Auburn School District CTE Framework

Course: Advanced Plant Science (CASE-ASP)		**Total Framework Hours up to: 180**
CIP Code: 010602	☒**Exploratory** ☐**Preparatory**	**Date Last Modified: 1/15/15**
Career Cluster: AFNR		**Cluster Pathway: Plant systems**

Unit 1 – Worlds of Opportunity — Hours: 10

Performance Assessment(s):

- Present relevant plant industry vocabulary and definitions to the class.
- Survey their personal dependency upon plants.
- Map regions of crop production.
- Investigate environmental influences on crop production.
- Record notes and reflections related to information presented in class regarding the importance of plants.
- Begin an ongoing course project researching physical attributes and growth requirements for several species of plants.
- Develop a Supervised Agricultural Experience (SAE) implementation plan.
- Utilize the Agriculture Experience Tracker (AET) online record keeping system to maintain accurate records on the SAE project.
- Conduct a sediment test to determine the particle sizes of the mineral matter and the presence of organic matter in a sample of soil.
- Investigate the effects organic matter has on soil porosity and soil air holding capacity.
- Examine a soil sample to determine what kinds of microorganisms are present.
- Conduct an investigation of soil deposition caused by water.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE events and conducting fundraisers. Students will think creatively, communicate clearly, and solve problems while developing a Supervised Agriculture Experience (SAE) project.

Standards and Competencies

Standards:
PS.01. Performance Element: Apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.

Competencies:

Lesson 1.1 The World of Agricultural Education

1.1.1 Many people work in a variety of agricultural enterprises to produce food, fiber, and fuel, which are essential to daily life.

1.1.2 Agricultural education includes learning about agriculture systems, natural resource management, science, business, communication, and leadership.

1.1.4 The National FFA Organization provides opportunities to build necessary life skills, such as leadership and personal character.

1.1.5 Supervised Agricultural Experience programs provide opportunities to explore potential career choices and develop professional career goals.

Lesson 1.2 A World without Enough Plants

1.2.1 The many different types of plant industries provide career opportunities in plant production and management.

1.2.2 Plants are used to sustain human existence by providing many essential products, such as food, fiber, fuel, and medicine.

1.2.3 Plants have aesthetic value to humans.

1.2.4 Environmental factors, such as temperature and rainfall influence crop production and the types of crops grown in different regions of the country.

Aligned Washington State Standards	
Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology. 2.2.2 Use a variety of hardware to support learning. 2.3.1 Select and use common applications. 2.3.2 Select and use online applications
Health and Fitness	
Math	
Reading	CCSS: English Language Arts Standards » Science & Technical Subjects » Grade 9-10 Key Ideas and Details RST.9-10.1 – Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. Integration of Knowledge and Ideas RST.9-10.7 – Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
Science	**Disciplinary Core Ideas** Life Science LS2.A: Interdependent Relationships in Ecosystems LS4.D: Biodiversity and Humans Earth and Space Science ESS3: Earth and Human Activity ESS3.C: Human Impacts on Earth Systems **Science and Engineering Practices** Asking Questions and Defining Problems Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Systems and System Models **Understandings about the Nature of Science** Science Addresses Questions About the Natural and Material World

Social Studies	
Writing	CCSS: English Language Arts Standards » Writing » Grade 9-10 Research to Build and Present Knowledge WHST.9-10.9 – Draw evidence from informational texts to support analysis, reflection, and research.

Unit 2 – Mineral Soils — Hours: 20

Performance Assessment(s):

- Conduct tests to determine soil texture by feel.
- Test soil permeability to understand the relationship between soil particle size and rate of water filtration.
- Demonstrate the principles of water holding capacity and represent differences between test substances with data.
- Conduct an experiment providing evidence for the role of organic matter related to water holding capacity of the soil.
- Conduct an inquiry lab making predictions of soil characteristics using knowledge of the properties of the whole system.
- Identify components commonly used in potting media.
- Test different potting media ingredients to determine the permeability and porosity qualities of the media.
- Determine the percentage of ingredients found in a potting soil mixture.
- Calculate the volume of various containers using mathematics.
- Use testing equipment to detect the levels of nitrogen, phosphorus, and potassium in soil samples.
- Identify the effects of nutrient deficiencies in plants by observing anatomical differences.
- Conduct plant tissue testing to determine the potential nutrients that are lacking in growing plants.
- Use mathematical formulas to solve problems regarding fertilizer analyses, rates, and cost comparisons.

Leadership Alignment:

Leadership activities embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE events and Science Fair entries. Students will access and evaluate information, use and manage information, and manage projects utilizing the soils activities and plant management plan project.

Standards and Competencies

Standards**:**

PS.02. Performance Element: Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

Competencies**:**

Lesson 2.1 Starting from the Ground Up

2.1.1 Mineral matter, air, water, and organic matter are found in different proportions within a soil and define soil quality.
2.1.2 Mineral soils consist of three different particle sizes, specifically sand, silt, and clay.
2.1.3 Organisms, found in soils, help to form soils and improve soil quality.
2.1.4 Geographical features and environmental factors influence the formation process of soils and impacts soil quality.
2.1.5 Soils form in layers that have distinguishing characteristics from other layers in a soil profile.
2.1.6 Soil color can vary due to the parent material it was derived from and environmental forces that formed it.
2.1.7 Soil erosion results in the loss of quality top soil and is a concern in the study of mineral soils.

Lesson 2.2 Understanding Soil Properties

2.2.1 Sand, silt, and clay are three sizes of mineral particles that comprise soil texture.

2.2.2 Soil structure and soil texture are elements that affect soil function.
2.2.3 The structure and color of the soil profile determines the effective depth of a soil.
2.2.4 Mottling, soil horizon color, and permeability of the soil provide clues for determining internal drainage characteristics of soil.
2.2.5 Organic matter influences the porosity and water holding capacity of soils.
2.2.6 Soil permeability is influenced by the texture and structure of soil horizons.

Lesson 2.3 Soil Chemistry

2.3.1 Soil pH determines the availability of nutrients required for plant growth and health.
2.3.2 Soil salinity concentration determines how well plants uptake water, and as a result the ability of plants to absorb the available necessary nutrients.
2.3.3 Testing of soil samples detect imbalances related to soil chemistry factors.
2.3.4 The optimal pH and salinity level required for plant growth varies among plant species and is adjusted with the use of chemical treatments.

Aligned Washington State Standards	
Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	CCSS: Conceptual Category – Number and Quantity Quantities Reason quantitatively and use units to solve problems. CCSS: Conceptual Category – Geometry Geometric Measurement and Dimension Explain volume formulas and use them to solve problems Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable. Making Inferences and Justifying Conclusions Make inferences and justify conclusions from sample surveys, experiments, and observational studies. Using Probability to Make Decisions Calculate expected values and use them to solve problems. CCSS: Conceptual Category – Statistics and Probability Interpreting Categorical and Quantitative Data

	Summarize, represent, and interpret data on a single count or measurement variable. Making Inferences and Justifying Conclusions Make inferences and justify conclusions from sample surveys, experiments, and observational studies. Using Probability to Make Decisions Calculate expected values and use them to solve problems
Reading	CCSS: English Language Arts Standards » Science & Technical Subjects » Grade 9-10 Key Ideas and Details RST.9-10.3 – Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. Integration of Knowledge and Ideas RST.9-10.7 – Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. Integration of Knowledge and Ideas RST.9-10.9 – Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
Science	**Disciplinary Core Ideas** <u>Life Science</u> LS2: Ecosystems: Interactions, Energy, and Dynamics LS2.B: Cycles of Matter and Energy Transfer in Ecosystems <u>Earth and Space Science</u> ESS2: Earth's Systems ESS2.A: Earth Materials and Systems ESS2.C: The Roles of Water in Earth's Surface Processes <u>Physical Science</u> PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Cause and Effect: Mechanism and Prediction Scale, Proportion, and Quantity Systems and System Models Energy and Matter: Flows, Cycles, and Conservation Structure and Function Stability and Change **Understandings about the Nature of Science**

	Scientific Investigations Use a Variety of Methods Scientific Knowledge is Based on Empirical Evidence Scientific Knowledge Assumes Order & Consistency in Natural Systems Science is a Human Endeavor Science Addresses Questions About the Natural and Material World
Social Studies	
Writing	CCSS: English Language Arts Standards » Writing » Grade 9-10 Text Types and Purposes WHST.9-10.1 – Write arguments focused on discipline-specific content. WHST.9-10.2 – Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. Production and Distribution of Writing WHST.9-10.4 – Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. Research to Build and Present Knowledge WHST.9-10.7 – Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Unit 3 – Soilless Systems Hours: 15

Performance Assessment(s):

- Compare the use of fertilizers, water, and media in hydroponic and traditional plant production systems.
- Recognize the different types of hydroponic systems available.
- Design a hydroponic system incorporating the design principles of a specific type of system, such as nutrient flow, aggregate, water culture, or aeroponics.
- Monitor hydroponic system water quality for electrical conductivity, pH, dissolved oxygen, and nutrient levels.
- Determine the impact water quality has on plant growth in a hydroponic system.
- Identify and label plant and animal cell organelles.
- Distinguish structural differences between plant and animal cells.
- Develop a pictorial representation of cell function.
- Correctly prepare slides of plant cells for viewing under a microscope.
- Collect and analyze data to provide evidence of cell metabolism.

Leadership Alignment:

Leadership activities embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE events and Science Fair entries. Students will work in small groups to conduct experiments, analyze data and interact effectively with others access and evaluate information, use and manage information, and manage projects utilizing the soils activities.

Standards and Competencies

Standards**:**

PS.02. Performance Element: Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

PS.03. Performance Element: Propagate, culture, and harvest plants.

Competencies

Lesson 3.1 Mixing Media

3.1.1 Potting media has specific qualities suited for container crops, such as using lightweight and inexpensive materials that provide the essential components needed for drainage and porosity.

3.1.2 Media is sold in cubic feet or cubic yard increments and calculation of usage is an important skill for greenhouse and nursery production.

3.1.3 There are many different types of ingredients used in potting soil that provide permeability and porosity needed for container crops.

Lesson 3.2 Hydroponics

3.2.1 Growing crops with a hydroponic method relies on using water with or without potting media instead of mineral soil to provide the necessary growth requirements.

3.2.2 Hydroponic crop production has advantages over traditional cropping systems, such as efficient use of space and resources.

3.3.3 There are many considerations to examine when choosing between hydroponic production and traditional crop production, such as the spread of disease and increased equipment costs.

3.3.4 Hydroponic crop production in a greenhouse provides the potential for yearlong crop production regardless of environmental conditions.

3.3.5 Careful management and monitoring of water quality in a hydroponic system are necessary to ensure plant health.

Aligned Washington State Standards	
Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	CCSS: Conceptual Category – Number and Quantity Quantities Reason quantitatively and use units to solve problems. Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning & explain the reasoning. Solve equations and inequalities in one variable. Solve systems of equations CCSS: Conceptual Category – Geometry Geometric Measurement and Dimension Explain volume formulas and use them to solve problems CCSS: Conceptual Category – Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable.

	Making Inferences and Justifying Conclusions Make inferences and justify conclusions from sample surveys, experiments, and observational studies. Using Probability to Make Decisions Calculate expected values and use them to solve problems
Reading	
Science	**Disciplinary Core Ideas** <u>Life Science</u> LS2: Ecosystems: Interactions, Energy, and Dynamics LS2.B: Cycles of Matter and Energy Transfer in Ecosystems <u>Earth and Space Science</u> ESS2: Earth's Systems ESS2.A: Earth Materials and Systems ESS2.C: The Roles of Water in Earth's Surface Processes <u>Physical Science</u> PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Cause and Effect: Mechanism and Prediction Scale, Proportion, and Quantity Systems and System Models Energy and Matter: Flows, Cycles, and Conservation Structure and Function Stability and Change **Understandings about the Nature of Science** Scientific Investigations Use a Variety of Methods Scientific Knowledge is Based on Empirical Evidence Scientific Knowledge Assumes Order & Consistency in Natural Systems Science is a Human Endeavor Science Addresses Questions About the Natural and Material World
Social Studies	
Writing	
Unit 4 – Anatomy and Physiology	**Hours: 30**
Performance Assessment(s):	

- Identify the four major parts of plant structure.
- Describe the function of the major plant parts.
- Examine a root structure and sketch representations of the structural form for a root.
- Examine cell differentiation as it relates to root cells.
- Conduct an experiment to simulate the osmosis process of plant root hairs.
- Examine internal structures of stems.
- Identify differences between monocotyledon and dicotyledon features.
- Research and examine the life span of a tree including environmental conditions that coincided with the growth of a tree.
- Create a poster depicting the lifespan of a tree referencing stages of growth with historical events.
- Create a journal that includes sketches and identification information for 20 different species of local plants.
- Identify the characteristics of simple and compound leaves.
- Investigate the pigments and food storage systems found in plant leaves.
- Explain the process plants use to produce and store food.
- Explain why leaves are important to plants.
- Identify the parts of a flower and explain the function for each part.
- Construct a model representing the parts of a flower.
- Develop a concept map to illustrate understanding of related ideas and nomenclature necessary to discuss the parts and functions of a flower.
- Determine different ways to group objects.
- Develop a flowchart to classify 20 different species of plants.
- Research the taxonomic classification for a plant species.
- Prepare for the plant identification portions of the Agronomy, Floriculture, Forestry, or Nursery/Landscape Career Development Events.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE and Science Fair entries. Students will use systems thinking, use and manage information and produce results with plant research and projects.

Standards and Competencies

Standards**:**

PS.01. Performance Element: Apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.

PS.02. Performance Element: Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

Competencies

Lesson 4.1 Cells: Life's Smallest Units

4.1.1 Plant cells share similarities and differences with animal cells.

4.1.2 Plant cells are comprised of many parts that have essential functions for the survival of plant tissue, such as respiration.

4.1.3 Cell organelles can only be seen using a microscope.

4.1.4 There are many different classifications of cells based on their utility.

4.1.5 New plant growth is not possible without meristematic tissues comprised of actively dividing cells.

4.1.6 Cells use water, oxygen, and glucose to produce energy and metabolic by-products of carbon dioxide and water.

Lesson 4.2 The Radicle Root

4.2.1 The four major parts of a plant are the root, stem, leaves, and flower; and their functions are vital for plant health and growth.

4.2.2 The root has specific anatomical features responsible for anchoring the plant in the soil.

4.2.3 Plant roots use differentiated cells that perform specific functions in the root, such as the absorption of water and dissolved nutrients.

4.2.4 Specialized plant cells have unique anatomical features, such as a root hair that serve very specific functions.

4.2.5 Plants use the process of osmosis for the uptake of water and dissolved nutrients required for plant growth.

4.2.6 Water uptake through plant roots is influenced by the turgidity of plant tissues.

Lesson 4.3 Stems, Stalks, and Trunks

4.3.1 Stems of plants provide physical support, storage of nutrients, and necessary pathways for translocation of materials throughout the plant.

4.3.2 Environmental conditions, such as temperature and precipitation are reflected in the growth rates of plants and evidence of those conditions can be found in woody stems.

Lesson 4.4 Leave it Leaves

4.4.1 Leaves are comprised of several parts that have differences in physical characteristics, such as shape and venation patterns.

4.4.2 The understanding of leaf characteristics assists agricultural scientists in identifying species or varieties of plants.

4.4.3 Leaf cells contain a specialized pigment known as chlorophyll that is used by the plant to harvest radiant energy from the sun.

4.4.4 Leaves produce food in the form of sugars that fuel the metabolic functions of a plant.

4.4. 5Leaves produce and store food.

Lesson 4.5 Flower Power

4.5.1 Flowers are classified as either complete or incomplete based on the inclusion of either male or female parts, or both.

4.5.2 The parts of the flower are the mechanisms for pollination and fertilization and are used by a plant to complete sexual reproduction.

4.5.3 Concept maps assist in structuring ideas or concepts and illustrating the various connections between those ideas.

Aligned Washington State Standards	
Art	
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Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	CCSS: Conceptual Category – Number and Quantity Quantities Reason quantitatively and use units to solve problems.

	CCSS: Conceptual Category – Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Arithmetic with Polynomials and Rational Expressions Creating Equations Create equations that describe numbers or relationships CCSS: Conceptual Category – Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable. Making Inferences and Justifying Conclusions Make inferences and justify conclusions from sample surveys, experiments, and observational studies. Using Probability to Make Decisions Calculate expected values and use them to solve problems
Reading	
Science	**Disciplinary Core Ideas** <u>Life Science</u> LS1: From Molecules to Organisms: Structures and Processes LS1.A: Structure and Function LS1.B: Growth and Development of Organisms LS1.C: Organization for Matter and Energy Flow in Organisms LS3: Heredity: Inheritance and Variation of Traits LS3.A: Inheritance of Traits LS3.B: Variation of Traits **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Systems and System Models Energy and Matter: Flows, Cycles, and Conservation Structure and Function Stability and Change **Understandings about the Nature of Science** Scientific Investigations Use a Variety of Methods Science is a Way of Knowing Scientific Knowledge Assumes Order & Consistency in Natural Systems Science is a Human Endeavor Science Addresses Questions About the Natural and Material World

Social Studies	
Writing	

Unit 5 – Taxonomy Hours: 10

Performance Assessment(s):

- Categorize plants by using leaf characteristics.
- Identify plants by using physical features.
- Research the meaning of scientific names for 10 species of trees.
- Create a fictitious plant describing the physical features and apply the principles of binomial nomenclature to create a common and scientific name for the plant.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE and Science Fair entries. Students will reason effectively, access and evaluate information, and produce results while creating taxonomic projects.

Standards and Competencies

Standards**:**
PS.01. Performance Element: Apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.

Competencies

Lesson 5.1 Sorting Out Plants

5.1.1 Classification of people, places, and things are a basic skill used in daily life, scientific research, and the agricultural industry.

5.1.2 Plants and animals are categorized using a hierarchical system to group organisms by anatomical or physiological similarities.

5.1.3 Plant parts are used as visual clues for differentiating between plant species often referred to as plant identification.

5.1.4 Classification is based on morphology that uses plant forms, such as parts, size, color, and usefulness to sort and group into classes with similar features.

Lesson 5.2 Plant Names

5.2.1 Plants are classified and named based upon distinguishing characteristics, such as their physical features.

5.2.2 All plants are named using a binomial system, which is a two-word system for naming plants with the first word being the generic name and the second word being the specific name.

5.2.3 The scientific names for plants consist of Latin words representing descriptive features associated with the plant.

5.2.4 Plant species are often subdivided into varieties and cultivars that will include additional names after the genus and species.

Aligned Washington State Standards

Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas:

	CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	
Reading	
Science	**Disciplinary Core Ideas** Life Science LS1: From Molecules to Organisms: Structures and Processes LS1.A: Structure and Function LS3: Heredity: Inheritance and Variation of Traits LS3.A: Inheritance of Traits LS3.B: Variation of Traits LS4.D: Biodiversity and Humans **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Patterns Systems and System Models Structure and Function Stability and Change **Understandings about the Nature of Science** Scientific Investigations Use a Variety of Methods Scientific Knowledge is Based on Empirical Evidence Science is a Human Endeavor Science Addresses Questions About the Natural and Material World
Social Studies	
Writing	

Unit 6 – The Growing Environment — Hours: 25

Performance Assessment(s):

- Conduct an experiment to determine the rate of transpiration and evaporation for different plant growing containers.
- Examine how the rate of water loss is altered by environmental conditions.
- Collect evidence of water movement through a stem detecting transpiration pull.
- Monitor soil moisture to determine the wilting point of different plant species.

- Investigate the interactions between animals and plants to understand the role of photosynthesis in biological systems.
- Collect evidence of the dependence of photosynthesis with light.
- Examine the relationship between the rate of photosynthesis and light spectrum quality.
- Conduct an investigation determining the effects of light intensity on plant growth.
- Calculate target dates for marketing flowering plants based on the length of time that plants are exposed to light.
- Calculate estimated plant maturity dates using growing degree-days to compare two geographical locations.
- Calculate a growing schedule for a crop started on the same date, but have three different maturity target dates.
- Plant bulbs and schedule flowering for those bulbs to meet a holiday delivery date.
- Conduct an experiment to test for seed viability.
- Perform scarification to treat seeds for seed coat dormancy.
- Sketch and label the stages of germination.
- Design and conduct an experiment to show evidence of the effects for different variations of treatments required for seed germination.
- Write a research report for an experiment showing evidence to support conclusions.
- Make a presentation to the class regarding their research procedures and findings.
- Identify the structures of seeds and plant embryos.
- Distinguish between monocotyledon and dicotyledon seedlings using anatomical features.
- Provide evidence in the form of data related to starch conversion to sugar during a seed germination experiment.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE and Science Fair entries. Students will apply technology effectively, manage goals and time, use systems thinking, and produce results with plant research and projects.

Standards and Competencies

Standards**:**

PS.01. Performance Element: Apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.

PS.02. Performance Element: Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

PS.03. Performance Element: Propagate, culture, and harvest plants.

Competencies:

Lesson 6.1 Plant Food

6.1.1 Plants require sixteen nutrients for optimal growth and development.

6.1.2 Nutrient deficiencies are detected in plants by the examination of anatomical features and chemical test of tissues.

6.1.3 Plants obtain required nutrients from the soil provided the soil has the available nutrients.

6.1.4 Nutrients can be added to the soil in various ways, such as chemical fertilizers, animal wastes, and organic matter.

Lesson 6.2 All Wet

6.2.1 Water is used by plants for the translocation of materials within the vascular systems of plants and used to complete the photosynthesis process.

6.2.2 Water is used to help cool the plant during periods of above optimal temperature conditions through the process of transpiration.

6.2.3 Different substances that plant containers are made from will affect the rate of water loss by evaporation in potted plants.

6.2.4 Water requirements and tolerances vary among plant species.

6.2.5 The wilting point is a critical physiological stage that if exceeded can cause permanent damage to the health and physical appearance of plants.

Lesson 6.3 Lighting it Up

6.3.1 Light is absorbed by chlorophyll and used by plants to convert carbon dioxide and water into glucose and oxygen through the process of photosynthesis.

6.3.2 Photosynthetic rate is affected by environmental factors, such as light exposure, availability of carbon dioxide, and temperature.

6.3.3 The level of red and blue-violet light emitted in a spectrum determines the quality of a light source intended for plant use.

6.3.4 Growth of plants is altered by light intensity and can create undesirable physical characteristics.

6.3.5 Plants respond to the length of daily dark periods to trigger physiological processes, such as flowering.

6.3.6 Plants and animals are codependent in ecosystems.

Lesson 6.4 Chilly Lilies

6.4.1 Plants are classified as cool season or warm season plants based on their temperature requirements.

6.4.2 Temperature affects the metabolism rate of plants including transpiration, respiration, and photosynthesis.

6.4.3 Plant maturity is determined by the accumulation of thermal units during a growing season.

6.4.4 Temperature is a principle determinant for plant dormancy of some seeds, bulbs, specialized roots, and species of perennial plants.

Aligned Washington State Standards	
Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	CCSS: Conceptual Category – Number and Quantity Quantities Reason quantitatively and use units to solve problems. CCSS: Conceptual Category – Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Arithmetic with Polynomials and Rational Expressions Creating Equations Create equations that describe numbers or relationships Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning & explain the reasoning. Solve equations and inequalities in one variable. Solve systems of equations Conceptual Category – Functions

	Linear, Quadratic, and Exponential Models Construct and compare linear, quadratic, exponential models and solve problems CCSS: Conceptual Category – Statistics and Probability Making Inferences and Justifying Conclusions Make inferences and justify conclusions from sample surveys, experiments, and observational studies. Using Probability to Make Decisions Calculate expected values and use them to solve problems Use probability to evaluate outcomes and decisions
Reading	
Science	**Disciplinary Core Ideas** Life Science LS1: From Molecules to Organisms: Structures and Processes LS1.A: Structure and Function LS1.B: Growth and Development of Organisms Earth and Space Science ESS2: Earth's Systems ESS2.A: Earth Materials and Systems ESS2.C: The Roles of Water in Earth's Surface Processes Physical Science PS1.A: Structure and Properties of Matter PS1.B: Chemical Reactions **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Cause and Effect: Mechanism and Prediction Systems and System Models **Understandings about the Nature of Science** Scientific Investigations Use a Variety of Methods Scientific Knowledge is Based on Empirical Evidence Scientific Knowledge is Open to Revision in Light of New Evidence Science Models, Laws, Mechanisms, & Theories Explain Natural Phenomena Science is a Way of Knowing Scientific Knowledge Assumes Order & Consistency in Natural Systems Science is a Human Endeavor Science Addresses Questions About the Natural and Material World

Social Studies	
Writing	

Unit 7 – Sexual Reproduction Hours: 25

Performance Assessment(s):

- Dissect a complete flower and identify the individual parts.
- Prepare a slide to be viewed under a microscope for examining cellular material of plant tissue.
- Identify the different stages of mitosis in plant root cells.
- Perform computer simulations related to genetic heritance in order to learn about the role genetics plays in plant production.
- Calculate the reproductive biotic potential of plants.
- Read articles related to issues involving seed dispersal.
- Summarize and develop prescriptive plans to resolve the issue of seed dispersal.
- Create a cycle diagram to illustrate the steps involved with seed dispersal and the relationship between plants and animals in this process.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE and Science Fair entries. Students will use systems thinking, use and manage information and produce results with plant research and projects.

Standards and Competencies

Standards**:**

PS.01. Performance Element: Apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.
PS.02. Performance Element: Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.
PS.03. Performance Element: Propagate, culture, and harvest plants.

Competencies**:**

Lesson 7.1 Kernels of Life

7.1.1 Germination rate in seeds is largely determined by the proper balance of environmental conditions, such as heat, oxygen, and water.

7.1.2 Not all seeds are viable and therefore do not have the potential to germinate.

7.1.3 Dormancy is a strategy plants utilize to ensure some offspring will germinate at optimal times and plants rely on special treatments, such as light, cold temperatures, and scarification to break seed dormancy.

7.1.4 The germinating seed has visible anatomical parts and structures from embryo to seedling stages that are used to identify the plant as either a monocotyledon or a dicotyledon.

7.1.5 Plant seeds convert starch into glucose by the use of enzymes during the germination process.

Lesson 7.2 Pollination and Fertilization

7.2.1 Flower pollination can happen with the assistance of several different pollination agents, such as wind, water, insects, and animals.

7.2.2 Fertilization is a necessary step for seed development.

7.2.3 The majority of plant growth happens in meristematic tissues of plants.

7.2.4 Eggs require meiosis and mitosis for development.

7.2.5 Mitosis has five distinct phases necessary for cell division. Genetic variation in plants is achieved by cross-pollination.

7.2.6 Dominant and recessive genes determine the phenotypic characteristics of plants.

Lesson 7.3 Fruits, Nuts, and Monkeys

7.3.1 Plants use seeds to multiply species exponentially over time.

7.3.2 Seeds are protected or supported by specialized anatomical structures called fruit.

7.3.3 There are different types of fruit structures that can be used to identify or classify plant species.

7.3.4 Plants require methods of seed dispersal to ensure their survival in nature.

7.3.5 The existence of some plant species may be threatened if they depend on a specific animal for seed dispersal.

Aligned Washington State Standards	
Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	CCSS: Conceptual Category – Number and Quantity Quantities Reason quantitatively and use units to solve problems. Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning & explain the reasoning. Solve equations and inequalities in one variable. Solve systems of equations Conceptual Category – Functions Linear, Quadratic, and Exponential Models Construct and compare linear, quadratic, exponential models and solve problems CCSS: Conceptual Category – Statistics and Probability Making Inferences and Justifying Conclusions Make inferences and justify conclusions from sample surveys, experiments, and observational studies. Using Probability to Make Decisions Calculate expected values and use them to solve problems Use probability to evaluate outcomes and decisions
Reading	
Science	**Disciplinary Core Ideas**

	Life Science LS1: From Molecules to Organisms: Structures and Processes LS1.A: Structure and Function LS1.B: Growth and Development of Organisms LS3: Heredity: Inheritance and Variation of Traits LS3.A: Inheritance of Traits LS3.B: Variation of Traits LS4.D: Biodiversity and Humans **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Cause and Effect: Mechanism and Prediction Scale, Proportion, and Quantity Systems and System Models Structure and Function **Understandings about the Nature of Science** Scientific Investigations Use a Variety of Methods Scientific Knowledge is Based on Empirical Evidence Scientific Knowledge is Open to Revision in Light of New Evidence Science Models, Laws, Mechanisms, & Theories Explain Natural Phenomena Science is a Way of Knowing Scientific Knowledge Assumes Order & Consistency in Natural Systems Science is a Human Endeavor Science Addresses Questions About the Natural and Material World
Social Studies	
Writing	

Unit 8 – Asexual Reproduction Hours: 10

Performance Assessment(s):

- Demonstrate how to perform common asexual propagation methods, such as grafting, budding, layering, division, and cuttings properly.
- Compare and contrast different asexual propagation methods.
- Decide the most appropriate method of asexual reproduction for different types of plant material.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE and Science Fair entries. Students will use systems thinking, use and manage information and produce results with plant research and projects.

Standards and Competencies

Standards**:**
PS.03. Performance Element: Propagate, culture, and harvest plants.

Competencies:

Lesson 8.1 Plant Multiplication

8.1.1 Some plant hybrids will produce seeds with genetic characteristics that are inconsistent with the parent plant genotype; therefore, asexual propagation methods are required for reproducing the desired traits.

8.1.2 Using asexual propagation methods, such as grafting, division, budding, layering, or cuttings are efficient ways to produce new plants exhibiting desired characteristics of a parent plant.

8.1.3 The tools and equipment required to perform asexual propagation on plants may create safety hazards for producers if not properly used.

Aligned Washington State Standards

Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	
Reading	
Science	**Disciplinary Core Ideas** Life Science LS1: From Molecules to Organisms: Structures and Processes LS1.A: Structure and Function LS1.B: Growth and Development of Organisms LS3: Heredity: Inheritance and Variation of Traits LS3.A: Inheritance of Traits

	LS3.B: Variation of Traits LS4.D: Biodiversity and Humans **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Cause and Effect: Mechanism and Prediction Scale, Proportion, and Quantity Systems and System Models Structure and Function **Understandings about the Nature of Science** Science is a Way of Knowing Scientific Knowledge Assumes Order & Consistency in Natural Systems Science is a Human Endeavor Science Addresses Questions About the Natural and Material World
Social Studies	
Writing	

Unit 9 – Surviving in a Harsh Environment — Hours: 15

Performance Assessment(s):

- Identify how pests affect crop quality.
- Identify anatomical features of pests that help determine what type of pests are responsible for crop predation.
- Identify specific symptoms of damage caused by pests.
- Create an Integrated Pest Management plan and discuss ways to implement such a plan.
- Determine pest populations based upon using a statistical estimation method.
- Identify harmful insects and list the crops the insects prefer.
- Create a pictorial model of the life cycle of pests.
- Compare and contrast pest eradication and pest control methods.
- Read articles related to common plant diseases and summarize the similarities and the differences among disease-causing agents.
- Develop a plant disease management plan.
- Compare the size of bacteria and viruses with other common objects to gain perspective of scale.
- Investigate bacteria cells under a microscope.
- Develop an understanding of plant disease, its causes, and means of prevention and control.
- Research information about machinery and equipment used to produce plants and create a study guide for the National FFA Agronomy CDE.

- Categorize machinery used to produce plants according to use.
- Conduct an experiment to determine the effects of greenhouse coverings on temperature.
- Research irrigation methods and compare each method to understand function and purpose.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE and Science Fair entries. Students will use systems thinking, use and manage information, and interact effectively with others, and collaborate with others to create a pest management plan (project). Students will work independently, be self-directed learners while creating a media project to be presented to the class and potential public demonstrations.

Standards and Competencies

Standards:

PS.02. Performance Element: Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

Competencies:

Lesson 9.1 Pesky Bugs and Plants

9.1.1 Pests have negative effects on plant growth, such as yield and quality losses.

9.1.2 Plant pests include several organisms including insects, mollusks, nematodes, vertebrates, and weeds.

9.1.3 Proper detection of symptoms can determine plant pest threats.

9.1.4 Biological, chemical, and mechanical methods as well as cultural practices are options for eradication or deterring pests.

9.1.5 An Integrated Pest Management plan assures that the management of pests is economically and environmentally sound.

9.1.6 Life cycles of plant pests must be considered prior to employing proper control measures.

Lesson 9.2 Diving into Diseases

9.2.1 Plant disease-causing agents, such as bacteria, fungi, and viruses cause detrimental health effects on plants.

9.2.2 Plant disease-causing agents are microscopic and damage plants in various ways.

9.2.3 Plant diseases cause visible symptoms in plant growth, such as defoliation, abscesses, growths, and decaying of plant tissue.

9.2.4 Knowledge of disease prevention and treatment is important to protect plants from infection.

Aligned Washington State Standards

Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

	CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	CCSS: Conceptual Category – Number and Quantity Quantities Reason quantitatively and use units to solve problems. CCSS: Conceptual Category – Algebra Seeing Structure in Expressions Write expressions in equivalent forms to solve problems. Arithmetic with Polynomials and Rational Expressions Reasoning with Equations and Inequalities Understand solving equations as a process of reasoning & explain the reasoning. Solve equations and inequalities in one variable. CCSS: Conceptual Category – Geometry Circles Find arc lengths and areas of sectors of circles CCSS: Conceptual Category – Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable. Using Probability to Make Decisions Calculate expected values and use them to solve problems
Reading	
Science	**Disciplinary Core Ideas** Life Science LS1: From Molecules to Organisms: Structures and Processes LS1.A: Structure and Function LS1.B: Growth and Development of Organisms LS1.C: Organization for Matter and Energy Flow in Organisms LS2: Ecosystems: Interactions, Energy, and Dynamics LS2.A: Interdependent Relationships in Ecosystems LS2.C: Ecosystem Dynamics, Functioning, and Resilience LS3: Heredity: Inheritance and Variation of Traits LS3.A: Inheritance of Traits Earth and Space Science ESS3: Earth and Human Activity ESS3.A: Natural Resources ESS3.C: Human Impacts on Earth Systems **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data

	Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Patterns Cause and Effect: Mechanism and Prediction Scale, Proportion, and Quantity Systems and System Models Structure and Function Stability and Change **Understandings about the Nature of Science** Scientific Investigations Use a Variety of Methods Scientific Knowledge is Based on Empirical Evidence Scientific Knowledge Assumes Order & Consistency in Natural Systems Science is a Human Endeavor Science Addresses Questions About the Natural and Material World
Social Studies	
Writing	

Unit 10 – Crop Production and Marketing Hours: 20

Performance Assessment(s):

- Develop a presentation as a team illustrating the four P's of marketing for each of the plant-based industries.
- Research and develop a business plan proposal utilizing 20 acres of school district property to raise plants.

Leadership Alignment:

Leadership activity embedded in curriculum and instruction through the National FFA Organization utilizing FFA CDE and fundraising. Students will reason effectively, guide and lead others, and be responsible to others while creating a marketing and business plan. Students will adapt to change and be flexible while working with the public during the annual plant sale.

Standards and Competencies

Standards**:**

PS.01. Performance Element: Apply knowledge of plant classification, plant anatomy and plant physiology to the production and management of plants.
PS.02. Performance Element: Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.
PS.03. Performance Element: Propagate, culture, and harvest plants.
PS.04. Performance Element: Employ elements of design to enhance an environment.

Competencies:

Lesson 10.1 Tools of Plant Production

10.1.1 Specialized equipment is required for soil tillage and the planting, harvesting, and transporting of agronomic crops.

10.1.2 The growing environment for plants may be altered by structures, such as greenhouses to provide optimal temperature requirements.

10.1.3 Irrigation is critical for many commercial plant species.

10.1.4 Methods of irrigation vary and each method has advantages and disadvantages related to the impact on the environment.

Lesson 10.2 Planting Seeds of Fortune

10.2.1 Product, placement, price, and promotion are the four keys to marketing products.

10.2.2 Agronomy, floriculture, forestry, and nursery and landscape are the four major classifications of plant-based industries.

10.2.3 There are many products produced within plant-based industries and all require careful planning to ensure the marketability of the product.

10.2.4 Basic steps, such as analyze the situation, decide on your objective, develop a plan, and measure the results are key components of a business plan.

Aligned Washington State Standards	
Art	
Communications	Comprehension and Collaboration: CCSS.ELA-LITERACY.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. CCSS.ELA-LITERACY.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. Presentation of Knowledge and Ideas: CCSS.ELA-LITERACY.SL.9-10.4 Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. CCSS.ELA-LITERACY.SL.9-10.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
Educational Technology	2.1 Practice Safety: Demonstrate safe, legal and ethical behavior in the use of information and technology.
Health and Fitness	
Math	CCSS: Conceptual Category – Number and Quantity Quantities Reason quantitatively and use units to solve problems CCSS: Conceptual Category – Statistics and Probability Interpreting Categorical and Quantitative Data Summarize, represent, and interpret data on a single count or measurement variable. Using Probability to Make Decisions Calculate expected values and use them to solve problems
Reading	
Science	**Disciplinary Core Ideas** Earth and Space Science

	ESS3: Earth and Human Activity ESS3.C: Human Impacts on Earth Systems **Science and Engineering Practices** Asking Questions and Defining Problems Developing and Using Models Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Obtaining, Evaluating, and Communicating Information **Crosscutting Concepts** Cause and Effect: Mechanism and Prediction Systems and System Models Structure and Function Stability and Change **Understandings about the Nature of Science** Science is a Human Endeavor Science Addresses Questions About the Natural and Material World
Social Studies	
Writing	

21st Century Skills		
Check those that students will demonstrate in this course:		
LEARNING & INNOVATION **Creativity and Innovation** ☒Think Creatively ☒Work Creatively with Others ☒Implement Innovations **Critical Thinking and Problem Solving** ☒Reason Effectively ☒**U**se Systems Thinking ☒Make Judgments and Decisions ☒Solve Problems **Communication and Collaboration** ☒Communicate Clearly ☒Collaborate with Others	**INFORMATION, MEDIA & TECHNOLOGY SKILLS** **Information Literacy** ☒Access and /evaluate Information ☒Use and Manage Information **Media Literacy** ☒Analyze Media ☒Create Media Products **Information, Communications and Technology (ICT Literacy)** ☒Apply Technology Effectively	**LIFE & CAREER SKILLS** **Flexibility and Adaptability** ☒Adapt to Change ☒Be Flexible **Initiative and Self-Direction** ☒Manage Goals and Time ☒Work Independently ☒Be Self-Directed Learners **Social and Cross-Cultural** ☒Interact Effectively with Others ☒Work Effectively in Diverse Teams **Productivity and Accountability** ☒Manage Projects ☒Produce Results

		Leadership and Responsibility ☒Guide and Lead Others ☒Be Responsible to Others