## CURRICULUM FRAMEWORKS CONNECTIONS

At Heritage Museums & Gardens, we are committed to helping you meet the demands of Education Standards. Each of our programs may be used to fulfill a multitude of standards across several disciplines. Listed below are examples of how the *Eco-Adventure* program can be used to meet current Massachusetts Curriculum Frameworks, Common Core Standards and the Next Generation Science Standards.

### <u>Eco-Adventure</u> Adventure Workshop

### **Massachusetts Frameworks 2011: Mathematics**

Domain: Standards for Mathematical Practice:

- MP1- Make Sense of problems and persevere in solving them
- MP2- Reason abstractly and quantitatively
- MP5- Use appropriate tools strategically
- MP6- Attend to precision

Domain: Expressions and Equations:

6.EE.C.9- Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation rto express quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship using tables and graphs.

Domain: Ratios and Proportional Relationships:

6.RP.A.3- Use ratio and rate reasoning to solve real-world and mathematical problems

Domain: Functions:

8.F.B.4- Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Domain: Geometry

8.G.C.9- Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. 7.G.B.4- Know the formulas for the area and circumference of a circle and solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Domain: Statistics and Probability:

8.SP.A.1- Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

7.SP.A.1- Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

7.SP.A.2- Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples of the same size to gauge the variation in estimates or predictions. 7.SP.B.3- Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.

7.SP.B.4- Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

6.SP.A.2- Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape

6.SP.B.5- Summarize numerical data sets in relation to their context, such as by reporting the number of observations, describing the nature of the attribute under investigation, include how it was measured and its units of measurement, giving quantitative measures of center and variability, relating the choice of measure and center and variability to the shape of the data distribution and the context in which the data were gathered.

### **Massachusetts Frameworks 2004: Mathematics**

Strand: Data Analysis, Statistics, and Probability:

8.D.2- Select, create, interpret, and utilize various tabular and graphical representations of data, e.g., circle graphs, Venn diagrams, scatterplots, stem-and-leaf plots, box-and-whisker plots, histograms, tables, and charts. Differentiate between continuous and discrete data and ways to represent them.

8.D.3/7.D.2- Find, describe, and interpret appropriate measures of central tendency (mean, median, and mode) and spread (range) that represent a set of data. Use these notions to compare different sets of data.

7.D.1- Select, create, interpret, and utilize the following tabular and graphical representations of data: circle graphs, Venn diagrams, stem-and-leaf plots, tables, and charts.

8.G.2/7.G.2- Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.

6.D.1- Describe and compare data sets using the concepts of median, mean, mode, maximum and minimum, and range

Strand: Geometry:

6.G.2- Identify three-dimensional shapes based on their properties, such as edges and faces

Strand: Patterns, Relations, and Algebra:

8.P.1- Extend, represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic expressions. Include arithmetic and geometric progressions, e.g., compounding.

#### Strand: Measurement:

8.M.1/7.M.1- Select, convert (within the same system of measurement), and use appropriate units of measurement or scale

6.M.5- Identify, measure, and describe circles and the relationships of the radius, diameter, circumference, and area, and use the concepts to solve problems

Strand: Numbers:

6.N.13- Accurately and efficiently add, subtract, multiply, and divide whole numbers and positive demands

### Massachusetts Frameworks 2006: Science and Technology/Engineering

Strand: Life Science:

17- Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans.

18- Recognize that biological evolution accounts for the diversity of species developed through gradual processes over many generations
1- Classify organisms into the currently recognized kingdoms according to characteristics that they share. Be familiar with organisms from each kingdom.

14- Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

15- Explain how dead plants and animals are broken down by other living organisms and how this process contributes to the system as a whole.

16- Recognize that producers use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later, or used by other organisms.

10- Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.

13- Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.

4- Recognize that within cells, many of the basic functions of organisms are carried out. The way in which cells function is similar in all living organisms.

Strand: Physical Science:

13- Differentiate between potential and kinetic energy. Identify situation where kinetic energy is transformed into potential energy and vice versa.

# Massachusetts Frameworks 2008: Technology Literacy Standards and Expectations

Strand: Research, Problem Solving and Communication:

3.4- Independently use appropriate technology tools (e.g., graphic organizer) to define problems and propose hypotheses.

3.6- Develop and use guidelines to evaluate the content, organization, design, use of citations, and presentation of technologically enhanced projects.

Strand: Use of Computers and Applications:

1.10- Perform simple operations in a database (i.e., browse, sort, filter, search on selected criteria, delete data, enter data).

1.11- Plan and develop database reports to organize and display information.

1.13- Create an original spreadsheet, using formulas.

1.15- Produce simple charts and graphs from a spreadsheet.

1.16- Distinguish among different types of charts and graphs, and choose the most appropriate type to represent given data.

### Massachusetts Frameworks 2011: English and Language Arts

Domain: College and Career readiness Anchor Standards for Language:

CCRA.L.1- Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. CCRA.L.2- Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. CCRA.L.3- Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening CCRA.L.4- Determine or clarify the meaning of unknown and multiplemeaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

CCRA.L.6- Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Domain: College and Career readiness Anchor Standards for Speaking and Listening: CCRA.SL.1- Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. CCRA.SL.2- Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. CCRA.SL.4- Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

Domain: College and Career readiness Anchor Standards for Writing:

CCRA.W.1- Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

CCRA.W.2- Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

CCRA.W.4- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCRA.W.7- Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

Domain: Reading Standards for Literacy in Science and Technical Subjects:

RST.6-8.2- Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. RST.6-8.4- 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 6–8 texts and topics. RST.6-8.9- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Domain: Language Standards:

L.8.1/L.7.1/L.6.1- Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

L.8.2/L.7.2/L.6.2- Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

L.8.3/L.7.3/L.6.3- Use knowledge of language and its conventions when writing, speaking, reading, or listening.

L.8.6/L.7.6- Determine an author's point of view or purpose in a text and analyze how the author distinguishes his or her position from that of others.

L.6.6- Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Domain: Standards for Speaking and Listening:

SL.8.4/SL.7.4- Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

SL.8.1/SL.7.1/SL.6.1- Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse

partners on *grade 6 topics, texts, and issues*, building on others' ideas and expressing their own clearly.

Domain: Writing Standards:

W.8.1/W.7.1/W.6.1- Write arguments to support claims with clear reasons and relevant evidence.

W.8.4/W.7.4/W.6.4- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

W.8.7/W.7.7/W.6.7- Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.

### **Common Core: Mathematics**

Expressions & Equations:

6.EE.A.2.C- Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). 6.EE.C.9- Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.

Statistics & Probability:

8.SP.A.1- Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

7.SP.A.1- Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

7.SP.A.2- Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

7.SP.B.3- Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the

difference between the centers by expressing it as a multiple of a measure of variability.

7.SP.B.4- Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

6.SP.B.4- Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.B.5- Summarize numerical data sets in relation to their context

### **Common Core: English and Language Arts**

Speaking & Listening:

SL.8.1/ SL.7.1/SL.6.1- Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly

SL.8.4/SL.7.4/SL.6.4- Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

Science and Technical Subjects:

RST.6-8.1- Cite specific textual evidence to support analysis of science and technical texts

RST.6-8.3- Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks RST.6-8.4- 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 6-8 texts and topics. RST.6-8.7- Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

RST.6-8.8- Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

RST.6-8.9- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Writing:

WHST.6-8.1.A- Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.

WHST.6-8.1.B- Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.

WHST.6-8.1.C- Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.

WHST.6-8.1.E- Provide a concluding statement or section that follows from and supports the argument presented.

WHST.6-8.2.D- Use precise language and domain-specific vocabulary to inform about or explain the topic.

WHST.6-8.4- Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.6-8.7- Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

### **Next Generation Science Standards**

Energy: MS-PS3-5- Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Matter and Energy in Organisms and Ecosystems:

MS-LS1-6- Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-LS2-1- Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-3- Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-4- Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Interdependent Relationships in Ecosystems:

MS-LS2-2- Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Earth and Human Activity:

MS-ESS3-4- Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

MS-ESS3-3- Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.