2.	Computer Science: Game Development and Design – Year 2 Strand: Computational Thinking and Problem Solving Content Cluster 1: Students will analyze and utilize problem-solving strategies. Leverage problem-solving strategies to solve problems of level-appropriate complexity Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate
STRAND / TOPIC CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY BENCHMARK / PROFICIENCY BENCHMARK /	CSGD.Y2 .1.1. CSGD.Y2 .1.2. CSGD.Y2	Computer Science: Game Development and Design - Year 2 Strand: Computational Thinking and Problem Solving Content Cluster 1: Students will analyze and utilize problem-solving strategies. Leverage problem-solving strategies to solve problems of level-appropriate complexity Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity
STRAND / TOPIC CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY BENCHMARK / PROFICIENCY BENCHMARK / PROFICIENCY	CSGD.Y2 .1.1. CSGD.Y2 .1.2. CSGD.Y2	Computer Science: Game Development and Design – Year 2 Strand: Computational Thinking and Problem Solving Content Cluster 1: Students will analyze and utilize problem-solving strategies. Leverage problem-solving strategies to solve problems of level-appropriate complexity Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate complexity Decompose problems of level-appropriate complexity

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

STRAND / TOPIC		Computer Science: Game Development and Design – Year 2
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION		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 / FOPIC		Computer Science: Game Development and Design – Year 2
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION		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 / FOPIC		Computer Science: Game Development and Design – Year 2
CONTENT		Strand: Computers and Communications

 ST ANDARD
 PERFORMANC

 E
 EXPECTATION

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

 PROFICIENCY
 .7.1.

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

BENCHMARK /CSGD.Y2Create and maintain a digital collection of self-created workPROFICIENCY.10.10.

CONTENT ST AND ARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E EXPECTATION	Content Cluster 2: Students will analyze and utilize connections between concepts of mathematics and computer science.

BENCHMARK /CSGD.Y3Research and utilize physics and mathematical principles to adapt to more immersive game mechanicsPROFICIENCY.2.7.

STRAND / TOPIC	Computer Science: Game Development and Design – Year 3—Advanced
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSGD.Y3Design and implement algorithms to solve student-identified problems of level-appropriate complexityPROFICIENCY.5.1.

STRAND / TOPIC	Computer Science: Game Development and Design – Year 3—Advanced
CONTENT STANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 9: Students will utilize appropriate hardware and software.

BENCHMARK /CSGD.Y3Contribute to team collaboration in the development of a computational artifact (e.g, creating and managingPROFICIENCY.9.2.repositories)

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

PERFORMANC E 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
PERFORMANC E EXPECT AT ION		Content Cluster 1: Students will analyze and utilize problem-solving strategies.
BENCHMARK / PROFICIENCY	CSMD.Y 1.1.1.	Leverage problem-solving strategies to solve problems of level-appropriate complexity
BENCHMARK / PROFICIENCY	CSMD.Y 1.1.2.	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 ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION		Content Cluster 5: Students will create, evaluate, and modify algorithms.
BENCHMARK / PROFICIENCY	CSMD.Y 1.5.1.	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
PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION		Content Cluster 1: Students will analyze and utilize problem-solving strategies.
BENCHMARK /	COMPIX	l everage problem-solving strategies to solve problems of level-appropriate complexity

BENCHMARK /CSMD.YLeverage problem-solving strategies to solve problems of level-appropriate complexityPROFICIENCY2.1.1.

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 ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E 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
PERFORMANC E 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 ST AND ARD		Strand: Computers and Communications
PERFORMANC E 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 ST ANDARD		Strand: Computers and Communications
PERFORMANC E 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

Strand: Professionalism and Impacts of Computing

CONTENT STANDARD

PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST ANDARD		Strand: Data, Information, and Security
PERFORMANC E 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 ST ANDARD		Strand: Data, Information, and Security
PERFORMANC E 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
		Strand: Algorithms and Programs

 PERFORMANC
 Content Cluster 5: Students will create, evaluate, and modify algorithms.

 E
 EXPECTATION

BENCHMARK /CSMD.YDesign and implement level-appropriate algorithms that solve student-identified problemsPROFICIENCY3.5.1.

STRAND / TOPIC	Computer Science: Mobile Application Development – Year 3—Advanced
CONTENT STANDARD	Strand: Professionalism and Impacts of Computing
PERFORMANC E EXPECT AT ION	Content Cluster 10: Students will analyze the impacts of technology and professionalism within the computing community.

BENCHMARK / CSMD.Y Create and maintain a professional digital portfolio comprised of self-created work PROFICIENCY 3.10.9.

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

BENCHMARK /
 CSNT.Y1.
 Leverage problem-solving strategies to solve problems of level-appropriate complexity

 PROFICIENCY
 1.1.

BENCHMARK /	CSNT.Y1.	Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriate
PROFICIENCY	1.2.	complexity

STRAND / TOPIC	Computer Science: Networking – Year 1
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSNT.Y1.Design and implement level-appropriate algorithms that use iteration, selection, and sequencePROFICIENCY5.1.

BENCHMARK /CSNT.Y1. Evaluate the qualities of level-appropriate student-created and non-student-created algorithmsPROFICIENCY5.3.

STRAND / TOPIC		Computer Science: Networking – Year 1
CONTENT ST ANDARD		Strand: Algorithms and Programs
PERFORMANC E 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

PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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 ST AND ARD		Strand: Computers and Communications
PERFORMANC E EXPECTATION		Content Cluster 8: Students will analyze communication methods and systems used to transmit information among computing devices.

BENCHMARK /CSNT.Y2.Design and implement a physical or virtual network of level-appropriate complexityPROFICIENCY8.3.

STRAND / TOPIC		Computer Science: Networking – Year 3—Advanced
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION		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
PERFORMANC E EXPECT AT ION		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
		Computer Science: Networking – Year 3—Advanced Strand: Algorithms and Programs
CONTENT STANDARD PERFORMANC E	CSNT.Y3. 5.1.	Strand: Algorithms and Programs
TOPIC CONTENT STANDARD PERFORMANC E EXPECTATION BENCHMARK /		Strand: Algorithms and Programs Content Cluster 5: Students will create, evaluate, and modify algorithms. Design and implement algorithms for automation of level-appropriate tasks (e.g., adding hosts to a network/domain,
TOPIC CONTENT STANDARD PERFORMANC E EXPECTATION BENCHMARK / PROFICIENCY STRAND /		Strand: Algorithms and Programs Content Cluster 5: Students will create, evaluate, and modify algorithms. Design and implement algorithms for automation of level-appropriate tasks (e.g., adding hosts to a network/domain, setting switch/router configurations, utilizing DevOps)
TOPIC CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY STRAND / TOPIC CONTENT		Strand: Algorithms and Programs Content Cluster 5: Students will create, evaluate, and modify algorithms. Design and implement algorithms for automation of level-appropriate tasks (e.g., adding hosts to a network/domain, setting switch/router configurations, utilizing DevOps) Computer Science: Networking – Year 3—Advanced
TOPIC CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY STRAND / TOPIC CONTENT STANDARD PERFORMANC E	5.1.	Strand: Algorithms and Programs Content Cluster 5: Students will create, evaluate, and modify algorithms. Design and implement algorithms for automation of level-appropriate tasks (e.g., adding hosts to a network/domain, setting switch/router configurations, utilizing DevOps) Computer Science: Networking – Year 3—Advanced Strand: Algorithms and Programs
TOPIC CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK / PROFICIENCY STRAND / CONTENT STANDARD PERFORMANC EXPECTATION BENCHMARK /	5.1. CSNT.Y3. 6.1.	Strand: Algorithms and Programs Content Cluster 5: Students will create, evaluate, and modify algorithms. Design and implement algorithms for automation of level-appropriate tasks (e.g., adding hosts to a network/domain, setting switch/router configurations, utilizing DevOps) Computer Science: Networking - Year 3—Advanced Strand: Algorithms and Programs Content Cluster 6: Students will create programs to solve problems.

CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E EXPECTATION		Content Cluster 5: Students will create, evaluate, and modify algorithms.

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

BENCHMARK /CSPG.Y1Evaluate the qualities of level-appropriate student-created and non-student-created algorithmsPROFICIENCY.5.3.

STRAND / TOPIC	Computer Science: Programming – Year 1
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 6: Students will create programs to solve problems.

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

STRAND / TOPIC		Computer Science: Programming – Year 2
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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 /CSPG.Y2Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classicPROFICIENCY.5.3.search and sort algorithms

STRAND / TOPIC	Computer Science: Programming – Year 2
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECTATION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK /CSPG.Y2Discuss and apply best practices of program design and format (e.g., descriptive names, documentation,PROFICIENCY.6.2.indentation, user experience design, whitespace)

STRAND / TOPIC	Computer Science: Programming – Year 2
CONTENT ST ANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 7: Students will analyze the utilization of computers within industry.

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

 PROFICIENCY
 .7.1.

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

BENCHMARK /CSPG.Y2Create and maintain a digital collection of self-created workPROFICIENCY.10.9.

STRAND / TOPIC	Computer Science: Programming – Year 3—Advanced
CONTENT STANDARD	Strand: Computational Thinking and Problem Solving
PERFORMANC E EXPECT AT ION	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 /CSPG.Y3Decompose problems of level-appropriate complexityPROFICIENCY.1.5.

STRAND / TOPIC	Computer Science: Programming – Year 3—Advanced
CONTENT ST ANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSPG.Y3Design and implement level-appropriate algorithms that solve student-identified problemsPROFICIENCY.5.1.

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

BENCHMARK /CSPG.Y3Create and maintain a professional digital portfolio comprised of self-created workPROFICIENCY.10.9.

STRAND / TOPIC		Computer Science: Robotics – Year 1
CONTENT STANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 /CSRB.Y1Analyze and utilize multiple representations of problem-solving logic used to solve problems of appropriatePROFICIENCY.1.2.complexity

STRAND / TOPIC	Computer Science: Robotics – Year 1
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 5: Students will create, evaluate, and modify algorithms.

BENCHMARK /CSRB.Y1Evaluate the qualities of level-appropriate student-created and non-student-created algorithmsPROFICIENCY.5.3.

STRAND / TOPIC	Computer Science: Robotics – Year 1
CONTENT STANDARD	Strand: Algorithms and Programs
PERFORMANC E EXPECT AT ION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK / CSRB.Y1 Dis PROFICIENCY .6.2. inde

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

STRAND / TOPIC		Computer Science: Robotics – Year 2
CONTENT ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST AND ARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E EXPECT AT ION		Content Cluster 3: Students will analyze and utilize data through the use of computing devices.

BENCHMARK /CSRBCreate programs to store, access, and manipulate level-appropriate robotics system data (e.g., position, sensorPROFICIENCYY2:input)

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

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

 PROFICIENCY
 .5.1.

BENCHMARK /CSRB.Y2Evaluate the qualities of level-appropriate student-created and non-student-created algorithms including classicPROFICIENCY.5.3.search and sort algorithms

STRAND / TOPIC		Computer Science: Robotics – Year 2
CONTENT STANDARD		Strand: Algorithms and Programs
PERFORMANC E 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 /	CSRB.Y2	Create programs that utilize various robotics system operations to solve problems

PROFICIENCY .6.6.

STRAND / TOPIC	Computer Science: Robotics – Year 2
CONTENT STANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 7: Students will analyze the utilization of computers within industry.

BENCHMARK /CSRB.Y2Utilize hardware and/or software to solve level-appropriate industry-based problemsPROFICIENCY.7.1.

STRAND / TOPIC	Computer Science: Robotics – Year 2
CONTENT STANDARD	Strand: Computers and Communications
PERFORMANC E EXPECTATION	Content Cluster 9: Students will utilize appropriate hardware and software.

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
PERFORMANC E 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
PERFORMANC E 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 ST ANDARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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 ST AND ARD		Strand: Computational Thinking and Problem Solving
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E 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
PERFORMANC E EXPECTATION	Content Cluster 6: Students will create programs to solve problems.

BENCHMARK /CSRB.Y3Create programs that utilize robotic systems to solve problems of level-appropriate complexityPROFICIENCY.6.1.

BENCHMARK /CSRB.Y3Create programs of level-appropriate complexity that leverage real-time sensory input to make decisions forPROFICIENCY.6.4.completing physical tasks

BENCHMARK /CSRB.Y3Create programs that utilize various robotics system operations to solve real-world problemsPROFICIENCY.6.6.

STRAND / TOPIC		Computer Science: Robotics – Year 3—Advanced
CONTENT ST AND ARD		Strand: Computers and Communications
PERFORMANC E 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
PERFORMANC E 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 ST ANDARD	Strand: Professionalism and Impacts of Computing
PERFORMANC E EXPECTATION	Content Cluster 11: Students will demonstrate understanding of storytelling with data and appropriately communicate about technical information.

BENCHMARK / CSRB.Y3 Utilize level-appropriate robotic system data for storytelling PROFICIENCY .11.2.

BENCHMARK /CSRB.Y3Communicate conditions of a robotic system in terms of performance, diagnostics, troubleshooting, and repairPROFICIENCY.11.6.