

Career & Technical Education (CTE) Standards Revision Project

Cluster: Agriculture & Natural Resources

Pathways: Animal Science, Agribusiness Systems, Environmental Service Systems, Food Products & Processing Systems, Natural Resources, Plant Science, Power, Structural & Technology Systems

The standards for this cluster were created under the direction of Dr. Kellie Enns with countless hours provided by the agriculture education instructors of Colorado. The finished product is the result of a compilation of existing Colorado secondary ag education standards, National AFNR standards created by the National Council on Agriculture Education and introductory course standards from Colorado community colleges. The attached standards for each of the pathways identify links to Colorado core content standards which have been validated by content specialists in each of the core content areas. Future work with this project will include linkage of the new standards to current Colorado curriculum in agriculture education, identification or development of curriculum in new areas and the creation of a course development website to facilitate effective utilization of the information by Colorado Agriculture Education instructors.

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Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Understanding Plant Systems	
Prepared Completer Competencies: PS.01 understand the role of agriculture in determining the need and supply of the worlds' food		
High School Expectations		
Concepts and skills students know include: PS.01.01 The world food situation		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.01.01.a. Define the difference in food supply and food need</p> <p>PS.01.01.b. Analyze global trends (population, societal, income, health, environmental) and the impact on food supply (MAT1.4a MAT 2.2b; MAT2.2d; MAT2.3a; MAT2.3b; MAT3.1a; MAT 3.1b; MAT 3.1c; MAT 3.2b; RWC04.02.a; RWC04.02.e; RWC4.10c)</p> <p>PS.01.01.c. Relate trends of food supply and food need to theories of Thomas Malthus and the work of Norman Borlaug (MAT1.4a; RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.2.b-Mathematics, Patterns, Functions, and Algebraic Structures, Analysis of elementary functions and their inverses, by investigating rates of change, intercepts, asymptotes, domain, range, and local and global behavior using all available tools, including technology. - Distinguish between functions and relations defined in any representation.</p> <p>MAT2.2.d- Make qualitative statements about the rate of change of a function, based on its graph or table or values.</p> <p>MAT2.3.a-Mathematics, Patterns, Functions, and Algebraic Structures, Application of transformations, including arithmetic combinations (addition, subtraction, and multiplication) and translations (vertical, horizontal, and dilations) to representations of elementary functions using tables, graphs, symbols, text, and geometric models, using all available tools, including technology. - Sketch the graph of common elementary functions and</p>	

translations of those functions.

MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.

MAT3.1.b- - Determine appropriate data collection methods to answer a research question.

MAT3.1.c- - Explain how data will be analyzed to provide answers to a research question.

MAT3.2.b- - Differentiate between the value of observational studies as useful for suggesting patterns in data and relationships between variables and experimental studies as useful for establishing cause and effect.

RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information*

RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences*

RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments*

RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic,*

	<p><i>or position</i></p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.01.02 Determine the meaning and importance of Plant Systems	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
PS.01.02.a. Define plant science and plant systems	Academic Content Knowledge Alignment:
PS.01.02.b. Explain the importance of plant systems locally, nationally and globally	
PS.01.02.c. Integrate concepts of plant science into other pathways/ agriculture	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
PS.01.02.d. Apply plant/ crop science/ system in a career pathway	

High School Expectations	
Concepts and skills students know include:	
The student will understand the history and future response in agribusiness systems to agriculture	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.01.03.a Determine important historical trends in plant systems</p> <p>PS.01.03.a Describe evolution and technological advances in plant systems</p> <p>PS.01.03.a Analyze trends (population, societal, income, health, environmental) and their impact on plant systems (MAT3.3.a; MAT3.3.c; RWC04.02.a; RWC04.02.e; RWC4.10c)</p> <p>PS.01.03.a Predict future trends in plant systems (MAT3.1.a; MAT3.1.b; RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.07.a; RWC04.07.b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>MAT3.3.c- Recognize association between two categorical variables.</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical</i></p>

argumentation

RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience*

RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources*

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Define and narrow a topic for research, developing the central idea, focus, or question at issue*

RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Identify and evaluate potential sources of information for accuracy, reliability, validity, and timeliness*

RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information*

	<p>RWC04.07.a - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co</i></p> <p>RWC04.07.b - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.01.04 Understand Plant System Industry Segments	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.01.04.a Define plant system industry segments (seed producer, farmer/producer, processor, retailer)</p> <p>PS.01.04.b Describe the interrelationship of processing segments</p> <p>PS.01.04.c Evaluate the impact of a change in markets on the plant systems industry (RWC04.02.a; RWC04.02.e; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.01.05 Understand plant system distribution channels	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.01.05.a Define Wholesalers, Local Markets/Direct Markets (CSA), Retailers, Governments/Institutional (School Lunch and Prison Lunch), Restaurant (Catering)/Hotel, Fast Food</p> <p>PS.01.05.b Describe the movement of products through channels</p> <p>PS.01.05.c Illustrate the impact of the distribution channels</p> <p>PS.01.05.d Design a new distribution channel (vertical integration)</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.01.06 The student create an individualized career and academic plan (ICAP) correlating to opportunities in plant systems	
Evidence Outcomes - Students can:	21 st Century Skills and Readiness Competencies
<p>PS.01.06.a Identify careers in plant systems and explore advantages and disadvantages of each</p> <p>PS.01.05.b Choose a career based upon skills and education necessary for a career</p> <p>PS.01.05.c Develop, review, modify and implement an ICAP specific to a plant systems (RWC03.05.a; RWC03.05.b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p>
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies: PS.02 Understand issues and trends in the Plant Systems pathway		
High School Expectations		
Concepts and skills students know include: PS.02.01 Understand and describe sustainable agriculture		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.02.01.a Explain sustainable agriculture and define objectives and strategies</p> <p>PS.02.01.b Describe sustainable agriculture practices and compare the ecological effects of traditional agricultural practices with those of sustainable agriculture (SCI 2.1b; SCI 2.1c; SCI 2.1d; SCI 2.1e; SCI 3.6a; SCI 3.6b; SCI 3.7a; SCI 3.7b; SCI 3.7c; RWC4.10c)</p> <p>PS.02.01.c Prepare a plan for an agricultural enterprise that involves practices in support of sustainable agriculture (MAT 1.4a; SCI 2.2b,d; SCI 3.6a SCI 3.6b; SCI 3.4a; SCI 3.7b SCI 3.7c; RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and</p>	

<p>PS.02.01.d Implement a plan for an agricultural enterprise that involves practices in support of sustainable agriculture (SCI 2.2b; SCI 2.2d; SCI 2.1b; SCI 2.1c ; SCI 2.1d; SCI 2.1e SCI 3.6a; SCI 3.6b; SCI 3.7b SCI 3.7c)</p>	<p>persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <hr/> <p>SCI2.1.b-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Evaluate the potential ecological impacts of a plant-based or meat-based diet</p> <p>SCI2.1.c-Science, Life Science - Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought</p> <p>SCI2.1.d-Science, Life Science - Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy</p> <p>SCI2.1.e-Science, Life Science - Define and distinguish between matter and energy, and how they are cycled or lost through life processes</p> <p>SCI2.2b- Science, Life Science – The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem – Describe or evaluate communities in terms of primary and secondary succession as they progress over time</p> <p>SCI2.2d – Science, Life Science – Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate ecosystem interactions</p> <p>SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing</p>
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	<p>external environments - Discuss how two or more body systems interact to promote health for the whole organism</p> <p>SCI2.6.b-Science, Life Science - Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis</p> <p>SCI2.7.a-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins - Explain that genes are long strands of deoxyribonucleic acid (DNA)</p> <p>SCI2.7.b-Science, Life Science,. - Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms</p> <p>SCI3.4.a-Science, Earth Science, Climate is the result of energy transfer among interactions of the atmosphere, hydrosphere, geosphere, and biosphere - Develop, communicate, and justify an evidence-based scientific explanation that shows climate is a result of energy transfer among the atmosphere, hydrosphere, geosphere and biosphere</p> <p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth's surface with water, air, gravity, and biological activity</p> <p>SCI3.6.b-Science, Earth Science, Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p> <p>SCI3.7a-Science, Earth Science, Natural hazards have local, national and global impacts such as volcanoes, earthquakes, tsunamis, hurricanes, and</p>
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	<p>thunderstorms – Develop, communicate, and justify an evidence-based scientific explanation regarding natural hazards, and explain their potential local and global impacts.</p> <p>SCI3.7b-Science, Earth Science, Analyze and interpret data about natural hazards using direct and indirect evidence</p> <p>SCI3.7c-Science, Earth Science, Make predictions and draw conclusions about the impact of natural hazards on human activity – locally and globally</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.02.02 Understand the role of biotechnology in plant systems	
Evidence Outcomes Students can:	21 st Century Skills and Readiness Competencies
<p>PS.02.02.a Define biotechnology and its impact on agriculture</p> <p>PS.02.02.b Recognize some current uses in biotechnology in plant systems (i.e. round-up ready corn, sugarbeets, etc)</p> <p>PS.02.02.c Develop a management plan for the local agricultural industry incorporating new plant system biotechnology methods (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a; SCI 2.7a; SCI 2.7b; SCI 2.7c; SCI 2.7d; SCI 2.7e;)</p> <p>PS.02.02.d Predict new developments in biotechnology likely to affect the agricultural industry (RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.07.a; RWC04.07.b)</p> <p>SCI 2.7a; SCI 2.7b; SCI 2.7c; SCI 2.7d; SCI 2.7e;)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p> <p>RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience</i></p>

RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources*

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Define and narrow a topic for research, developing the central idea, focus, or question at issue*

RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Identify and evaluate potential sources of information for accuracy, reliability, validity, and timeliness*

RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information*

RWC04.07.a - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - *Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co*

RWC04.07.b - Research and Reasoning - An author's reasoning is the essence

	<p>of legitimate writing and requires evaluating text for validity and accuracy - <i>Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation</i></p> <hr/> <p>SCI2.7.a-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins – analyze and interpret data that genes are expressed portions of DNA</p> <p>SCI2.7.b-Science, Life Science - Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms</p> <p>SCI2.7.c-Science, Life Science - Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism</p> <p>SCI2.7.d-Science, Life Science - Evaluate data showing that offspring are not clones of their parents or siblings due to the meiotic processes of independent assortment of chromosomes, crossing over, and mutations</p> <p>SCI2.7.e-Science, Life Science - Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism</p> <hr/> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include:	
PS.02.03 Understanding alternative crops and the importance of crop diversity in plant systems	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.02.03.a Identify alternative crops used in agriculture</p> <p>PS.02.03.b Explain the importance of crop diversity as a risk management method</p> <p>PS.02.03.c Explain non-traditional uses of alternative crops (i.e. soy based-artificial meat and dairy products)</p> <p>PS.02.03.d Evaluate how alternative crops can help meet world food demand (RWC04.02.a; RWC04.02.e; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.02.04 Understand organic plant production and the impact of organic production on plant systems industry	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.02.04.a Describe the difference between organic and natural foods</p> <p>PS.02.04.b Identify and explain the standards used by the USDA to certify organic food (RWC4.10a; RWC4.10b; RWC4.10c)</p> <p>PS.02.04.c Analyze how organic food production can be a niche market in agriculture (RWC04.02.a; RWC04.02.e; RWC4.10c)</p> <p>PS.02.04.d Analyze the advantages and disadvantages of organic production (RWC04.02.a; RWC04.02.e; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include:	
PS.02.05 Understand community and social responsibility as it relates to plant systems	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.02.05.a Identify the social responsibilities of agriculturalists</p> <p>PS.02.05.b Evaluate the difference between social responsibility and public perception</p> <p>PS.02.05.c Analyze legal issues associated with social responsibilities in agriculture</p> <p>PS.02.05.d Develop a management plan for agriculturalists to meet social responsibilities and public desires (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):		
Prepared Completer Competencies:		
PS.03 Understand plant biology and apply principles in a plant systems production setting		
High School Expectations		
Concepts and skills students know include:		
PS.03.01 Describe and utilize plant classification systems		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.03.01.a Explain and justify the systems used to classify plants</p> <p>PS.03.01.b Compare and contrast the hierarchical classification of agricultural plants</p> <p>PS.03.01.c Classify agricultural plants according to the hierarchical classification system, life cycles, plant use, and as monocots or dicots</p>	Academic Content Knowledge Alignment:	
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):	

High School Expectations	
Concepts and skills students know include:	
PS.03.02 Identify plants according to different methods of classification and identification	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.02.a Identify plant structures and functions and explain systems used to classify plants</p> <p>PS.03.02.b Identify agriculturally important plants by common names</p> <p>PS.03.02.c Identify agriculturally important plants by scientific names</p> <p>PS.03.02.d Classify agricultural plants according to the hierarchical classification system, life cycles, plant use and as monocotyledons or dicotyledons</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.03.03 Understand plant growth and development	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.03.a Distinguish growth processes of plants</p> <p>PS.03.03.b Define life span and relate it to living condition; explain the stages of life</p> <p>PS.03.03.c Analyze the growth factors that affect production enterprises (SCI2.4a)</p> <p>PS.03.03.d Explore the role that humans have in each of the life stages of agriculturally important plants</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI2.4.a-Science, Life Science, The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun’s light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken - Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.03.04 Understand cell structure and function	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.04.a Describe the basics of a plant cell and describe the cellular organelles and their functions (SCI2.7c)</p> <p>PS.03.04.b Identify and explain DNA structure and replication processes (SCI2.7.a; SCI2.7b)</p> <p>PS.03.04.c Diagram and label the cell cycle (mitosis and meiosis) and have understanding of each phase (SCI2.7.b; SCI2.7d)</p> <p>PS.03.04.d Select and use appropriate technologies to gather, process, and analyze data and to report information related to an investigation (MAT 3.1.a; MAT 3.1.b; MAT3.1.c; MAT3.3a; MAT3.3c; RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a; RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC4.10a; RWC4.10b; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>MAT3.3.c- Recognize association between two categorical variables.</p>

RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information*

RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences*

RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments*

RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position*

RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience*

RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources*

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

	<p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI2.7.a-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins – Analyze and interpret data that genes are expressed portions of DNA</p> <p>SCI2.7.b-Science, Life Science, - Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms</p> <p>SCI2.7.c-Science, Life Science, - Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism</p> <p>SCI2.7.d-Science, Life Science, - Evaluate data showing that offspring are not clones of their parents or siblings due to the meiotic processes of independent assortment of chromosomes, crossing over, and mutations</p>
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High School Expectations	
Concepts and skills students know include:	
PS.03.05 Understand the anatomy and function of plants	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.05.a Identify the components and functions of flowers, stems, leaves, and roots (SCI 2.6a; SCI 2.6b)</p> <p>PS.03.05.b Explain the role flowers, stems, leaves, and roots play in overall plant health(SCI 2.6a; SCI 2.6b)</p> <p>PS.03.05.c Apply the knowledge of flower, stem, leaves, and root structures to plant breeding, production, and use(SCI 2.6a; SCI 2.6b)</p> <p>PS.03.05.d Utilize plant anatomy to identify and classify plants and determine the adaptability of plants to the plant environment(SCI 2.6a, SCI 2.6 b; SCI 2.7e; SCI 2.9d)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism</p> <p>SCI2.6.b-Science, Life Science, - Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis</p> <p>SCI2.7.e-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins - Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism</p> <p>SCI2.9.d-Science, Life Science, Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment. - Analyze and interpret data on how evolution can be driven by three key components of natural selection – heritability, genetic variation, and differential survival and reproduction</p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include:	
PS.03.06 Describe plant physiology and important plant processes which impact production	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.06.a Explain the basic processes of photosynthesis and respiration and their importance on earth (SCI1.3.a; SCI 2.1d)</p> <p>PS.03.06.b Explain the requirements necessary for photosynthesis and respiration to occur and identify the products and byproducts of each process (SCI1.3.a; SCI 2.1D SCI 2.3a; SCI 2.3b; SCI 2.4a; SCI 2.4b)</p> <p>PS.03.06.c Explain the light dependent and light independent reactions that occur during photosynthesis and explain the stages of respiration (SCI1.3.a, SCI 2.4c)</p> <p>PS.03.06.d Perform experiments in the greenhouse testing light duration on overall plant development (MAT 1.4a; MAT 3.1a; MAT 3.1b; MAT 3.1c; MAT 3.3a; MAT3.3c; SCI 1.3a; SCI 2.4a)</p>	<p>Academic Content Knowledge Alignment:</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and</p>

numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.

MAT3.3.c- Recognize association between two categorical variables.

SCI1.3.a-Science, Physical Science, Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. - Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission)

SCI2.1.d-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem. - Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy

SCI2.3.a-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Identify biomolecules and their precursors/building blocks

SCI2.3.b-Science, Life Science, Develop, communicate, and justify an evidence-based explanation that biomolecules follow the same rules of chemistry as any other molecule

SCI2.4.a-Science, Life Science, The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun's light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken. -Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity

SCI2.4.b-Science, Life Science, -Discuss the interdependence of autotrophic and heterotrophic life forms such as depicting the flow of a carbon atom from

the atmosphere, to a leaf, through the food chain, and back to the atmosphere

SCI2.4.c-Science, Life Science, Explain how carbon compounds are gradually oxidized to provide energy in the form of adenosine triphosphate (ATP), which drives many chemical reactions in the cell

High School Expectations	
Concepts and skills students know include:	
PS.03.07 Understand plant processes	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.07.a Identify the processes of transpiration, translocation(SCI1.3.a; SCI 2.1d)</p> <p>PS.03.07.b Explain the movement of nutrients through the plant processes</p> <p>PS.03.07.c Describe signs of proper and improper physiological plant processes</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI1.3.a-Science, Physical Science, Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. - Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission)</p> <p>SCI2.1.d-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem. - Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.03.08 Describe the processes of plant reproduction and replication	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.08.a Discuss the importance of plant propagation and explain the difference between sexual and asexual propagation methods</p> <p>PS.03.08.b Describe how to successfully plant seeds, use stem cutting propagation, and use grafting propagation</p> <p>PS.03.08.c Produce plants using various propagation techniques</p> <p>PS.03.08.d Conduct an experiment showing how plant environment affects reproduction (MAT 1.4a; MAT 3.1.a; MAT 3.1.b; MAT 3.1 c; MAT 3.3a; MAT 3.3c;)</p>	<p>Academic Content Knowledge Alignment:</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and</p>

numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.

MAT3.3.c- Recognize association between two categorical variables.

High School Expectations	
Concepts and skills students know include:	
PS.03.09 Understanding plant genetics	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.03.09.a Define principles of inheritance and genetic terms</p> <p>PS.03.09.b Describe how improving plant genetics can improve plant production</p> <p>PS.03.09.c Diagram and explain how characteristics are inherited (punnet square) MAT1.3aMAT1.4a MAT2.3b MAT2.3c Mat2.3d; MAT2.3e MAT2.4a</p> <p>PS.03.09.d Explain how plant genetics impacts cultural reproductive practices (i.e. Cuttings, grafting, seed production, cross-pollination) Copy to animal science,</p>	<p>Academic Content Knowledge Alignment:</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
	<p>MAT1.3.a-Mathematics, Number Sense, Properties, and Operations, Development of an understanding of counting techniques. - Use combinatorics (Fundamental Counting Principle, permutations and combinations) to solve problems in real world contexts.</p>
	<p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.3.b-Mathematics, Patterns, Functions, and Algebraic Structures, Application of transformations, including arithmetic combinations (addition, subtraction, and multiplication) and translations (vertical, horizontal, and dilations) to representations of elementary functions using tables, graphs, symbols, text, and geometric models, using all available tools, including technology. - Given two functions in any representation, evaluate the sum and difference of the two functions.</p> <p>MAT2.3.b-Mathematics, Patterns, Functions, and Algebraic Structures, Application of transformations, including arithmetic combinations (addition, subtraction, and multiplication) and translations (vertical, horizontal, and</p>

dilations) to representations of elementary functions using tables, graphs, symbols, text, and geometric models, using all available tools, including technology. - Given two functions in any representation, evaluate the sum and difference of the two functions.

MAT2.3.c- Given two linear or power functions in any representation, evaluate the product of the two functions.

MAT2.3.d- Determine how translations affect the symbolic and graphical forms of a function. Know how to use graphing technology to examine translations.

MAT2.3.e- Perform arithmetic combinations on elementary (linear, quadratic, power, and exponential) functions, using all available tools including technology.

MAT2.4.a-Mathematics, Patterns, Functions, and Algebraic Structures, Understand equivalent forms of expressions, equations, inequalities, and relations. - Perform and justify steps in generating equivalent expressions by identifying properties used.

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies:		
PS.04. Describe processes and techniques of plant environmental management		
High School Expectations		
Concepts and skills students know include:		
PS.04.01. Understand plant environment		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.04.01.a Describe the effects air, temperature, nutrients, light and water have on plant metabolism and growth (MAT 3.3a; SCI 2.4a; SCI 3.6a; SCI 3.6b)</p> <p>PS.04.01.b Determine the optimal air, temperature, nutrients, light and water conditions for plant optimal plant growth (SCI 3.6a; SCI 3.6b; SCI 2.4a)</p> <p>PS.04.01.c Describe plant responses to changes in the environment</p> <p>PS.04.01.d Design, implement and evaluate a growing plan to maintain optimal conditions for plant growth (MAT 1.4a; MAT 2.5a; MAT 2.5b; MAT 2.5c; MAT 2.6 c; MAT 3.2B; MAT3.3a;)</p>	Academic Content Knowledge Alignment:	
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):	
	<p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.5.a-Mathematics, Patterns, Functions, and Algebraic Structures, Solutions to equations, inequalities and systems of equations using all available tools, including technology. - Find solutions to quadratic equations and inequalities (with real roots) by using algebraic methods such as factoring, completing the square, graphing or using the quadratic formula and using calculators, graphing utilities or other technology to solve quadratic equations and inequalities.</p> <p>MAT2.5.b- Find solutions to equations involving power and exponential functions; solve these equations graphically or numerically or algebraically</p>	

using calculators, graphing utilities or other.

MAT2.5.c- Rewrite literal equations in terms of an unknown variable.

MAT2.6.c-Mathematics, Patterns, Functions, and Algebraic Structures, Use of elementary functions (linear, quadratic, power, and exponential and their inverses) and their transformations to identify essential quantitative relationships in a situation and to model real world situations, using all available tools, including technology. - Analyze the reasonableness of a solution in its given context and compare the solution to appropriate graphical and numerical estimates.

MAT3.2.b-Mathematics, Data Analysis, Statistics, and Probability, Evaluation of the quality of observational studies, surveys, and experimental studies. - Differentiate between the value of observational studies as useful for suggesting patterns in data and relationships between variables and experimental studies as useful for establishing cause and effect.

MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.

SCI2.4.a-Science, Life Science, The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun's light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken -Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity

	<p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth's surface with water, air, gravity, and biological activity</p> <p>SCI3.6.b-Science, Earth Science, Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p>
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High School Expectations	
Concepts and skills students know include:	
PS.04.01 Identify and describe different growth promotants and regulators used in Plant Systems	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.04.02.a Identify growth promotants and regulators and their uses in production</p> <p>PS.04.02.a Describe the impact of growth promotants and regulators on the plant system</p> <p>PS.04.02.a Create a management plan using growth regulators and growth promotants (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)</p> <p>PS.04.02.a Analyze different types of growth promotants and regulators (MAT 1.4a:MAT 2.5a;MAT 2.5b; mat 2.5c mat 2.6 c; MAT 3.3a;MAT 3.2B;)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.5.a-Mathematics, Patterns, Functions, and Algebraic Structures, Solutions to equations, inequalities and systems of equations using all available tools, including technology. - Find solutions to quadratic equations and inequalities (with real roots) by using algebraic methods such as factoring, completing the square, graphing or using the quadratic formula and using calculators, graphing utilities or other technology to solve quadratic equations and inequalities.</p> <p>MAT2.5.b- Find solutions to equations involving power and exponential functions; solve these equations graphically or numerically or algebraically using calculators, graphing utilities or other.</p> <p>MAT2.5.c- Rewrite literal equations in terms of an unknown variable.</p> <p>MAT2.6.c-Mathematics, Patterns, Functions, and Algebraic Structures, Use of elementary functions (linear, quadratic, power, and exponential and their inverses) and their transformations to identify essential quantitative relationships in a situation and to model real world situations, using all available tools, including technology. - Analyze the reasonableness of a solution in its given context and compare the solution to appropriate graphical</p>

and numerical estimates.

MAT3.2.b-Mathematics, Data Analysis, Statistics, and Probability, Evaluation of the quality of observational studies, surveys, and experimental studies. - Differentiate between the value of observational studies as useful for suggesting patterns in data and relationships between variables and experimental studies as useful for establishing cause and effect.

MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.

RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information*

RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - *Follow the conventions of Standard English to write varied, strong, correct, complete sentences*

RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments*

RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - *Locate and select appropriate information that clearly supports a definite purpose, topic, or position*

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include:	
PS.04.03 Nutrient identification and management	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.04.03.a Recognize essential nutrients and their roles in growth (SCI 2.3a; SCI 2.3e; SCI 2.4c)</p> <p>PS.04.03.b Describe nutrient deficiency symptoms (SCI2.2.a; SCI 2.3a; SCI 2.3 e; SCI2.4.c)</p> <p>PS.04.03.c Identify nutrient availability in a soil (SCI2.4.a; SCI2.4.c)</p> <p>PS.04.03.d Determine the amount of fertilizer to apply to a soil (MAT 1.4a; SCI2.4.a; SCI2.4.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>SCI2.2a-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem – Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing non-native species into an ecosystem</p> <p>SCI2.3.a-Science, Life Science, Cellular metabolic activities are carried out by biomolecules produced by organisms - Identify biomolecules and their precursors/building blocks</p> <p>SCI2.3.e-Science, Life Science, - Analyze and interpret data on the body’s utilization of carbohydrates, lipids, and proteins</p> <p>SCI2.4.a-Science, Life Science, The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun’s light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken. -Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity</p>

SCI2.4.c-Science, -Explain how carbon compounds are gradually oxidized to provide energy in the form of adenosine triphosphate (ATP), which drives many chemical reactions in the cell

Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.04.04 Manage diseases and pests in plant systems	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.04.04.a Define disease and pest triangle and how they can be used as a prevention tool</p> <p>PS.04.04.b Identify major pests for commonly grown local crops and ornamentals</p> <p>PS.04.04.c Describe how pests affect plants and define economic and aesthetic thresholds (MAT 1.4 a; MAT 2.5c; MAT 2.6 c; MAT3.2b; MAT 3.3a)</p> <p>PS.04.04.d Evaluate the best treatments--both chemical and natural--for common diseases and plants (MAT 1.4 a MAT 2.5c MAT 2.6 c; MAT 3.3c)</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
	MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.
	MAT2.5.c-Mathematics, Patterns, Functions, and Algebraic Structures, Solutions to equations, inequalities and systems of equations using all available tools, including technology. - Rewrite literal equations in terms of an unknown variable.
	MAT2.6.c-Mathematics, Patterns, Functions, and Algebraic Structures, Use of elementary functions (linear, quadratic, power, and exponential and their inverses) and their transformations to identify essential quantitative relationships in a situation and to model real world situations, using all available tools, including technology. - Analyze the reasonableness of a solution in its given context and compare the solution to appropriate graphical and numerical estimates.
	MAT3.3.c-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and

	numerical summary statistics. - Recognize association between two categorical variables.
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High School Expectations	
Concepts and skills students know include:	
PS.04.04 Understand and implement an integrated pest management plan	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.04.05.a Explain general overview and history of IPM/PHC</p> <p>PS.04.05.b Explain generally accepted control methods and combinations for common insect, disease and weed groups based on pest life cycles</p> <p>PS.04.05.c Explain generally accepted control methods and combinations for common insect, disease and weed groups based on pest life cycles</p> <p>PS.04.05.d Implement an IPM plan for local agriculturalists (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.04.06 Understand safety practices and chemical pest control methods	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.04.06.a Explain risks and benefits associated with the materials and methods used in plant pest management</p> <p>PS.04.06.a Explain procedures for the safe handling, use and storage of pesticides Evaluate environmental and consumer concerns regarding pest management strategies</p> <p>PS.04.06.a Develop a safe chemical control method plan for local agricultural producers (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.04.07 Pest Identification and Disease diagnosis	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.04.07.a Define terms for common plant disease signs and symptoms (i.e. Stunting, chlorosis, necrosis)</p> <p>PS.04.06.a State difference between sign and symptoms of pests/diseases (SCI 2.6a; SCI 2.6c)</p> <p>PS.04.06.a Diagnose unknown pest/disease using diagnostic process</p> <p>PS.04.06.a Hypothesize how pest and diseases can adapt and modify over time; analyze new ways to control modified pests and diseases (SCI 2.7e; SCI 2.9d)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - Discuss how two or more body systems interact to promote health for the whole organism</p> <p>SCI2.6.c-Science, Life Science, - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases</p> <p>SCI2.7.e-Science, Life Science, Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins - Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism</p> <p>SCI2.9.d-Science, Life Science, Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment. - Analyze and interpret data on how evolution can be driven by three key components of natural selection – heritability, genetic variation, and differential survival and reproduction</p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies:		
PS.05 Understand the history and management of water resources in plant systems		
High School Expectations		
Concepts and skills students know include:		
PS.05.01 History and Background		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.05.01.a Identify important historical events related to water use, pollution, and conservation</p> <p>PS.05.01.b Describe how past events have shaped current policy regarding Colorado Water Law (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a; RWC4.10a; RWC4.10b; RWC4.10c)</p> <p>PS.05.01.c Explain the major components of the current Colorado Water Law</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a</i></p>	

	<p><i>definite purpose, topic, or position</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: PS.05.02 Water Cycle	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.05.02.a Define the term water cycle and explain how it relates to agriculture (SCI3.6a; SCI3.6b; SCI3.6c)</p> <p>PS.05.02.b Explain the components of the hydrologic cycle (SCI3.6a; SCI3.6b; SCI3.6c)</p> <p>PS.05.02.c Explain how the hydrological cycle is related to water storage (SCI3.7.c)</p> <p>PS.05.02.d Monitor changes in precipitation over the past ten years in the local community and explain how the water cycle affects water sources in the community (MAT3.3.a; MAT3.3c; SCI 3.4B; SCI3.6a; SCI3.6b; SCI3.6c;)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>MAT3.3.c -Recognize association between two categorical variables.</p> <p>SCI3.4.b-Science, Earth Science, Climate is the result of energy transfer among interactions of the atmosphere, hydrosphere, geosphere, and biosphere. - Analyze and interpret data on Earth’s climate</p> <p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth’s surface with water, air, gravity, and biological activity</p> <p>SCI3.6.b-Science, Earth Science, -Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p>

	<p>SCI3.6.c-Science, Earth Science, - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p> <p>SCI3.7.c-Science, Earth Science, Natural hazards have local, national and global impacts such as volcanoes, earthquakes, tsunamis, hurricanes, and thunderstorms-Make predictions and draw conclusions about the impact of natural hazards on human activity – locally and globally</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: PS.05.03 Methods, Systems, and Equipment	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.05.03.a Define irrigation and why it is needed in agriculture</p> <p>PS.05.03.a Identify common irrigation systems, methods and equipment and explain the main water users in agriculture</p> <p>PS.05.03.a Discuss the advantages and disadvantages of common types of irrigation systems</p> <p>PS.05.03.a Develop a model demonstrating common irrigation methods in Colorado</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: PS.05.04 Soil and Plant Water Interactions	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.05.04.a Define the terms gravitational water, capillary water, and hydroscopic water (SCI3.6.a)</p> <p>PS.05.04.a Describe how different types of soil water affect plant growth (MAT1.4.a; MAT3.2B; MAT3.3a; MAT 3.3c)</p> <p>PS.05.04.a Apply tests that visually demonstrate the affects of different types of soil water</p> <p>PS.05.04.a Create a model illustrating soil water interactions (MAT4.1.d; MAT4.1.e; MAT 2.2B; MAT 2.2D;)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth’s surface with water, air, gravity, and biological activity</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.2.b-Mathematics, Patterns, Functions, and Algebraic Structures, Analysis of elementary functions and their inverses, by investigating rates of change, intercepts, asymptotes, domain, range, and local and global behavior using all available tools, including technology. - Distinguish between functions and relations defined in any representation.</p> <p>MAT2.2.c- Identify intercepts, zeros (or roots), maxima, minima, and intervals of increase and decrease, and asymptotes in a table, graph, and symbolic representation of a function.</p> <p>MAT3.2.b-Mathematics, Data Analysis, Statistics, and Probability, Evaluation of the quality of observational studies, surveys, and experimental studies. - Differentiate between the value of observational</p>

	<p>studies as useful for suggesting patterns in data and relationships between variables and experimental studies as useful for establishing cause and effect.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>MAT3.3.c-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Recognize association between two categorical variables.</p> <p>SCI3.6a- Science, Earth Science, The interaction of Earth’s surface with water, air, gravity, and biological activity causes physical and chemical changes – Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth’s surface with water, air, gravity, and biological activity.</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: PS.05.05 Hydraulics	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.05.05.a Define hydraulics and how it controls the movement of water through a system (SCI3.6.a)</p> <p>PS.05.05.b Calculate dynamic and static water pressure (SCI3.6.a)</p> <p>PS.05.05.c Develop a classroom hydraulics system which demonstrates all the major components of the process (SCI3.6.a)</p> <p>PS.05.05.d Design an automated water system for a greenhouse or turf area(MAT 4.1a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1e; MAT 4.1 f; MAT 4.2b; MAT 4.2e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b - Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- - Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p>

	<p>MAT4.1.f-Develop and justify conjectures about relationships among properties of shapes in two- and three-dimensions using construction tools, including technology.</p> <p>Classify polygons according to their similarities and/or differences.</p> <p>MAT4.2.b-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Solve for unknown attributes of geometric shapes based on their congruence, similarity, or symmetry.</p> <p>MAT4.2.e- - Design a geometric structure with accurate and appropriate units of measure.</p> <p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth's surface with water, air, gravity, and biological activity</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: PS.05.06 Water Quality	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.05.06.a Identify the major water pollution groups and explain different types of agricultural pollution (SCI 2.1b; SCI 2.1c; SCI3.6.b)</p> <p>PS.05.06.b Explain common water pollution control measures (SCI3.6.b)</p> <p>PS.05.06.c Perform water tests at local reservoirs, rivers, and municipal water sources to identify factors that determine water quality for both agricultural and municipal purposes (MAT 3.1.a; MAT 3.1.b; MAT 3.1.c)</p> <p>PS.05.06.d Evaluate the results of water tests and determine changes that need to be made to produce high quality water for agriculture and municipal purposes (MAT 3.3.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c-- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>SCI2.1b-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transforms and eventually exits an ecosystem. – Evaluate the potential ecological impacts of a plant-based or meat-based diet.</p>

	<p>SCI2.1c-Science, Life Science – Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought.</p> <p>SCI3.6.b-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes- Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.05.07 Water Conservation	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.05.07.a Define water conservation and why conservation is important in agriculture (SCI3.6.c)</p> <p>PS.05.07.b Describe how irrigation practice and plant/crop choice is related to water consumption/ water conservation (SCI3.6.c)</p> <p>PS.05.07.c Relate water conservation to common soil conservation practices (i.e. waterways, runoff, no till, minimum till) (SCI36.c;)</p> <p>PS.05.07.d Develop a water conservation plan for a local enterprise (RWC3.05a; RWC3.05b; 3.03a; RWC3.02g)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include:	
PS.05.08 Water Shed and Sources	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.05.08.a Describe properties of watersheds and identify the boundaries of local watersheds (SCI3.7.a)</p> <p>PS.05.08.a Relate the function of watersheds to natural resources (SCI3.7.a)</p> <p>PS.05.08.a Analyze ecosystem functions of a watershed (RWC04.02.a; RWC04.02.e; RWC4.10c)</p> <p>PS.05.08.a Locate and analyze local watersheds</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI3.7.a-Science, Earth Science, Natural hazards have local, national and global impacts such as volcanoes, earthquakes, tsunamis, hurricanes, and thunderstorms - Develop, communicate, and justify an evidence-based scientific explanation regarding natural hazards, and explain their potential local and global impacts</p>
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies: PS.06 Student will identify and explain the principles of field crop production		
High School Expectations		
Concepts and skills students know include: PS.06.01 Planting Methods & Procedures		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.06.01.a Define germination and identify favorable conditions for seed germination</p> <p>PS.06.01.b Identify methods to handle seeds to overcome seed dormancy mechanisms</p> <p>PS.06.01.c Conduct tests associated with seed germination rates, viability and vigor (MAT1.4.a)</p> <p>PS.06.01.d Demonstrate sowing techniques, propagate plants by micro propagation and asexual propagation</p>	Academic Content Knowledge Alignment: MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.	
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):	

High School Expectations	
Concepts and skills students know include: PS.06.01 Harvest methods	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.06.02.a Determine harvest methods for major crops</p> <p>PS.06.02.b Assess the stage of growth to determine crop maturity</p> <p>PS.06.02.c Determine economic advantages & disadvantages of harvest methods (MAT1.4.a)</p> <p>PS.06.02.d Evaluate yield loss during harvest (MAT1.4.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.06.03 Crop Storage	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.06.03.a Identify storage methods for plants and plant products & determine size requirements (MAT 1.4a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1e;)</p> <p>PS.06.03.b Explain proper conditions to maintain the quality of plants/plant products held in storage</p> <p>PS.06.03.c Explain the reasons for preparing plants and plant products for distribution including grading, handling and packaging</p> <p>PS.06.03.d Monitor environmental conditions in storage facilities for plants and plant products</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.b-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d. - Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e - Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include: PS.06.04 Management Plan	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.06.04.a Explain the importance of a management plan including pests & disease control, growing medium, and environmental conditions</p> <p>PS.06.03.b Inspect propagation material for disease and pests as well as describe methods to prepare soils for planting</p> <p>PS.06.03.c Develop a plant management plan for crop production (RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC03.03.a)</p> <p>PS.06.03.d Implement a plant management plan for crop production</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy
Pathway(s):	Plant Systems
Prepared Completer Competencies: Student will describe principles necessary to effectively manage range sites	
High School Expectations	
Concepts and skills students know include: PS.06.04 Principles of Range Management	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.06.04.a Describe range management</p> <p>PS.06.04.b Determine the purpose of range management (SCI 2.1d; SCI3.6.c)</p> <p>PS.06.04.c Analyze the impact of production based on range management conditions (MAT1.4.a; MAT 3.3c; SCI3.6.c; RWC04.02.a; RWC04.02.e; RWC04.10.c)</p> <p>PS.06.04.d Evaluate a range site and make recommendations (MAT1.4.a; MAT3.1.a; MAT3.1.b; MAT3.1c; MAT 3.3a; SCI 3.5a; SCI 3.5b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b - Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection</p>

of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.

RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Synthesize information to support a logical argument*

RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation*

RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*

SCI2.1.d-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem. - Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy

SCI3.5.a-Science, Earth Science, There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources - Develop, communicate, and justify an evidence-based scientific explanation regarding the costs and benefits of exploration, development, and consumption of renewable and nonrenewable resources

SCI3.5.b-Science, Earth Science, - Evaluate positive and negative impacts on the geosphere, atmosphere, hydrosphere, and biosphere in regards to resource use

SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water,

	air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.06.05 Understanding and determining Range Condition	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.06.05.a Identify conditions necessary for optimum range conditions</p> <p>PS.06.05.b Analyze the condition of a range (SCI3.6.c)</p> <p>PS.06.05.c Make range management recommendations such as water or stocking rates (MAT 1.4a; MAT 3.1a; MAT 3.1 b; MAT 3.1c; MAT 3.3c; SCI 3.6c)</p> <p>PS.06.05.d Evaluate a range site and make recommendations (MAT 1.4a; MAT 3.1a; MAT 3.1 b; MAT 3.1c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b - Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include:	
PS.06.06 Identify and classify Range Plants	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.06.06.a Identify the following terms increases, decrease, and invaders</p> <p>PS.06.06.a Categorize plants according to increases, decrease, and invaders (SCI 2.2a; SCI 2.2c; SCI 3.5b,)</p> <p>PS.06.06.a Determine the optimum percentage of increases, decrease, or invaders that need to be in productive range site (MAT1.4.a)</p> <p>PS.06.06.a Evaluate a range site and identify invaders, increases, and decrease</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>SCI2.2.a-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem - Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing non-native species into an ecosystem</p> <p>SCI2.2.c-Science, Life Science, Evaluate data and assumptions regarding different scenarios for future human population growth and their projected consequences</p> <p>SCI3.5.b-Science, Earth Science, There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources - Evaluate positive and negative impacts on the geosphere, atmosphere, hydrosphere, and biosphere in regards to resource use</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy
Pathway(s):	Plant Systems
Prepared Completer Competencies: PS.07 The student will understand and apply principles of greenhouse management.	
High School Expectations	
Concepts and skills students know include: PS.07.01 Greenhouse Function, Design and Structure	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.07.01.a Explain the purposes of greenhouse production and identify crops grown in greenhouses</p> <p>PS.07.01.a Identify types of greenhouse structures and framework and compare and contrast their uses</p> <p>PS.07.01.a Recommend the best type of greenhouse structure and framework in different scenarios</p> <p>PS.07.01.a Design a greenhouse for a specific location encompassing all aspects of structure and management (MAT 1.4a; MAT 4.1a; MAT 4.1b MAT 4.1c; MAT 4.1d; MAT 4.1 e; MAT 4.2e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and</p>

	<p>surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: PS.07.02 Selection of Greenhouse Glazing Materials	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.07.02.a Describe types of glazing materials and the factors to consider when selecting a glazing material</p> <p>PS.07.02.b Compare and contrast glazing materials Recommend the best type of glazing material in different scenarios</p> <p>PS.07.02.c Design a greenhouse for a specific location encompassing all aspects of structure and management (MAT 1.4a; MAT 4.1a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1 e; MAT 4.2e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and</p>

	<p>spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.07.03 Understand and selection of greenhouse environmental systems	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.07.03.a Identify the factors that are involved with the climate of a greenhouse (Heating, Cooling, Humidity, Light) and the importance of each factor on plant production</p> <p>PS.07.03.a Describe the purpose and use of common environmental controls</p> <p>PS.07.03.a Recommend the best type of heating, cooling, and ventilation in different scenarios (MAT 4.1b MAT 4.1c ; MAT 4.1d; MAT 4.1 e; MAT 4.2e;)</p> <p>PS.07.03.a Design a greenhouse for a specific location encompassing all aspects of structure and management (MAT 4.1a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1 e; MAT 4.2e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including</p>

	congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: PS.07.04. Greenhouse irrigation systems	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.07.04.a Identify the types of irrigation systems used in greenhouse production</p> <p>PS.07.04.b Compare and contrast irrigation systems</p> <p>PS.07.04.c Recommend the best type of irrigation in different scenarios</p> <p>PS.07.04.d Design a greenhouse for a specific location encompassing all aspects of structure and management (MAT 1.4a; MAT 4.1a; MAT 4.1b MAT 4.1c; MAT 4.1d; MAT 4.1 e; MAT 4.2e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and</p>

	<p>spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.07.05 Selection of Greenhouse Growing Media	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.07.05.a Identify and compare growing media</p> <p>PS.07.05.b Describe properties and components of growing media</p> <p>PS.07.05.c Recommend the best type of growing media in different scenarios</p> <p>PS.07.05.d Design a greenhouse for a specific location encompassing all aspects of structure and management (MAT 1.4a; MAT 4.1a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1 e; MAT 4.2e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships,</p>

	Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: PS.07.06 Greenhouse Plant Nutrition and Growth	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.07.06.a Describe plant nutrition and the importance of nutrient management in a greenhouse setting;</p> <p>PS.07.06.b Identify micro- and macronutrients</p> <p>PS.07.06.c Describe fertilization practices and growth regulation practices</p> <p>PS.07.06.d Calculate and Recommend the best fertilization practices and growth regulation practices in different scenarios (MAT 1.4a; SCI 2.1b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>SCI2.1.b-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Evaluate the potential ecological impacts of a plant-based or meat-based diet</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.07.07 Greenhouse Disease and Pest Management	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
PS.07.07.a Identify major plant diseases and pests in a greenhouse production	Academic Content Knowledge Alignment: Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
PS.07.07.b Describe methods of control for major plant diseases and pests in a greenhouse production	
PS.07.07.c Develop standard operating procedures for control of major plant diseases and pests	
PS.07.07.d Design a greenhouse for a specific location encompassing all aspects of structure and management	

High School Expectations	
Concepts and skills students know include: PS.07.08 Greenhouse Business Operation	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.07.08.a Describe safety procedures for greenhouse production</p> <p>PS.07.08.b Describe common operations in a greenhouse business (MAT1.4.a)</p> <p>PS.07.08.c Identify automated systems and their advantages and disadvantages in greenhouse production (MAT1.4.a;)</p> <p>PS.07.08.d Design a greenhouse for a specific location encompassing all aspects of structure and management(MAT 1.4a; MAT 4.1a; MAT 4.1b; MAT 4.1c MAT 4.1d; MAT 4.1 e; MAT 4.2e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p>

	<p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies:		
PS.08 The student will develop skills in understanding, establishing and maintaining turf and landscape areas.		
High School Expectations		
Concepts and skills students know include:		
PS.08.01 Identification and utilization of landscape drafting tools and equipment		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.08.01.a Identify and properly use the traditional tools of the landscape designer</p> <p>PS.08.01.b Measure and interpret dimensions to scale (MAT4.1.a; MAT4.1b; MAT4.1c; MAT4.1d; MAT4.1e; MAT4.1f)</p> <p>PS.08.01.c Design a landscape scheme using the proper tools and equipment (MAT4.1.a; MAT4.1b; MAT4.1c; MAT4.1d; MAT4.1e; MAT4.1f)</p> <p>PS.08.01.d Compare and contrast landscape designs based on cost, climate conditions, and amount of maintenance ((MAT4.1.a; MAT4.1b; MAT4.1c; MAT4.1d; MAT4.1e; MAT4.1f; MAT3.1.a; MAT 3.3a; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving</p>	

	<p>situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.</p> <p>MAT4.1.f- Develop and justify conjectures about relationships among properties of shapes in two- and three-dimensions using construction tools, including technology.</p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.08.02 Principles of Xeroscaping	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.08.02.a Define xeroscaping and explain its benefits</p> <p>PS.08.02.b Describe the seven principles of xeroscaping</p> <p>PS.08.02.c Design a landscape scheme incorporating the seven xeroscaping principles</p> <p>PS.08.02.d Research and report on alternatives to xeroscaping that involve low water usage (RWC01.07.b; RWC01.07.c; RWC01.07.d; RWC3.05a; RWC3.05b; RWC3.02g; RWC3.03a; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC1.7.a-Reading, Writing and Communicating, Oral Expression and Language Study, Deliver and apply skills in preparing a planned formal and informal oral presentations to various audiences using appropriate communication skills. - Give formal and informal talks to various audiences and for various purposes using appropriate level of formality and rhetorical devices.</p> <p>RWC01.07.b - Oral Expression and Listening - Oral presentations require effective preparation strategies - <i>Use verbal and nonverbal techniques to communicate information</i></p> <p>RWC01.07.c - Oral Expression and Listening - Oral presentations require effective preparation strategies - <i>Define a position and select evidence to support that position</i></p> <p>RWC01.07.d - Oral Expression and Listening - Oral presentations require effective preparation strategies - <i>Develop a well-organized presentation to defend a position</i></p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p>

	<p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: Landscape Irrigation	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.08.03.a Identify common types of landscape irrigation systems</p> <p>C PS.08.03.b Calculate working water pressure (MAT 1.4.a)</p> <p>PS.08.03.c Design a landscape irrigation system for a newly landscaped area (MAT4.1.b; MAT4.1.c; MAT 4.1.d; MAT 4.1.e)</p> <p>PS.08.03.d Demonstrate how to set an irrigation timer and set irrigation zones to turn on at the proper time</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and</p>

	<p>spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.08.03 Selection and utilization of turf grass in the landscape	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.08.03.a Identify turf grass plant parts Select turf grass species for various purposes and locations</p> <p>PS.08.03.b Calculate amount needed and develop a plan for laying sod (MAT 4.1.a; MAT 4.1.b; MAT 4.1.c; MAT 4.1.d; MAT 4.1.e)</p> <p>PS.08.03.c Research the types of mowers to use on turf grass</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including</p>

	congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.08.04 Selection and placement of Trees and Shrubs in the landscape	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.08.04.a Identify ornamental trees and shrubs</p> <p>PS.08.04.b Select trees and shrubs for appropriate landscape use</p> <p>PS.08.04.c Design, plant, and maintain a landscape scheme incorporating all key elements of design (MAT 4.1a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1 e)</p> <p>PS.08.04.d Calculate the most economical landscape scheme using a variety of trees and shrubs (MAT 4.1a; MAT 4.1a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1 e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with</p>

	accurate and appropriate units of measure.
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.08.05 Identification and treatment of Plant Injuries and Diseases	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.08.05.a Identify common turf and landscape plant injuries caused by insects or the environment</p> <p>PS.08.05.b Describe integrated pest management and how it can be applied to turf and landscape maintenance</p> <p>PS.08.05.c Develop an IPM plan for a turf and landscape area (RWC3.05a; RWC3.05b; RWC3.02g; RWC3.03a)</p> <p>PS.08.05.ad Diagnose plant injuries and diseases and recommend chemical and natural solutions(SCI 2.6a; SCI 2.6 b; SCI 2.6c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p> <p>SCI2.6.a-Science, Life Science, Cells, tissues, organs, and organ systems maintain relatively stable internal environments – even in the face of changing external environments - <i>Discuss how two or more body systems interact to promote health for the whole organism</i></p>

	<p>SCI2.6.b-Science, Life Science, - Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis</p> <p>SCI2.6.c-Science, Life Science, - Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.08.05 Turf and Landscape Maintenance	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.08.05.a Identify the steps for proper landscape including pruning, mowing, aerating, and fertilization</p> <p>PS.08.05.b Describe how to maintain lawn equipment ensuring the proper health of the turf</p> <p>PS.08.05.c Recognize how to determine fertilizer requirements for a turf and make recommendations to properly maintain the turf (MAT1.4.a; MAT4.1.a; MAT4.1b; MAT4.1c; MAT4.1.d)</p> <p>PS.08.05.d Research different lawn mowers and evaluate advantages and disadvantages of each mower (RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.07.a; RWC04.07.b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.a-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Calculate (or estimate when appropriate) through successive iterations the perimeter and area of a two-dimensional irregular shape.</p> <p>MAT4.1.b- Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p>

MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.

RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Define and narrow a topic for research, developing the central idea, focus, or question at issue*

RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Identify and evaluate potential sources of information for accuracy, reliability, validity, and timeliness*

RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information*

RWC04.07.a - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - *Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co*

RWC04.07.b - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - *Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation*

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies: PS.09 Understand and apply the principles of floral design		
High School Expectations		
Concepts and skills students know include: PS.09.01 History of floral design		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.09.01.a Identify the origins of popular floral designs</p> <p>PS.09.01.b Identify the characteristics of mass, line-mass, and line designs</p> <p>PS.09.01.c Recognize the differences in classical, European and oriental design</p> <p>PS.09.01.d Analyze how European periods of floral design have effected modern design (RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.07.a; RWC04.07.b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Define and narrow a topic for research, developing the central idea, focus, or question at issue</i></p> <p>RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Identify and evaluate potential sources of information for accuracy, reliability, validity, and timeliness</i></p> <p>RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information</i></p>	

	<p>RWC04.07.a - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co</i></p> <p>RWC04.07.b - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.09.02 Principles of Floral Design	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.09.02.a Recognize primary, secondary and tertiary colors as they apply to basic color themes in floral design</p> <p>PS.09.02.b Define the principles and elements of design</p> <p>PS.09.02.c Develop a rating scale in order to critique the use of the basic design principles in an arrangement</p> <p>PS.09.02.d Construct & critique an arrangement using a rating scale based on the principles of design</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: PS.09.03 Identification and Selection of design material	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.09.03.a Classify flowers according to the four groups based on form and shape</p> <p>PS.09.03.b Identify most commonly used cut flowers, foliage and tools</p> <p>PS.09.03.c Investigate the seasonal availability of flowers and foliages</p> <p>PS.09.03.d Organize a method of pricing and packaging of the most commonly used flowers and foliage (MAT1.4.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <hr/> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.09.04 Handling & Processing Procedures	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.09.04.a Identify the steps of handling a shipment of flowers</p> <p>PS.09.04.b Demonstrate proper stem treatment and explain the benefits of floral preservatives Identify the causes and signs of premature flower deterioration</p> <p>PS.09.04.c Design a set of standard operating procedures to apply when receiving a shipment (RWC3.05a; RWC3.05b; 3.03a; RWC3.02g)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.09.05 Floral Construction Techniques	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.09.05.a Identify wire and ribbon sizes and describe their appropriate uses</p> <p>PS.09.05.b Apply wiring and taping techniques to different types of flowers</p> <p>PS.09.05.c Explain the steps to designing a bud vase, circular arrangement, angular arrangement and line arrangement</p> <p>PS.09.05.d Construct a bud vase arrangement, circular arrangement, angular arrangement and line arrangement</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies: PS.10 Soil Science		
High School Expectations		
Concepts and skills students know include: PS.10 .01 Soil Formation		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.10 .01.a Identify the components of soil (water, mineral particles, air, organic matter) (SCI3.6.b; SCI3.6.c)</p> <p>PS.10 .01.b Describe the process of soil formation through the five soil forming factors--time, topography, weathering, soil organisms, and climate (SCI3.6.b; SCI3.6.c)</p> <p>PS.10 .01.c Differentiate soils based on soil horizons, parent material, etc (SCI3.6.b; SCI3.6.c)</p> <p>PS.10 .01.d Describe the soil classification system and relate it to geographic landforms, etc</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI3.6.b-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes- Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p> <p>SCI3.6.c-Science, Earth Science - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>	
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>	

High School Expectations	
Concepts and skills students know include:	
PS.10 .02 Soil Physical Characteristics	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .02.a Identify physical properties of soil (Bulk density, aeration/drainage, water holding capacity, texture, structure) (MAT1.4.a; SCI3.6.b; SCI 3.6.c)</p> <p>PS.10 .02.b Explain how the physical qualities of the soil influence the infiltration and percolation of water (MAT1.4.a; SCI3.6.b; SCI3.6.c)</p> <p>PS.10 .02.c Diagnose plant growth problems due to the physical qualities of the soil (SCI 3.6.b; SCI3.6.c)</p> <p>PS.10 .02.d Relate soil formation and soil physical characteristics to suitable land uses, or land capability classes</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>SCI3.6.b-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes- Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p> <p>SCI3.6.c-Science, Earth Science, - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations		
Concepts and skills students know include:		
PS.10 .03 Soil Structure		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.10 .03.a Describe the main types of soil peds and define the difference between soil texture from structure</p> <p>PS.10 .03.b Describe how soil structure is related to soil treatment (plowing, cultivation, organic matter amendments, etc) and soil treatment is related to the degradation or improvement of soil Structure (SCI3.6.c)</p> <p>PS.10 .03.c Diagnose and prescribe treatments for potential plant growth related problems associated with soil structure (pans, compaction, etc)</p> <p>PS.10 .03.d Analyze how soil and water chemistry impact soil structure (MAT1.4.a; MAT1.4.b; MAT3.3.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT1.1.b- Explain why the order of operations is a universal convention for evaluating expressions.</p> <p>MAT3.3.c-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Recognize association between two categorical variables.</p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>	
		<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.10 .04 Soil Texture	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .04.a Identify different methods of determining soil texture (soil ribbon test and the USDA soil texture triangle, solids separation) (MAT1.4.a; SCI3.6.c)</p> <p>PS.10 .04.b Recognize potential plant growth problems associated with soil texture (tightness, poor drainage, temperature variations, etc) (SCI3.6.c)</p> <p>PS.10 .04.c Propose possible treatments for certain soil texture problems (RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.07.a; RWC04.07.b)</p> <p>PS.10 .04.d Analyze how soil texture relates to crop selection</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation met</p> <p>RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Define and narrow a topic for research, developing the central idea, focus, or question at issue</i></p> <p>RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Identify and evaluate potential sources of information for accuracy, reliability, validity, and timeliness</i></p> <p>RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information</i></p> <p>RWC04.07.a - Research and Reasoning - An author’s reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co</i></p>

	<p>RWC04.07.b - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation</i></p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere.</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.10 .05 Soil Color	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .05.a Identify factors that determine soil color such as hue, chroma, and value</p> <p>PS.10 .05.b Utilize a Munsell color chart to determine soil color</p> <p>PS.10 .05.c Determine how soil color is related to subsurface drainage problems like glaying and mottling</p> <p>PS.10 .05.d Prescribe treatments for soils lacking suitable characteristics for plant growth based on their soil color (i.e. glaying and mottling)</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.10 .06 Soil Water Holding Capacity	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .06.a Describe how soil serves as a reservoir for plant available water (SCI3.6.c)</p> <p>PS.10 .06.b Compare and contrast the different categories of soil water (SCI3.6.c)</p> <p>PS.10 .06.c Compare the relationship between root volume and soil water available to the plant (MAT3.3.c; SCI3.6.c)</p> <p>PS.10 .06.d Evaluate how soil drainage and water holding capacity can be improved</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT3.3.c-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Recognize association between two categorical variables.</p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.10 .06 Soil Water movement	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .06.a Discuss how water moves into and through soil and how it is retained (SCI3.6.a)</p> <p>PS.10 .06.b Describe how water is lost to evapo transpiration (ET) (SCI3.6.a)</p> <p>PS.10 .06.c Predict the amount of water lost to ET when given specific data on soil moisture retention and irrigation practices (MAT 3.1a; MAT 3.3c; SCI3.6.a)</p> <p>PS.10 .06.d Evaluate irrigation based upon soil moisture vs. soil water holding capacity (MAT 3.1a, MAT 3.3c,)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.3.c-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Recognize association between two categorical variables.</p> <p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth's surface with water, air, gravity, and biological activity</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.10 .07 Soil microbiology/ biology	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .07.a State the conditions necessary for a healthy soil microbiological ecosystem</p> <p>PS.10 .07.b Recognize situations where a soil's ecosystem will be damaged by human impacts (SCI 3.6a; SCI 3.6c)</p> <p>PS.10 .07.c Recommend ways in which a soil's microbiology environment can be improved</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth's surface with water, air, gravity, and biological activity</p> <p>SCI3.6.c-Science, Earth Science, Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies: Soil Chemistry		
High School Expectations		
Concepts and skills students know include: PS.10 .08 Soil pH		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.10 .08.a Define soil pH and how it relates to soil health and productivity (SCI1.2.b,SCI 1.4b)</p> <p>PS.10 .08.a Determine the ideal ph for most plants and how ph can affect the solubility/ availability of certain nutrients (SCI1.2b, SCI 1.4b)</p> <p>PS.10 .08.a Analyze how pH can be adjusted (i.e. by liming or acid injection/sulfur application) (MAT1.4.a; MAT2.6.b; MAT2.6.c; MAT3.3.a; SCI1.2.b, SCI 1.4b)</p> <p>PS.10 .08.a Summarize and analyze the problems associated with pH ranges above and below the ideal (i.e. Nutrient deficiencies in calcareous soils, deflocculation in high pH sodic soils, toxic metal solubility in acidic soils; (MAT 2.6b; MAT 2.6c; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.6.b-Mathematics, Patterns, Functions, and Algebraic Structures, Use of elementary functions (linear, quadratic, power, and exponential and their inverses) and their transformations to identify essential quantitative relationships in a situation and to model real world situations, using all available tools, including technology. - Represent and solve problems in various contexts using power and exponential functions, such as investment growth, depreciation and population growth.</p> <p>MAT2.6.cAnalyze the reasonableness of a solution in its given context and compare the solution to appropriate graphical and numerical estimates.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and</p>	

	<p>numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI1.2.b-Science, Physical Science, Matter has definite structure which determines characteristic physical and chemical properties. -Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity</p> <p>SCI1.4.b Atoms bond in different ways to form molecules and compounds that have definite properties- Gather, analyze, and interpret data on chemical and physical properties of different compounds such as density, melting point, boiling point, pH, and conductivity</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.10 .09 Soil Cation exchange	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .09.a Identify CEC and how it is related to soil health and productivity (SCI1.2.b)</p> <p>PS.10 .09.b Relate how CEC is a measure of the nutrient holding capacity of the soil (SCI1.2.b)</p> <p>PS.10 .09.c Describe how CEC varies by soil texture and is related to clay and organic matter content and soil chemistry</p> <p>PS.10 .09.d Analyze the relationship of CEC to pH, colloid content and water chemistry</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI1.2.b-Science, Physical Science, Matter has definite structure which determines characteristic physical and chemical properties. -Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.10 .10 Soil Salinity and Sodacity	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .10.a Recognize the difference between soluble salts and soil sodacity (MAT3.3.c)</p> <p>PS.10 .10.b Discuss the sources of soluble salts, the EC test and EC test values that limit plant growth (SCI 1.2b, SCI 1.4b)</p> <p>PS.10 .10.c Recommend appropriate corrective action for a salt affected soil (MAT2.5.c; MAT 3.1a- MAT 3.1b; MAT 3.1c; RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.07.a; RWC04.07.b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT2.5.c-Mathematics, Patterns, Functions, and Algebraic Structures, Solutions to equations, inequalities and systems of equations using all available tools, including technology. - Rewrite literal equations in terms of an unknown variable.</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.3.c-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Recognize association between two categorical variables.</p> <p>RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate</p>

information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Define and narrow a topic for research, developing the central idea, focus, or question at issue*

RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Identify and evaluate potential sources of information for accuracy, reliability, validity, and timeliness*

RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - *Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information*

RWC04.07.a - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - *Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co*

RWC04.07.b - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - *Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation*

SCII.2.b-Science, Physical Science, Matter has definite structure which determines characteristic physical and chemical properties. -Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity

	SCI1.4.b Atoms bond in different ways to form molecules and compounds that have definite properties- Gather, analyze, and interpret data on chemical and physical properties of different compounds such as density, melting point, boiling point, pH, and conductivity
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
PS.10 .11 Soil-Carbon Cycle	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .11.a Diagram the carbon cycle (SCI 2.1e; SCI2.2.b)</p> <p>PS.10 .11.a Describe the various forms carbon takes in the carbon cycle (SCI 1.3b; SCI 2.1e, SCI2.2.b)</p> <p>PS.10 .11.a Discuss the ecological importance of the various forms of carbon in the carbon cycle</p> <p>PS.10 .11.a Hypothesize the historical and future impact the carbon cycle has on our environment (i.e. global warming) (SCI 3.4b; SCI 3.4c; SCI 3.4d; SCI 3.4e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI1.3.b-Science, Physical Science, Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy. - Predict reactants and products for different types of chemical and nuclear reactions</p> <p>SCI2.1.e-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem- Define and distinguish between matter and energy, and how they are cycled or lost through life processes</p> <p>SCI2.2.b-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem - Describe or evaluate communities in terms of primary and secondary succession as they progress over time</p> <p>SCI3.4.b-Science, Earth Science, Climate is the result of energy transfer among interactions of the atmosphere, hydrosphere, geosphere, and biosphere. - Analyze and interpret data on Earth’s climate</p> <p>SCI3.4.c-Science, Earth Science- Explain how a combination of factors such as Earth’s tilt, seasons, geophysical location, proximity to oceans, landmass location, latitude, and elevation determine a location’s climate</p> <p>SCI3.4.d-Science, Earth Science– Identify mechanisms in the past and present that have changed Earth’s climate</p>

	SCI3.4.e-Science, Earth Science,– Analyze the evidence and assumptions regarding climate change
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: PS.10 .12 Soil Nutrient cycling	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .12.a State the sources of N, P, and K in a soil</p> <p>PS.10 .12.b Diagram and explain the N, P, and K cycle (SCI2.1.f)</p> <p>PS.10 .12.c Describe how nutrients are "gained" and "lost" in the soil nutrient cycle (SCI2.1.f)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI2.1.f-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem- Describe how carbon, nitrogen, phosphorus, and water cycles work</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Plant Systems	
Prepared Completer Competencies: Soil Management		
High School Expectations		
Concepts and skills students know include: PS.10 .13 Soil Erosion		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>PS.10 .13.a Identify types of erosion and predict when they will occur</p> <p>PS.10 .13.b Identify prevention/ control methods for various types of soil erosion</p> <p>PS.10 .13.c Develop a management plan to control soil erosion in the local community (RWC3.05a; RWC3.05b; 3.03a; RWC3.02g)</p> <p>PS.10 .13.d Research the history of soil erosion in the United States and explain the advancements in agricultural production</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.03.a - Writing and Composition - Standard English conventions effectively communicate to targeted audiences and purposes - <i>Follow the conventions of Standard English to write varied, strong, correct, complete sentences</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and select appropriate information that clearly supports a definite purpose, topic, or position</i></p>	

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include: PS.10 .14 Soil Organic Matter	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .14.a Define organic matter and identify sources of organic matter in the soil</p> <p>PS.10 .14.b Recognize ways in which organic matter may be managed in the soil (SCI2.2.b)</p> <p>PS.10 .14.c Utilize a soil test to measure organic matter (MAT1.4.a)</p> <p>PS.10 .14.d Make recommendations to improve organic matter content based on soil test results</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>SCI2.2.b-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem - Describe or evaluate communities in terms of primary and secondary succession as they progress over time</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
PS.10 .15 Soil Surveying	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .15.a Recognize the USDA soils survey system and discuss why soils varies from place to place</p> <p>PS.10 .15.b Interpret a USDA soil survey and state the soil type that is shown for a parcel in the soil survey</p> <p>PS.10 .15.c Utilize soil survey to determine best land uses (crop land, homesite, etc) (SCI 3.6b)</p> <p>PS.10 .15.d Analyze soil survey to determine factors that make a site unworthy for use and determine factors to increase usability</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI3.6.b-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes- Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: PS.10 .16 Soil Compaction	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .16.a Define soil compaction and its effects on growing conditions (SCI 3.1a)</p> <p>PS.10 .16.b Describe ways of preventing and correcting compaction problems</p> <p>PS.10 .16.c Make recommendations to improve soil compaction problems (i.e. rotational grazing, etc) (SCI3.6.c;)</p> <p>PS.10 .16.d Perform a bulk density test and predict growth problems based upon test results (MAT1.4.a; MAT2.5.c; MAT3.1.b; MAT3.3.a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.5.a-Mathematics, Patterns, Functions, and Algebraic Structures, Solutions to equations, inequalities and systems of equations using all available tools, including technology. - Find solutions to quadratic equations and inequalities (with real roots) by using algebraic methods such as factoring, completing the square, graphing or using the quadratic formula and using calculators, graphing utilities or other technology to solve quadratic equations and inequalities.</p> <p>MAT2.5.c- Rewrite literal equations in terms of an unknown variable.</p> <p>MAT3.1.b-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and</p>

	<p>categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>SCI3.1.a-Science, Earth Science, The history of the universe, solar system and Earth can be inferred from evidence left from past events - Develop, communicate, and justify an evidence-based scientific explanation addressing questions about Earth's history</p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: PS.10 .17 Soil Testing	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>PS.10 .17.a Collect, document, and submit a composite soil sample for testing</p> <p>PS.10 .17.b Interpret the results of a soil test (MAT1.4.a; MAT3.1.b; SCI3.6.c)</p> <p>PS.10 .17.c Make recommendations to improve soil after interpreting the soil test (MAT1.4.a; MAT3.1.b)</p> <p>PS.10 .17.d Complete a soil test, prepare results, and make recommendations (MAT1.4.a; MAT3.1.b-c; MAT3.3.a; MAT3.3b; MAT3.3c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT3.1.b-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <p>MAT3.3.b- Define and explain how sampling distributions (developed through simulation) are used to describe the sample-to-sample variability of sample statistics.</p>

	<p>MAT3.3.c- Recognize association between two categorical variables.</p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>