



# CreositySpace – Community Designers Sustainable Cities

## Activity Descriptions and Standards Alignment

### General Activity Descriptions:

Below you will find brief descriptions of the hands-on activities associated with the *Community Designers Technology Entrepreneurship Curriculum* module.

#### Activity - 21<sup>st</sup> Century Sustainable Neighborhood Design Game

##### Objective:

Sustainability is the defining term of the 21<sup>st</sup> century. Right now, natural and human forces contribute to a changing global climate, friends and enemies are created, and the economy is in need of an overhaul. Municipalities (cities, towns, and village) are working on activities that will make their neighborhoods more sustainable (i.e. solar panel installation, affordable healthcare, urban agriculture, bikes lanes, etc.). Addressing these challenging issues and creating unique solutions requires collaboration between the brightest, cross-functional group of professionals and citizens. Today your task is to design a neighborhood that provides the best possible support and future to its citizens.

Making the most sustainable community requires students to think about what they include from a number of different perspectives. Students are provided with a list of “community elements” (e.g. houses, schools, wells, urban farms) that they can chose to include in their city. A sustainable neighborhood will have enough local food and water for its citizens without over producing and generating a lot of waste. It will also provide places and methods to strengthen community bonds (e.g. community centers and the use of renewable energy).

Students will have a fixed amount of time to design their city (as determined by the teachers, and, in the end, they will present and discuss their choices with the class. Throughout this activity students will explore the following concepts:

- How different disciplines (school subjects) are connected.
- What systems are and how they affect society and decisions.
- Practice their teamwork skills
- Use basic math (addition, subtraction, multiplication)

##### Materials:

- Maps, neighborhood element templates, worksheets,
- pencils, permanent marker, crayons or colored pencils,
- scratch paper, rulers, calculators (although it is preferred if math is done by hand)



## Education Standards Supported

Don't see the standards for your school district? Contact us at [Kath@creosityspace.com](mailto:Kath@creosityspace.com) and we will determine the appropriate standards alignment for your district.

### Common Core ELA Standards

#### Grade 3

Reading Informational Text:

[CCSS.ELA-LITERACY.RI.3.1](#) Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

[CCSS.ELA-LITERACY.RI.3.2](#) Determine the main idea of a text; recount the key details and explain how they support the main idea.

[CCSS.ELA-LITERACY.RI.3.4](#) Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 3 topic or subject area*.

Writing:

[CCSS.ELA-Literacy.W.3.1](#) Write opinion pieces on topics or texts, supporting a point of view with reasons.

[CCSS.ELA-Literacy.W.3.1.a](#) Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.

[CCSS.ELA-Literacy.W.3.1.b](#) Provide reasons that support the opinion.

[CCSS.ELA-Literacy.W.3.1.c](#) Use linking words and phrases (e.g., *because, therefore, since, for example*) to connect opinion and reasons.

[CCSS.ELA-Literacy.W.3.1.d](#) Provide a concluding statement or section.

[CCSS.ELA-Literacy.W.3.2](#) Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

[CCSS.ELA-Literacy.W.3.2.a](#) Introduce a topic and group related information together; include illustrations when useful to aiding comprehension.

[CCSS.ELA-Literacy.W.3.2.b](#) Develop the topic with facts, definitions, and details.

[CCSS.ELA-Literacy.W.3.2.c](#) Use linking words and phrases (e.g., *also, another, and, more, but*) to connect ideas within categories of information.

[CCSS.ELA-Literacy.W.3.2.d](#) Provide a concluding statement or section.

[CCSS.ELA-Literacy.W.3.4](#) With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose. (Grade-specific expectations for writing types are defined in standards 1-3 above.)

[CCSS.ELA-Literacy.W.3.5](#) With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, and editing.

[CCSS.ELA-Literacy.W.3.7](#) Conduct short research projects that build knowledge about a topic.

[CCSS.ELA-Literacy.W.3.8](#) Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

Speaking & Listening:

[CCSS.ELA-LITERACY.SL.3.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 3 topics and texts*, building on others' ideas and expressing their own clearly.

[CCSS.ELA-LITERACY.SL.3.1.A](#) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

[CCSS.ELA-LITERACY.SL.3.1.B](#) Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).

[CCSS.ELA-Literacy.SL.3.1.C](#) Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.

[CCSS.ELA-Literacy.SL.3.1.D](#) Explain their own ideas and understanding in light of the discussion.

[CCSS.ELA-Literacy.SL.3.3](#) Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.

[CCSS.ELA-Literacy.SL.3.4](#) Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

[CCSS.ELA-Literacy.SL.3.6](#) Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.

Language:

[CCSS.ELA-LITERACY.L.3.1](#) Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

[CCSS.ELA-LITERACY.L.3.1.A](#) Explain the function of nouns, pronouns, verbs, adjectives, and adverbs in general and their functions in particular sentences.

[CCSS.ELA-LITERACY.L.3.2](#) Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

[CCSS.ELA-LITERACY.L.3.4](#) Determine or clarify the meaning of unknown and multiple-meaning word and phrases based on grade 3 reading and content, choosing flexibly from a range of strategies.

## Grade 4

### Reading Informational Text:

[CCSS.ELA-LITERACY.RI.4.1](#) Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

[CCSS.ELA-LITERACY.RI.4.2](#) Determine the main idea of a text and explain how it is supported by key details; summarize the text.

[CCSS.ELA-LITERACY.RI.4.4](#) Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.

[CCSS.ELA-LITERACY.RI.4.5](#) Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

[CCSS.ELA-LITERACY.RI.4.7](#) Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

### Writing:

[CCSS.ELA-LITERACY.W.4.1](#) Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

[CCSS.ELA-LITERACY.W.4.1.A](#) Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose.

[CCSS.ELA-LITERACY.W.4.1.B](#) Provide reasons that are supported by facts and details.

[CCSS.ELA-LITERACY.W.4.1.C](#) Link opinion and reasons using words and phrases

[CCSS.ELA-LITERACY.W.4.1.D](#) Provide a concluding statement or section related to the opinion presented.

[CCSS.ELA-LITERACY.W.4.2](#) Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

[CCSS.ELA-LITERACY.W.4.2.A](#) Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

[CCSS.ELA-LITERACY.W.4.2.B](#) Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

[CCSS.ELA-LITERACY.W.4.2.C](#) Link ideas within categories of information using words and phrases.

[CCSS.ELA-LITERACY.W.4.2.D](#) Use precise language and domain-specific vocabulary to inform about or explain the topic.

[CCSS.ELA-LITERACY.W.4.2.E](#) Provide a concluding statement or section related to the information or explanation presented.

[CCSS.ELA-LITERACY.W.4.4](#) Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

[CCSS.ELA-LITERACY.W.4.8](#) Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

### Speaking & Listening:

[CCSS.ELA-LITERACY.SL.4.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

[CCSS.ELA-LITERACY.SL.4.1.A](#) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

[CCSS.ELA-LITERACY.SL.4.1.B](#) Follow agreed-upon rules for discussions and carry out assigned roles.

[CCSS.ELA-LITERACY.SL.4.1.C](#) Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.

[CCSS.ELA-LITERACY.SL.4.1.D](#) Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.

[CCSS.ELA-LITERACY.SL.4.3](#) Identify the reasons and evidence a speaker provides to support particular points.

### Language:

[CCSS.ELA-LITERACY.L.4.1](#) Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

[CCSS.ELA-LITERACY.L.4.1.A](#) Use relative pronouns (*who, whose, whom, which, that*) and relative adverbs (*where, when, why*).

[CCSS.ELA-LITERACY.L.4.2](#) Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

[CCSS.ELA-LITERACY.L.4.3](#) Use knowledge of language and its conventions when writing, speaking, reading, or listening.

[CCSS.ELA-LITERACY.L.4.3.A](#) Choose words and phrases to convey ideas precisely.

[CCSS.ELA-LITERACY.L.4.4](#) Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 4 reading and content, choosing flexibly from a range of strategies.



## Grade 5

### Reading Informational Text:

- [CCSS.ELA-LITERACY.RI.5.2](#) Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- [CCSS.ELA-LITERACY.RI.5.3](#) Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- [CCSS.ELA-LITERACY.RI.5.4](#) Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 5 topic or subject area*.

### Writing:

- [CCSS.ELA-LITERACY.W.5.1](#) Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- [CCSS.ELA-LITERACY.W.5.1.A](#) Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.
- [CCSS.ELA-LITERACY.W.5.1.B](#) Provide logically ordered reasons that are supported by facts and details.
- [CCSS.ELA-LITERACY.W.5.1.C](#) Link opinion and reasons using words, phrases, and clauses
- [CCSS.ELA-LITERACY.W.5.1.D](#) Provide a concluding statement or section related to the opinion presented.
- [CCSS.ELA-LITERACY.W.5.2](#) Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- [CCSS.ELA-LITERACY.W.5.2.A](#) Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
- [CCSS.ELA-LITERACY.W.5.2.B](#) Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
- [CCSS.ELA-LITERACY.W.5.2.C](#) Link ideas within and across categories of information using words, phrases, and clauses (e.g., *in contrast, especially*).
- [CCSS.ELA-LITERACY.W.5.2.D](#) Use precise language and domain-specific vocabulary to inform about or explain the topic.
- [CCSS.ELA-LITERACY.W.5.2.E](#) Provide a concluding statement or section related to the information or explanation presented.
- [CCSS.ELA-LITERACY.W.5.4](#) Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
- [CCSS.ELA-LITERACY.W.5.8](#) Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

### Speaking & Listening:

- [CCSS.ELA-LITERACY.SL.5.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.
- [CCSS.ELA-LITERACY.SL.5.1.A](#) Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
- [CCSS.ELA-LITERACY.SL.5.1.B](#) Follow agreed-upon rules for discussions and carry out assigned roles.
- [CCSS.ELA-LITERACY.SL.5.1.C](#) Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
- [CCSS.ELA-LITERACY.SL.5.1.D](#) Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
- [CCSS.ELA-LITERACY.SL.5.3](#) Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.

### Language:

- [CCSS.ELA-LITERACY.L.5.1](#) Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- [CCSS.ELA-LITERACY.L.5.1.A](#) Explain the function of conjunctions, prepositions, and interjections in general and their function in particular sentences.
- [CCSS.ELA-LITERACY.L.5.2](#) Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- [CCSS.ELA-LITERACY.L.5.3](#) Use knowledge of language and its conventions when writing, speaking, reading, or listening.
- [CCSS.ELA-LITERACY.L.5.4](#) Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies.



## Common Core Math Standards (Grades 3 – 5)

### Grade 3

**MP.1** Make sense of problems and persevere in solving them.

**MP.2** Reason abstractly and quantitatively.

**3.OA.1-3** Represent and solve problems involving multiplication and division.

**3.OA.7** Multiply and divide within 100.

**3.NBT.1-3** Use place value understanding and properties of operations to perform multi-digit arithmetic.

**3.NF.1** Develop understanding of fractions as numbers.

**3.MD.5-7** Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

**3.MD.8** Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

**3.MD.5-7** Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measurements.

### Grade 4

**MP.1** Make sense of problems and persevere in solving them.

**MP.2** Reason abstractly and quantitatively.

**4.OA.1-3** Use the four operations with whole numbers to solve problems.

**4.NBT.1** Generalize place value understanding for multi-digit whole numbers.

**4.NBT.4-5** Use place value understanding and properties of operations to perform multi-digit arithmetic.

**4.MD.3** Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

**4.MD.4** Represent and interpret data.

### Grade 5

**MP.1** Make sense of problems and persevere in solving them.

**MP.2** Reason abstractly and quantitatively.

## Next Generation Science Standards/NY State Science Learning Standards 3 – 5

### Performance Expectations

- 3-LS4-3.** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- 3-LS4-4.** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- 4-ESS3-1.** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 5-ESS3-1.** Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.
- 3-5-ETS1-1.** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

**Example NGSS “Big Idea” and Topic Bundle:** How can we create a community that benefits all of living things in that community (people, animals and plants). The first part of the discussion focuses on how different organisms in a community or ecosystem interact (3-LS4-3, 3-LS4-4, 4-ESS3-1). An extended discussion includes how technology can be used to benefit all members of the community (5-ESS3-1, 3-5-ETS1-1,2).

<u>Science and Engineering Practices</u>	<u>Disciplinary Core Ideas</u>	<u>Cross Cutting Concepts</u>
<p><b>Asking questions / defining problems</b> <b>Developing and using models</b> Neighborhood design activity has students asking questions and using the activity as a model for their neighborhood.</p> <p><b>Using math &amp; computational thinking</b> Activity along with additional math word problems give students a chance to think how math is used in S&amp;E.</p> <p><b>Constructing explanations/designing solutions; Engaging in argument from evidence; Obtaining, evaluating, and communicating information</b> Challenge extensions and innovation prompts in the <i>Book of Ideas - Young Inventors Journal</i> enable students to design and support their solutions to a variety of challenges.</p> <hr/> <p><b>Connections to Nature of Science</b></p> <p><b>Scientific investigations use a variety of methods; Scientific knowledge is based on empirical evidence</b> Entrepreneur story/presentation and hands on activities illustrate how scientific investigations are conducted and how that information is put to use.</p>	<p><b>ESS3.A Natural resources</b> <b>ESS3.C Human impacts on Earth systems</b> <b>LS2.A Interdependent relationships in ecosystems</b> Activities and videos reinforce the interconnectedness between humans and all aspects of their environment.</p> <p><b>LS2.B Cycles of matter and energy transfer in ecosystems</b> <b>LS2.C Ecosystem dynamics, functioning, and resilience</b> <b>LS4.D Biodiversity and humans</b></p> <p>Concepts of ecology are discussed in materials as well as among students during group activities.</p> <p><b>PS3.A Definitions of energy</b> Types of energy, energy efficiency and renewable energy are discussed.</p> <p><b>ETS1.A: Defining and Delimiting Engineering Problems</b> <b>ETS1.B: Developing Possible Solutions</b> <b>ETS1.C: Optimizing the Design Solution</b> Science and technology based writing prompts, challenge questions and group activities support the three phases of Engineering Design. The Book of Idea, along with the Design Challenge lesson plan take students through the full cycle of concept to design.</p>	<p><b>Cause and effect; Scale, proportion and quantity; Stability and chance</b> The activity and videos emphasize environmental cause and effect as well as the concept of balancing availability and demand of resources.</p> <p><b>Systems and system models; Energy and matter: Flows, cycles, and conservation</b> The activity highlight a model system based on resource balance and optimal usage.</p> <p><b>Structure and function</b> Entrepreneurs highlight how the structure and properties of materials can be used to perform specific functions.</p> <hr/> <p><b>Connections to Nature of Science</b> <b>Science is a way of knowing; Science addresses questions about the natural and material world</b> Videos and introduction text give support these connections.</p> <p><b>Science is a human endeavor</b> Entrepreneur story and historical timeline highlight the human aspect of science and engineering.</p> <p><b>Connections to Engineering, Technology, and Applications of Science</b></p> <p><b>Interdependence of Science, Engineering, and Technology; Influence of Engineering, Technology and Science on Society and the Natural World</b> Introduction text, historical timeline, entrepreneur story and activities highlight above interactions and interdependencies.</p>

Connections to Common Core State Standards

**See previous Common Core Standards section for ELA and Math standards addressed by these activities.**

## NY State Science Standards

### Grade 3 & 4

#### STANDARD 1 - SCIENTIFIC INQUIRY:

**S1.1** Ask "why" questions in attempts to seek greater understanding concerning objects and events they have observed and heard about.

#### STANDARD 1 - ENGINEERING DESIGN:

**T1.1** Describe objects, imaginary or real, that might be modeled or made differently and suggest ways in which the objects can be changed, fixed, or improved.

**T1.1a** Identify a simple/common object which might be improved and state the purpose of the improvement

**T1.1b** Identify features of an object that help or hinder the performance of the object

**T1.1c** Suggest ways the object can be made differently, fixed, or improved within given constraints

**T1.3.** Generate ideas for possible solutions, individually and through group activity; apply age-appropriate mathematics and science skills; evaluate the ideas and determine the best solution; and explain reasons for the choices.

#### STANDARD 6 – INTERCONNECTEDNESS:

**Systems Thinking – Key Idea 1:** Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.

**Models – Key Idea 2:** Models are simplified representations of objects, structures, or systems, used in analysis, explanation, or design.

#### SCIENCE STANDARD - LIVING ENVIRONMENT:

*Key Idea 1:* Living things are both similar to and different from nonliving things.

**1.2a** Living things grow, take in nutrients, breathe, reproduce, eliminate waste, and die.

**5.1b** An organism's external physical features can enable it to carry out life functions in its particular environment.

**7.1a** Humans depend on their natural and constructed environments.

**7.1b** Over time humans have changed their environment by cultivating crops and raising animals, creating shelter, using energy, manufacturing goods, developing means of transportation, changing populations, and carrying out other activities.

**7.1c** Humans, as individuals or communities, change environments in ways that can be either helpful or harmful for themselves and other organisms.

#### SCIENCE STANDARD - PHYSICAL SETTING:

**4.2b** Humans utilize interactions between matter and energy.

### Grade 5

#### STANDARD 6 – INTERCONNECTEDNESS:

**Systems Thinking – Key Idea 1:** Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.

**Models – Key Idea 2:** Models are simplified representations of objects, structures, or systems, used in analysis, explanation, or design.

**Optimization – Key Idea 6:** In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs.

#### STANDARD 7 – INTERDISCIPLINARY PROBLEM SOLVING:

**Connections – Key Idea 1:** The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena.

**Strategies – Key Idea 2:** Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.

#### SCIENCE STANDARD - LIVING ENVIRONMENT:

*Key Idea 5 –* Organisms maintain a dynamic equilibrium that sustains life.

*Key Idea 6:* Plants and animals depend on each other and their physical environment.

*Key Idea 7:* Human decisions and activities have had a profound impact on the physical and living environment.



## Texas Essential Knowledge and Skills

### General

(2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and outdoor investigations. The student is expected to:

(C) construct maps, graphic organizers, simple tables, charts, and bar graphs using tools and current technology to organize, examine, and evaluate measured data;

(3) Scientific investigation and reasoning. The student knows that information, critical thinking, scientific problem solving, and the contributions of scientists are used in making decisions. The student is expected to:

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(D) connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.

### Grade 3

(7) Earth and space. The student knows that Earth consists of natural resources and its surface is constantly changing.

(9) Organisms and environments. The student knows that organisms have characteristics that help them survive and can describe patterns, cycles, systems, and relationships within the environments. The student is expected to:

(A) observe and describe the physical characteristics of environments and how they support populations and communities within an ecosystem;

(B) identify and describe the flow of energy in a food chain and predict how changes in a food chain affect the ecosystem such as removal of frogs from a pond or bees from a field.

### Grade 4

(7) Earth and space. The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to:

(C) identify and classify Earth's renewable resources, including air, plants, water, and animals; and nonrenewable resources, including coal, oil, and natural gas; and the importance of conservation.

(9) Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to:

### Grade 5

(7) Earth and space. The student knows Earth's surface is constantly changing and consists of useful resources. The student is expected to:

(C) identify alternative energy resources such as wind, solar, hydroelectric, geothermal, and biofuels; and

(9) Organisms and environments. The student knows that there are relationships, systems, and cycles within environments. The student is expected to:

(A) observe the way organisms live and survive in their ecosystem by interacting with the living and non-living elements;

(C) predict the effects of changes in ecosystems caused by living organisms, including humans, such as the overpopulation of grazers or the building of highways;