Main Criteria: Forward Education
Secondary Criteria: Rhode Island World-Class Standards
Subjects: Mathematics, Science, Technology Education
Grades: 11, 12, Key Stage 4

Forward Education

Autonomous Electric Vehicles of the Future

Rhode Island World-Class Standards
Mathematics
Grade **11** - Adopted: **2021**

DOMAIN		The Standards for Mathematical Practice
STATEMENT OF ENDURING KNOWLEDGE	MP1	Make sense of problems and persevere in solving them.
STATEMENT OF ENDURING KNOWLEDGE	MP2	Reason abstractly and quantitatively.
STATEMENT OF ENDURING KNOWLEDGE	MP3	Construct viable arguments and critique the reasoning of others.
STATEMENT OF ENDURING KNOWLEDGE	MP4	Model with mathematics.
STATEMENT OF ENDURING KNOWLEDGE	MP8	Look for and express regularity in repeated reasoning.

DOMAIN		Conceptual Category: Algebra Content Standards [A]
STATEMENT OF ENDURING KNOWLEDGE	**A-CED.**	**Creating Equations**
GSE STEM	**A-CED.A.**	**Create equations that describe numbers or relationships.**
SPECIFIC INDICATOR	A-CED.A.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

DOMAIN		Conceptual Category: Algebra Content Standards [A]
STATEMENT OF ENDURING KNOWLEDGE	**A-REI.**	**Reasoning with Equations and Inequalities**
GSE STEM	**A-REI.A.**	**Understand solving equations as a process of reasoning and explain the reasoning.**
SPECIFIC INDICATOR	A-REI.A.1.	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify or refute a solution method.

DOMAIN		Conceptual Category: Functions Content Standards [F]

STATEMENT OF ENDURING KNOWLEDGE	**F-IF.**	**Interpreting Functions**
GSE STEM	**F-IF.C.**	**Analyze functions using different representations.**
SPECIFIC INDICATOR	**F-IF.C.7.**	**Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.**
INDICATOR	F-IF.C.7.a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.

DOMAIN		**Conceptual Category: Functions Content Standards [F]**
STATEMENT OF ENDURING KNOWLEDGE	**F-LE.**	**Linear, Quadratic, and Exponential Models**
GSE STEM	**F-LE.A.**	**Construct and compare linear, quadratic, and exponential models and solve problems.**
SPECIFIC INDICATOR	**F-LE.A.1.**	**Distinguish between situations that can be modeled with linear functions and with exponential functions.**
INDICATOR	F-LE.A.1.a.	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

DOMAIN		**Conceptual Category: Geometry Content Standards [G]**
STATEMENT OF ENDURING KNOWLEDGE	**G-GPE.**	**Expressing Geometric Properties with Equations**
GSE STEM	**G-GPE.B.**	**Use coordinates to prove simple geometric theorems algebraically.**
SPECIFIC INDICATOR	G-GPE.B.5.	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Rhode Island World-Class Standards

Mathematics

Grade **12** - Adopted: **2021**

DOMAIN		**The Standards for Mathematical Practice**
STATEMENT OF ENDURING KNOWLEDGE	MP1	Make sense of problems and persevere in solving them.
STATEMENT OF ENDURING KNOWLEDGE	MP2	Reason abstractly and quantitatively.
STATEMENT OF ENDURING KNOWLEDGE	MP3	Construct viable arguments and critique the reasoning of others.
STATEMENT OF ENDURING KNOWLEDGE	MP4	Model with mathematics.

STATEMENT OF ENDURING KNOWLEDGE	MP8	Look for and express regularity in repeated reasoning.

DOMAIN		Conceptual Category: Algebra Content Standards [A]
STATEMENT OF ENDURING KNOWLEDGE	A-CED.	Creating Equations
GSE STEM	A-CED.A.	Create equations that describe numbers or relationships.
SPECIFIC INDICATOR	A-CED.A.2.	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

DOMAIN		Conceptual Category: Algebra Content Standards [A]
STATEMENT OF ENDURING KNOWLEDGE	A-REI.	Reasoning with Equations and Inequalities
GSE STEM	A-REI.A.	Understand solving equations as a process of reasoning and explain the reasoning.
SPECIFIC INDICATOR	A-REI.A.1.	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify or refute a solution method.

DOMAIN		Conceptual Category: Functions Content Standards [F]
STATEMENT OF ENDURING KNOWLEDGE	F-IF.	Interpreting Functions
GSE STEM	F-IF.C.	Analyze functions using different representations.
SPECIFIC INDICATOR	F-IF.C.7.	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
INDICATOR	F-IF.C.7.a.	Graph linear and quadratic functions and show intercepts, maxima, and minima.

DOMAIN		Conceptual Category: Functions Content Standards [F]
STATEMENT OF ENDURING KNOWLEDGE	F-LE.	Linear, Quadratic, and Exponential Models
GSE STEM	F-LE.A.	Construct and compare linear, quadratic, and exponential models and solve problems.
SPECIFIC INDICATOR	F-LE.A.1.	Distinguish between situations that can be modeled with linear functions and with exponential functions.
INDICATOR	F-LE.A.1.a.	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.

DOMAIN		Conceptual Category: Geometry Content Standards [G]
STATEMENT OF ENDURING KNOWLEDGE	G-GPE.	Expressing Geometric Properties with Equations
GSE STEM	G-GPE.B.	Use coordinates to prove simple geometric theorems algebraically.

SPECIFIC INDICATOR	G-GPE.B.5.	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).

Rhode Island World-Class Standards

Science

Grade **11** - Adopted: **2013**

DOMAIN	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STATEMENT OF ENDURING KNOWLEDGE	**HS-PS1.**	**Matter and Its Interactions**
GSE STEM		**Students who demonstrate understanding can:**
SPECIFIC INDICATOR	HS-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.

DOMAIN	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STATEMENT OF ENDURING KNOWLEDGE	**HS-PS3.**	**Energy**
GSE STEM		**Students who demonstrate understanding can:**
SPECIFIC INDICATOR	HS-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

DOMAIN	**NGSS.HS-PS.**	**PHYSICAL SCIENCE**
STATEMENT OF ENDURING KNOWLEDGE	**HS-PS4.**	**Waves and Their Applications in Technologies for Information Transfer**
GSE STEM		**Students who demonstrate understanding can:**
SPECIFIC INDICATOR	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

DOMAIN	**NGSS.HS-LS.**	**LIFE SCIENCE**
STATEMENT OF ENDURING KNOWLEDGE	**HS-LS2.**	**Ecosystems: Interactions, Energy, and Dynamics**
GSE STEM		**Students who demonstrate understanding can:**
SPECIFIC INDICATOR	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

DOMAIN	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STATEMENT OF ENDURING KNOWLEDGE	**HS-ESS2.**	**Earth's Systems**
GSE STEM		**Students who demonstrate understanding can:**

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

DOMAIN	**NGSS.HS-ESS.**	**EARTH AND SPACE SCIENCE**
STATEMENT OF ENDURING KNOWLEDGE	**HS-ESS3.**	**Earth and Human Activity**
GSE STEM		**Students who demonstrate understanding can:**
SPECIFIC INDICATOR	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
SPECIFIC INDICATOR	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
SPECIFIC INDICATOR	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SPECIFIC INDICATOR	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
SPECIFIC INDICATOR	HS-ESS3-6.	Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

DOMAIN	**NGSS.HS-ETS.**	**ENGINEERING DESIGN**
STATEMENT OF ENDURING KNOWLEDGE	**HS-ETS1.**	**Engineering Design**
GSE STEM		**Students who demonstrate understanding can:**
SPECIFIC INDICATOR	HS-ETS1-1.	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
SPECIFIC INDICATOR	HS-ETS1-2.	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
SPECIFIC INDICATOR	HS-ETS1-3.	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

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

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

DOMAIN	RST.11-12.	Reading Standards for Literacy in Science and Technical Subjects
STATEMENT OF ENDURING KNOWLEDGE		Craft and Structure
GSE STEM	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.
GSE STEM	RST.11-12.5.	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

DOMAIN	RST.11-12.	Reading Standards for Literacy in Science and Technical Subjects
STATEMENT OF ENDURING KNOWLEDGE		Integration of Knowledge and Ideas
GSE STEM	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.

DOMAIN	RST.11-12.	Reading Standards for Literacy in Science and Technical Subjects
STATEMENT OF ENDURING KNOWLEDGE		Range of Reading and Level of Text Complexity
GSE STEM	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.

DOMAIN	WHST.11-12.	Writing Standards for Literacy in Science and Technical Subjects
STATEMENT OF ENDURING KNOWLEDGE		Text Types and Purposes
GSE STEM	WHST.11-12.2.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
SPECIFIC INDICATOR	WHST.11-12.2(d)	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

DOMAIN	WHST.11-12.	Writing Standards for Literacy in Science and Technical Subjects
STATEMENT OF ENDURING KNOWLEDGE		Production and Distribution of Writing
GSE STEM	WHST.11-12.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
GSE STEM	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.

Rhode Island World-Class Standards

Science

Grade **12** - Adopted: **2013**

DOMAIN	NGSS.HS-PS.	PHYSICAL SCIENCE
STATEMENT OF ENDURING KNOWLEDGE	HS-PS1.	Matter and Its Interactions
GSE STEM		Students who demonstrate understanding can:
SPECIFIC INDICATOR	HS-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.

DOMAIN	NGSS.HS-PS.	PHYSICAL SCIENCE
STATEMENT OF ENDURING KNOWLEDGE	HS-PS3.	Energy
GSE STEM		Students who demonstrate understanding can:
SPECIFIC INDICATOR	HS-PS3-3.	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

DOMAIN	NGSS.HS-PS.	PHYSICAL SCIENCE
STATEMENT OF ENDURING KNOWLEDGE	HS-PS4.	Waves and Their Applications in Technologies for Information Transfer
GSE STEM		Students who demonstrate understanding can:
SPECIFIC INDICATOR	HS-PS4-2.	Evaluate questions about the advantages of using a digital transmission and storage of information.

DOMAIN	NGSS.HS-LS.	LIFE SCIENCE
STATEMENT OF ENDURING KNOWLEDGE	HS-LS2.	Ecosystems: Interactions, Energy, and Dynamics
GSE STEM		Students who demonstrate understanding can:
SPECIFIC INDICATOR	HS-LS2-7.	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

DOMAIN	NGSS.HS-ESS.	EARTH AND SPACE SCIENCE
STATEMENT OF ENDURING KNOWLEDGE	HS-ESS2.	Earth's Systems
GSE STEM		Students who demonstrate understanding can:
SPECIFIC INDICATOR	HS-ESS2-4.	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

DOMAIN	NGSS.HS-ESS.	EARTH AND SPACE SCIENCE
STATEMENT OF ENDURING KNOWLEDGE	HS-ESS3.	Earth and Human Activity
GSE STEM		Students who demonstrate understanding can:
SPECIFIC INDICATOR	HS-ESS3-1.	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
SPECIFIC INDICATOR	HS-ESS3-2.	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
SPECIFIC INDICATOR	HS-ESS3-3.	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SPECIFIC INDICATOR	HS-ESS3-4.	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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STATEMENT OF ENDURING KNOWLEDGE	HS-ETS1.	Engineering Design
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Grade **12** - Adopted: **2010**

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STATEMENT OF ENDURING KNOWLEDGE		Key Ideas and Details
GSE STEM	RST.11-12.2.	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
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STATEMENT OF ENDURING KNOWLEDGE		**Craft and Structure**
GSE STEM	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.
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DOMAIN	**RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
STATEMENT OF ENDURING KNOWLEDGE		**Integration of Knowledge and Ideas**
GSE STEM	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.
DOMAIN	**RST.11-12.**	**Reading Standards for Literacy in Science and Technical Subjects**
STATEMENT OF ENDURING KNOWLEDGE		**Range of Reading and Level of Text Complexity**
GSE STEM	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.
DOMAIN	**WHST.11-12.**	**Writing Standards for Literacy in Science and Technical Subjects**
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GSE STEM	**WHST.11-12.2.**	**Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.**
SPECIFIC INDICATOR	WHST.11-12.2(d)	Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
DOMAIN	**WHST.11-12.**	**Writing Standards for Literacy in Science and Technical Subjects**
STATEMENT OF ENDURING KNOWLEDGE		**Production and Distribution of Writing**
GSE STEM	WHST.11-12.4.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
GSE STEM	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.

Rhode Island World-Class Standards

Technology Education

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

DOMAIN		**ISTE Standards for Students**

STATEMENT OF ENDURING KNOWLEDGE	**RI.ISTE-S.3.**	**Knowledge Constructors: Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.**
GSE STEM	ISTE-S.3.d.	Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

DOMAIN		**ISTE Standards for Students**
STATEMENT OF ENDURING KNOWLEDGE	**RI.ISTE-S.4.**	**Innovative Designers: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.**
GSE STEM	ISTE-S.4.a.	Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
GSE STEM	ISTE-S.4.b.	Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

DOMAIN		**ISTE Standards for Students**
STATEMENT OF ENDURING KNOWLEDGE	**RI.ISTE-S.5.**	**Computational Thinkers: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.**
GSE STEM	ISTE-S.5.a.	Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.
GSE STEM	ISTE-S.5.b.	Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
GSE STEM	ISTE-S.5.d.	Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

Rhode Island World-Class Standards

Technology Education

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

DOMAIN		**ISTE Standards for Students**
STATEMENT OF ENDURING KNOWLEDGE	**RI.ISTE-S.3.**	**Knowledge Constructors: Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.**
GSE STEM	ISTE-S.3.d.	Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

DOMAIN		**ISTE Standards for Students**
STATEMENT OF ENDURING KNOWLEDGE	**RI.ISTE-S.4.**	**Innovative Designers: Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.**
GSE STEM	ISTE-S.4.a.	Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
GSE STEM	ISTE-S.4.b.	Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

DOMAIN		**ISTE Standards for Students**

STATEMENT OF ENDURING KNOWLEDGE	RI.ISTE-S.5.	Computational Thinkers: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
GSE STEM	ISTE-S.5.a.	Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.
GSE STEM	ISTE-S.5.b.	Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
GSE STEM	ISTE-S.5.d.	Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.