



Section IV

Wisconsin Standards for Agriculture, Food and Natural Resources



This page intentionally left blank.



Wisconsin Standards for Agriculture, Food and Natural Resources

Curriculum opportunities related to Agriculture, Food and Natural Resources support career growth within the 16 areas identified by the U.S. Department of Education’s Career Clusters and transcend every career setting. Regardless of a student’s future endeavors as an employee and/or as an entrepreneur, the **Wisconsin Standards for Agriculture, Food and Natural Resources** address increased academic, technical and employability knowledge and skills that are critical for students to be college and career ready. Within agriculture related learning priorities across multiple content area standards, the following career pathways are specifically emphasized: Agribusiness systems, Animal systems, Environmental Services systems, Food Products and Processing systems, Plant systems, Power, Structural and Technical systems and Natural Resources systems. The effective delivery of Career and Technical Education through Agriculture, Food and Natural Resources standards can be best observed through quality programs that provide local communities access to the following educational experiences:

- Work-Based Learning Programs such as State Certified Skills Cooperative Education Certificate, Employability Skills;
- Career and Technical Student Organization such as Wisconsin Association of FFA; and
- classroom delivery of learning priorities that document the integration of academic and technical skills.

Courses in Agriculture, Food and Natural Resources

Middle level and high school programs that are taught by licensed Agriculture teachers provide the ability for students to build their academic capacity through rigorous curriculum offerings. Students that are introduced to basic knowledge and skills at early grade levels can effectively engage in exploratory middle level course work in preparation for a career-focused high school academic plan that leads to college and career readiness through postsecondary options.

Local districts that desire to develop programs of study across career clusters must work to ensure a balanced approach to the multiple aspects of coursework available within Agriculture, Food and Natural Resources. The following area is identified within the National Center for Educational Statistics (NCES) course code:

- Agriculture, Food and Natural Resources -Subject Area 18;

The **Wisconsin Standards for Agriculture, Food and Natural Resources** are broken into eight standard areas: Each of these areas is interdependent on the other; however, for ease of use by classroom teachers, the standards have been set up in this manner. These sections are further delineated as follows:

Agriculture, Food and Natural Resources Standards	
Agriculture Business	Animal Systems
Biotechnology	Environmental Service Systems
Food Production and Processing	Natural Resources
Plant Systems	Power, Structural and Technical Systems

The following chart outlines a curriculum alignment of the content area standards into a variety of course types that may be developed within local school districts.

Note: The chart identifies the primary standard source (P) for a specific type of course. Additionally, the secondary standard sources (s) may also be used to complement the primary standard source within a type of course. The types of courses listed are not inclusive of all Agriculture, Food and Natural Resource courses. School districts may have a variety of names for these types of courses.



P=Primary source/s=secondary source

Type of Course	Common Career Technical Standards						AFNR Standards								
	Global Awareness	Life & Career Skills, Career Development, & Employability Skills	Information, Media & Technology	Sustainability, Environmental, & Safety	Leadership	Communication, Creativity, Collaboration, & Critical Thinking	Agriculture Business Systems	Animal Systems	Biotechnology Systems	Environmental Service Systems	Food Production and Processing	Natural Resources	Plant Systems	Power, Structural and Technical Systems	
Agribusiness Management	s	s	s	s	s	s	P	s	s	s	s	s	s	s	
Agricultural Biotechnology	s	s	s	s	s	s	s	s	P	s	s	s	s	s	
Agricultural Entrepreneurship	s	s	s	s	s	s	P	s	s	s	s	s	s	s	
Agricultural Leadership	s	s	s	s	P	s	s	s	s	s	s	s	s	s	
Agricultural Processing	s	s	s	s	s	s	s	s	s	P	s	s	s	s	
Agriculture Mechanics and Equipment	s	s	s	s	s	s	s	s	s	s	s	s	s	P	
Agriculture Structures	s	s	s	s	s	s	s	s	s	s	s	s	s	P	
Agriculture Welding	s	s	s	s	s	s	s	s	s	s	s	s	s	P	
Animal Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Aquaculture	s	s	s	s	s	s	s	s	s	s	P	s	s	s	
Dairy Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Environmental Science	s	s	s	s	s	s	s	s	s	P	s	P	s	s	
Equine Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Food Product Processing	s	s	s	s	s	s	s	s	s	s	P	s	s	s	
Food Science	s	s	s	s	s	s	s	s	s	s	P	s	s	s	
Forestry	s	s	s	s	s	s	s	s	s	s	s	P	s	s	
Horticulture/Floriculture/Greenhouse Management	s	s	s	s	s	s	s		s	s	s	s	P	s	
Introduction to Agriculture	s	s	s	s	s	s	s	s	s	s	s	s	s	s	
Large Animal Care	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Natural Resource Management	s	s	s	s	s	s	s	s	s	s	s	P	s	s	
Plant/Soil Science	s	s	s	s	s	s	s	s	s	s	s	s	P	s	
Small Animal Care	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Turf and Landscape Management	s	s	s	s	s	s	s		s	s	s	s	P	s	
Veterinary Science	s	s	s	s	s	s	s	P	s	s	s	s	s	s	
Wildlife Management	s	s	s	s	s	s	s	s	s	s	s	P	s	s	
Workplace Experience (COOP)	s	s	s	s	s	s	P	s	s	s	s	s	s	s	



Program Structure

The progression of instruction related to the Agriculture, Food and Natural Resource standards should be developed throughout the PK-12 system as reflected by the learning priorities that are identified within the three grade bands featured in this document. The leadership of a Agriculture, Food and Natural Resource licensed teacher at each of the grade levels can be critical to the fluidity of standards development across the PK-12 grade bands, provide flexibility of delivery options, support best practices that are researched based within content instruction, develop additional resources with other academic classroom teachers in related areas of instruction and develop a collaborative relationship with elementary classroom teachers who are teaching fundamental skills to only their own students.

A variety of program structures may be used by local districts to deliver Agriculture, Food and Natural Resource standards to students including, but not limited to the following:

<u>Grades PK-5</u>	<u>Grades 6-8</u>	<u>Grades 9-12</u>
<ol style="list-style-type: none"> 1. Foundational skills are incorporated into elementary level course work in multiple disciplines. 	<ol style="list-style-type: none"> 1. A dedicated career exploration program that integrates course work that introduces and/or expands upon Agriculture, Food and Natural Resources. 2. Exploratory units in foundational elective programs that support career development and skills needed across content areas. 3. Elective course options for students in Career and Technical Education subjects, including Agriculture, Food and Natural Resources. 	<ol style="list-style-type: none"> 1. An integrated sequence of courses within Agriculture, Food and Natural Resource that develops course work related to Programs of Study in multiple career pathways associated with Career Clusters. 2. A balanced Agriculture, Food and Natural Resource Program that supports student career development in: <ol style="list-style-type: none"> a. Agriculture, Food and Natural Resource; b. Science, Technology, Engineering and Math (STEM); c. Education and Training. 3. A career cluster program that provides dedicated curriculum and resources that feature capstone coursework, postsecondary credit attainment and/or industry connections through certifications.

Delivery of Agriculture, Food and Natural Resource courses

Agriculture, Food and Natural Resources courses should be delivered as a coherent sequence within a pathway. Pathway knowledge builds on foundation knowledge and skills. These courses should include differentiated instruction to meet the needs of all learners.

These are multiple ways that students access Agriculture, Food and Natural Resources courses within the K-12 system:

- Face-to-Face Classroom Instruction
- Digital Learning (models may include blended, hybrid and online distance learning at multiple grade levels)
- Transcribed Credit (partnering with local Technical College or University should be strongly considered)



Youth Options

Work-Based Learning (State Certified Skill Standards, Youth Apprenticeship, etc.)

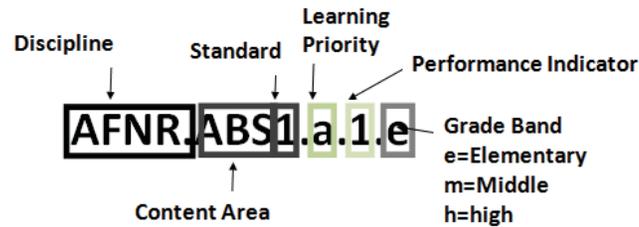
In Wisconsin, each district determines the best setting for courses within the school. When developing a balanced Agriculture, Food and Natural Resource program, consideration should be given to how a local program can support current local, state and national initiatives. Standards associated with a quality program in Agriculture, Food and Natural Resource should be used for program self-evaluation, improvement and goal-setting. Areas of particular interest include quality educators, curriculum instruction and student assessment, parent and community involvement and program planning.



Standard Structure

The Wisconsin Standards for Career and Technical Education, including the Wisconsin Common Career Technical Standards, each follow a similar structure.

Standard Coding



Standard Formatting

- Discipline** →
- Content Area** →
- Standard:** Broad statement that tells what students are expected to know or be able to do →
- Learning Priority:** Breaks down the broad statement into manageable learning pieces →

Performance Indicator by Grade Band: Measurable degree to which a standard has been developed and/or met

Agriculture, Food, & Natural Resources (AFNR)			
Content Area: ABS/Agriculture Business Standards			
Standard: ABT1: Students will use economic principles to establish and manage an AFNR enterprise.			
Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
ABT1.a: Apply principles of capitalism in the business environment.	ABT1.a.1.e: Become aware of the use of money as a medium for exchange in a capitalistic system.	ABT1.a.2.m: Recognize principles of capitalism as related to AFNR businesses.	ABT1.a.3.h: Differentiate types of ownership and outline the structure of AFNR businesses in a capitalistic economic system.
ABT1.b: Apply principles of entrepreneurship in businesses.	ABT1.b.1.e: Describe the meaning, importance and economic impact of entrepreneurship.	ABT1.b.2.m: Classify the characteristics of successful entrepreneurs in AFNR businesses.	ABT1.a.4.h: Execute supply-and-demand principles in AFNR businesses. ABT1.b.3.h: Demonstrate entrepreneurship, including idea generation, opportunity analysis and risk assessment.

Grade Bands

Grade bands of PK-5, 6-8 and 9-12 align to typical elementary, middle and high school levels.

Grade band PK-5 performance indicators represent knowledge and skills that should be integrated throughout the elementary curriculum. Career and technical education teachers in districts can be an excellent resource to assist in the development of curriculum and activities. Career and technical education should be part of the core curriculum for all middle school students. Awareness, exploration and building foundational skills for career pathways occur in middle school. The performance indicators in grade band 6-8 these foundational skills with an emphasis on career development.

Career and technical education at the high school level must go beyond awareness and exploration. Students should be developing specific knowledge and skills that are transferrable to other coursework, a job-site or postsecondary options. Performance indicators for grades 9-12 align specifically to industry standards and expectations for career clusters and pathways.



Agriculture, Food, & Natural Resources (AFNR)

Content Area: ABS/Agriculture Business Standards

Standard: ABS1: Students will use economic principles to establish and manage an AFNR enterprise.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
ABS1.a: Apply principles of capitalism in the business environment.	ABS1.a.1.e: Recognize the use of money as a medium for exchange in a capitalistic system.	ABS1.a.2.m: Recognize principles of capitalism as related to AFNR businesses.	ABS1.a.3.h: Differentiate types of ownership and outline the structure of AFNR businesses in a capitalistic economic system.
			ABS1.a.4.h: Execute supply-and-demand principles in AFNR businesses.
ABS1.b: Apply principles of entrepreneurship in businesses.	ABS1.b.1.e: Describe the meaning, importance and economic impact of entrepreneurship.	ABS1.b.2.m: Classify the characteristics of successful entrepreneurs in AFNR businesses.	ABS1.b.3.h: Demonstrate entrepreneurship, including idea generation, opportunity analysis and risk assessment.

Standard: ABS2: Students will use appropriate management planning principles in AFNR business enterprise.

ABS2.a: Compose and analyze a business plan for an enterprise.	ABS2.a.1.e: Recognize the importance of setting goals for success of a business.	ABS2.a.3.m: Recognize quality AFNR business plan components that have been developed using the SMART (specific, measurable, attainable, realistic and timely) format.	ABS2.a.5.h: Identify components of business plans and demonstrate how to write such components using the SMART format.
	ABS2.a.2.e: Connect DATCP to consumer safety standards.	ABS2.a.4.m: Identify and observe ethical standards in planning and operating AFNR businesses.	ABS2.a.6.h: Prepare and critique AFNR business plans.
			ABS2.a.7.h: Observe appropriate laws and regulations in planning and operating AFNR businesses.
			ABS2.a.8.h: Use methods of AFNR business enterprise analysis, such as SWOT (strengths, weaknesses, opportunities and threats).
ABS2.b: Read, interpret, evaluate and write a mission statement to guide business goals, objectives and resource allocation.	ABS2.b.1.e: Recognize goals or purposes of a club.	ABS2.b.3.m: Read and interpret mission statements.	ABS2.b.5.h: Identify approaches in creating mission statements for AFNR businesses.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	ABS2.b.2.e: Make the connection between goals, means and outcomes.	ABS2.b.4.m: Identify the meaning and importance of goals and objectives in AFNR business enterprises.	ABS2.b.6.h: Create and disseminate a mission statement for business activities in AFNR.
			ABS2.b.7.h: Prepare short-term, intermediate and long-term goals and objectives that are consistent with the mission statement for an AFNR business.
			ABS2.b.8.h: Evaluate AFNR business goals and objectives and make revisions based on observations.
ABS2.c: Apply appropriate management skills to organize a business.	ABS2.c.1.e: Recognize the roles in a business owners and employees.	ABS2.c.2.m: Identify organizational structures and chains of command in AFNR businesses.	ABS2.c.4.h: Identify management types in AFNR businesses.
		ABS2.c.3.m: Identify appropriate local, state, federal, international and industry regulations for AFNR businesses.	ABS2.c.5.h: Implement management approaches to assure efficiency and profitability.
			ABS2.c.6.h: Prepare and deliver AFNR business presentations that include customers served, sources of inputs and how a business produces goods and services.
			ABS2.c.7.h: Create an organizational chart for an AFNR business.
ABS2.d: Recruit, train and retain appropriate and productive human resources for businesses.	ABS2.d.1.e: Identify types of skills that people can contribute to a business.	ABS2.d.5.m: Identify the meaning and functions of human resources in AFNR businesses.	ABS2.d.9.h: Determine appropriate human resources for AFNR businesses.
	ABS2.d.2.e: Consider how someone might develop skills and grow in a business.	ABS2.d.6.m: Identify usual employee benefits in AFNR businesses.	ABS2.d.10.h: Write job descriptions for specific positions in an AFNR business.
	ABS2.d.3.e: Explain why it is important to get along with others you work with.	ABS2.d.7.m: Explain the meaning and importance of employee relations, including communication.	ABS2.d.11.h: Design a career development and training plan for employees of an AFNR business.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	ABS2.d.4.e: Identify dangers that exist in work places.	ABS2.d.8.m: Identify the meaning and nature of employee compensation.	ABS2.d.12.h: Create a recruitment and evaluation program for employees in an AFNR business.
			ABS2.d.13.h: Establish and maintain appropriate records and reports on human resources.
			ABS2.d.14.h: Determine and follow appropriate regulations in recruiting, hiring and promoting personnel.
			ABS2.d.15.h: Design a legally compliant and competitive compensation plan for AFNR business employees.
			ABS2.d.16.h: Devise a compensation plan to equitably compensate, motivate and recognize productivity of human resources.
Standard: ABS3: Students will use record keeping to accomplish AFNR business objectives while complying with laws and regulations.			
ABS3.a: Prepare and maintain all files needed to accomplish effective record keeping.	ABS3.a.1.e: Describe the income and expenses of a business.	ABS3.a.2.m: Maintain production and agribusiness records.	ABS3.a.3.h: Analyze records to improve efficiency and profitability of an AFNR business.
			ABS3.a.4.h: Apply management information systems in AFNR business financial analysis.
ABS3.b: Implement appropriate inventory management practices.	ABS3.b.1.e: Consider items a business might own or borrow to operate.	ABS3.b.2.m: Monitor inventory to maintain optimal levels and calculate costs of carrying input and output inventory.	ABS3.b.3.h: Use computer technology in inventory management and reporting, including spreadsheets, databases, word processing, networked systems and the Internet.
			ABS3.b.4.h: Apply logistics management strategies.



Standard ABS4: Students will apply generally accepted accounting principles and skills to manage cash budgets, credit budgets and credit for AFNR businesses.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
ABS4.a: Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.	ABS4.a.1.e: Create a budget for earning and spending allowance money.	ABS4.a.2.m: Budget resources, as applied to the AFNR business, including capital, human, financial and time.	ABS4.a.5.h: Manage assets, including credit, for agribusiness goal achievement.
		ABS4.a.3.m: Identify financial concepts associated with production and profit.	ABS4.a.6.h: Manage resources to minimize liabilities and maximize profit.
		ABS4.a.4.m: Explain the importance of return on investment for an agribusiness enterprise.	ABS4.a.7.h: Use accounting information to estimate the cost of goods sold and margins on the goods.
			ABS4.a.8.h: Evaluate characteristics of lines of credit, loan terms and alternatives in sources of capital.
			ABS4.a.9.h: Analyze reporting requirements for income, property and employment taxes associated with small AFNR businesses.
			ABS4.a.10.h: Use accountants in AFNR business management.

Standard ABS5: Students will access accomplishment of goals and objectives by an AFNR business.

ABS5.a: Maintain and interpret financial information (i.e., income statements, balance sheets, inventory, purchase orders, accounts receivable and cash-flow analyses) for businesses.	ABS5.a.1.e: Keep track of expenses and deposits on a checkbook ledger.	ABS5.a.4.m: Identify accounting information in AFNR business reporting and management.	ABS5.a.7.h: Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business.
	ABS5.a.2.e: Determine the value of a commodity by considering the yield and commodity price.	ABS5.a.5.m: Name and explain the impact of external economic factors on an AFNR business.	ABS5.a.8.h: Interpret financial information for an AFNR business to determine profitability, net worth position, financial ratios, performance measures and ability to meet cash-flow requirements.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	ABS5.a.3.e: Identify expenses and incomes that might be incurred by a business.	ABS5.a.6.m: Identify information needed for an AFNR business manager to monitor performance on a daily, weekly, monthly, quarterly and annual basis.	ABS5.a.9.h: Maintain accounting information needed to prepare an income statement, balance sheet and cash-flow analysis for an AFNR business.
			ABS5.a.10.h: Interpret financial information for an AFNR business to determine profitability, net worth position, financial ratios, performance measures and ability to meet cash-flow requirements.
			ABS5.a.11.h: Interpret business performance data.
			ABS5.a.12.h: Conduct a breakeven analysis for an AFNR business.
			ABS5.a.13.h: Summarize financial data for use in preparing various business financial statements.
		ABS5.a.14.h: Interpret and evaluate financial statements, including income statements, balance sheets and cash-flow analyses.	
Standard: ABS6: Students will use industry-accepted marketing principles to accomplish AFNR business objectives.			
ABS6.a: Conduct appropriate market and marketing research.	ABS6.a.1.e: Consider ways of marketing products of a business.	ABS6.a.3.m: Investigate the meaning and methods of marketing in AFNR as related to agricultural commodities, products and services and to agricultural goods in domestic and international markets.	ABS6.a.5.h: Apply benefit/cost analysis to marketing in AFNR businesses.
	ABS6.a.2.e: Identify agricultural products that consumers purchase.	ABS6.a.4.m: Describe functions in agricultural marketing.	ABS6.a.6.h: Implement and evaluate marketing strategies with agricultural commodities, products and services.
			ABS6.a.7.h: Assess the presence of marketing infrastructure for agricultural commodities.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			ABS6.a.8.h: appropriate modifications to achieve AFNR business goals.
			ABS6.a.9.h: Evaluate alternative marketing strategies, such as value-adding, branding and niche marketing and propose and implement.
ABS6.b: Develop a marketing plan.	ABS6.b.1.e: Identify places that consumers purchase agricultural products.	ABS6.b.2.m: Identify the purpose, components and developmental processes of marketing plans.	ABS6.b.3.h: Perform a marketing analysis, including evaluation of the competitors, customers, international and domestic policy environment, regulations and rules, standards and AFNR business resources.
			ABS6.b.4.h: Establish marketing plan goals/objectives, including monitoring, measuring and analyzing goal achievement.
ABS6.c: Develop strategies for marketing plan implementation.	ABS6.c.1.e: Consider how you would convince others to buy your goods if you had a business.	ABS6.c.2.m: Identify and use strategies frequently employed in marketing programs, including those used in niche markets.	ABS6.c.3.h: Determine marketing strategies that are most likely to be effective in an AFNR business.
			ABS6.c.4.h: Revise marketing strategies based on monitoring and measurement information for target customer base.
ABS6.d: Develop specific tactics to market AFNR products and services.	ABS6.d.1.e: Identify the people involved in bring agricultural products to consumers.	ABS6.d.2.m: Identify and maintain needed sales records.	ABS6.d.3.h: Use strategies to follow up sales to provide post-sales service.
			ABS6.d.4.h: Intercept, interpret and process customer complaints, needs and problems with products and services.



Standard: ABS7: Students will create a production system plan.			
	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
ABS7.a: Prepare a step-by-step production plan that identifies needed resources.	ABS7.a.1.e: Explain what a business flowchart is and how it works.	ABS7.a.2.m: Prepare a flowchart that shows production processes, including the resources needed for each step.	ABS7.a.3.h: Identify and assess alternative production systems and ways products can be produced.
			ABS7.a.4.h: Adapt production processes based on changing product characteristics.
ABS7.b: Develop a production and operational plan.	ABS7.b.1.e: Consider the use of a plan to conduct an activity.	ABS7.b.2.m: Identify the components of a production and operational plan.	ABS7.b.4.h: Evaluate the components of a production and operational plan and then revise an existing plan.
		ABS7.b.3.m: Identify common resources needed to operate a production facility.	ABS7.b.5.h: Develop and implement a product supply and distribution plan that meets the goals and objectives of an AFNR business.
			ABS7.b.6.h: Examine legal and industry requirements for a production facility.
			ABS7.b.7.h: Develop a production facility plan that includes building, equipment, personnel, utilities and logistics components.
ABS7.c: Use appropriate techniques to determine the most likely strengths, weaknesses and inconsistencies in a business plan and relate these to risk management strategies.		ABS7.c.1.m: Examine a business plan to identify inconsistencies and actions to correct inconsistencies.	ABS7.c.2.h: Describe approaches to use in revising a business plan for improved consistency and realism.
			ABS7.c.3.h: Revise business plans as needed to assure internal consistency.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
ABS7.d: Manage risk and uncertainty.	ABS7.d.1.e: Identify risks of having a business.	ABS7.d.2.m: Determine the meaning and importance of risk and uncertainty with AFNR enterprises.	ABS7.d.3.h: Describe alternative approaches to reducing risk, including the use of insurance for product liability, property, production or income loss and for personnel life and health.
			ABS7.d.4.h: Prepare a comprehensive risk management and contingency plan for an AFNR business.



Agriculture, Food and Natural Resources (AFNR)

Content Area: AS/Animal Systems

Standard: AS1: Students will examine the components, historical development, global implications and future trends of the animal systems industry.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
AS1.a: Evaluate the development and implications of animal origin, domestication and distribution.	AS1.a.1.e: Identify domesticated animals used in production agriculture and pets by sight and/or sounds.	AS1.a.3.m: Identify the origin, significance, distribution and domestication of animal species.	AS1.a.5.h: Evaluate and describe characteristics of animals that developed in response to the animals' environment and led to their domestication.
	AS1.a.2.e: Recognize products and the animals that the products are derived from.	AS1.a.4.m: Define major components of the animal industry.	AS1.a.6.h: Outline the development of the animal industry and the resulting products, services and careers.
			AS1.a.7.h: Predict adaptations of animals to production practices and environments.
			AS1.a.8.h: Predict trends and implications of future development of the animal systems industry.
Standard: AS2: Students will classify, evaluate, select and manage animals based on anatomical and physiological characteristics.			
AS2.a: Classify animals according to hierarchical taxonomy and agricultural use.	AS2.a.1.e: Identify major animal species by sight and/or sound.	AS2.a.2.m: Explain the importance of the binomial system of nomenclature.	AS2.a.4.h: Explain how animals are classified using Linnaeus's taxonomical classification system.
		AS2.a.3.m: Identify major animal species by common and scientific names.	AS2.a.5.h: Compare and contrast the hierarchical classification of the major agricultural animal species.
			AS2.a.6.h: Classify animals according to the taxonomical classification system.
			AS2.a.7.h: Appraise and evaluate the economic value of animals for various applications in the agriculture industry.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
AS2.b: Apply principles of comparative anatomy and physiology to uses within various animal systems.	AS2.b.1.e: Identify body parts of domestic food animals and pets.	AS2.b.2.m: Identify, diagram and describe characteristics of animal cells, tissues organs and body systems in growth and reproduction.	AS2.b.6.h: Compare and contrast animal cells, tissues organs and body systems and describe their functions.
		AS2.b.3.m: Describe the properties, locations, functions and types of animal tissues.	AS2.b.7.h: Detail the processes and application of meiosis and mitosis in animal growth, development, health and reproduction.
		AS2.b.4.m: Describe the properties, locations, functions and types of animal organs.	AS2.b.8.h: Explain the relationship, importance and uses of animal tissues to growth, performance and health in the agriculture industry.
		AS2.b.5.m: Describe the functions of the animal body systems and system components.	AS2.b.9.h: Compare and contrast organ types, functions and body systems adaptations among and between animal species.
			AS2.b.10.h: Explain how the components and systems of animal anatomy and physiology relate to the production and use of animals.
			AS2.b.11.h: Describe the molecular makeup of animal cells and organs and their importance in animal growth, health, production, reproduction and management.
			AS2.b.12.h: Explain the impact of animal body systems on health, growth and reproduction.
AS2.c: Select animals for specific purposes and maximum performance based on anatomy and physiology.	AS2.c.1.e: Identify a sick animal by sight and/or sound.	AS2.c.2.m: Identify ways an animal's health can be affected by anatomical and physiological disorders.	AS2.c.4.h: Compare and contrast desirable anatomical and physiological characteristics of animals within and between species.
		AS2.c.3.m: Create a program to develop an animal to its highest potential performance.	AS2.c.5.h: Assess an animal to determine if it has reached its optimal performance level based on anatomical and physiological characteristics.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
			AS2.c.6.h: Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction.
			AS2.c.7.h: Develop efficient procedures to produce consistently high quality animals, well suited for their intended purposes.
Standard: AS3: Students will provide for the proper health care of animals.			
AS3.a: Prescribe and implement a prevention treatment program for animal diseases, parasites and other disorders.	AS3.a.1.e: Explain basic care of animals and how it affects their health.	AS3.a.4.m: Explain methods of determining animal health and disorders.	AS3.a.8.h: Perform simple health-check evaluations on animals.
	AS3.a.2.e: Identify agriculture careers in animal health (small and large).	AS3.a.5.m: Identify common diseases, parasites and physiological disorders that affect animals.	AS3.a.9.h: Perform diagnostic tests to detect health problems in animals.
	AS3.a.3.e: Identify photos of healthy cats, dogs, other pets and equipment used to keep them healthy.	AS3.a.6.m: Explain characteristics of causative agents and vectors of diseases and disorders in animals.	AS3.a.10.h: Diagnose illnesses and disorders of animals based on symptoms and problems caused by diseases, parasites and physiological disorders.
		AS3.a.7.m: Explain the clinical significance of common considerations in veterinary treatments, such as aseptic techniques.	AS3.a.11.h: Treat common diseases, parasites and physiological disorders of animals.
			AS3.a.12.h: Evaluate preventive measures for controlling and limiting the spread of diseases, parasites and disorders among animals.
			AS3.a.13.h: Design and implement a health maintenance and disease and disorder prevention plan for animals in their natural and/or confined environments.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			AS3.a.14.h: Prepare animals, facilities and equipment for surgical and nonsurgical veterinary treatments and procedures.
			AS3.a.15.h: Perform surgical and nonsurgical veterinary treatments and procedures in animal health care.
AS3.b: Identify bio-security threats and provide for the bio-security of agricultural animals and production facilities.	AS3.b.1.e: Define “bio-security” as it relates to the animal industry and its importance to humans.	AS3.b.2.m: Identify and describe zoonotic diseases.	AS3.b.4.h: Explain the health risk of zoonotic diseases to humans and their historical significance and future implications.
		AS3.b.3.m: Explain the importance of biosecurity to the animal industry.	AS3.b.5.h: Implement zoonotic disease prevention methods and procedures for the safe handling and treatment of animals.
			AS3.b.6.h: Discuss procedures at the local, state and national levels to ensure biosecurity of the animal industry.
			AS3.b.7.h: Implement a biosecurity plan for an animal production operation.
Standard: AS4: Students will apply principles of animal nutrition to ensure the proper growth, development, reproduction and economic production of animals.			
AS4.a: Formulate feed rations to provide for the nutritional needs of animals.	AS4.a.1.e: Recognize that food and fiber can originate from animals.	AS4.a.2.m: Compare and contrast common types of feedstuffs and the roles they play in the diets of animals.	AS4.a.4.h: Determine the relative nutritional value of feedstuffs by evaluating their general quality and condition.
		AS4.a.3.m: Explain the importance of a balanced ration for animals.	AS4.a.5.h: Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements and performance.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			AS4.a.6.h: Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs.
			AS4.a.7.h: Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production.
AS4.a: Prescribe and administer animal feed additives and growth promotants in animal production.	AS4.a.1.e: Identify foods fed to domestic food animals and pets.	AS4.a.2.m: Explain the purpose and benefits of feed additives and growth promotants in animal production.	AS4.a.3.h: Discuss how feed additives and growth promotants are administered and the precautions that should be taken.
			AS4.a: Prescribe and administer feed additives and growth promotants.
Standard: AS5: Students will evaluate and select animals based on scientific principles of animal production.			
AS5.a: Evaluate the male and females reproductive systems in selecting animals.	AS5.a.1.e: Identify differences between babies and adults species of pets and production animals.	AS5.a.2.m: Explain the male and female reproductive organs of the major animal species.	AS5.a.3.h: Describe the functions of major organs in the male and female reproductive systems.
			AS5.a.4.h: Select breeding animals based on characteristics of the reproductive organs.
AS5.b: Evaluate animals for breeding readiness and soundness.		AS5.b.1.m: Explain how age, size, life cycle, maturity level and health statuses affect the reproductive efficiency of male and female animals.	AS5.b.2.h: Summarize factors that lead to reproductive maturity.
			AS5.b.3.h: Evaluate and select animals for reproductive readiness.
AS5.c: Describe how selection and geographical regions impact the economic decisions of our livestock business.	AS5.c.1.e: Identify livestock raised in different geographic regions.	AS5.c.2.m: Discuss the importance of efficient and economic reproduction in animals.	AS5.c.3.h: Evaluate reproductive problems that occur in animals.
			AS5.c.4.h: Treat or cull animals with reproductive problems.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
AS5.d: Apply scientific principles in the selection and breeding of animals.	AS5.d.1.e: Explain the selection of animals for “specific traits”.	AS5.d.2.m: Explain genetic inheritance in agricultural animals.	AS5.d.3.h: Explain the advantages of using genetically superior animals in the production of animals and animal products.
			AS5.d.4.h: Select a breeding system based on the principles of genetics and reproductive/economic efficiencies.
AS5.f: Compare and contrast scientific methods associated with animal reproduction.	AS5.f.1.e: Identify ways that animal reproduction is science based.	AS5.f.2.m: Define natural and artificial breeding methods.	AS5.f.6.h: Explain the processes of natural and artificial breeding methods.
		AS5.f.3.m: Explain the use of quantitative breeding values (e.g., EPDs) in the selection of genetically superior breeding stock.	AS5.f.7.h: Compare and contrast quantitative breeding value differences between genetically superior animals and animals of average genetic value.
		AS5.f.4.m: Explain the advantages of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.	AS5.f.8.h: Select animals based on quantitative breeding values for specific characteristics.
		AS5.f.5.m: Discuss the uses and advantages and disadvantages of natural breeding and artificial insemination.	AS5.f.9.h: Explain the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer.
			AS5.f.10.h: Perform procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices.
			AS5.f.11.h: Explain and demonstrate the materials, methods and processes of artificial insemination.



Standard: AS6: Students will prepare and implement animal handling procedures for the safety of animals, producers and consumers of animal products.			
	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
AS6.a: Demonstrate safe animal handling and management techniques.	AS6.a.1.e: Demonstrate safe practices around animals.	AS6.a.2.m: Discuss the dangers involved in working with animals.	AS6.a.4.h: Outline safety procedures for working with animals by species.
		AS6.a.3.m: Explain the implications of animal welfare and animal rights for animal agriculture.	AS6.a.5.h: Design programs that assure the welfare of animals and prevent abuse or mistreatment.
			AS6.a.6.h: Interpret animal behaviors and execute protocols for safe handling of animals.
			AS6.a.7.h: Implement quality-assurance programs and procedures for animal production.
AS6.b: Implement procedures to ensure that animal products are safe.	AS6.b.1.e: Identify safety hazards effecting animals.	AS6.b.2.m: Identify animal production practices that could pose health risks or are considered to pose risks by some.	AS6.b.4.h: Discuss consumer concerns with animal production practices relative to human health.
		AS6.b.3.m: Describe how animal identification systems can track an animal's location, nutrition requirements, production progress and changes in health.	AS6.b.5.h: Explain why animal trace-back capability, using individual animal and farm identification systems, is important to producers and consumers.
			AS6.b.6.h: Implement a program to assure the safety of animal products.
			AS6.b.7.h: Implement an animal and/or premises identification program.



Standard: AS7: Students will select animal facilities and equipment that provide for the safe and efficient production, housing and handling of animals.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
AS7.a: Design animal housing, equipment and handling facilities for the major systems of animal production.	AS7.a.1.e: Identify animal facilities and equipment used in animal husbandry.	AS7.a.2.m: Identify facilities needed to house and produce each animal species safely and efficiently.	AS7.a.4.h: Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe and efficient use of the facility.
		AS7.a.3.m: Identify equipment and handling facilities used in modern animal production.	AS7.a.5.h: Design an animal facility, focusing on animal requirements, efficiency, safety and ease of handling.
			AS7.a.6.h: Explain how modern equipment and handling facilities enhance the safe and economic production of animals.
			AS7.a.7.h: Select equipment and implement animal handling procedures and improvements to enhance production efficiency.
AS7.b: Comply with government regulations and safety standards for facilities used in animal production.		AS7.b.1.m: List the general standards (e.g., environmental, zoning, construction) that must be met in facilities for animal production.	AS7.b.2.h: Evaluate an animal facility to determine if standards have been met.
			AS7.b.3.h: Design a facility that meets standards for the legal, safe, ethical and efficient production of animals.



Standard: AS8: Students will analyze environmental factors associated with animal production.			
	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
AS8.a: Reduce the effects of animal production on the environment.	AS8.a.1.e: Identify how the food and fiber system uses natural resources.	AS8.a.2.m: Evaluate the effects of animal agriculture on the environment.	AS8.a.3.h: Outline methods of reducing the effects of animal agriculture on the environment.
			AS8.a.4.h: Implement measures to reduce the impact of animal agriculture on the environment.
AS8.b: Evaluate the effects of environmental conditions on animals.		AS8.b.1.m: Identify optimal environmental conditions for animals.	AS8.b.2.h: Describe the effects of environmental conditions on animal populations and performance.
			AS8.b.3.h: Establish and maintain favorable environmental conditions for animal growth and performance.



Agriculture, Food and Natural Resources (AFNR)

Content Area: BT/Biotechnology Systems

Standard: BT1: Students will recognize the historical, social, cultural and potential applications of biotechnology.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
BT1.a: Distinguish major innovators, historical developments and potential applications of biotechnology in agriculture.	BT1.a.1.e: Define biotechnology; identify examples of agricultural products and processes created through biotechnology.	BT1.a.2.m: Define biotechnology and explore the historical impact it has had on agriculture.	BT1.a.5.h: Create a timeline and use it to explain the developmental progression of biotechnology.
		BT1.a.3.m: Investigate current applications of biotechnology in agriculture.	BT1.a.6.h: Research and report on current work being done in agricultural biotechnology.
		BT1.a.4.m: Examine potential future applications of biotechnology in agriculture and compare them with alternative approaches to improving agriculture.	BT1.a.7.h: Research and report on emerging problems and issues associated with agricultural biotechnology.
BT1.b: Analyze the ethical, legal, social and cultural issues relating to biotechnology.	BT1.b.1.e: List reasons why biotechnology should be regulated by the government.	BT1.b.3.m: Describe the role of agencies that regulate biotechnology.	BT1.b.7.h: Interpret the major regulatory issues related to biotechnology.
	BT1.b.2.e: Identify reasons why people would either support or not support breakthroughs in biotechnology.	BT1.b.4.m: Explore ethical, legal and social biotechnology issues.	BT1.b.8.h: Evaluate the benefits and risks associated with biotechnology.
		BT1.b.5.m: Explore the emergence, evolution and implications of bioethics.	BT1.b.9.h: Examine an ethical dilemma associated with biotechnology by identifying its components.
		BT1.b.6.m: Explain the meaning of intellectual properties as related to biotechnology.	BT1.b.10.h: Examine intellectual properties associated with biotechnology by defining their components.



Standard: BT2: Students will demonstrate laboratory skills as applied to biotechnology.			
	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
BT2.a: Demonstrate safe and proper laboratory procedures and record keeping using biological materials.	BT2.a.1.e: Recall what you did to complete a scientific experiment.	BT2.a.7.m: Maintain a biotechnology laboratory notebook.	BT2.a.13.h: Analyze strengths of the research based on data and procedures and propose future investigation.
	BT2.a.2.e: Demonstrate how to measure a substance in a scientific experiment.	BT2.a.8.m: Operate basic laboratory equipment and measurement devices.	BT2.a.14.h: Operate advanced laboratory equipment and measurement devices.
	BT2.a.3.e: Recognize that microbes can grow on any surface.	BT2.a.9.m: Demonstrate basic aseptic techniques in the biotechnology laboratory.	BT2.a.15.h: Demonstrate advanced aseptic techniques in the biotechnology laboratory.
	BT2.a.4.e: Demonstrate how to properly follow instructions in an experiment.	BT2.a.10.m: Perform procedures with biological materials according to directions.	BT2.a.16.h: Select an appropriate standard operating procedure for working with biological materials.
	BT2.a.5.e: Recognize that some laboratory chemicals can be very dangerous.	BT2.a.11.m: Identify and describe hazards associated with biological and chemical materials.	BT2.a.17.h: Inventory biological and chemical materials and maintain accurate records of supplies and expiration dates.
	BT2.a.6.e: Explain how to prevent accidents when doing scientific experiments.	BT2.a.12.m: Maintain a safe environment by properly identifying and disposing of laboratory waste.	BT2.a.18.h: Diagram the flow of waste after it leaves the laboratory.
BT2.b: Perform microbiology, molecular biology, enzymology and immunology procedures.	BT2.b.1.e: Recognize that microbes are living organisms like animals and plants.	BT2.b.6.m: Differentiate the types of organisms and demonstrate how to handle them safely.	BT2.b.12.h: Isolate, maintain, quantify and store cell cultures.
	BT2.b.2.e: Describe what all living organisms (including microbes) need to survive.	BT2.b.7.m: Explain the structures of DNA and RNA and how genotype influences phenotype.	BT2.b.13.h: Explain the molecular basis for heredity and the tools and techniques used in DNA and RNA manipulations.
	BT2.b.3.e: State why DNA and proteins are needed by living organisms.	BT2.b.8.m: Extract and purify DNA and RNA.	BT2.b.14.h: Perform electrophoresis techniques and interpret electrophoresis fragmentation patterns.
	BT2.b.4.e: Recognize that biotechnology can be used to improve human health.	BT2.b.9.m: Perform simple enzyme activity assays to detect proteins.	BT2.b.15.h: Perform protein separation techniques and interpret the results.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	BT2.b.5.e: Distinguish between examples of helpful and harmful microbes.	BT2.b.10.m: Describe how antibodies are formed and how they can be used in biotechnology applications.	BT2.b.16.h: Conduct an Enzyme-Linked Immunosorbent Assay (ELISA).
		BT2.b.11.m: Explain reasons for detecting microbes and identify sources of microbes.	BT2.b.17.h: Research and describe the use of biotechnology to detect microbes.
BT2.c: Evaluate the application of genetic engineering to improve products of AFNR systems.	BT2.c.1.e: Recognize that scientists can change the DNA of living organisms.	BT2.c.3.m: Explain biological, social, agronomic and economic reasons for genetic modification of eukaryotes.	BT2.c.7.h: Diagram the processes and describe the techniques used to produce transgenic eukaryotes.
	BT2.c.2.e: Identify products, medicines and services created by changing the DNA of organisms.	BT2.c.4.m: Describe enzymes, the changes they cause in foods and the physical and chemical parameters that affect enzymatic reactions.	BT2.c.8.h: Describe processes by which enzymes are produced through biotechnology.
		BT2.c.5.m: Compare and contrast the use of natural organisms and genetically engineered organisms in the treatment of wastes.	BT2.c.9.h: Diagram the process by which organisms are genetically engineered for waste treatment.
		BT2.c.6.m: Describe the benefits and risks associated with the use of biotechnology to increase productivity and improve quality of aquatic species.	BT2.c.10.h: Investigate and report on genetic engineering procedures used in the production of aquatic species.
BT2.d: Perform biotechnology processes used in AFNR systems.	BT2.d.1.e: Define hormones.	BT2.d.7.m: Explain the functions of hormones in animals.	BT2.d.13.h: Describe the processes used to produce animal hormones from transgenic organisms.
	BT2.d.2.e: Define fermentation.	BT2.d.8.m: Identify foods produced through fermentation.	BT2.d.14.h: Compare and contrast bioengineering and conventional pathways used in food processing.
	BT2.d.3.e: List a product created by fermentation.	BT2.d.9.m: Explain the process of fermentation.	BT2.d.15.h: Describe the process used in producing alcohol from biomass.
	BT2.d.4.e: Recognize that we can use plants to make fuel.	BT2.d.10.m: Explain the process of transesterification.	BT2.d.16.h: Diagram the process used in producing biodiesel from biomass.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	BT2.d.5.e: Distinguish between renewable and nonrenewable resources.	BT2.d.11.m: Explain biomass and sources of biomass.	BT2.d.17.h: Assess the characteristics of biomass that make it useful for biofuels production.
	BT2.d.6.e: Recognize that we can obtain energy from waste.	BT2.d.12.m: Explain the process of methanogenesis.	BT2.d.18.h: Illustrate the process used in producing methane from biomass.
BT2.f: Use biotechnology to monitor and evaluate procedures performed in AFNR systems.	BT2.f.1.e: Summarize how a plant reproduces.	BT2.f.7.m: Describe the selective plant breeding process.	BT2.f.14.h: Select biotechnology tools used to monitor and direct plant breeding.
	BT2.f.2.e: Identify how animals are kept healthy.	BT2.f.8.m: Describe biotechnology processes applicable to animal health.	BT2.f.15.h: Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health.
	BT2.f.3.e: Recognize that biotechnology can be used to clean up pollution and waste.	BT2.f.9.m: Give examples of instances in which bioremediation can be applied to clean up environmental contaminants.	BT2.f.16.h: Describe the use of biotechnology in bioremediation.
	BT2.f.4.e: Explain the importance of biodiversity.	BT2.f.10.m: Explain the use of microorganisms in biological waste management and industrial chemical waste treatment.	BT2.f.17.h: Describe the processes involved in bio treatment of biological wastes and industrial chemical wastes.
	BT2.f.5.e: Give examples of human impact on various ecosystems and wild populations.	BT2.f.11.m: Explain the global importance of biodiversity.	BT2.f.18.h: Select biotechnology tools used to measure biodiversity.
	BT2.f.6.e: Describe how they use natural resources in their everyday lives.	BT2.f.12.m: Explain the consequences of agricultural practices on wild populations.	BT2.f.19.h: Explain how biotechnology tools can be used to monitor the effects of agricultural practices on wild populations.
		BT2.f.13.m: Define industrial biotechnology and describe the benefits and risks associated with its use in the manufacturing of fabrics, plastics and other products.	BT2.f.20.h: Describe the processes used in the production of molecules for use in industrial applications.



Agriculture, Food and Natural Resources (AFNR)

Content Area: FPP/Food Production and Processing

Standard: FPP1: Students will examine components of the food industry and historical development of food products and processing.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
FPP1.a: Evaluate the significance and implications of changes and trends in the food products and processing industry.	FPP1.a.1.e: Identify where food is produced and why it is processed.	FPP1.a.3.m: Discuss the history and describe and explain the components (e.g., processing, distribution, byproducts) of the food products and processing industry.	FPP1.a.5.h: Evaluate changes and trends in the food products and processing industry and be able to predict trends and implications in the food products and processing industry.
	FPP1.a.2.e: Identify and explain environmental and safety concerns about the food supply.	FPP1.a.4.m: Identify the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, irradiation).	FPP1.a.6.h: Determine appropriate industry response to consumer concerns to assure a safe and wholesome food supply.
FPP1.b: Work effectively with industry organizations, groups and regulatory agencies affecting the food products and processing industry.	FPP1.b.1.e: Explain food production is monitored and inspected.	FPP1.b.3.m: Evaluate the changes in the food products and processing industry brought about by industry organizations or regulatory agencies.	FPP1.b.5.h: Demonstrate how to interact effectively with organizations, groups and regulatory agencies that affect the food products and processing industry.
	FPP1.b.2.e: Explain the importance and usage of guidelines in food products and processing.	FPP1.b.4.m: Discuss the application of industry standards in the food products and processing industry.	FPP1.b.6.h: Prepare a plan for implementation of industry standards in food products and processing programs.
Standard: FPP2: Students will apply safety principles; recommend equipment and facility management techniques to the food products and processing industry.			
FPP2.a: Manage operational procedures and create equipment and facility maintenance plans.	FPP2.a.1.e: Demonstrate how to properly clean a food preparation work space.	FPP2.a.3.m: Explain the importance of developing and maintaining Sanitation Standard Operating Procedures (SSOP).	FPP2.a.6.h: Develop and evaluate SSOP for a food products and processing company.
	FPP2.a.2.e: Discuss the importance of food processors hygiene expectation (i.e., hair nets, gloves, hand washing, equipment sanitation, etc.).	FPP2.a.4.m: Explain and evaluate the purpose of Good Manufacturing Practices (GMP).	FPP2.a.7.h: Develop a plan to implement GMP for a food products and processing company.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
		FPP2.a.5.m: Develop a basic equipment and facility maintenance program.	FPP2.a.8.h: Perform basic equipment and facility maintenance in a food products and processing operation.
FPP2.b: Implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters.	FPP2.b.1.e: Describe the dangers associated with food borne illness.	FPP2.b.3.m: Outline procedures to eliminate possible contamination hazards associated with food products and processing.	FPP2.b.5.h: Analyze the effectiveness of a food products and processing company's Critical Control Point (CCP) procedures.
	FPP2.b.2.e: Determine optimum refrigerator and freezer temperatures.	FPP2.b.4.m: Identify and Explain the implementation of the seven principles of HACCP.	FPP2.b.6.h: Design an HACCP program for a food products and processing facility.
FPP2.c: Apply safety and sanitation procedures in the handling, processing and storing of food products.	FPP2.c.1.e: Explain techniques and procedures for the safe handling of food products.	FPP2.c.5.m: Evaluate food product handling procedures.	FPP2.c.9.h: Demonstrate approved food product handling techniques.
	FPP2.c.2.e: Explore the sensory aspects of various foods (taste, touch, smell, etc.).	FPP2.c.6.m: Describe and perform quality-assurance tests on food products.	FPP2.c.10.h: Interpret quality-assurance test results and apply corrective procedures.
	FPP2.c.3.e: Describe the effects food-borne pathogens have on food products and humans.	FPP2.c.7.m: Explain the importance of microbiological tests in food product preparation, listing common spoilage and pathogenic microorganisms.	FPP2.c.11.h: Conduct and interpret microbiological tests for food-borne pathogens and implement corrective procedures.
	FPP2.c.4.e: Explain the importance of record keeping in a food product and processing system.	FPP2.c.8.m: Discuss documentation procedures in a food products and processing system.	FPP2.c.12.h: Demonstrate proper record keeping in a food products and processing system.
FPP2.d: Demonstrate worker safety procedures with food product and processing equipment and facilities.	FPP2.d.1.e: Explain safety standards in the food industry.	FPP2.d.2.m: Outline guidelines for personnel safety in the food products and processing industry.	FPP2.d.3.h: Create a check list of industry-used safety procedures and evaluate school lab safety procedures.



Standard: FPP3: Students will apply principles of science to the food products and processing industry			
	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
FPP3.a: Apply principles of science to food processing to provide a safe, wholesome and nutritious food supply.	FPP3.a.1.e: Create a timeline showing how food processing evolved over the past century.	FPP3.a.8.m: Design a research project in food science using the scientific method.	FPP3.a.15.h: Conduct research in food science and interpret results to improve food products.
	FPP3.a.2.e: Observe changes in food during processing.	FPP3.a.9.m: Determine the chemical and physical properties of food products.	FPP3.a.16.h: Explain how the chemical and physical properties of foods influence nutritional value and eating quality.
	FPP3.a.3.e: Illustrate which food products provide the essential nutrients in the human diet.	FPP3.a.10.m: Design a daily food guide for a healthful diet.	FPP3.a.17.h: Conduct a test and then compare and contrast the nutritive value of food and food groups.
	FPP3.a.4.e: Discuss common food components (e.g., proteins, carbohydrates, fats, vitamins, minerals).	FPP3.a.11.m: Compare and contrast food constituents and their relative value to product taste, appearance, etc.	FPP3.a.18.h: Analyze food products to identify food constituents.
	FPP3.a.5.e: Examine food labels to identify common food additives (e.g., preservatives, colors, flavors).	FPP3.a.12.m: Describe the purpose of common food additives.	FPP3.a.19.h: Formulate and explain incorporation of additives into food products.
	FPP3.a.6.e: Explain the importance of food labeling to the consumer.	FPP3.a.13.m: Explain the required components of a food label.	FPP3.a.20.h: Prepare and label foods according to the established standards of regulatory agencies.
	FPP3.a.7.e: Describe factors in planning and developing a new food product (i.e., regulation, creativity and economics).	FPP3.a.14.m: Plan and create a new food product.	FPP3.a.21.h: Perform sensory-testing and marketing functions to characterize and determine consumer preference and market potential.



Standard: FPP4: Students will select and process food products for storage, distribution and consumption			
	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
FPP4.a: Use harvesting, selection and inspection techniques to obtain quality food products for processing.	FPP4.a.1.e: Identify techniques used to sort and classify of food products. (i.e., size, color, maturity, etc.).	FPP4.a.5.m: Discuss factors that affect quality and yield grades of food products.	FPP4.a.9.h: Assign quality and yield grades to food products according to industry standards.
	FPP4.a.2.e: Compare and contrast fresh, frozen, canned or other forms of processed food products.	FPP4.a.6.m: Select raw food products perform quality-control inspections of raw food products for processing.	FPP4.a.10.h: Develop and demonstrate procedures to maintain original food quality and yield.
	FPP4.a.3.e: Identify proper care of production animals and describe accepted animal treatment and harvesting techniques.	FPP4.a.7.m: Compare and contrast industry approved production animal care and treatment.	FPP4.a.11.h: Research and present regulatory-agency-approved or industry-approved techniques for harvesting animals.
	FPP4.a.4.e: Describe the purpose and importance of meat inspection.	FPP4.a.8.m: Explain characteristics of animals in relation to food production.	FPP4.a.12.h: Investigate the role and responsibilities of a USDA meat inspector.
FPP4.b: Evaluate, grade and classify processed food products.	FPP4.b.1.e: Identify and describe foods derived from meat, egg, poultry, fish and dairy products.	FPP4.b.4.m: Discuss desirable qualities of processed meat, egg, poultry, fish and dairy products.	FPP4.b.7.h: Evaluate, grade and classify processed meat, egg, poultry, fish and dairy products.
	FPP4.b.2.e: Identify and describe products derived from fruits and vegetables.	FPP4.b.5.m: Discuss desirable qualities of fruit and vegetable products.	FPP4.b.8.h: Evaluate, grade and classify processed products from fruits and vegetables.
	FPP4.b.3.e: Identify and describe products derived from grains, legumes and oilseeds.	FPP4.b.6.m: Discuss desirable qualities of grain, legume and oilseed products.	FPP4.b.9.h: Evaluate, grade and classify finished products derived from grains, legumes and oilseeds.
FPP4.c: Process, preserve, package and present food and food products for sale and distribution.	FPP4.c.1.e: Identify and explain common weights and measures used in the food products and processing industry.	FPP4.c.7.m: Weigh and measure food products and perform conversions between units of measure.	FPP4.c.13.h: Create a food package while taking into account weight and product requirements.
	FPP4.c.2.e: Explain methods and materials for processing foods for sale as fresh-food products.	FPP4.c.8.m: Demonstrate how fresh foods are prepared for distribution.	FPP4.c.14.h: Evaluate foods prepared for the fresh-food market based on factors such as shelf life, shrinkage, appearance and weight.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	FPP4.c.3.e: Identify methods of food preservation and give examples of foods preserved by each method.	FPP4.c.9.m: Explain the processes of food preservation methods.	FPP4.c.15.h: Preserve foods using various methods and techniques.
	FPP4.c.4.e: Explain techniques for preparing ready-to-eat food products. <i>(Various categories of ready to eat food, such as snack food, convince meals, microwaveable meal).</i>	FPP4.c.10.m: Research the steps involved in the creation of ready-to-eat food products.	FPP4.c.16.h: Create and evaluate ready-to-eat food products.
	FPP4.c.5.e: Explain materials and methods of food packaging and presentation.	FPP4.c.11.m: Explain the science behind packaging materials in storing processed foods and raw food products.	FPP4.c.17.h: Applying science principles analyze the foods stored in various packaging, to determine which materials retain desirable food qualities.
	FPP4.c.6.e: Identify and explain methods used to store food.	FPP4.c.12.m: Determine appropriate methods and conditions for storing raw and processed food products based on their characteristics.	FPP4.c.18.h: Compare and contrast foods stored under varying conditions for quality, shelf life and intended use.



Agriculture, Food and Natural Resources (AFNR)

Content Area: ESS/Environmental Service Systems

Standard: ESS1: Students will use analytical procedures to plan and evaluate environmental service systems while assessing the impact of policies and regulations on environmental service systems.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
ESS1.a: Analyze and interpret samples.	ESS1.a.1.e: Identify items to sample and basic tools to use during sampling and testing procedures.	ESS1.a.3.m: Determine the appropriate sampling techniques needed, explain the importance of unbiased sampling and collection of samples.	ESS1.a.5.h: Determine appropriate sampling techniques, analyze and interpret samples and generate statistical analysis report(s) and prepare valid chemical laboratory samples according to instructions.
	ESS1.a.2.e: Actively participate in basic sampling and measuring procedures with one activity connected to the indoors and one to the outdoors.	ESS1.a.4.m: Identify basic laboratory equipment and environmental monitoring instruments and explain their uses.	ESS1.a.6.h: Demonstrate proper use, maintenance and calibration of lab and monitoring equipment according to standard operating procedures.
ESS1.b: Interpret laws affecting environmental service systems.	ESS1.b.1.e: Be able to identify a law connected to the environment.	ESS1.b.2.m: Identify laws associated with Wisconsin environmental service systems.	ESS1.b.3.h: Identify purposes of Wisconsin laws associated with environmental service systems.
Standard: ESS2: Students will apply scientific principles to environmental service systems.			
ESS2.a: Apply meteorology principles to environmental service systems.	ESS2.a.1.e: Explain the rain cycle in a format that correlates to grade level.	ESS2.a.5.m: Identify components and structural layers of the earth's atmosphere.	ESS2.a.9.h: Differentiate the types of weather systems and patterns along with basic monitoring of meteorological conditions with accurately documented data.
	ESS2.a.2.e: Describe weather conditions and identify factors that influence quality of water and air.	ESS2.a.6.m: Explain how meteorological conditions influence air quality.	ESS2.a.10.h: Illustrate and monitor the formation of acid precipitation and explain its impact on the environment.
	ESS2.a.3.e: Decide on indicators that may signal a change in weather and the general climate of an area.	ESS2.a.7.m: Explain and recognize signs of climate change within Wisconsin.	ESS2.a.11.h: Report on consequences of climate change and its impact on Wisconsin and globally.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	ESS2.a.4.e: Compare and contrast how the earth's energy changes.	ESS2.a.8.m: Explain the Earth's balance of energy.	ESS2.a.12.h: Explain the basics and contributing factors of the greenhouse effect and how it alters the earth's balance of energy including greenhouse gasses.
ESS2.b: Apply soil science and microbiology principles to environmental service systems.	ESS2.b.1.e: Describe soil and compare and contrast different soil types.	ESS2.b.7.m: Explain the process of soil formation through weathering.	ESS2.b.13.h: Differentiate rocks relating chemical composition of mineral matter in soils to the parent material with a connection to environmental service systems.
	ESS2.b.2.e: Identify the basic make-up of soil biodiversity.	ESS2.b.8.m: Describe the biodiversity found in soil and the contribution of biodiversity of the physical and chemical characteristics of soil.	ESS2.b.14.h: Relate and evaluate soil microorganism activities to environmental service systems.
	ESS2.b.3.e: Participate in a demonstration of water percolating through different soil types.	ESS2.b.9.m: Explain how the physical qualities of the soil influence the infiltration and percolation of water.	ESS2.b.15.h: Identify physical soil qualities, through testing, that determine its use for environmental service systems.
	ESS2.b.4.e: Compare and contrast land and how it is used.	ESS2.b.10.m: Identify land uses, capability factors and land capability classes.	ESS2.b.16.h: Determine land capability classes for land parcels and design a land-use management plan for a given area.
	ESS2.b.5.e: Identify a simple organism.	ESS2.b.11.m: Identify the basic structures of microorganisms and the major groups of microorganisms.	ESS2.b.17.h: Describe microbial growth in the environment and analyze the influence of environmental factors on microbial growth with an examination of microorganisms using safe practices.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	ESS2.b.6.e: List how pollution affects organisms.	ESS2.b.12.m: Define the purposes of bioassay tests.	ESS2.b.18.h: Outline procedures for a bioassay test followed by a basic bioassay test related to environmental service systems and interpret results.
ESS2.c: Apply hydrology principles to environmental service systems.	ESS2.c.1.e: List ways water is used in daily life tracking its source.	ESS2.c.7.m: Describe the world's water supplies and discuss water uses.	ESS2.c.13.h: Describe and research water characteristics that influence the biosphere for life and be able to identify current environmental water issues.
	ESS2.c.2.e: Define ground and surface water and reinforce the difference by comparing and contrasting.	ESS2.c.8.m: Demonstrate knowledge of hydrogeology by differentiating between ground and surface water.	ESS2.c.14.h: Describe ground and surface water interactions with emphasis on groundwater-flow equations and Darcy's Law to explain how geology and meteorology affect groundwater and its flow.
	ESS2.c.3.e: Explain the source of drinking water.	ESS2.c.9.m: Define groundwater potential.	ESS2.c.15.h: Identify differences in groundwater potential delineate groundwater potential zones.
	ESS2.c.4.e: Match environmental hazards with the natural resource that could be potentially damaged.	ESS2.c.10.m: Identify environmental hazards associated with groundwater supplies.	ESS2.c.16.h: Describe precautions taken t to prevent/reduce groundwater contamination while testing and documenting results of related tests.
	ESS2.c.5.e: Explain how water moves through an open channel.	ESS2.c.11.m: Discuss factors that influence the velocity of water through an open channel.	ESS2.c.17.h: Explain, measure and document velocity of water as it influences channel morphology and stream processes.
	ESS2.c.6.e: Describe what happens when a fluid moves through a hose or group of pipes.	ESS2.c.12.m: Identify the operational components of a pumping or fluid movement system.	ESS2.c.18.h: Discuss design principles related to hydraulic systems and high-flow technologies related to fluid movement and created a model.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
ESS2.d: Apply best management techniques associated with the properties, classifications and functions of wetlands.	ESS2.d.1.e: Define wetlands and list reasons and why they are important.	ESS2.d.5.m: Describe the functions of wetlands and differentiate the types of wetlands.	ESS2.d.9.h: Explain the criteria for classifying wetlands while applying the Hydrogeomorphic (HGM) Approach and National Wetland Inventories (NWI) to determine the classification for local wetlands.
	ESS2.d.2.e: Compare and contrast what organisms might live in a wetland verses some other type of habitat.	ESS2.d.6.m: Identify the major types of living organisms that inhabit wetlands.	ESS2.d.10.h: Conduct a survey and identify of the predominant species.
	ESS2.d.3.e: List ways to improve a wetland.	ESS2.d.7.m: Explain the importance of wetland management, creation, enhancement and restoration programs.	ESS2.d.11.h: Identify techniques used to evaluate a wetland, record conditions of a local wetland followed by application of proper techniques used to manage, create and restore a wetland.
	ESS2.d.4.e: Explain how chemistry helps the world.	ESS2.d.8.m: Explain basic chemistry principals.	ESS2.d.12.h: Distinguish characteristics of inorganic and organic compounds and identify standard operating procedures for use of chemicals in environmental service systems.
Standard: ESS3: Students will operate environmental service systems to manage a facility environment.			
ESS3.a: Use pollution control measures to maintain a safe facility environment.	ESS3.a.1.e: Identify different types of pollution.	ESS3.a.3.m: Identify types of pollution and distinguish between point and nonpoint source pollution.	ESS3.a.5.h: Provide examples of industrial and nonindustrial pollution impacts on the environment and discuss a local pollution survey.
	ESS3.a.2.e: List types of pollution that can be found in the country vs. city and ways it can be prevented.	ESS3.a.4.m: Describe ways in which pollution can be managed and prevented.	ESS3.a.6.h: Conduct tests determining the presence and extent of pollution and create a plan to develop a pollution, remediation, management or prevention program.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
ESS3.b: Manage safe disposal of all categories of solid waste.	ESS3.b.1.e: Define solid waste.	ESS3.b.7.m: Describe different types of solid wastes.	ESS3.b.13.h: Evaluate and analyze environmental hazards created by different types of solid waste, solid waste accumulation and solid waste disposal.
	ESS3.b.2.e: Identify solid waste and its sources.	ESS3.b.8.m: Discuss practical management options for treating solid wastes.	ESS3.b.14.h: Collect, identify and treat solid waste materials and recognize byproducts of solid waste treatments.
	ESS3.b.3.e: Identify a sanitary landfill.	ESS3.b.9.m: Explain sanitary landfill.	ESS3.b.15.h: Explain and evaluate basic sanitary landfill operating procedures and designs.
	ESS3.b.4.e: Describe how items decay in nature.	ESS3.b.10.m: Define composts and composting.	ESS3.b.16.h: Explain and evaluate scientific operating principles of composting and compost facilities.
	ESS3.b.5.e: Compare and contrast solid waste handling.	ESS3.b.11.m: Explain the basic concepts associated with solid waste incineration.	ESS3.b.17.h: Describe and evaluate methods of incineration and its environmental impact including Wisconsin's waste-to-energy plants.
	ESS3.b.6.e: Generate a list of items that are recycled.	ESS3.b.12.m: Explain the importance of recycling.	ESS3.b.18.h: Describe recycling methods and conduct a local survey analyzing for future recycling options.
ESS3.c: Apply the principles of public drinking water treatment operations to ensure safe water at a facility.	ESS3.c.1.e: Explain what safe drinking water is.	ESS3.c.3.m: Identify chemical and physical properties of drinking water.	ESS3.c.5.h: Illustrate and/or demonstrate the steps in the public drinking water treatment process with emphasis on equipment used.
	ESS3.c.2.e: List important reasons for water testing.	ESS3.c.4.m: Define source water quality and assessment steps.	ESS3.c.6.h: Conduct and interpret source water assessment.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
ESS3.d: Apply principles of wastewater treatment to manage wastewater disposal in keeping with rules and regulations.	ESS3.d.1.e: List sources of wastewater.	ESS3.d.3.m: Diagram the steps in wastewater treatment.	ESS3.d.5: Demonstrate use of water-testing instruments and water-treatment equipment to treat wastewater.
	ESS3.d.2.e: Define hazardous.	ESS3.d.4.m: Identify types of hazardous material.	ESS3.d.6.h: Describe procedures for the treatment and disposal of hazardous materials and wastes while identifying safety practices to reduce risks.
Standard: ESS4: Students will examine the relationships between energy sources and environmental service system with a basic understanding of the use of tools, equipment, machinery and technology to accomplish tasks in environmental service systems.			
ESS4.a: Compare and contrast the impact of conventional and alternative energy sources on the environment.	ESS4.a.1.e: Explain energy and ways in which it can be used.	ESS4.a.3.m: Identify conventional energy sources and list conservation measures to reduce energy consumption.	ESS4.a.5.h: Compare and contrast the use and environmental impact of the burning of fossil fuels (conventional energy sources).
	ESS4.a.2.e: List ways energy is created that is friendly to the earth.	ESS4.a.4.m: Identify alternative energy sources.	ESS4.a.6.h: Compare and contrast the use and environmental impact of alternative energy sources.
ESS4.b: Use technological and mathematical tools to map land, facilities and infrastructure with inclusion of basic maintenance knowledge related to tools, equipment and machinery in safe working order for tasks in environmental service systems.	ESS4.b.1.e: Compare and contrast map types.	ESS4.b.3.m: Explain the importance of surveying and mapping for environmental service systems.	ESS4.b.5.h: Explain and demonstrate surveying and mapping principles with identification/description of surveying and mapping equipment with awareness for infrastructure.
	ESS4.b.2.e: Identify hand tools and what they are used for.	ESS4.b.4.m: Demonstrate proper use and maintenance of hand tools.	ESS4.b.6.h: Operate equipment and machinery in accordance with manufacturers' instructions and OSHA standards, specifically addressing personal protective equipment and proper machine guarding.
			ESS4.b.7.h: Demonstrate proper preventative maintenance techniques and set up a mock preventative maintenance schedule.



Agriculture, Food and Natural Resources (AFNR)

Content Area: NR/Natural Resources

Standard: NR1: Students will explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.

Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
NR1.a: Apply knowledge of natural resource components to the management of natural resource systems.	NR1.a.1.e: Identify natural resources	NR1.a.3.m: Differentiate between renewable and nonrenewable natural resources.	NR1.a.5.h: Research and debate one or more current issues related to the conservation or preservation of natural resources
	NR1.a.2.e: Compare and contrast different ecosystems.	NR1.a.4.m: Define ecosystem and related terms.	NR1.a.6.h: Compare and contrast the interdependence of organisms within an ecosystem.
NR1.b: Classify natural resources.	NR1.b.1.e: List and describe differences in trees.	NR1.b.6.m: Describe morphological characteristics used to identify trees and other woody plants.	NR1.b.11.h: Compare and contrast trees and other woody plants.
	NR1.b.2.e: Match names to basic herbaceous plants.	NR1.b.7.m: Explain morphological characteristics used to identify herbaceous plants.	NR1.b.12.h: Compare and contrast herbaceous plants.
	NR1.b.3.e: Match names to wildlife species.	NR1.b.8.m: Compare and contrast wildlife species.	NR1.b.13.h: Compare and contrast wildlife species.
	NR1.b.4.e: Match names to aquatic species.	NR1.b.9.m: Compare and contrast aquatic species.	NR1.b.14.h: Conduct an aquatic field inventory experience.
	NR1.b.5.e: Match names to rock, mineral and soil types.	NR1.b.10.m: Demonstrate techniques used to identify rock, mineral and soil differences.	NR1.b.15.h: Identify rock, mineral and soil types.
Standard: NR2: Students will apply scientific principles to natural resource management activities.			
NR2.a: Use cartographic skills to aid in developing, implementing and evaluating natural resource management plans, measure and survey for natural resource status in developing related plans with interpretation of laws related to natural resource management and protection.	NR2.a.1.e: Identify hazards associated with the outdoor environment.	NR2.a.4.m: Identify hazards associated with the outdoor environment.	NR2.a.7.h: Demonstrate safety practices.
	NR2.a.2.e: Explain biohazard materials.	NR2.a.5.m: Recognize biohazards associated with natural resources.	NR2.a.8.h: Demonstrate and use appropriate techniques and equipment when working with biohazard materials along with appropriate responses.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	NR2.a.3.e: Differentiate different types of maps.	NR2.a.6.m: Demonstrate how to use maps to identify directions and features, calculate actual distance and determine the elevations of points.	NR2.a.9.h: Locate natural resources using a land survey and employ a Global Positioning System and/or Geographic Information Systems technologies to inventory features in natural resource management.
NR2.b: Apply ecological concepts and principles to natural resource systems.	NR2.b.1.e: Categorize natural resource inventories and/or population studies.	NR2.b.4.m: Describe the value of resource inventories and population studies.	NR2.b.7.h: Discuss procedures used to conduct resource inventories and population studies.
	NR2.b.2.e: Explain why laws are needed for natural resource systems.	NR2.b.5.m: Identify laws associated with natural resource systems.	NR2.b.8.h: Identify purposes of laws associated with natural resource systems and abide by specific laws pertaining to natural resource systems.
	NR2.b.3.e: Identify natural resource systems that are at risk.	NR2.b.6.m: Define mitigation.	NR2.b.9.h: Identify and evaluate issues involving mitigation of natural resources.
NR2.c: Demonstrate natural resource enhancement techniques.	NR2.c.1.e: Illustrate a stream.	NR2.c.7.m: Categorize the different kinds of streams.	NR2.c.13.h: Identify indicators of the biological health of a stream.
	NR2.c.2.e: Describe different types of forests.	NR2.c.8.m: Generate characteristics of a healthy forest.	NR2.c.14.h: Develop and conduct a timber stand improvement (TSI) plan.
	NR2.c.3.e: Illustrate a healthy wildlife habitat.	NR2.c.9.m: Identify characteristics of a healthy wildlife habitat.	NR2.c.15.h: Design a blueprint and/or survey of a wildlife habitat.
	NR2.c.4.e: Illustrate a healthy rangeland.	NR2.c.10.m: Identify characteristics of a healthy rangeland.	NR2.c.16.h: Summarize methods of rangeland improvement.
	NR2.c.5.e: Compare and contrast natural resources used for recreational purposes.	NR2.c.11.m: Identify natural resource characteristics desirable for recreational purposes.	NR2.c.17.h: Explain natural resource management techniques for improving recreation opportunities.
	NR2.c.6.e: Compare and contrast healthy marine and coastal natural resources.	NR2.c.12.m: Identify characteristics of healthy marine and coastal natural resources.	NR2.c.18.h: Identify methods to improve marine and coastal natural resources.
NR2.d: Apply ecological concepts and principles to natural resource systems.	NR2.d.1.e: Label the parts of a biogeochemical cycle.	NR2.d.8.m: Illustrate biogeochemical cycles.	NR2.d.15.h: Diagram biogeochemical cycles and explain the processes.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	NR2.d.2.e: Identify parts of a watershed.	NR2.d.9.m: Describe properties of watersheds and identify the boundaries of local watersheds.	NR2.d.16.h: Relate the function of watersheds to natural resources.
	NR2.d.3.e: Match groundwater and surface-water flow to sources.	NR2.d.10.m: Compare and contrast groundwater and surface-water flow	NR2.d.17.h: Explain stream hydrology and structure and determine different classes of streams.
	NR2.d.4.e: Illustrate a riparian zone.	NR2.d.11.m: Define riparian zones and riparian buffers and explain their functions	NR2.d.18.h: Identify techniques used in the creation, enhancement and management of riparian zones and riparian buffers.
	NR2.d.5.e: Recognize illustrations of succession.	NR2.d.12.m: Describe the processes associated with ecological succession.	NR2.d.19.h: Give examples of primary-succession and secondary-succession species in a community of organisms.
	NR2.d.6.e: Recognize populations within natural resource systems.	NR2.d.13.m: Explain population ecology, population density and population dispersion.	NR2.d.20.h: Evaluate and create a management plan based on a population study for a community of organisms.
	NR2.d.7.e: Explain why invasive species have negative impacts on natural resource systems with recognition of polluted illustrations and a description of the climate you live in.	NR2.d.14.m: Define invasive species along with pollution descriptions and delineation between point and nonpoint source pollutions with descriptions of climatic factors that influence natural resources.	NR2.d.21.h: Discuss factors that influence the establishment and spread of invasive species.
Standards: NR3: Students will apply knowledge of natural resources to production and processing industries.			
NR3.a: Produce, harvest, process and use natural resource products.	NR3.a.1.e: Define harvesting related to tree products.	NR3.a.8.m: List tree species and describe related uses and harvesting methods.	NR3.a.15.h: List and describe uses of trees species and determine when to harvest forest products.
	NR3.a.2.e: Match names to corresponding aquatic and wildlife species.	NR3.a.9.m: Identify wildlife and aquatic species that can be commercially and or sustainably harvested for commercial and recreational purposes.	NR3.a.16.h: Describe techniques used in the harvesting of wildlife and aquatic species.
	NR3.a.3.e: Compare and contrast wildlife and aquatic products from other products.	NR3.a.10.m: Identify uses and products obtained from wildlife and aquatic species.	NR3.a.17.h: Explain and use techniques to process wildlife and aquatic species.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
	NR3.a.4.e: Recognize a mineral and ore.	NR3.a.11.m: Describe the value of minerals and ores to the economy.	NR3.a.18.h: Summarize economically important minerals and ores that are extracted and processed.
	NR3.a.5.e: Match names with corresponding fossil fuels.	NR3.a.12.m: Describe the value of fossil fuels to the economy.	NR3.a.19.h: Describe sources of fossil fuels and products made from fossil fuels.
	NR3.a.6.e: List benefits of a hydroelectric dam as a power source.	NR3.a.13.m: Describe the benefits of hydroelectric generation.	NR3.a.20.h: Describe characteristics of sites that lend themselves to hydroelectric generation and green energy saving system and designs.
	NR3.a.7.e: List ways to enjoy natural resources.	NR3.a.14.m: Identify recreational uses of natural resources.	NR3.a.21.h: Debate an issue related to the creation use of natural resources.
Standard: NR4: Students will demonstrate techniques used to protect natural resources.			
NR4.a: Manage fires in natural resource systems.	NR4.a.1.e: Recognize forest fire types.	NR4.a.2.m: Differentiate between desirable and undesirable fires and prepare a report on the role fire plays in a healthy ecosystem.	NR4.a.3.h: Describe techniques used to suppress wildfires and manage prescribed fires.
NR4.b: Diagnose plant and wildlife diseases and follow protocol to prevent their spread while acquiring management protocol of insect infestations of natural resources.	NR4.b.1.e: Illustrate or recognize a diseased plant.	NR4.b.4.m: Identify causes of diseases in plants.	NR4.b.7.h: Report the observance of diseases affecting plants to the appropriate authorities.
	NR4.b.2.e: Choose a safe practice or procedure around a diseased wildlife animal.	NR4.b.5.m: Identify causes of diseases in wildlife.	
	NR4.b.3.e: Recognize insect damage within natural resources.	NR4.b.6.m: Identify harmful and beneficial insects and signs of insect damage to natural resources.	NR4.b.8.h: Report observance of insect pests to the appropriate authorities and describe techniques used to manage pests of natural resources.
Standard: NR5: Students will use effective methods and venues to communicate natural resource processes to the public.			
NR5.a: Communicate natural resource information to the public.	NR5.a.1.e: Recognize messages that relate natural resources and the message being sent.	NR5.a.2.m: Identify ways in which a message regarding natural resources may be communicated to the public.	NR5.a.3.h: Design and/or construct a display communicating a natural resource message for a media type.



Agriculture, Food and Natural Resources (AFNR)

Content Area: PS/Plant Systems

Standard: PS1: Students will apply knowledge of plant classification, anatomy and physiology to the production and management of plants.

	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
PS1.a: Classify agricultural plants according to taxonomy systems.	PS1.a.1.e: Identify how people use plants and match plant products to the appropriate plant class.	PS1.a.4.m: Explain systems used to classify plants and compare and contrast the hierarchical agricultural plants.	PS1.a.7.h: Classify agricultural plants according to the hierarchical classification system, life cycles, plant use and as monocotyledons or dicotyledons.
	PS1.a.2.e: Observe and describe changes in plants as the seasons change.	PS1.a.5.m: Identify major groups of plants based on physiological characteristics.	PS1.a.8.h: Describe the morphological characteristics used to identify agricultural plants.
	PS1.a.3.e: Prepare a chart categorizing plants or plant products by similar characteristics.	PS1.a.6.m: Identify agriculturally important plants by common names.	PS1.a.9.h: Identify agriculturally important plants by scientific names.
PS1.b: Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.	PS1.b.1.e: Draw the life cycle of a plant.	PS1.b.3.m: Diagram a typical plant cell and identify plant cell organelles and their functions.	PS1.b.9.h: Compare and contrast mitosis and meiosis and apply the knowledge of cell differentiation and the functions of the major types of cells to plant systems.
	PS1.b.2.e: Match fruit to the plant structure that produces it and compare seeds of plants.	PS1.b.4.m: Identify the components, the types and the functions of plant roots.	PS1.b.10.h: Identify root tissues and explain the pathway of water and nutrients into and through the root tissues.
		PS1.b.5.m: Identify the components and the functions of plant stems.	PS1.b.11.h: Relate the active and passive transport of minerals into and through the vascular system to plant nutrition.
		PS1.b.6.m: Discuss leaf morphology and the functions of leaves.	PS1.b.12.h: Describe and apply the processes of translocation to the management of plants.
		PS1.b.7.m: Identify the components of a flower, the functions of a flower and the functions of flower components.	PS1.b.13.h: Explain how leaves capture light energy and allow for the exchange of gases.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
		PS1.b.8.m: Explain the functions and components of seeds and fruit and describe ways they may be carried through the environment.	PS1.b.14.h: Identify the different types of flowers and flower forms and apply the knowledge of flower structures to plant breeding, production and use.
			PS1.b.15.h: Apply the knowledge of seed and fruit structures to plant culture and use.
PS1.c: Apply energy conversion to plant systems.	PS1.c.1.e: Identify plants that require all sun, partial sun or shade.	PS1.c.3.m: Explain the basic process of photosynthesis and its importance to life on Earth.	PS1.c.5.h: Explain the light-dependent and light-independent reactions that occur during photosynthesis and apply the knowledge to plant management.
	PS1.c.2.e: Identify environmental products from plants.	PS1.c.4.m: Explain requirements necessary for photosynthesis to occur and identify the products and byproducts of photosynthesis.	PS1.c.6.h: Explain cellular respiration and its importance to plant life.
			PS1.c.7.h: Explain factors that affect cellular respiration and identify the products and byproducts of cellular respiration.
			PS1.c.8.h: Explain the four stages of aerobic respiration and relate cellular respiration to plant growth, crop management and post-harvest handling.
PS1.d: Apply knowledge of plant physiology to plant systems.	PS1.d.1.e: Observe seed and plant growth and changes in seed and plant characteristics.	PS1.d.3.m: Compare and contrast monocot and dicot seed and plant growth characteristics.	PS1.d.5.h: Define primary growth and the role of the apical meristem.
	PS1.d.2.e: Observe the effects of light on plant growth.	PS1.d.4.m: Identify different types of plant growth regulators and forms of tropism.	PS1.d.6.h: Explain the process of secondary plant growth.



	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
			PS1.d.7.h: Relate the principles of primary and secondary growth to plant systems.
			PS1.d.8.h: Identify the five groups of naturally occurring plant hormones and synthetic plant growth regulators.
			PS1.d.9.h: Identify the plant responses to plant growth regulators and different forms of tropism.
			PS1.d.10.h: Select plant growth regulators to produce desired responses from plants.
Standard: PS2: Students will prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients and soil on plant growth.			
PS2.a: Determine the influence of environmental factors on plant growth.	PS2.a.1.e: Define the elements that plants need to grow successfully.	PS2.a.3.m: Describe the qualities of light that affect plant growth.	PS2.a.6.h: Describe plant responses to light color, intensity and duration.
	PS2.a.2.e: Identify the different ways that land is used to grow plants.	PS2.a.4.m: Describe the effects air; temperature and water have on plant metabolism and growth.	PS2.a.7.h: Evaluate plant responses to varied light color, intensity and duration.
		PS2.a.5.m: Determine the optimal air, temperature and water conditions for plant growth.	PS2.a.8.h: Design, implement and evaluate a plan to maintain optimal conditions for plant growth.
PS2.b: Prepare growing media for use in plant systems.	PS2.b.1.e: Demonstrate how to properly prepare media for plant growth.	PS2.b.3.m: Identify the major components of growing media and describe how growing media support plant growth.	PS2.b.5.h: Describe the physical characteristics of growing media and explain the influence they have on plant growth.
	PS2.b.2.e: Distinguish between media that is too dry or too wet for seeds or plants to grow efficiently.	PS2.b.4.m: Compare and contrast different plant medias.	PS2.b.6.h: Formulate and prepare growing media for specific plants or crops.
			PS2.b.7.h: Identify the categories of soil water.
			PS2.b.8.h: Discuss how soil drainage and water-holding capacity can be improved.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
			PS2.b.9.h: Determine the hydraulic conductivity for soil and how the results influence irrigation practices.
PS2.c: Develop and implement a fertilization plan for specific plants, field crops and/or greenhouse crops.	PS2.c.1.e: Describe what elements plants use for food.	PS2.c.3.m: Identify the essential nutrients for plant growth and development and their major functions and monitor plants for signs of nutrient deficiencies.	PS2.c.7.h: Describe nutrient deficiency symptoms, recognize environmental causes of nutrient deficiencies and prepare a scouting report.
	PS2.c.2.e: Distinguish between healthy and unhealthy plants.	PS2.c.4.m: Adjust the pH of growing media.	PS2.c.8.h: Discuss the influence of pH and cation exchange capacity on the availability of nutrients.
		PS2.c.5.m: Collect soil and plant tissue samples for testing and interpret the test results.	PS2.c.9.h: Contrast pH and cation exchange capacity between mineral soil and soilless growing media.
		PS2.c.6.m: Identify fertilizer sources of essential plant nutrients, explain fertilizer formulations and describe different methods of fertilizer application.	PS2.c.10.h: Determine the nutrient content of soil using appropriate laboratory procedures and prescribe fertilization based on results.
			PS2.c.11.h: Determine the nutrient content of plant tissue samples using appropriate laboratory procedures and prescribe fertilization based on results.
			PS2.c.12.h: Calculate the amount of fertilizer to be applied and calibrate equipment to apply the prescribed amount of fertilizer.
			PS2.c.13.h: Use variable-rate technology to apply fertilizers to meet crop nutrient needs.
Standard: PS3: Students will propagate, culture and harvest plants			
PS3.a: Demonstrate plant propagation techniques.	PS3.a.1.e: Demonstrate sowing techniques and provide favorable conditions for seed germination.	PS3.a.3.m: Explain pollination, cross-pollination and self-pollination of flowering plants.	PS3.a.9.h: Demonstrate proper procedures in budding or grafting selected materials.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	PS3.a.2.e: Conduct tests associated with seed germination rates, viability and vigor.	PS3.a.4.m: Diagram the process of plant fertilization.	PS3.a.10.h: Evaluate asexual propagation practices based on productivity and efficiency.
		PS3.a.5.m: Design and implement a plan to control the pollination of plants.	PS3.a.11.h: Define micropropagation, discuss advantages associated with the practice and outline the four main stages of the process.
		PS3.a.6.m: Handle seed to overcome seed dormancy mechanisms and to maintain seed viability and vigor.	PS3.a.12.h: Propagate plants by micropropagation using aseptic techniques.
		PS3.a.7.m: Describe optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation and layering.	PS3.a.13.h: Explain the principles behind recombinant DNA technology and the basic steps in the process.
		PS3.a.8.m: Give examples of the risks and advantages associated with genetically modified plants.	PS3.a.14.h: Evaluate the performance of genetically modified crops.
PS3.b: Develop and implement a plant management plan for crop production.	PS3.b.1.e: Identify acceptable medias for growing plants.	PS3.b.4.m: Explain the importance of starting with pest- and disease-free propagation material.	PS3.b.10.h: Inspect propagation material for evidence of pests or disease.
	PS3.b.2.e: Prepare growing media for planting.	PS3.b.5.m: Explain the reasons for preparing growing media before planting.	PS3.b.11.h: Produce pest- and disease-free propagation material.
	PS3.b.3.e: Demonstrate proper planting procedures and post-planting care.	PS3.b.6.m: Prepare soil for planting with the addition of amendments.	PS3.b.12.h: Operate mechanized planting equipment.
		PS3.b.7.m: Apply pre-plant treatments required of seeds and plants and evaluate the results.	PS3.b.13.h: Prepare and implement a plant production schedule based on predicted environmental conditions.
		PS3.b.8.m: Observe and record environmental conditions during the germination, growth and development of a crop.	PS3.b.14.h: Explain the reasons for controlling plant growth.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
		PS3.b.9.m: Monitor the progress of plantings and determine the need to adjust environmental conditions.	PS3.b.15.h: Demonstrate proper techniques to control and manage plant growth through mechanical, cultural or chemical means.
			PS3.b.16.h: Create and implement a plan to control and manage plant growth.
PS3.c: Develop and implement a plan for integrated pest management.	PS3.c.1.e: Identify the ways chemicals are used safely in the growing of plants.	PS3.c.3.m: Identify types of plant pests and disorders.	PS3.c.8.h: Predict pest and disease problems based on environmental conditions and life cycles.
	PS3.c.2.e: Identify helpful insects as an alternative to chemicals.	PS3.c.4.m: Identify major local weeds, insect pests and infectious and noninfectious plant diseases.	PS3.c.9.h: Describe pest control strategies associated with integrated pest management.
		PS3.c.5.m: Design and implement a crop scouting program.	PS3.c.10.h: Describe types of pesticide controls and formulations.
		PS3.c.6.m: Describe damage caused by plant pests and diseases.	PS3.c.11.h: Employ pest management strategies to manage pest populations, assess the effectiveness of the plan and adjust the plan as needed.
		PS3.c.7.m: Diagram the life cycles of major plant pests and diseases.	PS3.c.12.h: Explain risks and benefits associated with the materials and methods used in plant pest management.
			PS3.c.13.h: Explain procedures for the safe handling, use and storage of pesticides.
			PS3.c.14.h: Evaluate environmental and consumer concerns regarding pest management strategies.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
PS3.d: Apply principles and practices of sustainable agriculture to plant production.		PS3.d.1.m: Explain sustainable agriculture and objectives associated with the strategy.	PS3.d.3.h: Prepare and implement a plan for an agricultural enterprise that involves practices in support of sustainable agriculture.
		PS3.d.2.m: Describe sustainable agriculture practices and compare the ecological effects of traditional agricultural practices with those of sustainable agriculture.	
PS3.e: Harvest, handle and store crops.	PS3.e.1.e: Identify important agricultural crops.	PS3.e.3.m: Identify harvesting methods and harvesting equipment.	PS3.e.8.h: Operate mechanized harvesting equipment.
	PS3.e.2.e: Describe how agricultural crops get from the farm to the table.	PS3.e.4.m: Identify storage methods for plants and plant products.	PS3.e.9.h: Explain reasons for calculating crop yield and loss.
		PS3.e.5.m: Assess the stage of growth to determine crop maturity or salability and demonstrate proper harvesting techniques.	PS3.e.10.h: Evaluate crop yield and loss data.
		PS3.e.6.m: Explain the reasons for preparing plants and plant products for distribution.	PS3.e.11.h: Implement plans to reduce crop loss.
		PS3.e.7.m: Demonstrate techniques for grading, handling and packaging plants and plant products for distribution.	PS3.e.12.h: Explain the proper conditions to maintain the quality of plants and plant products held in storage.
			PS3.e.13.h: Monitor environmental conditions in storage facilities for plants and plant products.
			PS3.e.14.h: Evaluate techniques for grading, handling and packaging plants and plant products.



Standard: PS4: Students will employ elements of design to enhance an environment.			
	Performance Indicators (By Grade Band)		
Learning Priority	PK-5	6-8	9-12
PS4.a: Create designs using plants.	PS4.a.1.e: Draw a picture using the elements of design.	PS4.a.3.m: Define design and identify design elements.	PS4.a.5.h: Explain design elements of line, form, texture and color and express the visual effect each has on the viewer
	PS4.a.2.e: Explain how plants can be used to improve the appearance of an environment.	PS4.a.4.m: Discuss the applications of art in agriculture/horticulture.	PS4.a.6.h: Select plants, hard goods, supplies and other materials for use in a design based on a range of criteria.
			PS4.a.7.h: Discuss principles of design that form the basis of artistic impression.
			PS4.a.8.h: Create and implement designs by following established principles of art.
Standard: PS5: Students will recognize different systems in which plants grow.			
PS5.a: Investigate various means to grow plants.	PS5.a.1.e: Identify the various places plants grow.	PS5.a.2.m: Compare and contrast growing plants in soil versus growing plants in water.	PS5.a.3.h: Compare and contrast various plant growing systems including, but not limited to greenhouse, hydroponics, and aquaponics.



Discipline: Agriculture, Food and Natural Resources (AFNR)

Content Area: PST/Power, Structural and Technical Systems

Standard: PST1: Students will demonstrate competence in the application of principles and techniques for the development and management of power, structural and technical systems.

Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
PST1.a: Select energy sources in power generation appropriate to the situation.	PST1.a.1.e: Identify renewable and nonrenewable energy sources	PST1.a.2.m: Examine environmental impacts and efficiencies of energy sources.	PST1.a.3.h: Compare the efficiency of energy production from various sources.
PST1.b: Apply physical science laws and principles to identify, classify and use lubricants.	PST1.b.1.e: Identify the sources of lubricants and its importance.	PST1.b.2.m: Classify lubricants by SAE viscosity and API service classifications.	PST1.b.3.h: Select, use and dispose of lubricants.
PST1.c: Identify and use hand and power tools and equipment for service, construction and fabrication.	PST1.c.1.e: Identify risks of using hand tools and power tools.	PST1.c.2.m: Select, maintain and use hand and power tools in service, construction and fabrication.	PST1.c.3.h: Assess the performance of employees in use of hand and power tools to safely and efficiently service, construct and fabricate quality products.
PST1.d: Perform service routines to maintain power units and equipment.	PST1.d.1.e: Identify Agricultural Equipment such as: tractors, mowers, discs and wagons.	PST1.d.4.m: Identify a maintenance schedule for power equipment.	PST1.d.9.h: Test and service mechanical systems.
	PST1.d.2.e: Maintain the cleanliness and appearance of power units and equipment to assure functionality.	PST1.d.5.m: Service filtration systems and maintain fluid levels on power units and equipment.	PST1.d.10.h: Adjust and troubleshoot equipment, including belts and drives, chains and sprockets and maintain fluid conveyance components, such as hoses, lines and nozzles, using computer and on-board diagnostics.
	PST1.d.3.e: Demonstrate safe practices around power units and equipment.	PST1.d.6.m: Develop a preventive maintenance schedule for power units and equipment.	PST1.d.11.h: Maintain and calibrate metering, monitoring and sensing devices on equipment.
		PST1.d.7.m: Identify power unit and equipment controls and instruments, along with their functions.	PST1.d.12.h: Perform start-up and shut-down procedures on power units and equipment as specified in technical manuals.
		PST1.d.8.m: Locate safety warnings, dangers and caution areas on equipment and in the operation manuals.	PST1.d.13.h: Adjust equipment for safe and efficient operation.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
PST1.e: Identify the principles of operation and the systems of small engines.	PST1.e.1.e: Discuss the use of small engines.	PST1.e.2.m: Observe safety precautions when working around small engines.	PST1.e.5.h: Safely operate small engine equipment.
		PST1.e.3.m: Distinguish between two and four stroke engines.	PST1.e.6.h: Demonstrate the operation of two and four stroke engines.
		PST1.e.4.m: Identify the mechanical systems found in small engines.	PST1.e.7.h: Explain how various mechanical systems interrelate in small engine operation.
PST1.f: Troubleshoot and repair internal combustion engines.	PST1.f.1.e: Identify components and systems of internal combustion engines.	PST1.f.4.m: Use technical manuals and computer-based diagnostics in engine analysis and repair.	PST1.f.6.h: Performance test internal combustion engines to determine service and repair needs.
	PST1.f.2.e: Describe the operation of internal combustion engines by types of fuel used.		PST1.f.7.h: Analyze and troubleshoot internal combustion engines.
			PST1.f.8.h: Overhaul spark-and-compression internal combustion engines.
	PST1.f.3.e: Be safe around internal combustion engines.	PST1.f.5.m: Identify tools used to repair internal combustion engines.	PST1.f.9.h: Use the proper tools to repair and maintain an internal combustion engine.
PST1.g: Use manufacturers' guidelines to service and repair the power transmission systems of equipment.	PST1.g.1.e: Identify and describe applications of simple machines in power systems.	PST1.g.2.m: Apply and use mechanical advantages of simple machines.	PST1.g.4.h: Describe features, benefits and applications of mechanical transmission components, including belts, chains, gears, bearings, seals, universals and drive shafts.
			PST1.g.5.h: Identify and compare operation principles and features, benefits and applications of various power transmission systems.
			PST1.g.6.h: Use speed, torque and power measurements to improve efficiency in power transmission systems.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
		PST1.g.3.m: Identify power transfer principles, including those using friction, gears and fluids.	PST1.g.7.h: Inspect, analyze and repair drive trains.
			PST1.g.8.h: Inspect, analyze and repair clutches and brakes.
PST1.h: Service and repair hydraulic and pneumatic systems.	PST1.h.1.e: Describe the features, benefits and applications of common types of hydraulic and pneumatic systems.	PST1.h.2.m: Describe principles of hydraulic and pneumatic system operation.	PST1.h.5.h: Use symbols and schematic drawings in the maintenance of hydraulic and pneumatic systems.
		PST1.h.3.m: Identify major components of hydraulic and pneumatic systems and describe their use.	PST1.h.6.h: Inspect, analyze and repair hydraulic and pneumatic system components, including fluid and compressed-air conveyance components.
		PST1.h.4.m: Identify hydraulic and pneumatic system fittings and ports.	PST1.h.7.h: Use a pressure-and-flow tester in diagnosing malfunctions and repairing hydraulic and pneumatic systems.
PST1.i: Troubleshoot and service electrical systems.	PST1.i.1.e: Identify the kinds and applications of electricity and its impact on your life.	PST1.i.2.m: Apply the meaning and measurement of electricity, including amperage, voltage and wattage.	PST1.i.3.h: Assess and install electrical circuits, including conductors, insulators and controls.
			PST1.i.4.h: Interpret electrical system symbols and diagrams.
PST1.j: Create sketches and plans of agricultural structures.	PST1.j.1.e: Identify and sketch various agriculture structures.	PST1.j.2.m: Develop plans and sketches using drafting equipment and computer programs.	PST1.j.4.h: Apply principles of design, fabrication and installation of agricultural structures.
		PST1.j.3.m: Use scale measurement and dimension to develop plans and sketches.	PST1.j.5.h: Design functional and efficient facilities for agricultural use.
PST1.k: Apply structural plans, specifications and building codes.	PST1.k.1.e: Identify major parts of a construction drawing.	PST1.k.2.m: Identify and interpret different views of a construction drawing.	PST1.k.3.h: Locate, explain and apply elements of a construction drawing.
			PST1.k.4.h: Follow local construction and safety codes in agricultural construction.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
PST1.l: Examine structural requirements for materials and procedures and estimate construction cost.	PST1.l.1.e: Identify materials used in agricultural construction/fabrication.	PST1.l.2.m: Select types of materials, determine quantities and estimate their costs and other costs associated with a specified project plan.	PST1.l.3.h: Prepare a project cost estimate, including materials, labor and management.
PST1.m: Follow architectural and mechanical plans to construct and/or repair equipment, buildings and facilities.	PST1.m.1.e: Construct models of Agricultural Buildings with wood and metal.	PST1.m.4.m: Install and/or repair pipes and plumbing equipment and fixtures.	PST1.m.9.h: Evaluate work products or samples for quality and efficiency of workmanship following architectural and mechanical plans.
	PST1.m.2.e: Identify various fencing materials.	PST1.m.5.m: Distinguish electrical circuits and components of each.	PST1.m.10.h: Install and/or repair electrical wiring components and fixtures following appropriate codes and standards.
	PST1.m.3.e: Be aware of energy conservation in your world.	PST1.m.6.m: Measure and calculate fencing materials.	PST1.m.11.h: Identify electricity measurements and make measurement calculations.
		PST1.m.7.m: Identify insulation materials and methods to achieve desired R-value.	PST1.m.12.h: Construct and/or repair fencing, including wood, static wire, electrical wire and other fencing materials.
		PST1.m.8.m: Calculate volume for concrete projects.	PST1.m.13.h: Insulate a structure. Calculate BTU Loss.
			PST1.m.14.h: Construct and/or repair with concrete, brick, stone or masonry units.
PST1.n: Use arc, MIG/TIG welders, equipment and materials needed to weld.	PST1.n.1.e: Describe the shielded metal arc welding process.	PST1.n.5.m: Distinguish types of electric welding machines.	PST1.n.9.h: Select suitable supplies and equipment for shielded metal arc welding.
	PST1.n.2.e: Identify welding equipment.	PST1.n.6.m: Recognize, color and numerical code marking on electrodes.	PST1.n.10.h: Select Electrodes for use in various arc welding applications.
	PST1.n.3.e: Identify safety equipment and protective clothing for welding.	PST1.n.7.m: Identify safety equipment and protective clothing for welding.	PST1.n.11.h: Use safety equipment and protective clothing for welding.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
	PST1.n.4.e: Point out various welds.	PST1.n.8.m: Describe types of welding operations.	PST1.n.12.h: Demonstrate through use of welding equipment welding operations (beads, butt, t, lap, fillet vertical, horizontal and pipe welding).
PST1.o: Use gas welding equipment and materials to weld.	PST1.o.1.e: Be safe around welding equipment.	PST1.o.2.m: Identify the parts of gas welding equipment and its safe use.	PST1.o.6.h: Use heating, cutting and gas welding equipment safely
		PST1.o.3.m: Point out parts of a gas welding system.	PST1.o.7.h: Change, adjust, shut down and check for leaks in oxygen and acetylene equipment.
		PST1.o.4.m: Explain the uses of brazing and gas welding.	PST1.o.8.h: Braze and weld safely with oxyacetylene equipment.
		PST1.o.5.m: Identify the parts of an oxyfuel cutting system.	PST1.o.9.h: Use oxyfuels and other gases to cut steel with a flame touch.
PST1.p: Apply the use of welding to agricultural related industries.	PST1.p.1.e: Identify kinds and characteristics of metal materials.	PST1.p.2.m: Distinguish welding processes, positions and materials preparation.	PST1.p.3.h: Construct and/or repair metal structures and equipment using welding fabrication procedures, including those associated with SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch methods.
PST1.q: Apply electrical wiring principles in agricultural applications.	PST1.q.1.e: Discuss various types and sources of electricity.		PST1.q.6.h: Locate and use electrical codes and regulations.
			PST1.q.7.h: Use volt and amp meters and continuity testers to demonstrate electricity principles.
	PST1.q.2.e: Identify uses of electrical sensors and controls. (Thermostat, light sensors etc.)	PST1.q.4.m: Interpret maintenance schedules for electrical control systems. (Thermostat, light sensors etc.)	PST1.q.8.h: Troubleshoot electrical control system performance problems. (Thermostat, light sensors etc.)
	PST1.q.3.e: Identify hazards and safety when using electricity.	PST1.q.5.m: Identify hazards and safety related to the materials and tools used in electrical control circuit installation.	PST1.q.9.h: Identify hazards and safety when using electricity while installing electrical control circuits.



Learning Priority	Performance Indicators (By Grade Band)		
	PK-5	6-8	9-12
PST1.r: Apply technology principles in the use of agricultural technical systems.	PST1.r.1.e: Identify the importance and uses of computer-based systems in agriculture, food and natural resources.	PST1.r.2.m: Use common computer-based programs to analyze agricultural data.	PST1.r.3.h: Assess database summaries to draw conclusions and propose plans of action.
PST1.s: Use geospatial technologies in agricultural applications.	PST1.s.1.e: Identify geospatial technologies, including global positioning, geographical information and remote sensing.	PST1.s.2.m: Explain and evaluate concepts and principles of geospatial technologies.	PST1.s.6.h: Assess and install instrumentation and data acquisition systems, including Global Positioning System (GPS) receivers.
		PST1.s.3.m: Describe equipment and processes used in geospatial technologies.	PST1.s.7.h: Output and apply maps using GIS/GPS systems.
		PST1.s.4.m: Identify uses, components and setup of precision technology in agriculture, food and natural resources.	PST1.s.8.h: Describe principles of precision agriculture for map-and sensor-based systems.
		PST1.s.5.m: Describe the meaning and use of sensors, controllers and actuators.	PST1.s.9.h: Identify sensor, control and actuator system components on power units and equipment.



This page intentionally left blank.