FAIRFIELD PUBLIC SCHOOLS

Board of Education Regular Meeting Agenda
501 Kings Highway East, 2nd Floor Board Conference Room
THURSDAY April 5, 2018
7:30 PM

1. Call to Order of the Regular Meeting of the Board of Education and Roll Call
2. Pledge of Allegiance
3. Student Reports
   Fairfield Ludlowe: Ms. Molly Baker, Ms. Isabella Schichter
   Fairfield Warde: Mr. Ted Orben, Mr. Paul Rivera
4. Presentation of Science Curriculum PK-12, Mrs. Faggella, Mr. Wakeman
   (Enclosure Nos. 1, 2, 3)

   *(**Note:** See http://fairfieldschools.org/curriculum-instruction/subjects/science for a complete set of DRAFT Science Curriculum Documents)*
5. Public Comment*
6. Old Business
7. New Business
   A. Establish Date and Time of Fairfield Ludlowe High School and Fairfield Warde High School Graduation
      Recommended Motion: "that the Board of Education establish **Wednesday, June 20, 2018 at 6:00 p.m.** as the date and time of graduation for Fairfield Ludlowe High School and Fairfield Warde High School"

   B. Discussion of Possible 2018-2019 Budget Changes
8. Approval of Minutes
   Approval of *Special Minutes of March 19, 2018* and *Regular Minutes of March 19, 2018*
   Recommended Motion: "that the Board of Education approve the minutes of the Special Meeting of March 19, 2018 the Regular Meeting of March 19, 2018"
   (Enclosure Nos.4, 5)
9. Superintendent's Report
10. Committee/Liaison Reports
11. Open Board Comment
12. Public Comment*
13. Adjournment
    Recommended Motion: "that this Regular Meeting of the Board of Education adjourn"

**During this period the Board will accept public comment on items pertaining to this meeting's agenda from any citizen present at the meeting (per BOE By-Law, Article V, Section 6). Those wishing to videotape or take photographs must abide by CGS §1-226.*

CALENDAR OF EVENTS

April 24, 2018, SPECIAL Meeting Board Self-Evaluation, Executive Session	Board of Education **7:00 PM**	501 Kings Highway East Superintendent's Conference Room
May 8, 2018, REGULAR Meeting	Board of Education 7:30 PM	501 Kings Highway East 2nd Floor Board Conference Room

RELOCATION POLICY NOTICE

The Fairfield Public Schools System provides services to ensure students, parents and other persons have access to meetings, programs and activities. The School System will relocate programs in order to ensure accessibility of programs and activities to disabled persons. To make arrangements, please contact the office of Special Education, 501 Kings Highway East, Fairfield, CT 06825, Telephone: (203) 255-8379.

Fairfield Public Schools
Science Curriculum

Grade 3

Grade 3: Description

The elementary science standards are driven by questions to spark curiosity, guide instruction, deepen investigation into phenomena, acquire rigorous content knowledge and enable students to transfer the knowledge of ideas in real-world situations and to design and find solutions to problems. In the performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the disciplinary core ideas in earth science, life science and physical science. The standards define what students should know about the most essential ideas in the major science disciplines. Cross-cutting concepts provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. These standards also tie together the influence of engineering, technology, and science on society and the natural world.

There is one physical science disciplinary core idea in grade three: 1) Motion and Stability: Forces and Interactions. There are four life science disciplinary core ideas: 1) From Molecules to Organisms: Structures and Processes, 2) Ecosystems: Interactions, Energy, and Dynamics Heredity: Inheritance and Variation of Traits, 4) Biological Evolution: Unity and Diversity. And, there are two earth science disciplinary core ideas: 1) Earth's Systems, 2) Earth and Human Activity.

The third grade science performance expectations require that students examine phenomena for patterns, cause and effect relationships, scale, proportion, and quantity and systems and system models. Students compare and contrast the life cycles of different organisms. Students are expected to understand that organisms have different inherited traits, and that the environment can affect the traits that an organism develops. A comparison is made of the types of organisms that lived long ago and their environments which may have been very different from the present. Students construct an explanation using evidence for how variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Third graders develop an understanding that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. Data is organized and used to describe typical weather conditions expected seasonally and in different regions of the world. Students evaluate and make a claim about design solutions that reduce the impacts of weather-related hazards. Evidence is gathered through observation and predictions made based on observed patterns. The effects of equal and unequal forces on the motion of an object, and the cause and effect relationships of electricity or magnetic interactions between two objects not in contact with each other are observed and data recorded. Understanding of magnetic interactions is used to identify a simple design problem that can be solved with magnets.

NGSS Unit Standards

SCIENCE AND ENGINEERING PRACTICES (SEP):

Asking Questions and Defining Problems

Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.

- Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1)
- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)

CROSS-CUTTING CONCEPTS (CCC):

Patterns

- Patterns of change can be used to make predictions. (3-PS2-2)

Cause and Effect

- Cause and effect relationships are routinely identified. (3-PS2-1)
- Cause and effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3)

Grade 3: Overview

Essential Understandings

- Organisms have diverse life cycles yet follow similar patterns.
- When an environment changes, some organisms survive and reproduce by adapting or moving, while others die.
- Organisms' traits can be inherited from parents and are affected by the environment. Some of the differences in traits within the same species can be advantageous for survival in changing environments.
- Typical weather and climate have predictable patterns based on region and season, and data can be gathered and analyzed to identify these patterns which can be used to predict weather. Weather patterns can be used to design solutions for weather hazards.
- Balanced and unbalanced forces have an effect on objects.
- There are observable patterns of forces acting on an object's motion that can be used to make predictions.

Course Essential Questions

- How do organisms vary in their traits and how can the differences in traits within the species help them to survive?
- What happens to organisms when their environment changes and how do their traits help them to survive and reproduce?
- What does the evidence of plants and animals no longer found on Earth tell us about how and when they lived?
- How can seasonal and regional weather patterns be used to make predictions?
- How can humans reduce impacts of hazardous weather events?
- How do equal and unequal forces have an effect on the movement of an object?
- What effects do electricity and magnetism have on the interaction of objects, even when they are not touching?

Grade 3: Year-at-a Glance

Unit	Title	Unit Essential Questions
1	Interdependent Relationships in Ecosystems/ Hereditary	• How do organisms vary in their traits and how can the differences in traits within the species help them to survive? • What does the evidence of plants and animals no longer found on Earth tell us about how and when they lived? • What happens to organisms when their environment changes?
2	Weather and Climate	• What are typical weather conditions for each season and in different regions of the world? • What data is collected and how is it used to predict future weather including weather related hazards? • What are some solutions that can be used to minimize the impact of weather related hazards?
3	Forces and Motions	• How do balanced and unbalanced forces effect the motion of objects? • What effects do electricity and magnetism have on the interaction of objects, even when they are not touching?

Organisms: Life Cycles, Traits and Interdependence

Overview

The third grade life science unit is organized around three main ideas. One is the study of organisms; how they live and grow and the interdependent relationships between them and their environment. Different organisms go through changes during their life, yet follow a similar pattern. For example, a plant life cycle and a butterfly life cycle are diverse yet have commonalities such as birth, growth, reproduction and death. A third idea is that organisms inherit traits from their parents and there is variation in traits within a group of similar organisms. Certain traits can be influenced by the environment. For instance, normally tall plants may be stunted by a drought. Also, inherited traits may provide advantages for survival, finding mates and reproducing. Examples could be that plants with larger thorns would be less likely to be eaten by predators and animals with better camouflage may be more likely to survive and leave offspring.

Unit Performance Expectations

At the conclusion of this unit, students will be able to:

- **3-LS2-1** Construct an argument that some animals form groups that help members survive.
- **3-LS4-1** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
- **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.
- **3-LS1-1** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction and death.
- **3-LS3-1** Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
- **3-LS3-2** Use evidence to support the explanation that traits can be influenced by the environment.
- **3-LS4-2** Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates and reproducing.

Unit Essential Questions

- How do organisms vary in their traits and how can the differences in traits within the species help them to survive?
- What does the evidence of plants and animals no longer found on Earth tell us about how and when they lived?
- What happens to organisms when their environment changes?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

LS2.D: Social Interactions and Group Behavior

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (3-LS2-1)

LS3.A: Inheritance of Traits

- Many characteristics of organisms are inherited from their parents. (3-LS3-1)
- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)
- The environment also affects the traits that an organism develops. (3-LS3-2)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Asking Questions and Defining Problems
- Developing and Using Models
- Engaging in Argument from Evidence
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions

CROSS-CUTTING CONCEPTS (CCC):

- Patterns
- Cause and Effect

Corresponding Connecticut Core Standards:
ELA/Literacy –
RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)
SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)
Mathematics –
MP.4 Model with mathematics. (3-LS1-1)
3.NBT Number and Operations in Base Ten (3-LS1-1)
3.NF Number and Operations—Fractions (3-LS1-1)
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. (3-LS2-1)
RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS2-1)
W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1)
Mathematics –
MP.4 Model with mathematics. (3-LS2-1)
3.NBT Number and Operations in Base Ten (3-LS2-1)
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. (3-LS3-1),(3-LS3-2)
RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1),(3-LS3-2)
RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1),(3-LS3-2)
W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1),(3-LS3-2)
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. (3-LS3-1),(3-LS3-2)
Mathematics –
MP.2 Reason abstractly and quantitatively. (3-LS3-1),(3-LS3-2)
MP.4 Model with mathematics. (3-LS3-1),(3-LS3-2)
3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units- whole numbers, halves or quarters. (3-LS3-1),(3-LS3-2)

Weather and Climate

Overview

The grade three unit on weather and climate is focused around three main ideas. The first is that typical weather conditions can be observed seasonally and in different regions of the world, and that climate defines typical weather of a region and its variation over the years. The second idea is that weather and climate conditions can be observed, recorded and represented in pictographs and bar graphs. This data can be used to make weather predictions. The third idea is hazardous weather conditions exist and solutions can be made to minimize their impact.

Unit Performance Expectations

At the conclusion of this unit, students will be able to:

- **3-ESS2-1.** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
- **3-ESS2-2.** Obtain and combine information to describe climates in different regions of the world.
- **3-ESS3-1.** Make a claim about the merit of a design solution that reduces the impacts of a weather related hazard.

Unit Essential Questions

- What are typical weather conditions for each season and in different regions of the world?
- How is data collected and used to predict future weather including weather related hazards?
- What are some solutions that can be used to minimize the impact of weather related hazards?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

ESS2.D: Weather and Climate

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)

ESS3.B: Natural Hazards

- A variety of natural hazards result from natural processes.
- Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Analyzing and Interpreting Data
- Obtaining, Evaluating, and Communicating
- Information
- Engaging in Argument from Evidence

CROSS-CUTTING CONCEPTS (CCC):

- Patterns
- Cause and Effect

Corresponding Connecticut Core Standards:
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. (3-ESS2-2)
RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)
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. (3-ESS2-2)
Mathematics –
MP.2 Reason abstractly and quantitatively. (3-ESS2-1),(3-ESS2-2)
MP.4 Model with mathematics. (3-ESS2-1),(3-ESS2-2)
MP.5 Use appropriate tools strategically. (3-ESS2-1)
3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs. (3-ESS2-1)
Common Core State Standards Connections:
ELA/Literacy –
W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-ESS3-1)
W.3.7 Conduct short research projects that build knowledge about a topic. (3-ESS3-1)
Mathematics –
MP.2 Reason abstractly and quantitatively. (3-ESS3-1)
MP.4 Model with mathematics. (3-ESS3-1)

Forces and Motions

Overview

The third grade unit on forces and motion is organized around two main ideas. The first idea is that balanced and unbalanced forces affect the motion of an object. For example, a force on one side of a ball can make it start moving while balanced forces pushing on a box from opposite sides will not produce any motion at all. The second idea is that electric or magnetic forces can cause interactions between two objects not in contact with each other. For instance, the force on hair from an electrically charged balloon or the force between an electromagnet and steel paper clips. Information gained in the unit will be used to identify a simple problem involving magnetic interactions and design a solution that can be solved with magnets.

Unit Performance Expectations

At the conclusion of this unit, students will be able to:

- **3-PS2-1.** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
- **3-PS2- 2.** Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
- **3- PS2-3.** Ask questions to determine cause and effect relationships of electrical or magnetic interactions between two objects not in contact with each other.
- **3-PS2-4.** Identify a simple problem and design a solution that can be solved by applying scientific ideas about magnets.

Unit Essential Questions

- How do equal and unequal forces affect the motion of objects?
- What effects do electricity and magnetism have on the interaction of objects, even when they are not touching?

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

PS2.A: Forces and Motion

- Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1)
- The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)

PS2.B: Types of Interactions

Objects in contact exert forces on each other. (3-PS2-1) Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)

SCIENCE AND ENGINEERING PRACTICES (SEP):

- Asking Questions and Defining Problems
- Planning and Carrying Out Investigations

CROSS-CUTTING CONCEPTS (CCC):

- Patterns
- Cause and Effect

Corresponding Connecticut Core Standards:

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. (3-PS2-1),(3-PS2-3)

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-PS2-3)

RI.3.8 Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence). (3-PS2-3)

W.3.7 Conduct short research projects that build knowledge about a topic. (3-PS2-1),(3-PS2-2)

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. (3-PS2-1),(3-PS2-2)

SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail. (3-PS2-3)

Mathematics –

MP.2 Reason abstractly and quantitatively. (3-PS2-1)

MP.5 Use appropriate tools strategically. (3-PS2-1)

3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem (3-PS2-1)

Fairfield Public Schools
Science Curriculum

Draft
Grade 7
March 12, 2018

FAIRFIELD PUBLIC SCHOOLS

Grade 7 Science: Description

Students in middle school develop understanding of key concepts to help them grasp the big ideas in life science. The ideas build upon students' science understanding from earlier grades and from the disciplinary core ideas, science and engineering practices, and crosscutting concepts of other experiences with physical and earth sciences. There are four life science disciplinary core ideas in middle school: 1) From Molecules to Organisms: Structures and Processes, 2) Ecosystems: Interactions, Energy, and Dynamics, 3) Heredity: Inheritance and Variation of Traits, 4) Biological Evolution: Unity and Diversity. The performance expectations in middle school blend the core ideas with scientific and engineering practices and crosscutting concepts to support students in developing knowledge that can be applied across the science disciplines.

Standards for this course are taken from the *Next Generation Science Standards* and are of three types:

Disciplinary Core Ideas (DCIs): Shown as content objectives, these standards define what students should know about the most essential ideas in the major science disciplines. The focus is on a limited number of core ideas in science and engineering both within and across the disciplines to avoid the shallow coverage of a large number of topics and to allow more time for teachers and students to explore each idea in greater depth. Reduction of the sheer sum of details to be mastered is intended to give time for students to engage in scientific investigations and argumentation and to achieve depth of understanding of the core ideas presented.

Science and Engineering Practices (SEP): These standards enable students to apply the content in the DCI's and the skills of practicing scientists and engineers to explain phenomena and solve real world problems. Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. Engaging in the practices of engineering likewise helps students understand the work of engineers, as well as the links between engineering and science.

Crosscutting Concepts: These standards provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. These broad concepts tie together the influence of engineering, technology, and science on society and the natural world.

http://www.nextgenscience.org/next-generation-science-standards

Grade 7 Science: Overview

Enduring Understandings
An organism's structures and interacting subsystems allow it to carry out the functions needed to support life. Organisms interact with their environment and respond to the effects of these interactions. Over time, organisms change through genetic variation in order to survive.

Course Essential Questions
• Why are the interactions of living and non-living things on Earth so critical to the survival of all living things? • What evidence do we have of the changes that have taken place in the past? • What can we learn from those changes to better our lives and the lives of other organisms?

Course: Year-at-a Glance

Unit	Title	Unit Essential Questions
1	From Molecules to Organisms: Structures and Processes	How and why do cells work together to create systems? What environmental and genetic factors influence the growth of organisms?
2	Heredity: Inheritance and Variation of Traits	How do changes in genetic material result in the creation of different proteins? How does gene transmission from parent to offspring result in genetic variation?
3	Biological Evolution: Unit and Diversity	What evidence exists of the relationships between fossils and modern organisms to support the theory of evolution? How does genetic variation of traits in a population increase some individuals' probability to survive and reproduce in a specific environment? What is the influence of humans on genetic outcomes in artificial selection?

4	Ecosystems: Interactions, Energy and Dynamics	What patterns of interaction exist among organisms and their environments? How does energy move through various ecosystems?

Unit 1: From Molecules to Organisms: Structures and Processes

Overview

All living things consist of cells. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). Within cells, special structures (organelles) are responsible for particular functions. Multicellular organisms are composed of cells that work together to form tissues, organs and organ systems.

Performance Expectations

At the conclusion of this unit, students will be able to:

- MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
- MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.
- MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- 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-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
- MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Unit Essential Question

- How and why do cells work together to create systems?
- What environmental and genetic factors influence the growth of organisms?

Crosscutting Concepts

Scale, Proportion and Quantity

- Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)
- Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)

Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

- All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)
- Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)

LS1.C: Organization for Matter and Energy Flow in Organisms

- Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)
- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)

PS3.D: Energy in Chemical Processes and Everyday Life

- The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6)
- Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Developing and Using Models

- Develop a model to describe unobservable cellular mechanisms. (MS-LS1-7)

Constructing Explanations and Designing Solutions

- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-6)

Corresponding CT Core Standards:

ELA/Literacy – RST.6-8.1, RST 6.8.8, RI 8.8, SL 8.1, SL 8.4

Mathematics – MP.4, 6.RPA.3. 6.SP B.5

Unit 2: Heredity: Inheritance and Variation of Traits

Overview

Organisms reproduce and transfer their genetic information to their offspring. Genes are located in the chromosomes of cells. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes that may affect the structures and functions of the organism and thereby change traits.

Performance Expectations

At the conclusion of this unit, students will be able to:

- MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
- MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Unit Essential Question

- How do changes in genetic material result in the creation of different proteins?
- How does gene transmission from parent to offspring result in genetic variation?

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8, MS-LS3-2)

Systems and System Models

- Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3)

Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

- In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

LS1.D: Information Processing

- Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)

LS3.A: Inheritance of Traits

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)
- Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)

LS3.B: Variation of Traits

- In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)
- In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1) LS4.B: Natural Selection
- In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Developing and Using Models

- Develop and use a model to describe genetic phenomena. (MSLS3-1),(MS-LS3-2)

Obtaining, Evaluating, and Communicating Information

- Gather, read, and synthesize information from multiple appropriate sources about a genetic phenomenon/problem and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS4-5)

Engaging in Argument from Evidence

- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a genetics phenomenon or a solution to a genetics problem. (MSLS3-1),(MS-LS3-2)

Corresponding CT Core Standards:

ELA/Literacy – RST.6-8.1, RST 6-8.2, RST 6-8.4, RST 6.8.7, WHST 6-8.1, WHST 6-8.2, WHST 6-8.8, WHST6-8.9, SL 8.5

Mathematics – MP.4, 6.SP A.2, 6.SP B.4, 6.SP B.5

Unit 3: Biology Evolution: Unit and Diversity

Overview

Adaptation by natural selection acting over generations is an important process by which species change over time. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.

Performance Expectations

At the conclusion of this unit, students will be able to:

- MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past
- MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
- MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.
- MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
- MS-LS4-5. Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.
- MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time

Unit Essential Questions

- What evidence exists of the relationships between fossils and modern organisms to support the theory of evolution?
- How does genetic variation of traits in a population increase some individuals' probability to survive and reproduce in a specific environment?
- What is the influence of humans on genetic outcomes in artificial selection?

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS4-2)
- Graphs, charts, and images can be used to identify patterns in data. (MS-LS4-1),(MS-LS4-3)

Cause and Effect

- Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS4-4),(MS-LS4-5),(MS-LS4-6)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS4.A: Evidence of Common Ancestry and Diversity

- The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth. (MS-LS4-1)
- Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2)
- Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy. (MS-LS4-3)

LS4.B: Natural Selection

- Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4)
- In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5)

LS4.C: Adaptation

- Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Analyzing and Interpreting Data

- Analyze displays of evolutionary data to identify linear and nonlinear relationships. (MS-LS4-3)
- Analyze and interpret evolutionary data to determine similarities and differences in findings. (MS-LS4-1)

Using Mathematics and Computational Thinking

- Use mathematical representations of evolutionary data to support scientific conclusions and design solutions. (MS-LS4-6)

Constructing Explanations and Designing Solutions

- Apply evolutionary scientific ideas to construct an explanation for real-world phenomena, examples, or events. (MS-LS4- 2)
- Construct an explanation that includes qualitative or quantitative relationships between variables that describe evolutionary phenomena. (MS-LS4-4)

Corresponding CT Core Standards:

ELA/Literacy – RST.6-8.1, RST 6.8.7, WHST 6-8.9

Mathematics – MP.4, 6.RP.A.1, 6.SP.B.5, 6.EE.B.6, 7.RP.A.2 R

Unit 4: Ecosystems: Interactions, Energy and Dynamics

Overview

Organisms, and populations of organisms, are dependent on their environmental interactions with both living and with nonliving factors. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources. Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy.

Performance Expectations

At the conclusion of this unit, students will be able to:

- 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-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- 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.
- MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem

Unit Essential Questions

- What patterns of interaction exist among organisms and their environments?
- How does energy move through various ecosystems?

Crosscutting Concepts

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS2-2)

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)
- Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4),(MS-LS1-5)

Energy and Matter

- The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3)

Stability and Change

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4),(MS-LS2-5)

Scale, Proportion, and Quantity

- Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

- All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)

LS2.A: Interdependent Relationships in Ecosystems

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2- 1)
- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)
- Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5)

LS4.D: Biodiversity and Humans

- Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Developing and Using Models

- Develop a model to describe an ecological phenomena. (MS-LS2-3)

Analyzing and Interpreting Data

- Analyze and interpret data to provide evidence for ecological phenomena. (MS-LS2-1)

Engaging in Argument from Evidence

- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for an ecological phenomenon or a solution to an ecological problem. (MS-LS2-4) (MS-LS1-4)
- Evaluate competing ecological design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

Constructing Explanations and Designing Solutions

- Construct an explanation that includes qualitative or quantitative relationships between variables that predict ecological phenomena. (MS-LS2-2)
- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS- LS1-5)

Corresponding CT Core Standards:

ELA/Literacy – RST.6-8.1, RST 6-8.2, RST 6-8.7, RI 8.8, WHST.6-8.1, WHST.6-8.2, WHST 6-8.9, SL.8.5

Mathematics – 6.EE.C.9

Fairfield Public Schools
Science Curriculum

Draft
Biology
March 12, 2018

FAIRFIELD PUBLIC SCHOOLS

Biology: Description

Students in high school develop understanding of key concepts that will help them make sense of life science. The ideas are built upon students' science understanding of disciplinary core ideas, science and engineering practices, and crosscutting concepts from earlier grades.

There are four life science disciplinary core ideas in high school: 1) From Molecules to Organisms: Structures and Processes, 2) Ecosystems: Interactions, Energy, and Dynamics, 3) Heredity: Inheritance and Variation of Traits, 4) Biological Evolution: Unity and Diversity.

The performance expectations for high school life science blend core ideas with scientific and engineering practices and crosscutting concepts to support students in developing usable knowledge that can be applied across the science disciplines. While the performance expectations in high school life science couple particular practices with specific disciplinary core ideas, instructional decisions include use of many practices underlying the performance expectations.

Standards for this course are taken from the *Next Generation Science Standards* and are of three types:

Disciplinary Core Ideas (DCIs): Shown as content objectives, these standards define what students should know about the most essential ideas in the major science disciplines. The focus is on a limited number of core ideas in science and engineering both within and across the disciplines to avoid the shallow coverage of a large number of topics and to allow more time for teachers and students to explore each idea in greater depth. Reduction of the sheer sum of details to be mastered is intended to give time for students to engage in scientific investigations and argumentation and to achieve depth of understanding of the core ideas presented.

Science and Engineering Practices (SEP): These standards enable students to apply the content in the DCI's and the skills of practicing scientists and engineers to explain phenomena and solve real world problems. Engaging in the practices of science helps students understand how scientific knowledge develops; such direct involvement gives them an appreciation of the wide range of approaches that are used to investigate, model, and explain the world. Engaging in the practices of engineering likewise helps students understand the work of engineers, as well as the links between engineering and science.

Crosscutting Concepts: These standards provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. These broad concepts tie together the influence of engineering, technology, and science on society and the natural world.
http://www.nextgenscience.org/next-generation-science-standards

Biology

Enduring Understandings
Over many generations variations in the living organisms arise allowing them to survive in an ever changing Earth. The structure of biological components determines the role they play in survival of a species. All living organisms maintain a balance internally and between individuals, this equilibrium can be disturbed by natural or human events.

Course Essential Questions
• How do organisms live and grow? • Why do interactions vary among organisms and their environments? • Why are some characteristics passed on and some characteristics changed over time?

Course: Year-at-a-Glance

Unit	Title	Unit Essential Questions
1	Biological Evolution: Unity and Diversity	How does natural selection lead to a change in species over time?
2	Heredity: Inheritance and Variation of Traits	Why do individuals of the same species and even siblings have different characteristics? How does genetic variation arise and how is it distributed in a population?
3	From Molecules to Organisms: Structures and Processes	How do organisms use matter and energy found in their environment to sustain life processes? What mechanisms do organisms use to grow, develop and maintain homeostasis?
4	Ecosystems: Interactions, Energy, and Dynamics	How do organisms cycle matter and energy? How do stable and changing environmental conditions affect species populations?

Unit 1: Natural Selection and Evolution

Overview

Evolution is the unifying theme of biology. Natural selection incorporates how species and populations change and adapt over time depending on changes in environmental conditions. There are multiple lines of scientific evidence that can be evaluated to support the processes of natural selection including the role of genetic variation in evolution.

Performance Expectations

At the conclusion of this unit, students will be able to:

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity

Unit Essential Question

- How does natural selection lead to a change in species over time?

Crosscutting Concepts

Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS4-2), (HS-LS4-4), (HS-LS4-4), (HS-LS4-5), (HS-LS4-6).

Patterns

- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HS-LS4-1, HS-LS4-3)

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Scientific knowledge is based on the assumption that natural laws operate today as they did in the past, and will continue to do so in the future. (HS-LS4-1, HS-LS4-4)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS4.A : Evidence of Common Ancestry and Diversity

- Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

LS4.B: Natural Selection

- Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2),(HS-LS4-3)
- The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

LS4.C: Adaptation

- Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2)

- Natural selection leads to adaptation that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3),(HS-LS4-4)
- Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)
- Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5),(HS-LS4-6)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Constructing Explanations and Designing Solutions

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS4-2),(HS-LS4-4)

Engaging in Argument from Evidence

- Evaluate the evidence currently accepted explanations of solutions to determine the merits of arguments. (HS-LS4-5)

Using Mathematical and Computational Thinking

- Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6)

Analyzing and Interpreting Data

- Apply concepts of statistics and probability (inducing determining function fits to data, slope, intercepts, and correlation coefficient for linear fits) to science and engineering questions and problems, using digital tools when feasible. (HS-LS4-3)

Obtaining, Evaluating, and Communicating Information

- Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-LS4-1)

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence. (HS-LS4-1)

Corresponding CT Core Standards:

ELA/Literacy – RST.11-12.1, WHST.9-12.1, SL 11-12.5

Mathematics – MP.2, MP.4, HSN-Q.A1, HSN-Q.A.2, HSN-Q.A.3

Unit 2 Heredity: Inheritance and Variation of Traits

Overview

Scientists have observed variations in species that are caused by factors including the inheritance of genes and a changing environment. These genetic variations can be predicted and quantified using mathematical concepts.

Performance Expectations

At the conclusion of this unit, students will be able to:

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Unit Essential Questions

- What is the role of DNA in determining the traits passed from parents to offspring?
- How does genetic variation arise and how is it distributed in a population?

Crosscutting Concepts

Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS3-1), (HS-LS3-2)

Scale, Proportion, and Quantity

- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth v s. exponential growth). (HS-LS3-3)

Science is a Human Endeavor

- Technological advances have influenced the progress of science and science has influenced advances in technology. (HS-LS3-3)
- Science and engineering are influenced by society and society is influenced by science and engineering. (HS-LS3-3)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (secondary to HS-LS3-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.)

LS3.A : Inheritance of Traits

- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA . The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

LS3.B: Variation of Traits

- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)

LS1.B: Growth and Development of Organisms

- The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. (Note: This Disciplinary Core Idea has been divided between unit 2 and 3)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Engaging in Argument from Evidence

- Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. (HS-LS3-2)

Analyzing and Interpreting Data

- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS -LS3-3)

Asking Questions and Defining Problems

Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1)

Corresponding CT Core Standards:

ELA/Literacy – RST.11-12.1, RST.11-12.8, WHST.9-12.1, RST.11-12.2, RST.11-12.7

Mathematics – MP.2, MP.4, HSN-Q.A1, HSN-Q.A.2, HSN-Q.A.3

Unit 3 From Molecules to Organisms: Structures and Processes

Overview

Organisms are built on a hierarchical structure, with each level providing the foundation for the next. The structure and function of these foundational molecules is determined by an organism's genetic code which is inherited from the previous generation. As matter and energy flow through different organizational levels of living systems, these building blocks are rearranged and used to perform essential life functions.

Performance Expectations

At the conclusion of this unit, students will be able to:

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Unit Essential Questions

- How do organisms use matter and energy found in their environment to sustain life processes?
- What mechanisms do organisms use to grow, develop and maintain homeostasis?

Crosscutting Concepts

Systems and System Models

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows—within and between systems at different scales. (HS-LS1-2), (HS-LS1-4)

Energy and Matter

- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. (HS-LS1-5), (HS-LS1-6)
- Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.(HS-LS1-7),(HS-LS2-4)

Structure and Function

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)

Stability and Change

Feedback (negative or positive) can stabilize or destabilize a system. (HS- LS1-3)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS1.A: Structure and Function

- Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1) (Note:This Disciplinary Core Idea is also addressed by HS-LS3-1.)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

LS1.B: Growth and Development of Organisms

- In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (Note: This Disciplinary Core Idea has been divided between unit 2 and 3)

LS1.C: Organization for Matter and Energy Flow in Organisms

- The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. (HS-LS1-5)
- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)
- As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6),(HS-LS1-7)
- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment. (HS-LS1-7)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Developing and Using Models

- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

Constructing Explanations and Designing Solutions

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS -LS1-1)

Planning and Carrying out Investigations

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

Corresponding CT Core Standards:

ELA/Literacy – RST.11-12.1, RST.11-12.8, WHST.9-12.2

Mathematics – MP.2, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3

Unit 4 Ecosystems: Interactions, Energy, and Dynamics

Overview

The Earth is an ever changing system. Many factors within the system affect biodiversity and populations of species. Populations are influenced by available energy, cycling of nutrients, populations of other species, and human activities. The biodiversity of ecosystems is dependent upon various organisms ability to adapt and survive changes in the environment.

Unit Content Objectives

At the conclusion of this unit, students will be able to:

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Unit Essential Questions

- How do organisms cycle matter and energy?
- How do stable and changing environmental conditions affect species populations?

Crosscutting Concepts

Scale, Proportion, and Quantity

- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. (HS-LS2-1)
- Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale. (HS-LS2-2)

Energy and Matter

- Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.(HS-LS1-7),(HS-LS2-4)
- Energy drives the cycling of matter within and between systems. (HS-LS2- 3)

Systems and System Models

- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions— including energy, matter, and information flows—within and between systems at different scales. (HS-LS2-5)

Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable. (HS-LS2-6),(HSLS2-7)

Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS2-8), (HS-LS4-6)

NGSS Unit Standards

DISCIPLINARY CORE IDEAS (DCI):

LS2.A: Interdependent Relationships in Ecosystems

- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HS-LS2-2)

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HSLS2-3)
- Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)
- Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. (HS-LS2-5)

PS3.D: Energy in Chemical Processes

- The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. (secondary to HS-LS2-5)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.(HS-LS2-2),(HS-LS2-6)
- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7)

LS2.D: Social Interactions and Group Behavior

- Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (HS-LS2-8)

LS4.D: Biodiversity and Humans

- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (HS-LS4-6) (Note: This Disciplinary Core Idea is also addressed by HS-LS2-7.)
- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)

SCIENCE AND ENGINEERING PRACTICES (SEP):

Engaging in Argument from Evidence

- Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6)
- Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-8)

Constructing Explanations and Designing Solutions

- Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-6)
- Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS2-8)

Scientific Knowledge is Open to Revision in Light of New Evidence

- Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence. (HS-LS2-2)
- Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation. (HS-LS2-6), (HS-LS2-8)

Using Mathematical and Computational Thinking

- Use mathematical and/or computational representations of phenomena or design solutions to support explanations. (HS-LS2-1)
- Use mathematical representations of phenomena or design solutions to support and revise explanations. (HS-LS2-2)
- Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6)

Developing and Using Models

- Develop a model based on evidence to illustrate the relationships between systems or components of a system. (HS-LS2-5)

Corresponding CT Core Standards:

ELA/Literacy – RST.11-12.1, RST.11-12.8

Mathematics – MP.2, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3

DRAFT

Special Meeting Notes
Fairfield BoE; March 19, 2018

Call to order of the Special Meeting of the Board of Education and Roll Call

Chairman Philip Dwyer called the Special meeting to order at 6:07PM. Present were members Trisha Pytko, Jennifer Leeper (arrived 6:10PM), Christine Vitale, Jessica Gerber, Philip Dwyer, Jennifer Jacobsen, Jennifer Maxon-Kennelly and Jeff Peterson. Nick Aysseh was not present. Others present were Superintendent Dr. Toni Jones, First Selectman Michael Tetreau, Police Chief Gary MacNamara, Lt. Eddie Weihe, Mr. Tom Cullen and Mr. Sal Morabito.

Board Discussion Regarding Security Matters

Mrs. Gerber moved/Ms. Pytko seconded the recommended motion "that the Board of Education hereby moves to enter into Executive Session to discuss security matters in accordance with General Statute CGS 1-210(b)(19) and invite Mr. Cullen, Mr. Morabito, Lt. Weihe, Chief MacNamara and First Selectman Tetreau; and to discuss personnel matters per Connecticut general Statute CGS 1-200(6)" Motion passed 7-0 (Ms. Leeper was not present at this time).

The Board came out of Executive Session at 7:27PM

Adjournment

Mrs. Gerber moved/Mrs. Jacobsen seconded the recommended motion "that this Regular Meeting of the Board of Education adjourn." Motion passed 8-0. Meeting adjourned at 7:27PM.

Enclosure No. 5
April 5, 2018

Regular Meeting Minutes
Fairfield BoE, March 19, 2018

NOTICE: A full meeting recording can be obtained from Fairfield Public Schools. Please call 203-255-8371 for more information and/or see the FPS website (under Board Meeting Minutes) for a link to FAIRTV.

Voting Summary:

Call to order of the Regular Meeting of the Board of Education and Roll Call
Chairman Philip Dwyer called the Regular meeting to order at 7:35PM. Present were members Trisha Pytko, Jennifer Leeper, Christine Vitale, Jessica Gerber, Philip Dwyer, Jennifer Jacobsen, Jennifer Maxon-Kennelly and Jeff Peterson. Nick Aysseh was not present. Others present were Superintendent Dr. Toni Jones, members of the central office leadership team, student representatives Molly Baker, Ted Orben and Paul Rivera, and approximately 50 members of the public.

Old Business
Approval of Policies

Policy 1311.1: Community Relations, Political Activities of School Employees
Mrs. Maxon-Kennelly moved/Mrs. Jacobsen seconded the recommended motion "that the Board of Education approve Policy 1311.1: Community Relations, Political Activities of School Employees."

Mr. Dwyer moved/Mrs. Gerber seconded to amend the Policy and delete "Political materials and/or engagement as part of the instructional program," paragraphs A through E. Following Board discussion, Mr. Dwyer withdrew his motion by unanimous consent.

Mr. Dwyer moved/Mrs. Maxon-Kennelly seconded to amend the Policy and delete "Political materials and/or engagement as part of the instructional program," paragraphs A through E, and direct that this form the basis of an Administrative Regulation. Motion passed 8-0.

The original motion to approve the Policy – as amended – passed 8-0.

Policy 1311.2: Community Relations, Political Activities in the Schools/On School Board Property
Mrs. Maxon-Kennelly moved/Ms. Pytko seconded the recommended motion, "that the Board of Education approve Policy 1311.2: Community Relations, Political Activities in the Schools/On School Board Property." Motion passed 8-0.

Policy 5144.1: Students, Use of Physical Force
Mrs. Maxon-Kennelly moved/Mrs. Gerber seconded the recommended motion, "that the Board of Education approve Policy 5144.1: Students, Use of Physical Force." Motion passed 8-0.

New Business
Approval of UI Energy Opportunity Program – Proposed Project at McKinley Elementary School.
Mrs. Gerber moved/Mrs. Vitale seconded to add a voting item to the agenda. Motion passed 7-0 (Mrs. Jacobsen was not in the room at this time).

Mr. Dwyer moved/Mrs. Gerber seconded "Approval of UI Energy Program Proposed for McKinley Elementary School" Motion passed 8-0.

At 10:50PM, Mrs. Gerber moved/Mrs. Vitale seconded to suspend the rules and extend the meeting to 11:30PM. Motion passed 6-2 (Ms. Leeper, Mrs. Vitale, Mrs. Gerber, Mr. Dwyer, Mrs. Jacobsen, Mr. Peterson in favor; Ms. Pytko, Mrs. Maxon-Kennelly against).

Discussion and Possible Action on Facilities Planning Research – Milone and MacBroom Scenarios
Ms. Leeper moved/Ms. Pytko seconded to add discussion of "Scenario C" to the agenda. Motion passed 8-0.

Mr. Dwyer moved/Ms. Pytko seconded the motion "that the BoE agrees to remove from consideration items i, iv, v, and "scenario C" from Milone & MacBroom's scenarios" Motion passed 8-0.

Approval of Minutes
Approval of Special Minutes of January 23, 2018
Approval of Regular Minutes of January 25, 2018
Approval of Special Minutes of February 8, 2018
Approval of Regular Minutes of February 13, 2018
Mrs. Gerber moved/Ms. Pytko seconded the recommended motion "that the Board of Education approve the Minutes of the Special Meeting of January 23, 2018, the Minutes of the Regular Meeting of January 25, 2018, the Minutes of the Special Meeting of February 8, 2018 and the Minutes of the Regular Meeting of February 13, 2018." Motion passed 8-0.

Adjournment
Mrs. Gerber moved/Ms. Leeper seconded the recommended motion "that this Regular Meeting of the Board of Education adjourn." Motion passed 8-0. Meeting adjourned at 11:25PM.

Detailed Minutes

Mr. Dwyer said the district is doing everything possible to ensure student safety. He commended the Police Department and the Chief of Police in particular.

Student Reports
Ms. Baker reported for Fairfield Ludlowe High School: Over 700 FLHS students participated in the National Student Walk-out; a group of AP US Govt and AP Comparative Govt students will participate in the Washington DC March for Our Lives; Project Runway took place a few weeks ago; spring sports begin this week; Juniors will take the SATs this week; the combined orchestra performance featured guest conductor Robert Gardner; and the Music Dept. will go to Disney this week to perform. Given the number of snow days, Ms. Baker requested consideration of an earlier graduation date to allow for internships and college orientations.

Mr. Orben and Mr. Rivera reported for Fairfield Warde High School: The Girls Co-op Ski Team won the State Championship for the 6th year in a row; the Boys Co-op came in second place; the hockey and basketball teams made States; approximately 600 students participated in the National Student Walk-out; Fairfield University students shared college experiences with Health classes; hosted no-phone day a few weeks ago; Warde Achievement Gap Task Force presented in San Diego; hosted the American Math Competition and the National Latin Exam; the Business Team came in 2nd at the Junior Achievement Competition; the Unified Sports Basketball game was held last week; Coaches vs. Cancer game raised over $2K; SAT's are scheduled for Wednesday.

Presentations
Technology Education Curriculum – Status Update
Mr. McCandless led the presentation. Technology Education is the study of human innovation; it must keep pace with 21st century changes and ongoing updates in state standards. In middle school, Tech Ed is 3D modeling/printing, woodworking, graphic design, animation and transportation technology. STEM activities include measurement, organization, geometry, problem solving and aerodynamics. In high school, the new curriculum provides an avenue for students to implement theory knowledge into application practice and gain a deeper understanding of content. Current practices and future plans were reviewed for courses including Wood Technology, Transportation Technology/Applied Mechanics, CAD, Computer Technology, and Engineering. Future plans include digital classroom, certifications, internships, and software updates. Success can be judged by the use of DSM (design model), Project Success Assessment (based on USM Rubric) and Project-Based Assessments. An Advisory Council is in the works to help curriculum stay

current with industry needs, provide internships and research possible school-work opportunities. The council will be comprised of business leaders and staff.

In order to keep pace with technology, new classes may be needed in STEM areas, particularly Engineering, and course offerings may need modifications and updated technology. Tech Ed does not have AP offerings; the focus is on an early college experience and is curriculum-driven with more opportunity for specialization. Tech Ed integrates well with core courses and the department is working hard to recruit more female students.

Library/Media Curriculum - Status Update
Ms. Callahan and Ms. Faiella presented the status update for Library/Media Curriculum. The Library Learning Commons serves as the school's physical and virtual center for active and engaged learning. The curriculum addressed the 5 Big Ideas: Inquiry and Information Skills, Critical Thinking and Creativity, Communication and Collaboration, Independent Reading and Technology Skills; resulting in 22 exit skills for a 12th grader. The elementary level includes both fixed and collaborative schedules that allow technology integration. Middle school skills are always embedded in the curriculum. In high schools, goals are closely aligned with the Academic Expectations. Makerspaces allow movement from knowledge consumption to knowledge creation and include activities such as coding and engineering. Because the curriculum is integrated, separate achievement data is not collected. Moving forward, the department will continue to embed inquiry skills, focus on new science curriculum, implement digital citizenship instruction, support technology integration and develop core and consistent Maker Space initiatives.

Even with all the digital media and Learning Commons space, print books are still very popular. Each time there is a curriculum update, there is a need to change and adapt due to the embedded nature of this work. Success is measured at the elementary level with a tech skills checklist and rubric, at the middle school level with a process grade and rubric; and at the high school level with academic expectations. Digital citizenship, academic integrity and ethical use of media are reinforced with every project. Future plans include transforming spaces to include mobility, flexible work areas and comfortable seating.

Public Comment:
12 Sherman parents (Joe, Alex, Matt, Sarah Ferrizz, Sara Nuland, Meghann Dockum, Melanie Ross, Kathleen Raymond, Shannon Sherry, Jennifer Gainer, Eunice Oleksiw): Spoke against pocket redistricting at Sherman Elementary.
Mark Shalhoub, Verna Hill Road: Spoke against closing Dwight Elementary School.
Dale Resnick, Steiner Street: Spoke against closing Jennings Elementary School.
Liz Matthews, Wakeman Lane: Spoke against redistricting in general and closing an elementary school.
Frank Sahagian, FPS Teacher and Resident: Thanked the Board for political activities policy changes; requested parts of the policy be scrapped altogether.
Bob Smoler, FEA President: Thanked the Board for addressing political policy; remains concerned that policy as it is now could have negative impact.
Sue Miska, Ryegate Road: Thanked the Board for the political policy; teachers should encourage student perspective.

Old Business

Approval of Policies

Policy 1311.1: Community Relations, Political Activities of School Employees
Mrs. Maxon-Kennelly moved, Mrs. Jacobsen seconded that the Board of Education approve Policy 1311.1: Community Relations, Political Activities of School Employees.

Mrs. Maxon-Kennelly alerted the Board of several minor modifications to the policy since the last meeting. She would be happy to consider the policies as a First Read should the Board choose that path. The policy is an attempt to provide guidance. All sample policies that were reviewed were from CABE and were initially far more prescriptive; the general intent is to provide a balance.

Mrs. Gerber, while understanding the genesis of this policy, questioned how the policy committee arrived at including

the classroom in its policy. Mrs. Maxon-Kennelly said the policy does not deprive anyone of his or her constitutional rights to free speech.

Mr. Dwyer said last year's campaign activities held directly outside of a school building was the driver for the policy. He would prefer the section 'Political Materials and/or Engagement as Part of the Instructional Program, paragraphs A through E,' be removed. Ms. Pytko felt that section should remain and is an important part of the policy – countless hours were spent discussing these paragraphs while she was a temporary member of the Policy Committee.

Dr. Jones felt a guidance document would be more appropriate and more helpful to staff than policy 1311.1. Policy 1311.2 addresses her concern from last year's concert event. As currently written, Policy 1311.1 would not have changed any past actions on the part of administrators, and there aren't many complaints about this. The code of conduct is enforced when needed.

Mr. Dwyer moved, Mrs. Gerber seconded to amend the Policy and delete "Political materials and/or engagement as part of the instructional program," paragraphs A through E.

Mr. Dwyer felt unease with that section as it could be misconstrued by some. Mrs. Gerber agreed and added that the teacher comments the Board has heard thus far have been negative. Mrs. Leeper expressed some concern over the possibility that a parent could inject his view in order to provide 'balance.'

Mr. Peterson added that the idea was to create a safe harbor for teachers without suffering negative commentary from the public. Additionally, it was to allow latitude on enforcement.

Mrs. Maxon-Kennelly suggested taking Mr. Dwyer's amended section and addressing that through Administrative Regulations.

Following Board discussion, Mr. Dwyer withdrew his motion by unanimous consent.

Mr. Dwyer moved, Mrs. Maxon-Kennelly seconded to amend the Policy and delete "Political materials and/or engagement as part of the instructional program," paragraphs A through E, and direct that this form the basis of an Administrative Regulation.

Public Comment:
Frank Sahagian, FPS Teacher and Resident: Administrative regulations is a terrific compromise and more appropriate.
Bob Smoler, FEA President: Administrative regulations is a wonderful compromise and supports the amendment.

Motion Passed: 8-0

The original motion to approve the Policy – as amended – Passed: 8-0

Policy 1311.2: Community Relations, Political Activities in the Schools/On School Board Property
Mrs. Maxon-Kennelly moved, Ms. Pytko seconded that the Board of Education approve Policy 1311.2: Community Relations, Political Activities in the Schools/On School Board Property.

Motion Passed: 8-0

Policy 5144.1: Students, Use of Physical Force
Mrs. Maxon-Kennelly moved, Mrs. Gerber seconded that the Board of Education approve Policy 5144.1: Students, Use of Physical Force.

Motion Passed: 8-0

New Business

Approval of UI Energy Opportunity Program
Mr. Cullen and Mr. Morabito said the vote is timely – UI is running out of money for the program.

Mrs. Gerber moved, Mrs. Vitale seconded to add a voting item to the agenda.
Motion Passed: 7-0 *(Mrs. Jacobsen was not in the room at this time).*

Mr. Dwyer moved, Mrs. Gerber seconded "Approval of UI Energy Program Proposed for McKinley Elementary School"

Mr. Morabito reviewed the proposal and said it creates an immediate savings on our energy bill. This program is not new to the district - eight district schools have recently participated in this program. For McKinley, the monthly savings would be approximately $840/month, but after the payback for the work– the savings would jump to approximately $3600/month. Mr. Dwyer and Mrs. Gerber requested a spreadsheet showing overall district savings with this program.

Motion Passed: 8-0

Discussion and Possible Action on Facilities Planning Research – Milone and MacBroom Scenarios

i. *Close an elementary school (Scenario A and B) *Two items*
ii. *Relocate WFC (Scenario D2)*
iii. *Consider grade reconfiguration (Scenario D and F) *Two items*
iv. *Relocate CO as part of grade reconfiguration*
v. *Consolidate to one High School*

Mrs. Maxon-Kennelly explained the background for these items; the list is the result of ideas generated by the Adhoc Committee for Operational Effectiveness to address structural change. At this time, there is no real timeline for a decision on these items except to inform the community of ideas that will not be considered.

i. Close an elementary school (Scenario A and B)
Mrs. Gerber suggested removing the first item, based on projected enrollments and the associated costs of closing an elementary school. Mr. Peterson, Mrs. Vitale and Ms. Leeper agreed. Mr. Dwyer is against closing a school; building planning usually projects out 30-40 years. In addition, redistricting guidelines were adopted in 2015 that do not support closing a school.

ii. Relocate WFC (Scenario D2)
Mr. Dwyer said the WFC building is very old, in need of repair and in a poor location. Mrs. Maxon-Kennelly agreed but said staff have done a wonderful job making the interior very welcoming; she would like this to remain on the list until she has more information. Mrs. Jacobsen agrees and would like to hear from the WFC Administrator. Ms. Leeper is interested in moving WFC back in-house until a more appropriate setting can be found.

iii. Consider grade reconfiguration (Scenario D and F)
Mrs. Gerber said more detail would be helpful. Scenario F does not appear feasible due to middle school space limitations. Mr. Dwyer referred more to the concept of grade reconfiguration, which can also be K-2 and 3-5 scenarios. Mr. Peterson requested to hear more about the educational component of this idea; younger siblings would be separated. Ms. Pytko said grade reconfigurations would not maintain the concept of neighborhood schools. Mrs. Jacobsen would like to hear more about this item – particularly from the McKinley and Jennings communities. Mrs. Vitale and Mrs. Maxon-Kennelly said this idea is worth exploring. Ms. Leeper requested feedback from Dr. Jones.

At 10:50PM, Mrs. Gerber moved, Mrs. Vitale seconded to suspend the rules and extend the meeting to 11:30PM.
Motion Passed: 6-2
Favor: Ms. Leeper, Mrs. Vitale, Mrs. Gerber, Mr. Dwyer, Mrs. Jacobsen, Mr. Peterson
Oppose: Ms. Pytko, Mrs. Maxon-Kennelly

iv. Relocate CO as part of grade reconfiguration
Dr. Jones mentioned the CO rent is very reasonable; it would be very expensive to move the IT staff. Mr. Cullen said the CO location is actually a Rooster River agreement that was made with the Town's assistance and expires June 2026. The CO space is approximately 21,000 square feet, the amount is $92K and utilities are approximately $68K. Mrs. Jacobsen would like this item removed from the list – CO is very busy with people coming and going; it is safer to have CO at a non-school location.

v. Consolidate to one High School
Mr. Dwyer does not support this item – there is not enough space at the high schools for a consolidation. Mrs. Maxon-Kennelly agreed; she did not want this item to move forward.

Ms. Leeper moved, Ms. Pytko seconded to add discussion of "Scenario C" to the agenda.

Mrs. Gerber recognized that it may be necessary to redistrict at some point, although redistricting walkers would appear to be counterintuitive. Mrs. Vitale agreed that redistricting is an item for future discussion.

Motion Passed: 8-0

Mr. Dwyer moved, Ms. Pytko seconded that the BoE agrees to remove from consideration items i, iv, v, and "scenario C" from Milone & MacBroom's scenarios.

Public Comment:
Rena Paris, Morehouse Hwy: Concern in the community regarding Jennings.
Liz DellaVolpe, Garden Drive: Concern in the community regarding Jennings.
Meghann Dockum, Fairfield Resident: Thanked the Board for clarifying.
Sara Nuland, Fairfield Resident: Thanked the Board for clarifying.

Motion Passed: 8-0

Mr. Dwyer said he will add Ms. Leeper's emailed items to the list. Ms. Pytko asked that the ECC re-location be added as an item.

Approval of Minutes

Approval of Special Minutes of January 23, 2018
Approval of Regular Minutes of January 25, 2018
Approval of Special Minutes of February 8, 2018
Approval of Regular Minutes of February 13, 2018
Mrs. Gerber moved, Ms. Pytko seconded that the Board of Education approve the Minutes of the Special Meeting of January 23, 2018, the Minutes of the Regular Meeting of January 25, 2018, the Minutes of the Special Meeting of February 8, 2018 and the Minutes of the Regular Meeting of February 13, 2018.

Motion Passed: 8-0

Superintendent Report

Dr. Jones reported on the National Student Walk-out and was very proud of the students. She thanked police for quickly mobilizing to assist the district. She attended the event at Ludlowe, and Mr. Cummings attended at Warde.

The 'Vision of a Graduate' event was well-attended and participants contributed to a great discussion.

SAT's will not be administered if there is an impacting snow event on Wednesday.

Committee/Liaison Report

Ms. Pytko reported for SEPTA: On, March 21st there will be a presentation on Anxiety; March 28 is the monthly meeting; March 30 is the SEPTA Teen Social Group.

Mr. Peterson reported for the BOF: The BOF Open Forum will be held on Saturday, March 24 at 9:30 am in the FLHS auditorium.

Mr. Dwyer reported for the Holland Hill BC on behalf of Mr. Aysseh: The project is currently on time and on budget.

Open Board Comment

Mrs. Maxon-Kennelly said it was an exciting weekend for Odyssey of the Mind with a record number of students participating. There were many top-tier finishers.

Ms. Leeper said she is a member the newly formed Finance Committee, together with Mr. Aysseh and Mrs. Vitale. The committee will meet soon to set the 2018 meeting schedule and elect a Chairman.

Ms. Pytko was excited to have recently signed up to be a Mill River Guide.

Mr. Dwyer reminded the Board of the self-evaluation meeting in late April and requested topics. There will be an outside facilitator. Mrs. Gerber asked that new Board members receive guidance on this meeting.

Adjournment

Mrs. Gerber moved, Ms. Leeper seconded that this Regular Meeting of the Board of Education adjourn.

Motion Passed: 8-0

Meeting adjourned at 11:25PM.

Respectfully Submitted by
Jessica Gerber
Fairfield Board of Education
Secretary