Iowa

CONTENT STANDARDS and BENCHMARKS

Agricultural Education

1999

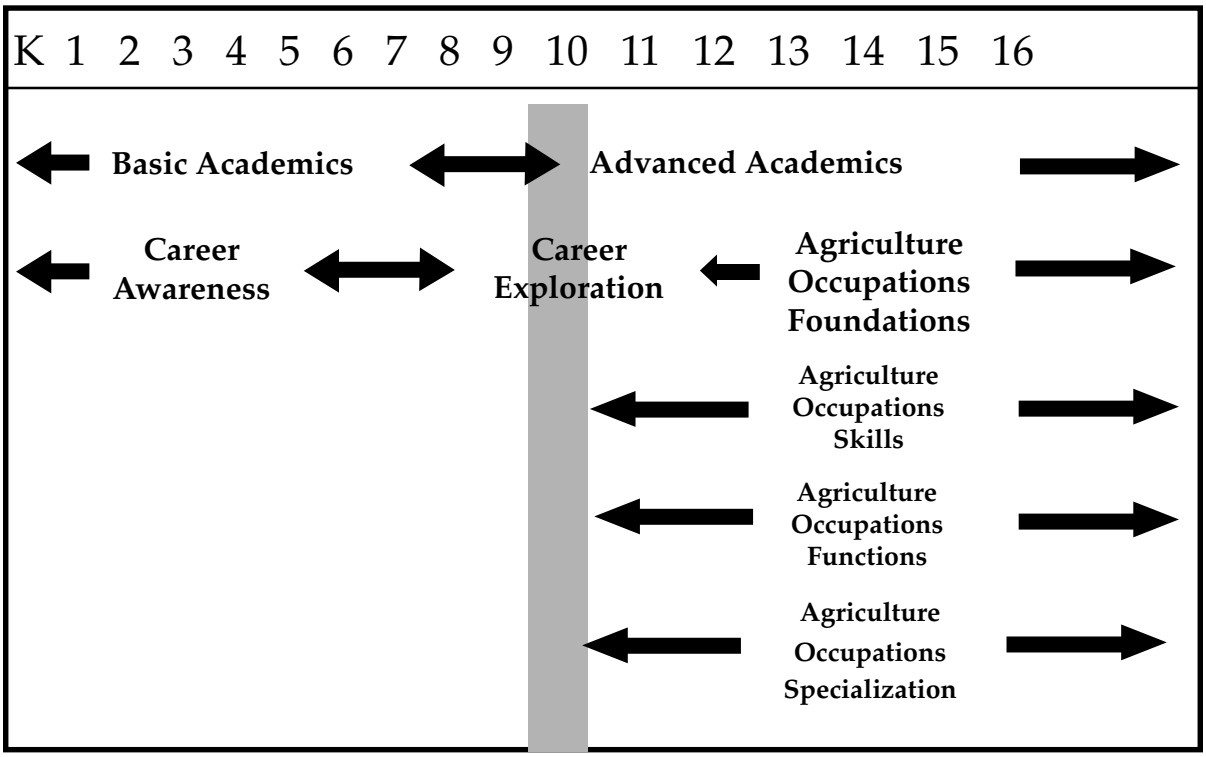
Pre K-12+ Agriscience and Natural Resources Career Pathway

Illustration of Program Possibilities

Academic	Employability	Career Area Knowledge and Skills	Occupational Cluster	Career and Technical Programs Specific Technical Knowledge and Skills
Academic Knowledge and Skills (K-12) Majors - Reflect examples from 2 & 4 year colleges Core - Reflects examples connecting to 2 & 4 year colleges	Employability Knowledge and Skills—Standards and Benchmarks (K-12)	Content and Knowledge of Career Areas—Standards and Benchmarks (K-12)	Production	Swine Production
				Agriculture Production Management
			Horticulture	Landscaping
				Turf Management
				Horticulture Science
				Arborculture
				Floriculture
			Agri-Business Service and Supply	Ag Chemicals Application Management
				Agriculture Marketing
				Agriculture Business and Production
				Agriculture Economics
				Agriculture Power Technology
			Agriculture Mechanics	Agriculture Mechanics Parts and Service Technology
				Food Services and Technology
			Agriculture Products & Processing	Food Manufacturing
				Food Marketing
			Natural Resources	Natural Resources Conservation
				Renewable Natural Resources
				Forestry Sciences
				Natural Resource Management

K-14

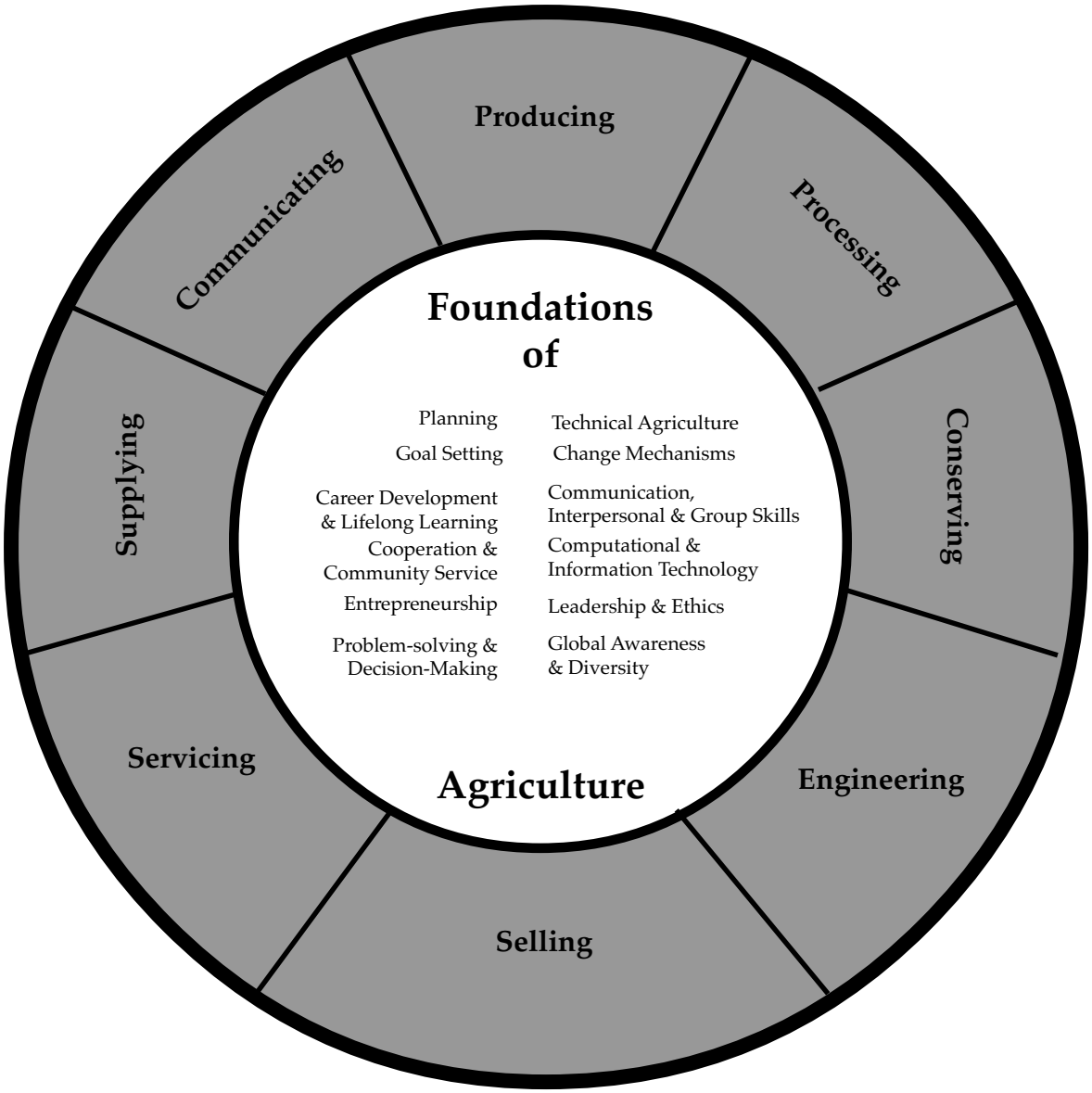
The Agriculture Occupations Curriculum



This flow chart describes how the agriculture curriculum can be viewed as a continuum that begins in the primary grades with career awareness and exploration. The model continues through postsecondary education with the emphasis becoming more specialized to the student's individual interest in agriculture occupations.

Curriculum Framework for Agriculture

Functions of Agriculture



Academic concepts • Technology

Agricultural Business, Supply & Service Standards and Benchmarks

Standard I: Understand problem-solving, analysis, and decision-making in agriculture.

Benchmarks

Analyze situation, use problem-solving approach and make appropriate decisions.

1. Compare the advantages and disadvantages of biological, chemical and cultural pest controls.
2. Evaluate livestock for profitable production traits.
3. Interpret the results from a soil and/or tissue test.
4. Determine appropriate land use management based on soil evaluation needs.
5. Identify the three components of management.
6. Explain the relationship of land, labor, and capital to management.
7. Describe the types of record-keeping systems used in agriculture.
8. Analyze marketing and pricing alternatives for agricultural commodities.
9. Interpret charts, graphs, and maps to make specific decisions related to business.

Standard II: Understand leadership and ethics development in agriculture.

Benchmark

Apply principles of leadership and ethical behavior to selected situations in agriculture.

1. Delegate duties.
2. Manage conflict (personal and customer).
3. Facilitate group interaction (teamwork).
4. Take responsibility for mistakes and/or good work.
5. Become personally involved in professional or organizations.
6. Recognize relevant, ethical issues in business.

Standard III: Understand the concept of cooperation and community service/ teamwork.

Benchmark

Demonstrate cooperation and teamwork skills.

1. Explain the relationship between public and private sectors.
2. Maintain clean and orderly work area.
3. Cooperate with others.
4. Respect the property of others.
5. Exhibit dependability responsibility on the job.
6. Demonstrate punctuality.
7. Ask for help when needed.
8. Comply with safety and health rules.
9. Accept supervision willingly.

10. Follow directions.
11. Work effectively with others.
12. Develop positive community relations.

Standard IV: Understand the use of entrepreneurial knowledge and skills in agriculture.

Benchmark

Apply the principles of entrepreneurship in an agricultural experiential learning experience.

1. Analyze business organizations.
2. Identify skills required of a business owner.
3. Identify the personal characteristics of entrepreneurs.
4. Analyze the contents of a business plan.
5. Recognize the importance of technical assistance.
6. Explain types of business ownership.
7. Identify factors in obtaining finances for a new business.
8. Demonstrate the ability of market analysis.
9. Identify the four types of agricultural business organizations.
10. Compare the advantages and disadvantages of the four types of agricultural business.
11. Explain the concept of competition.
12. Explain the concept of profit.

Standard V: Understand the use of communication skills in agriculture – interpersonal and group; written and oral.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Identify factors that are important to human relations in agribusiness.
2. Identify sources of marketing information.
3. Demonstrate proper telephone answering skills.
4. Demonstrate proper telephone etiquette.
5. Interact with others in a courteous and tactful manner.
6. Organize thoughts and clearly express point of view.
7. Organize thoughts and write clearly.
8. Lead a discussion.
9. Listen effectively.
10. Speak effectively in front of others.

Standard VI: Understand the principles of goal setting - personal and organizational.

Benchmark

Explain the goal setting process.

1. Define goals.
2. Compose a resume.
3. Manage time effectively.
4. Follow rules and regulations.

5. Demonstrate initiative.
6. Construct an application letter.
7. Utilize time effectively.

Standard VII: Understand the principles of planning.

Benchmark

Apply planning strategies in agriculture sales and service businesses and organizations.

1. Identify skills, physical and emotional - requirements for a job.
2. Complete required forms.
3. Produce quality work.
4. Work within guidelines.
5. Prioritize a series of tasks.
6. Organize an event.

Standard VIII: Understand the concept of adapting to change in agriculture.

Benchmark

Develop strategies to effectively adapt to new situations and rapid changes in agriculture.

1. Accept new challenges.
2. Adapt to change/demonstrate flexibility.
3. Adapt to environment/situation.

Standard IX: Understand global and cultural diversity issues.

Benchmark

Demonstrate a working knowledge of the relationship between global/cultural diversity and occupational success in agriculture.

1. Identify the types of production systems used worldwide and their impact.
2. Determine the impact of biotechnology on world food production systems.
3. Identify the monetary systems of selected countries and their impact on the United States.
4. Explain how the production of one country impacts the production of another.
5. Locate on a map each of the major continents of the world.
6. Locate on a map each of the major agricultural regions of the world.
7. Explain the impact of government policy on the production and marketing of various commodities.
8. Explain the linkage between culture and diet.
9. Explain the nature of international trade.
10. Determine the political role of governments and their impact on food production.
11. Compare the differences between measurement systems in the United States and the world.
12. Accept individual differences.

Standard X: Understand basic computational and informational technology.

Benchmark

Apply computational and informational technologies to analyze and solve mathematical problems.

1. Calculate the time value of money.
2. Calculate the payback period for an investment. Identify procedures for determining the market value of assets used in depreciation and inventory schedules.
3. Calculate a least-cost ratio.
4. Use the metric system to calculate specific weights and measurement.
5. Calculate the amount of fertilizer and/or chemicals needed for a specific task or recommendation.
6. Calibrate fertilizer and chemical equipment.
7. Calculate finance charges.
8. Operate office equipment.
9. Utilize a data-base, word-processing, and spreadsheet program.
10. Calculate margins and discounts for agricultural supplies.
11. Calculate storage charges on grain.
12. Show awareness of various forms of electronic communication: e-mail, ftp, Worldwide Web.
13. Describe basic hardware components.
14. Use the following hardware components: keyboard, mouse, disk drive, monitor.
15. Recognize what the operating system of a computer is.
16. Use an operating system to: open or chose programs, list files or program and file management.

Standard XI: Understand the concept of career development and improvement – lifelong learning.

Benchmark

Develop strategies to make a successful transition from school to work.

1. Identify agricultural career opportunities in management, sales and service.
2. Demonstrate personal hygiene and cleanliness.
3. Evaluate a job offer, benefits, time, and working environment.

Standard XII: Understand basic technical skills and knowledge in the occupational area of agricultural business, supply and service.

Benchmark

Apply technical skills in a hands-on experiential setting in agriculture.

1. List the steps used in purchasing fixed and variable assets in a business.
2. Complete a personal income tax form.
3. Explain the components of a local property tax.
4. Explain social security taxes and their benefit related to types of employment.
5. Demonstrate the impact of the state sales tax on purchases.
6. Analyze the common types of financial and legal agreements used in agriculture.
7. Identify resources for technical assistance.

8. Identify governmental regulatory agencies related to agribusiness.
9. Identify current government programs that support agricultural business.
10. Determine the types of insurance available for both personal and business needs.
11. Explain opportunity cost.
12. Complete a cash flow projection worksheet.
13. Identify types of credit.
14. Determine available credit resources.
15. Develop a process for accurately determining business inventory.
16. Utilize accounting procedures to record cash receipts and expenditures.
17. Develop a balance sheet for business.
18. Complete a net worth statement.
19. Identify appropriate financial ratios.
20. Explain the different types of budgets used in business.
21. Prepare an enterprise budget.
22. Identify variable cost.
23. Explain fixed cost.
24. Utilize equipment correctly as shown/demonstrated by supervisor.
25. Perform routine maintenance on agricultural equipment using service manual schedules.
26. Identify different production techniques and their effect on the environment.
27. Perform plant propagation using sexual, asexual or tissue culture techniques.
28. Demonstrate the proper procedure for planting trees and shrubs.
29. Identify opportunities for the development of diversified crop and/or livestock enterprises.
30. Explain how the selection of hybrid and certified seed affects performance and profitability.
31. Explain the principles of plant breeding.
32. Identify the types of tillage methods used in crop production.
33. Describe the types of harvesting systems used in crop production.
34. Explain the role of primary and secondary nutrients used in crop production.
35. Select appropriate commercial fertilizers and chemicals based on identified needs.
36. Identify the types of wholesale and retail cuts of meat.
37. Explain methods for the proper handling and disposal of animal waste.
38. Demonstrate the proper procedures for administering of animal health products.
39. Read a soil classification map.
40. Identify the different types of discounts used in agricultural sales to increase sales.
41. Make change correctly.
42. Differentiate between marketing, pricing, and grading standards for agricultural commodities.
43. List the purposes of governmental farm agencies.
44. Develop a process for ordering and receiving goods based on inventory needs.
45. Generate periodic billing statements.
46. Explain factors in pricing agricultural merchandising.
47. Balance a ration in accordance to the nutritional requirements of an animal species.
48. Explain the functions of the monogastric digestive system.
49. Diagram the ruminant digestive system.
50. Identify procedures for developing a quality livestock disease prevention program.
51. Balance daily cash receipts.
52. Balance monthly bank statements.

53. Identify feedstuffs and additives available for specific livestock enterprises.
54. Explain the nutritional value of feedstuffs and additives as related to specific livestock enterprises.
55. Identify livestock facility requirements.
56. Analyze the concept of supply and demand.
57. Explain the concept of organized labor and business.
58. Explain the concept of business cycles.
59. Demonstrate the principles of effective selling.
60. List the methods used to advertise an agricultural product.
61. Explain the developmental process used to prepare an appropriate advertisement.
62. Write a sales ticket.

Standards and Benchmarks
for
Agricultural Production

Standard I: Understand problem-solving, analysis, and decision-making in agriculture.

Benchmarks

Analyze situation, use problem-solving approach and make appropriate decisions.

1. Analyze the economic impact of production agriculture on the economy.
2. Identify and compare the operation of equipment and facilities involved with livestock for optimum production efficiency.
3. Compare agronomic production systems.
4. Adjust and calibrate agriculture equipment.
5. Recognize the use of ultrasound in decision-making.
6. Recognize the use of electronic ID system in decision-making.
7. Describe the value of computerized record keeping for decision-making.

Standard II: Understand leadership and ethics development in agriculture.

Benchmarks

Apply principles of leadership and ethical behavior to selected situations in agriculture.

1. Recognize relevant, ethical issues in business.
2. Demonstrate initiative.
3. Analyze components of labor management.
4. Delegate duties.
5. Manage Conflict (personal and customer).
6. Become personally involved in a professional organization.
7. Take responsibility for mistakes and/or good work.
8. Manage time effectively.

Standard III: Understand the concept of cooperation and community service/ teamwork.

Benchmark

Demonstrate cooperation and teamwork skills.

1. Identify the impact of positive community relations through communications, business appearance and practices in addition to personal involvement in related professional organizations.
2. Respect the property of others.
3. Follow directions.
4. Interact with others in a courteous and tactful manner.
5. Cooperate with others.
6. Work effectively with others.

7. Facilitate group interaction (teamwork).
8. Explain the relationship between public and private sectors.
9. Follow rules and regulations.
10. Accept supervision willingly.
11. Develop positive community relations.
12. Ask for help when needed.
13. Comply with safety and health rules.
14. Utilize equipment correctly as shown/demonstrated by supervisor.

Standard IV: Understand the use of entrepreneurial knowledge and skills in agriculture.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Explain types of business ownership.
2. Identify factors in obtaining finances for a new business.
3. Demonstrate the ability of market analysis.
4. Analyze present and future business resource base.
5. Identify necessary financial components for a production agricultural business.
6. Identify risk components and analyze management strategies.
7. Develop and implement a business plan for crop/animal production.
8. Explain the concept of competition.
9. Analyze the concept of supply and demand.
10. Explain the concept of organized labor and business.
11. Explain the concept of business cycles.
12. Analyze business organizations.
13. Identify skills required of a business owner.
14. Explain the concept of profit.
15. Identify the personal characteristics of entrepreneurs.
16. Analyze the contents of a business plan.

Standard V: Understand the use of communication skills in agriculture – interpersonal and group; written and oral.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Lead a discussion.
2. Speak effectively in front of others.
3. Listen effectively.
4. Organize thoughts and clearly express point of view.
5. Organize thoughts and write clearly.
6. Demonstrate proper telephone etiquette.

Standard VI: Understand the principles of goal setting - personal and organizational

Benchmark

Explain the goal setting process.

1. Define goals.
2. Determine personal attitude toward business risk.

Standard VII: Understand the principles of planning.

Benchmark

Apply planning strategies in agriculture production.

1. Analyze components involved in contracting services for the product of an agricultural business.
2. Identify components needed for appropriate tax information.
3. Determine marketing systems, methods, and strategies.
4. Plan an animal health program/schedule.
5. Prioritize a series of tasks.
6. Utilize time effectively.
7. Organize an event.
8. Recognize the importance of technical assistance.
9. Work within guidelines.

Standard VIII: Understand the concept of adapting to change in agriculture.

Benchmark

Develop strategies to effectively adapt to new situations and rapid changes in agriculture.

1. Adapt to change/demonstrate flexibility.
2. Accept new challenges.
3. Utilize past, current, and future trends to analyze and interpret charts, graphs, and other information to develop management decisions.
4. Adapt to environment/situation.

Standard IX: Understand global and cultural diversity issues.

Benchmark

Demonstrate a working knowledge of the relationship between global/cultural diversity and occupational success in agriculture.

1. Explain the nature of international trade.
2. Identify domestic and global niche markets and analyze the production requirements.
3. Accept individual difference.

Standard X: Understand basic computational and informational technology.

Benchmark

Apply computational and informational technologies to analyze and solve mathematical problems.

1. Evaluate and demonstrate use of current technology in land surveying and measuring.
2. Utilize digitized soil surveys to establish a soil sampling methods and formulate a nutrient.
3. Utilize computerized record analyze in making production, management and marketing decisions.
4. Show awareness of various forms of electronic communication: e-mail, ftp, Worldwide Web.
5. Describe basic hardware components.
6. Use the following hardware components: keyboard, mouse, disk drive, monitor.
7. Explain the operating system of a computer.
8. Use an operating system to: open or chose programs, list files or program and file management.

Standard XI: Understand the concept of career development and improvement – lifelong learning.

Benchmark

Develop strategies to make a successful transition from school to work.

1. Identify career opportunities in production agriculture.
2. Complete the course work for current and evolving certification or licensure requirements in production agriculture.
3. Identify skills, physical and emotional requirements for a job.
4. Complete required forms.
5. Construct an application letter.
6. Evaluate job offer, benefits, time, and working environment.
7. Exhibit dependability and responsibility on the job.
8. Demonstrate punctuality.
9. Compose a resume.
10. Demonstrate personal hygiene and cleanliness.
11. Produce quality work.

Standard XII: Understand basic technical skills and knowledge in the occupational area of production agriculture.

Benchmark

Apply technical skills in a hands-on experiential setting in agriculture.

1. Explain practices to ensure food safety for the consumer.
2. Follow procedures in identification, handling and disposal of hazardous materials.
3. Identify basic laws and governmental regulations related to agricultural production.
4. Analyze the environmental effect that agricultural stewardship may have on surface and ground water, wildlife, soil, air, and people.

5. Demonstrate safe and humane animal handling techniques.
6. Identify major genetic characteristics of animal breeds and plant varieties.
7. Evaluate agricultural product quality.
8. Analyze various animal testing programs.
9. Repair/condition/service agricultural equipment.
10. Identify components of water systems.
11. Demonstrate knowledge of safe and proper operation of tools and equipment.
12. Demonstrate carpentry skills needed in agriculture.
13. Demonstrate welding and cutting skills.
14. Demonstrate and calculation, forming, placing, and finishing of concrete.
15. Identify and evaluate various energy and power sources.
16. Evaluate various animal feeding programs including ration development and feedstuff analysis.
17. Plan an animal health program/schedule with emphasis toward quality assurance.
18. Identify major genetic characteristics of animal breeds (including hybrids) and examine their uses in animal breeding systems and scientific principles.
19. Explain soil and water conservation practices and their part in federal program compliance.
20. Explain the factors involved with seed and plant selection.
21. Identify and demonstrate plant growth and reproduction.
22. Identify and select biological and chemical pest controls for agronomic production.
23. Design storage establishment improvement practices/grazing systems.
24. Identify and compare the operation of grain harvesting, handling, drying, and storage systems.
25. Maintain clean and orderly work area.
26. Show awareness of the tools of precision farming.
27. Describe the importance of graphic information systems in precision farming.
28. Describe the role of graphic information systems in precision farming.
29. Describe the role of VRT in precision farming.
30. Describe the value of precision farming in agriculture.
31. Use the graphic information system receiver to record a coordinate position of some point.
32. List specific objects that can be mapped.
33. Recognize what a coordinate system is.
34. Use the survey plat of township, range and section to describe an area.
35. Define precision farming.
36. Show awareness of relationships between mapped objects.
37. List specific biotechnology products in use.
38. Recognize the concept of DNA.
39. Describe the role DNA plays in an animal's phenotype.
40. Define phenotype and genotype.
41. Show awareness of processes of biotechnology: fingerprinting, transformation and extraction.
42. Use e-mail to send a message.
43. Use the Worldwide Web to find information.
44. Describe value of technology in livestock production and in management.

Standards and Benchmarks for Horticulture

Standard I: Understand problem-solving, analysis, and decision-making in agriculture.

Benchmarks

Analyze situation, use problem-solving approach and make appropriate decisions.

1. Identify and differentiate between (may be a combination of) disease damage, pest and insect damage, chemical and environmental damage in a plant.
2. Use observational techniques to identify healthy, quality plants.
3. Interpret data of soil sample analysis.
4. Demonstrate handling customer complaints and returned purchases.
5. Choose an appropriate plant for a specific location in a home or business.
6. Choose plants of appropriate mature size, shape, texture, and function for a given site.
7. Interpret landscape plans.
8. Adjust or control closed environmental factors: water, heat, cold, humidity, air circulation, and ventilation.

Standard II: Understand leadership and ethics development in agriculture.

Benchmarks

Apply principles of leadership and ethical behavior to selected situations in agriculture.

1. Manage conflict (personal and customer).
2. Become personally involved in a professional organization.
3. Manage time effectively.
4. Recognize relevant, ethical issues in business.
5. Take responsibility for mistakes and/or good work.
6. Demonstrate initiative.
7. Delegate duties.

Standard III: Understand the concept of cooperation and community service/ teamwork.

Benchmark

Demonstrate cooperation and teamwork skills.

1. Accept supervision willingly.
2. Facilitate group interactions (teamwork).
3. Ask for help when needed.
4. Follow directions.

5. Explain the relationship between public and private sectors.
6. Interact with others in a courteous and tactful manner.
7. Cooperate with others.
8. Follow rules and regulations.
9. Comply with safety and health rules.
10. Utilize equipment correctly as shown/demonstrated by a supervisor.
11. Work effectively with others.
12. Develop positive community relations.
13. Respect the property of others.

Standard IV: Understand the use of entrepreneurial knowledge and skills in agriculture.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Recognize the importance of technical assistance.
2. Explain types of business ownership.
3. Identify factors in obtaining finances for a new business.
4. Demonstrate the ability of market analysis.
5. Analyze business organizations.
6. Identify skills required of a business owner.
7. Explain the concept of profit.
8. Identify the personal characteristics of entrepreneurs.
9. Analyze the contents of a business plan.
10. Explain the concept of competition.
11. Analyze the concept of supply and demand.
12. Explain the concept of organized labor and business.
13. Explain the concept of business cycles.
14. Complete business forms (invoices, sales slips, charge card forms) correctly.

Standard V: Understand the use of communication skills in agriculture – interpersonal and group; written and oral.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Demonstrate proper telephone etiquette.
2. Explain process of and reasons for pasteurization and fumigation of soil mixes.
3. Explain growth-regulating chemicals.
4. Explain how to develop and use a customer file system.
5. Explain wiring floral products by telephone/Internet.
6. Listen effectively.
7. Lead a discussion.
8. Organize thoughts and clearly express point of view.
9. Organize thoughts and write clearly.
10. Demonstrate interactions with customer (i.e. determine consumer need and provide technical assistance).
11. Develop a promotional display.

12. Demonstrate taking and processing telephone orders.
13 Explain how to maintain product and sales area of store.
14. Speak effectively in front of others.

Standard VI: Understand the principles of goal setting - personal and organizational.

Benchmark

Explain the goal setting process.

1. Define goals.

Standard VII: Understand the principles of planning.

Benchmark

Apply planning strategies in horticulture.

1. Plan planting schedules.
2. Identify basic inventory procedures and techniques.
3. Organize an event.
4. Use drafting techniques to draw a basic design plan to scale.
5. Develop a planting plan.
6. Prepare, design and plant a dish garden.
7. Develop a vegetable garden plan.
8. Utilize time effectively.
9. Design and construct fresh floral arrangements.
10. Work within guidelines.
11. Prioritize a series of tasks.

Standard VIII: Understand the concept of adapting to change in agriculture.

Benchmark

Develop strategies to effectively adapt to new situations and rapid changes in agriculture.

1. Adapt to change/demonstrate flexibility.
2. Accept new challenges.
3. Identify issues and trends in horticulture concerning environmental and conservation problems.
4. Explain current/future trends in horticulture.
5. Adapt to environment/situation.

Standard IX: Understand global and cultural diversity issues.

Benchmark

Demonstrate a working knowledge of the relationship between global/cultural diversity and occupational success in agriculture.

1. Measure a tree trunk accurately using a caliper.
2. Use a word processing, database and spreadsheet program.

3. Use "standard" units of measurement accurately in the various areas of horticulture.
4. Make change properly.

Standard X: Understand basic computational and informational technology.

Benchmark

Apply computational and informational technologies to analyze and solve mathematical problems.

1. Measure a tree trunk accurately using a caliper.
2. Use a word processing, database and spreadsheet program.
3. Use "standard" units of measurement accurately in the various areas of horticulture.
4. Make change properly.
5. Show awareness of various forms of electronic communication: e-mail, ftp, Worldwide Web.
6. Describe basic hardware components.
7. Use the following hardware components: keyboard, mouse, disk drive, monitor.
8. Recognize the operating system of a computer.
9. Use an operating system to: open or chose programs, list files or program and file management.

Standard XI: Understand the concept of career development and improvement – lifelong learning.

Benchmark

Develop strategies to make a successful transition from school to work.

1. Identify skills, physical and emotional requirements for a job.
2. Complete required forms.
3. Construct an application letter.
4. Evaluate job offer, benefits, time, and working environment.
5. Exhibit dependability/responsibility on the job.
6. Demonstrate punctuality.
7. Produce quality work.
8. Demonstrate personal hygiene and cleanliness.
9. Compose a resume.
10. Identify career opportunities in the horticulture industry.

Standard XII: Understand basic technical skills and knowledge in the occupational area of Horticulture.

Benchmark

Apply technical skills in a hands-on experiential setting in agriculture.

1. Fertilize media/soil.
2. Take soil samples.
3. Produce, harvest, and store greenhouse crops.
4. Maintain houseplants.

5. Prepare plant media.
6. Apply nutrients, soil amendments, by preparing a compost pile.
7. Prepare/plant seeds.
8. Label plants.
9. Identify growing structures utilized in horticulture.
10. Perform basic maintenance practices on gasoline and diesel engines.
11. Maintain large and small tools and implements.
12. Operate lawnmower, small tractor, weed trimmer, backpack sprayer, hand sprayer and edger safely.
13. Use proper equipment in all aspects of horticulture.
14. Use correct horticulture terminology.
15. Identify common weeds.
16. Label and price products.
17. Identify floriculture crops including houseplants by common name.
18. Identify midwestern fruits and nuts by common name.
19. Identify vegetables and herbs by common name.
20. Explain the propagation of plants by budding, grafting, and tissue culture techniques.
21. Maintain clean and orderly work area.
22. Install landscape material.
23. Identify different landscape structures and the materials used in their construction.
24. Prepare site and install sod and/or seed.
25. Force bulbs (control temperature, moisture, and light).
26. Identify plants using a botanical key.
27. Identify herbaceous and woody ornamental plants by common name.
28. Explain the process of producing, harvesting, and storing ornamental plants (i.e. trees, shrubs, Christmas trees, and perennials).
29. Prepare planting media.
30. Prepare/plant bulbs, corms, tubers, rhizomes, and roots.
31. Prepare/transplant trees and shrubs and seedlings.
32. Prepare/transplant trees, shrubs, and herbaceous perennials for container production.
33. Prune or shear plants and trees in an appropriate manner.
34. Identify Midwestern turf grasses by common name.
35. Observe commercial and residential irrigation systems.
36. Identify soil types for their fruit and vegetable production characteristics.
37. Prepare/transplant seedlings, cuttings, and daughter plants.
38. Construct bows using basic ribbon width.
39. Construct different types of body flowers.
40. Construct floral design using holiday greens.
41. Package florist flowers/arrangements for delivery.
42. Demonstrate the construction of a wedding or funeral design.
43. Properly care for the prepare fresh cut plant materials for use in floral design.
44. Prepare a green or flowering plant for sale.
45. Define production practices for greenhouse pot crops.
46. Identify common tools and mechanics used in arranging flowers.
47. Identify the types of flowers/greens that can be used in floral design.
48. Identify the basic principles of floral design.
49. Perform basic wiring and taping techniques.
50. Explain how to set up a maintenance schedule.

51. Explain the process of photosynthesis.
52. Explain factors affecting plant growth: light, water, temperature, humidity, nutrients (micro/macro) soils, atmosphere, and pollutants.
53. Explain the principles of nutrient uptake.
54. Define and identify hardiness zones.
55. Explain the system of scientific nomenclature for plants (e.g., families, genus, species).
56. Explain plant propagation from seed, cuttings, divisions, and layering.
57. Explain how to safely mix, apply, store, transport and dispose of chemicals and chemical containers.
58. Explain and demonstrate first aid practices when using chemicals.
59. Explain the principles of aerating turf.
60. Explain the process of producing, harvesting, and storing greenhouse crops.
61. Explain the process of maintaining orchards and vineyards and the harvesting and storing of fruit and vegetables.
62. Explain the use of a scale, cash register, and charge card authorization system.
63. Explain lawn and turf maintenance.
64. Explain the basic principles of landscape design.
65. Explain the principles of integrated pest management.

Standards, Benchmarks, & Performance Indicators for Agricultural Products & Processing

Standard I: Understand problem-solving, analysis, and decision-making in agriculture.

Benchmark

Analyze situation, use problem-solving approach and make appropriate decisions.

1. Interpret information on a packaging label (i.e., foods, pesticides, and antibiotics).
2. Explain the importance of safety in the workplace and demonstrate first aid techniques used in the work related accident.

Standard II: Understand leadership and ethics development in agriculture.

Benchmark

Apply principles of leadership and ethical behavior to selected situations in agriculture.

1. Delegate duties.
2. Become personally involved in a professional organization.
3. Take responsibility for mistakes and/or good work.
4. Manage time effectively.
5. Explain the ethical and cultural concerns of biotechnology in agricultural processing.
6. Demonstrate initiative.
7. Manage conflict (personal and customer).
8. Explain the ethical and cultural concerns of biotechnology in agricultural processing.
9. Demonstrate initiative.
10. Manage conflict (personal and customer).
11. Recognize relevant, ethical issues in business.

Standard III: Understand the concept of cooperation and community service/ teamwork.

Benchmark

Demonstrate cooperation and teamwork skills.

1. Work effectively with others.
2. Accept supervision willingly.
3. Utilize equipment correctly as shown/demonstrated by a supervisor.
4. Follow directions.
5. Follow rules and regulations.
6. Interact with others in a courteous and tactful manner.
7. Respect the property of others.
8. Facilitate group interactions (teamwork).
9. Develop positive community relations.
10. Cooperate with others.

11. Explain the relationship between public and private sectors.
12. Ask for help when needed.
13. Comply with safety and health rules.

Standard IV: Understand the use of entrepreneurial knowledge and skills in agriculture.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Analyze the concept of supply and demand.
2. Identify and describe the entrepreneurial, economic, and business management skills associated with the on-going production, processing and distribution of the agricultural products.
3. Analyze the contents of a business plan.
4. Explain the concept of competition.
5. Analyze business organizations.
6. Identify factors in obtaining finances for a new business.
7. Explain types of business ownership.
8. Explain the concept of organized labor and business.
9. Explain the concept of profit.
10. Identify skills required of a business owner.
11. Identify the personal characteristics of entrepreneurs.
12. Demonstrate the ability of market analysis.
13. Explain the concept of business cycles.
14. Recognize the importance of technical assistance.

Standard V: Understand the use of communication skills in agriculture – interpersonal and group; written and oral.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Lead a discussion.
2. Organize thoughts and write clearly.
3. Demonstrate proper telephone etiquette.
4. Explain the importance of quality assurance of food and fiber products.
5. Listen effectively.
6. Organize thoughts and clearly express point of view.
7. Explain the basic microbiological concepts associate with food and fiber products, including applications to the sanitary operation of the physical plant.
8. Explain the concepts of food sanitation and safety.
9. Speak effectively in front of others.

Standard VI: Understand the principles of goal setting - personal and organizational.

Benchmark

Explain the goal setting process.

1. Define goals.

Standard VII: Understand the principles of planning.

Benchmark

Apply planning strategies in agriculture products and processing businesses.

1. Organize an event.
2. Prioritize a series of tasks.
3. Utilize time effectively.
4. Work within guidelines.

Standard VIII: Understand the concept of adapting to change in agriculture.

Benchmark

Develop strategies to effectively adapt to new situations and rapid changes in agriculture.

1. Explain how trends in convenience buying have impacted processing and packaging.
2. Accept new challenges.
3. Adapt to environment/situation.
4. Adapt to change/demonstrate flexibility.

Standard IX: Understand global and cultural diversity issues.

Benchmark

Demonstrate a working knowledge of the relationship between global/cultural diversity and occupational success in agriculture.

1. Explain the impact global international markets have on products and processing.
2. Analyze the food distribution system in the U.S. and other nations.
3. Accept individual differences.
4. Demonstrate the use of the various measuring systems used in the U.S. and in other countries, and explain the benefits and show conversions of the various measuring systems.
5. Explain the nature of international trade.

Standard X: Understand basic computational and informational technology.

Benchmark

Apply computational and informational technologies to analyze and solve mathematical problems.

1. Use basic addition, subtraction, multiplication and division to formulate agricultural products for processing and/or packaging.
2. Demonstrate computer skills for business applications (i.e., spreadsheets, Internet, information management, word processing).
3. Show awareness of various forms of electronic communication: e-mail, ftp, Worldwide Web.
4. Describe basic hardware components.
5. Use the following hardware components: keyboard, mouse, disk drive, CD ROM, monitor.
6. Recognize the operating system of a computer.
7. Use an operating system to: locate, open, close, copy and delete programs and files.

Standard XI: Understand the concept of career development and improvement – lifelong learning.

Benchmark

Develop strategies to make a successful transition from school to work.

1. Identify skills, physical and emotional requirements for a job.
2. Complete required forms.
3. Construct an application letter.
4. Evaluate job offer, benefits, time, and working environment.
5. Identify the skills needed to become a productive and efficient worker in a production, processing, or distribution business.
6. Identify occupational opportunities available to the area of agricultural products and processing.
7. Demonstrate personal hygiene and cleanliness.
8. Exhibit dependability/responsibility on the job.
9. Compose a resume.
10. Demonstrate punctuality.
11. Produce quality work.

Standard XII: Understand basic technical skills and knowledge in the occupational area of agricultural products and processing.

Benchmark

Apply technical skills in a hands-on experiential setting in agriculture.

1. Identify geographic areas where and why product processing occurs.
2. Identify the use of chemicals and biological agents that affect agricultural processing.
3. Identify packaging methods of agricultural products and their impact on quality and distribution.
4. Identify the various agricultural products produced and processed in Iowa (i.e., fruits and vegetables, grains, meat, dairy, etc.).
5. Identify the various agricultural processing methods for agricultural products (i.e., irradiation, dried, frozen, thermo, fresh, vacuum sealed, canned, juiced, etc.).
6. Identify how genetically altered agricultural products affect the marketing of those agricultural products.
7. Demonstrate methods for storing and monitoring agricultural products (i.e., drying corn, moisture testing, insect damage, etc.).
8. Demonstrate the importance of operating and reading measuring devices accurately.
9. Describe quality factors for agricultural products (i.e., meats, grains, fiber, fruits, and vegetables, etc.).
10. Describe how health concerns, consumer issues, and political groups impact products.
11. Identify governmental agencies and structures regulating food products.
12. Identify the parts of plants and animals used in processed food and fiber products.
13. Maintain clean and orderly work area.

Standards and Benchmarks
for
Natural Resources

Standard I: Understand problem-solving, analysis, and decision-making in agriculture.

Benchmark

Analyze situation, use problem-solving approach and make appropriate decisions.

1. Assess and implement BMPs (Best Management Practices) related to agriculture drainage wells, erosion control, irrigation of wastewater, irrigation of groundwater, use of storage tanks (i.e., fuels, Anhydrous Ammonia, etc.) and wellhead and source of water protection which improve water quality.
2. Evaluate alternative solutions to Iowa air pollution problems.
3. Evaluate benefits and uses of native plants and animals, as well as their negative uses.
4. Explain the role of test plots in evaluating agricultural management practices.
5. Evaluate alternative agricultural systems based on productivity, profitability, environmental considerations, and social acceptance.
6. Evaluate means of solving local wildlife resource problems.
7. Evaluate and incorporate alternative fuel resource.
8. Determine soil amendments necessary based on soil tests, realistic yield goals, and the fertility level of a given piece of land.
9. Identify and evaluate conservation tillage systems and their productivity, profitability and environmental impact.
10. Evaluate means of solving local water resource problems.
11. Collecting, understanding, and analyzing samples to assess water quality and analyze findings.
12. Evaluate various solid waste disposal systems by their environmental impact.
13. Evaluate means of solving Iowa forest resource problems.

Standard II: Understand leadership and ethics development in agriculture.

Benchmark

Apply principles of leadership and ethical behavior to selected situations in agriculture.

1. Manage time effectively.
2. Become personally involved in a professional organization.
3. Manage conflict (personal and customer).
4. Delegate duties.
5. Take responsibility for mistakes and/or good work.
6. Recognize relevant, ethical issues in business.
7. Demonstrate initiative.

Standard III: Understand the concept of cooperation and community service/ teamwork.

Benchmark

Demonstrate cooperation and teamwork skills.

1. Comply with safety and health rules.
2. Utilize equipment correctly as shown/demonstrated by a supervisor.
3. Interact with others in a courteous and tactful manner.
4. Cooperate with others.
5 Respect the property of others.
6. Explain the relationship between public and private sectors.
7. Work effectively with others.
8. Follow rules and regulations.
9. Accept supervision willingly.
10. Facilitate group interactions (teamwork).
11. Follow directions.
12. Ask for help when needed.
13. Develop positive community relations.

Standard IV: Understand the use of entrepreneurial knowledge and skills in agriculture.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Identify the personal characteristics of entrepreneurs.
2. Analyze the contents of a business plan.
3. Recognize the importance of technical assistance.
4. Explain types of business ownership.
5. Identify factors in obtaining finances for a new business.
6. Demonstrate the ability of market analysis.
7. Analyze business organizations.
8. Identify skills required of a business owner.
9. Explain the concept of competition.
10. Analyze the concept of supply and demand.
11. Explain the concept of organized labor and business.
12. Explain the concept of business cycles.
13. Explain the concept of profit.

Standard V: Understand the use of communication skills in agriculture – interpersonal and group; written and oral.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Read manuals and labels to properly use agricultural equipment, chemicals, and other agricultural inputs correctly and safely.
2. Write a legal description of a selected piece of land.
3. Listen effectively.
4. Demonstrate proper telephone etiquette.

5. Organize thoughts and clearly express point of view.
6. Organize thoughts and write clearly.
7. Lead a discussion.
8. Speak effectively in front of others.

Standard VI: Understand the principles of goal setting - personal and organizational

Benchmark

Explain the goal setting process.

1. Define goals.
2. Prioritize a series of tasks.

Standard VII: Understand the principles of planning.

Benchmark

Apply planning strategies in natural resources management.

1. Develop an individual resource conservation plan to include crop, pasture, woodlands, wildlife, farmstead, and urban considerations.
2. Identify the role geologic resources have in land use planning.
3. Develop a wildlife management plan for a given area.
4. Utilize time effectively.
5. Organize an event.
6. Develop plans which incorporate the use of federal, state, and local agriculture programs to sustain resources (i.e., buffer strips).
7. Work within guidelines.

Standard VIII: Understand the concept of adapting to change in agriculture.

Benchmark

Develop strategies to effectively adapt to new situations and rapid changes in agriculture.

1. Identify contemporary natural resources issues/concerns relating to agriculture.
2. Adapt to environment/situation.
3. Accept new challenges.
4. Adapt to change/demonstrate flexibility.

Standard IX: Understand global and cultural diversity issues.

Benchmark

Demonstrate a working knowledge of the relationship between global/cultural diversity and occupational success in agriculture.

1. Describe global environmental impact.
2. Explain global positioning systems and graphic information systems and understand practice application.
3. Explain the nature of international trade.
4. Accept individual differences.

Standard X: Understand basic computational and informational technology.

Benchmark

Apply computational and informational technologies to analyze and solve mathematical problems.

1. Estimate water needs for a community and farm operation.
2. Measure and calculate land area, length, and percent slope.
3. Operate office equipment (e-mail, fax, phone innovations, etc.)
4. Demonstrate general computer literacy, word processing, information gathering, and database operation.
5. Show awareness of various forms of electronic communication: e-mail, ftp, Worldwide Web.
6. Describe basic hardware components.
7. Use the following hardware components: keyboard, mouse, disk drive, monitor.
8. Recognize the operating system of a computer
9. Use an operating system to: open or chose programs, list files or program and file.

Standard XI: Understand the concept of career development and improvement – lifelong learning.

Benchmark

Develop strategies to make a successful transition from school to work.

1. Identify a minimum of five (5) environmental and natural resource occupations and explain the job requirements, major activities performed by persons in these occupations and availability by location.
2. Explain the connection between the natural resources occupations, agribusiness, and technology.
3. Evaluate job offer, benefits, time, and working environment.
4. Demonstrate personal hygiene and cleanliness.
5. Compose a resume.
6. Identify skills, physical and emotional requirements for a job.
7. Complete required forms.
8. Construct an application letter.
9. Exhibit dependability/responsibility on the job.
10. Demonstrate punctuality.
11. Produce quality work.

Standard XII: Understand basic technical skills and knowledge in the occupational area of natural resources.

Benchmark

Apply technical skills in a hands-on experiential setting in agriculture.

1. Explain the economic impact of the loss of wildlife, habitat, urban sprawl, and navigation on wildlife resources.
2. Identify the agricultural impact of groundwater resource availability, management, and use.
3. Select alternative grazing practices to eliminate grazing of woodlands.

4. Identify alternative forest management practices that reduce “high grading” of timber harvest.
5. Describe the connections between land use, rural Iowa, and agriculture.
6. Locate a plot of land given a legal description.
7. Explain basic soil morphology and its relationship to management.
8. Explain the impact agriculture, industry, and population centers have on natural resources and the environment.
9. Use soil survey, topography maps, aerial photos, and other natural resources inventories to interpret, compare (limits and potentials), and plan wise land management.
10. Identify federal, state, and local regulations related to soil and water conservation, water quality, forestry, air quality, and wildlife. Explain their applicability to resource management.
11. Identify types of hunting leases and liability involved.
12. Determine crops and crop management that will provide habitat for wildlife.
13. Perform wildlife habitat improvements; be knowledgeable of wildlife habitat technologies.
14. Identify a minimum of 30 Iowa wildlife species to include game, non-game, and endangered species.
15. Explain a minimum of five timber stand improvement practices.
16. Identify woodland changes caused by pests and fire.
17. Explain important principals and economic values in managing trees for wood products, Christmas tree production, wildlife, recreation, windbreak, water recycling, air pollution, and energy.
18. Identify a minimum of fifteen (15) Iowa tree species and their common uses and planting objectives.
19. Demonstrate the proper planting of a tree based on soil conditions, size conditions, and land use objectives.
20. Describe how Iowa climate and weather is relevant to natural resources and agricultural resource management.
21. Identify techniques for improvement of aquatic habitats.
22. Identify a minimum of ten aquatic plants and ten aquatic animals common to Iowa.
23. Select appropriate conservation practices that will reduce erosion and improve water quality on a farm and urban area.
24. Describe the types of wind an water erosion and determine soil erosion rates and resulting economic and environmental losses to society.
25. Explain the principles of integrate crop (fertility levels, pests) management.
26. Explain the techniques of crop cultivation and how they interrelate with the environment.
27. Identify a minimum of 50 plants by their common names.
28. Explain the importance of protecting ground and surface water resources.
29. Explain proper stocking and management of farm ponds.
30. Explain current issues involved in natural resource management.
31. Explain harvest management techniques and regulations.
32. Describe current animal waste regulations as they apply to the environment.
33. Explain State and Federal Ag and Natural Resource Management Agencies and their functions.
34. Explain the hydrologic cycle.
35. Identify local sources of ground and surface water contamination and explain techniques for protecting these resources.

36. Identify and incorporate nutrient management practices including spreading lagoon fertilizers, commercial applicator training, composing of manure and animal carcasses, managing wastes from food processing facilities through composting, developing manure management plans, the application of municipal sludge, and the storage, handling, and transfer of chemicals into agricultural plans.
37. Identify BMPs (Best Management Practices) for proper asbestos removal from agriculture facilities.
38. Identify BMPs (Best Management Practices) for management of solid wastes from agriculture facilities (i.e., reduce burning and on-site disposal).
39. Identify BMPs (Best Management Practices) for the management of vehicular wastes (i.e., oil antifreeze, lead batteries, tires, etc.).
40. Incorporate wildlife depredation prevention into animal husbandry practices.
41. Maintain clean and orderly work area.

Standards and Benchmarks
for
Agricultural Mechanics

Standard I: Understand problem-solving, analysis, and decision-making in agriculture.

Benchmark

Analyze situation, use problem-solving approach and make appropriate decisions.

1. Measure and trouble shoot electrical circuits (to include charging and starting systems) using a circuit test.
2. Troubleshoot and diagnose malfunctions pertaining to engines.
3. Differentiate between cast iron, metallic arc, gas tungsten, TIG, oxy/act. Welding including the selection of equipment and supplies.
4. Identify environmental problems in agricultural structures such as livestock building and chemical storage facilities.
5. Plan and evaluate farmstead and agricultural building design and layout.
6. Compare types of drives, used in agricultural machinery.
7. Sketch a simple line drawing of a three dimensional object showing top, bottom, and front views.

Standard II: Understand leadership and ethics development in agriculture.

Benchmark

Apply principles of leadership and ethical behavior to selected situations in agriculture.

1. Take responsibility for mistakes and/or good work.
2. Become personally involved in a professional organization.
3. Manage time effectively.
4. Demonstrate initiative.
5. Recognize relevant, ethical issues in business.
6. Manage conflict (personal and customer).
7. Delegate duties.

Standard III: Understand the concept of cooperation and community service/ teamwork.

Benchmark

Demonstrate cooperation and teamwork skills.

1. Facilitate group interactions (teamwork).
2. Follow rules and regulations.
3. Work effectively with others.

4. Respect the property of others.
5. Follow directions.
6. Comply with safety and health rules.
7. Utilize equipment correctly as shown/demonstrated by a supervisor.
8. Cooperate with others.
9. Interact with others in a courteous and tactful manner.
10. Develop positive community relations.
11. Accept supervision willingly.
12. Ask for help when needed.
13. Explain the relationship between public and private sectors.

Standard IV: Understand the use of entrepreneurial knowledge and skills in agriculture.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Identify the personal characteristics of entrepreneurs.
2. Analyze the contents of a business plan.
3. Recognize the importance of technical assistance.
4. Explain types of business ownership.
5. Identify factors in obtaining finances for a new business.
6. Demonstrate the ability of market analysis.
7. Analyze business organizations.
8. Identify skills required of a business owner.
9. Explain the concept of competition.
10. Analyze the concept of supply and demand.
11. Explain the concept of organized labor and business.
12. Explain the concept of business cycles.
13. Explain the concept of profit.

Standard V: Understand the use of communication skills in agriculture – interpersonal and group; written and oral.

Benchmark

Use appropriate communication skills in a variety of occupational situations in agriculture.

1. Develop a bill of materials and projected cost list.
2. Interpret and follow recommended service and maintenance schedules using operator's manuals.
3. Handle hazardous chemicals and flammable materials according to product label.
4. Utilize service or cooperator's manuals, and catalogs to complete a job.
5. Explain the terms compression ratio, and piston displacement.
6. Speak effectively in front of others.
7. Demonstrate proper telephone etiquette.
8. Organize thoughts and write clearly.
9. Listen effectively.

10. Lead a discussion.
11. Organize thoughts and clearly express point of view.

Standard VI: Understand the principles of goal setting – personal and organizational.

Benchmark

Explain the goal setting process.

1. Prioritize a series of tasks.
2. Define goals.

Standard VII: Understand the principles of planning.

Benchmark

Apply planning strategies in agriculture mechanics.

1. Interpret plans and working drawings.
2. Complete a simple construction project of good quality.
3. Work within guidelines.
4. Utilize time effectively.
5. Organize an event.

Standard VIII: Understand the concept of adapting to change in agriculture.

Benchmark

Develop strategies to effectively adapt to new situations and rapid changes in agriculture.

1. Identify common applications of agricultural machinery and major trends in technology.
2. Adapt to environment/situation.
3. Accept new challenges.
4. Adapt to change/demonstrate flexibility.

Standard IX: Understand global and cultural diversity issues.

Benchmark

Demonstrate a working knowledge of the relationship between global/cultural diversity and occupational success in agriculture.

1. Accept individual differences.
2. Explain the nature of international trade.

Standard X: Understand basic computational and informational technology.

Benchmark

Apply computational and informational technologies to analyze and solve mathematical problems.

1. Demonstrate adjustment or calibration seeding, fertilizing, spraying, harvesting, tillage, or processing machinery.
2. Demonstrate proper measurement and layout of a mechanics project.
3. Calculate board fee, square feet, and linear foot of lumber or metal.
4. Use basic computer functions or word processing, spreadsheet, and database management.
5. Identify and compute harvest losses.
6. Calculate the volume of concrete to be ordered based on a design plan.
7. Describe basic hardware components.
8. Use the following hardware components: keyboard, mouse, disk drive, monitor.
9. Recognize the operating system of a computer.
10. Use an operating system to locate, open, close, copy and delete programs and files.
11. Show awareness of various forms of electronic communication: e-mail, ftp, Worldwide Web.
12. Describe basic hardware components.
13. Use the following hardware components: keyboard, mouse, disk drive, monitor.
14. Recognize what the operating system of a computer is.
15. Use an operating system to: open or chose programs, list files or program and file.

Standard XI: Understand the concept of career development and improvement - lifelong learning.

Benchmark

Develop strategies to make a successful transition from school to work.

1. Demonstrate punctuality.
2. Produce quality work.
3. Describe career opportunities in various areas of agricultural mechanics.
4. Identify skills, physical and emotional requirements for a job.
5. Complete required forms.
6. Construct an application letter.
7. Evaluate job offer, benefits, time, and working environment.
8. Demonstrate personal hygiene and cleanliness.
9. Exhibit dependability/responsibility on the job.
10. Compose a resume.
11. Maintain clean and orderly work area.

Standard XII: Understand basic technical skills and knowledge in the occupational area of agricultural mechanics.

Benchmark

Apply technical skills in a hands-on experiential setting in agriculture.

1. Demonstrate installation of a simple electrical circuit with switch, receptacles, and over current protection.
2. Demonstrate work with electricity in a safe manner.
3. Identify factors for selecting motors and protection devices based upon types of application.
4. Complete the following plumbing joints: plastic, copper solder, compression joints, and threaded pipe.
5. Explain functions and applications of electrical circuits and sensors used in agricultural equipment.
6. Explain the function and operating principles of two-stroke and four-stroke gasoline diesel engine systems.
7. Perform routine care, maintenance and perform tune-up of a gasoline engine.
8. Demonstrate site preparation, placement and proper curing of quality concrete.
9. Describe wiring standards for agricultural application.
10. Describe basic principles of electricity and define electrical related terminology.
11. Describe importance of proper grounding systems and ground-fault protection.
12. Describe relationship between volts, ohm, amps, watts and kilowatts.
13. Identify symbols from basic wiring circuits.
14. Set up and maintain equipment, cut a hole, straight line, and bevel on flat mild steel using a gas torch and/or plasma cutter.
15. List the advantages of brazing and complete a braze weld using gas welding equipment.
16. Describe ingredients and mixes of high quality concrete.
17. Describe characteristics of a quality weld.
18. Explain arc, braze, and wire fed welding terms and principles.
19. Set up equipment , prepare metal and complete corner, fillet, lap and butt welds on mild steel in various positions with wire fed braze and arc welders.
20. Maintain clean and orderly work area.
21. Select fuels, lubricants, hydraulic fluids and filters by service classifications.
22. Perform a four-stroke or two-stroke cycle engine overhaul.
23. Select and properly use hand and power tools.
24. Determine tap and die sizes and thread pitch.
25. Identify common building materials, hardware and their uses.
26. Identify types of erosion control structures.
27. Select abrasives for grinding and sharpening.
28. Recondition tools such as twist drill, chisels, punches.
29. Identify basic structural parts of a building.
30. Select hydraulic components from a vendor's sales literature
31. Identify components of hydraulic systems.
32. Operate agricultural equipment in a safe manner.
33. Use shop tools in a safe manner.
34. Demonstrate use of level for determining slope for building layout.
35. Explain basic procedures for emergency rescue involved in agricultural related accidents.
36. Describe basic hydraulic functions including fluids, fluid cleanliness and filtration.
37. Explain the relationship among pressure, velocity, flow and power in a hydraulic system.

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