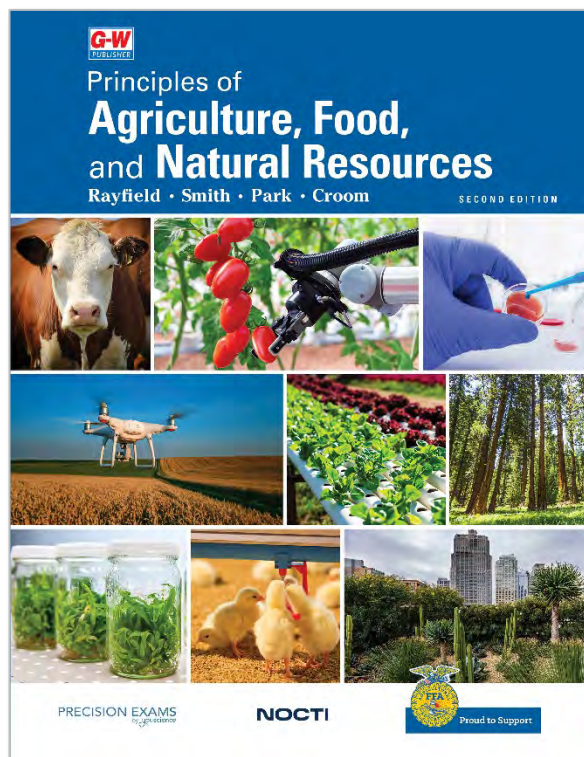


Correlation of
Principles of Agriculture, Food, and Natural Resources
by John S. Rayfield, Kasee L. Smith, Travis D. Park, D. Barry Croom
(Goodheart-Willcox Publisher ©2023)
to
Precision Exams Agricultural Science I

Goodheart-Willcox is pleased to partner with Precision Exams by correlating *Principles of Agriculture, Food, and Natural Resources* to their Agricultural Science standards. Precision Exams standards and Career Skills Exams were created in concert with industry and subject matter experts to match real-world job skills and marketplace demands. Students that pass the exam and performance portion of the exam can earn a Career Skills Certification.

The correlation chart below lists the Standards, Objectives, and Indicators for the Agricultural Science exam in the left column. Corresponding content from *Principles of Agriculture, Food, and Natural Resources* that can be used by a student to help achieve the standard, objective, or indicator is listed in the right column.

For more information on Precision Exams, including a complete listing of their 150+ Career Skills Exams and Certificates, please visit www.precisionexams.com.



| Standards / Objectives / Indicators | Textbook Pages <small>(The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX)</small> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standard 1: Students will explain the role of student organizations in agricultural education. | |
| Objective 1. Discuss the history and organization of student organizations as they relate to the complete program of agricultural education. | Student Organizations 56-57 Lesson 3.1 Experiential Learning through Agriculture 92-109 Agricultural Education Model 93-94 |
| Indicator 1: Explain the interrelationship of classroom and laboratory instruction, supervised agricultural experience, and student organizations. | Lesson 3.1 Experiential Learning through Agriculture 92-109 Agricultural Education Model 93-94 SAE Components 95-99 |

Correlation of *Horticulture Today* to Precision Exams Plant and Soil Science—page 2

| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator 2: Describe how, when, and why student organizations were organized. | Legislation That Influenced Modern Agricultural Education 23-24 |
| Indicator 3: Identify key historical events within student organizations. | Student Organizations 56-57 AA #6 p60 |
| Indicator 4: Identify the mission and strategies, colors, motto, emblem and parts of the emblem, and organizational structure of student organizations. | AG ED Connection: Conduct of Chapter Meetings and Parliamentary Procedure LDEs 82 AA #10, 11, 12, 8 p60 |
| Indicator 5: Recite and explain the meaning of student organizations creed. | FFA Connection: Speaking Leadership Events 65 AA #7 p60 |
| Indicator 6: Discuss the meaning and purpose of a program of activities and its committee structure. | AG ED Connection: FFA Program of Activities 94 |
| Indicator 7: List student organizations officers and discuss the role of each. | AA #9 p60 |
| Objective 2. Identify opportunities in student organizations. | Lesson 2.1 Building Leadership Skills through Agriculture 48-60 Lesson 2.2 Communication Skills in the Agricultural Industry 61-74 |
| Indicator 1: Describe student organizations opportunities that develop leadership skills, personal growth, and career success. | Chapter 2 Leadership in Agriculture 46-89 Lesson 2.1 Building Leadership Skills through Agriculture 48-60 Lesson 2.2 Communication Skills in the Agricultural Industry 61-74 Lesson 2.3 Conducting Meetings in Agricultural Organizations 75-89 Lesson 3.1 Experiential Learning through Agriculture (SAE) 92-109 Lesson 3.2 Your Career in Agriculture 110-133 |
| Indicator 2: Summarize major state and national activities available to student organizations members. | Speaking Leadership Events 65 Conduct of Chapter Meetings and Parliamentary Procedure LDEs 82 FFA Program of Activities 94 Employment Skills LDE 122 The National FFA Agriscience Fair: Categories 196 The National FFA Agriscience Fair 197 |
| Objective 3. Describe student organizations degrees, awards, and career development events (CDEs). | FFA Program of Activities 4 FFA Scholarships 56 AA #3 p73 Awards and Recognition 102-103 FFA Connection: The National FFA Agriscience Fair 196 |

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| Standards / Objectives / Indicators | Textbook Pages <small>(The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX)</small> |
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| Indicator 1: List and explain student organizations degree areas. | FFA Program of Activities 4 Awards and Recognition 102-103 TC #3 p109 |
| Indicator 2: Identify student organizations proficiency awards. | Awards and Recognition 102-103 SAE Connection: Research SAE 193 TC #3 p109 SAE #3 p931 |
| Indicator 3: List and discuss various team and individual CDEs, LDEs, and awards. | Conduct of Chapter Meetings and Parliamentary Procedure LDEs 2 Employment Skills LDE 122 The National FFA Agriscience Fair 209 Farm and Agribusiness Management CDE 398 Marketing Plan CDE 409 Food Science and Technology CDE 466 Dairy Cattle Events 516 Horse Evaluation CDE 526 Veterinary Science CDE 624 Agronomy CDE 712 Floriculture CDE 762 Nursery/Landscape CDE 766 |
| Standard 2: Students will explain the role of supervised agricultural experience (SAE) programs in agricultural education. | |
| Objective 1. Examine the responsibilities and benefits associated with an SAE. | Lesson 3.1 Experiential Learning through Agriculture 92-109 |
| Indicator 1: Explain the meaning and benefits of supervised agricultural experience. | Supervised Agricultural Experiences 94 |
| Indicator 2: Explain the characteristics of an effective SAE program and the responsibilities of those involved. | TC #1 p108 |
| Objective 2. Determine the types of SAE programs. | Supervised Agricultural Experiences 94-99 Placement/Internship SAE 97 School-Based Enterprise SAE 98 Service Learning SAE 98-99 |
| Indicator 1: Compare entrepreneurship SAEs and placement SAEs. | SAE Components 95-99 Foundational SAEs 95-96 Immersion SAEs 96-99 Ownership/Entrepreneurship SAE 97 Placement/Internship SAEs 97 |
| Indicator 2: Describe research/experimentation SAEs. | Research SAE 98 SAE Connection: Research SAE 193 |
| Indicator 3: Describe exploratory SAEs. | Foundational SAEs 95-96 |
| Objective 3. Plan an SAE program. | Developing an Immersion SAE Plan 99 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator 1: Identify the steps in planning an SAE program. | Developing an Immersion SAE Plan 99 SAE Interests 99 SAE Resources (Time, Money, Equipment, Facilities) 100-101 |
| Indicator 2: Describe the function of a business/training plan and/or agreement in an SAE program. | FFA Program of Activities 94 SAE Connection: Business Plan 402 |
| Indicator 3: Develop a short-range plan and a long-range plan for an SAE program. | Setting SAE Goals 102-103 |
| Indicator 4: Relate classroom and laboratory instruction to an SAE program. | SAE #2 p109 |
| Objective 4. Maintain and use SAE records. | SAE Recordkeeping 103 |
| Indicator 1: Explain the importance of keeping records on an SAE program. | How to Know What to Record 103-104 TC #2 p109 |
| Indicator 2: Explain how SAE records are organized | SAE Recordkeeping 103-105 Journaling Experiences 104 Recording Finances 104 Methods for Recordkeeping 105 |
| Indicator 3: Follow approved procedures to make entries in SAE records. | SAE Recordkeeping 103-105 |
| Standard 3: Students will describe the relationship of agricultural science to the sciences and the scientific method. | |
| Objective 1. Describe how science is integral to agriculture. | Lesson 5.2 Practical Science in Agriculture 204-210 AA #1 p212 |
| Indicator 1: Describe how life science, including botany and zoology is integral to agriculture. | AA #1 p212 TC #1-2 p213 |
| Indicator 2: Describe how physical science, including earth science, chemistry, and physics is integral to agriculture. | Lesson 5.2 Practical Science in Agriculture 204-213 Lesson 5.3 Biotechnology in Agriculture 214-231 |
| Indicator 3: Describe how mathematics, including calculation, measurement, and statistics is integral to agriculture. | Chapter 8 Agricultural Mathematics 394-435 Lesson 8.2 Practical Mathematics in Agriculture 418-435 |
| Indicator 4: Describe how the social sciences, including economics, geography, sociology, and psychology is integral to agriculture. | Lesson 5.2 Practical Science in Agriculture 204-213 |
| Objective 2. Apply the scientific method in solving agricultural problems. | Lesson 5.1 Agriscience and the Scientific Method 192-203 AA #1-#2 p201 TC p202 ST #1 p230 |
| Indicator 1: Define the scientific method and explain why it is used. | The Scientific Method 193-203 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Indicator 2: List and explain the steps of the scientific method.</p> <ol style="list-style-type: none"> 1. Identify the problem 2. Information gathering/research 3. Hypothesis formation 4. Experiment 5. Conclusion | The Scientific Method 193-203 |
| <p>Indicator 3: Maintain laboratory logs, including detailed and precise records of events and observations.</p> | <p>Step 4: Collect and Analyze Data 196</p> <p>Step 5: Reach a Conclusion 197</p> <p>Communicating Results 197</p> |
| <p>Indicator 4: Use the scientific method to investigate a problem.</p> | <p>Know and Understand #12-13 p201</p> <p>AA #1-2 p201</p> <p>TC #1-2 p202-203</p> <p>ST #1 p230</p> |
| <p>Indicator 5: Explain the general guidelines for preparing a research report.</p> | The Scientific Method 193-203 |
| <p>Objective 3. Explore the role of research, development, and technology in the agricultural industry.</p> | <p>Chapter 6 Agricultural Technology 232-263</p> <p>Lesson 1.3 Future of Agriculture, Food Systems, and Natural Resources Management 32-45</p> |
| <p>Indicator 1: Explain the meaning and importance of research and development.</p> | Technology and Agriculture 35-37 |
| <p>Indicator 2: Identify major providers of agricultural research, such as the USDA’s Agricultural Research Service, and review examples of their research.</p> | <p>USDA Economic Research Service</p> <p>Land Use in the United States (Figure 1-4) 6</p> <p>Agricultural Imports and Exports (Figure 1-5) 7</p> <p>Food Dollar Series (Figure 1-9) 9</p> <p>Risk Management 407</p> <p>Household Income Spent on food (Figure 9-3) 441</p> <p>Food Availability (Figure 9-5) 442</p> <p>US Department of Commerce (Figure 1-8) 8</p> <p>US Bureau of Economic Analysis (Figure 1-8) 8</p> <p>US Bureau of Labor Statistics (<i>salaries included in Career Connection Features</i>)</p> <p>USDA, 4-H youth development organization 57</p> <p>USDA ARS Wheat Quality Lab, SAE for ALL Profile 190</p> <p>Environmental Protection Agency (EPA) chemical regulation 206, 849</p> <p>USDA, defining genetic engineering 216</p> <p>USDA Foreign Agricultural Service, Biotechnology Regulation 225</p> <p><i>(continued on following page)</i></p> |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Indicator 2: Identify major providers of agricultural research, such as the USDA’s Agricultural Research Service, and review examples of their research.</p> | <p><i>(continued from preceding page)</i> USDA, defining genetic engineering 216 USDA Foreign Agricultural Service, Biotechnology Regulation 225 USDA Food and Drug Administration (FDA), Biotechnology Regulation 225 USDA Food Safety and Inspection Service (FSIS) regulations in food production 442 Centers for Disease Control and Prevention (CDC) 461 US Department of Homeland Security 461 Animal and Plant Health Inspection Service (APHIS) 461 Food and Nutrition Services (FNS) 461 National Institute of Food and Agriculture (NIFA) 462 National Agricultural Library (NAL) 462 United States Forest Service (USFS) 845 Natural Resources Conservation Service (NRCS) 847, 949 National Oceanic and Atmospheric Administration (NOAA) 849 National Association of Conservation Districts (NACD) 850 Soil and Water Conservation Districts (SWCDs) 850</p> |
| <p>Indicator 3: Identify major areas of research in agriculture.</p> | <p>Lesson 9.1 Food Production Systems 438-459 Lesson 9.2 Maintaining a Safe Food Supply 460-470 Lesson 9.3 Animal Feeds and Feeding 471-489 Chapter 10 Large Livestock Production 490-549 Chapter 11 Small Livestock Production 550-615 Chapter 12 Other Animal Production 616-683 Chapter 13 Plant Production 684-775 Chapter 14 Environmental Systems Impacting Agriculture 776-841 Lesson 15.2 Soil Formation and Properties 855-873 Lesson 15.3 Hydrological Cycles 874-887 Lesson 15.4 Water Quality 888-900 Lesson 15.5 Conservation Practices in Agriculture 901-915</p> |
| <p>Indicator 4: Define biotechnology and explore its impact on agriculture.</p> | <p>Lesson 5.3 Biotechnology in Agriculture 214-231</p> |
| <p>Indicator 5: Describe current applications of biotechnology in agriculture.</p> | <p>Natural and Artificial Selection (plants and animals) 215 Genetic Engineering 216 Genetically Modified Organisms 216-221 Genetic Engineering and Animal Production 221-229</p> |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator 6: Describe benefits and risks associated with biotechnology. | Benefits of GMO Crops 218-220 Risks of GMO Crops 220-221 Benefits of Transgenic Animals 224 Risks of Transgenic Animals 224 |
| Indicator 7: Identify career opportunities in agricultural biotechnology. | Career Connection: Geneticist 27; Biomedical Engineer 226; |
| Indicator 8: Determine the role of science and technology in agricultural production and processing. | Lesson 9.1 Food Production Systems 438-459 Lesson 9.2 Maintaining a Safe Food Supply 460-470 Lesson 9.3 Animal Feeds and Feeding 471-489 Chapter 10 Large Livestock Production 490-549 Chapter 11 Small Livestock Production 550-615 Chapter 12 Other Animal Production 616-683 Chapter 13 Plant Production 684-775 Chapter 14 Environmental Systems Impacting Agriculture 776-841 Lesson 15.2 Soil Formation and Properties 855-873 Lesson 15.3 Hydrological Cycles 874-887 Lesson 15.4 Water Quality 888-900 Lesson 15.5 Conservation Practices in Agriculture 901-915 |
| Indicator 9: Describe the application of precision technologies in agriculture. | Satellite Technology 26 STEM Connection: Coding in Agriculture 38 Precision Agriculture 253 Telematics and Mobile Applications 254-255 Today's Agriculture 816 TC #2 p262 |
| Objective 4. Apply mathematics skills used in the agricultural industry. | Lesson 8.2 Practical Mathematics in Agriculture 418-435 |
| Indicator 1: Convert standard and metric measurements. | Fluid Quantities 419-421 Dry Quantities 422 Ratios 423 Practice Problems by Category 432 |
| Indicator 2: Determine length, area, and volume measurements. | Calculating Length and Area 426-427 Calculating Volume 427 |
| Objective 5. Describe safety skills needed in the agricultural industry. | <i>Safety First notes are dispersed throughout the text</i> Chapter 4 Agricultural Safety 134-189 Lesson 4.1 Occupational Safety and Health 136-147 Lesson 4.2 Shop and Lab Safety 148-164 Lesson 4.3 Farm and Work Safety 165-189 AA 1-2 p187 TC 1-2 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
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| Indicator 1: Explain where accidents occur and identify agencies associated with workplace safety. | Hazardous Jobs 140 The Department of Labor 138-139 Working Outdoors 142 ST 2-3 p188 |
| Indicator 2: Explain why accidents occur and how to prevent them. | Shop Safety 153 Maintaining a Safe Environment 141 What Makes Agriculture Jobs So Dangerous? 165-166 |
| Indicator 3: Demonstrate personal and laboratory safety, including correct use of personal protective equipment (PPE) and proper disposal of wastes. | Best Practices in Workplace Safety 142 Supervised Agricultural Experience (Safety) 143 Safety Procedures 149 Personal Protective Equipment 149-153, 166-167 Fire Extinguishers 154 Safety Data Sheets 155 Electrical Safety 156-157, 171-173 Ladder and Scaffolding Safety 158 AA #1-2 p146 CA #2 p188 AA #1 p163 TC #1-3 p163 |
| Standard 4: Students will explain basic principles of agricultural science. | |
| Objective 1. Examine basic soil science principles. | Chapter 15 Soil and Water Conservation 842-914 Lesson 15.2 Soil Formation and Properties 855-873 |
| Indicator 1: Explain the components of soil. | Soil Composition and Texture 860-865 |
| Indicator 2: Investigate soil texture and structure. | STEM Connection: Using the Soil Triangle 861 Figure 15-16: soil particle sizes 862 USDA NRCS Soil Test 864 Soil Enrichment and Preservation 865-868 |
| Indicator 3: Explain soil profile. (O Horizon/Organic, A Horizon/Topsoil, B Horizon/Subsoil and C Horizon/Bedrock) | Soil Horizons and Layers 855-857 |
| Indicator 4: Explain what soil color indicates. | STEM Connection: Using the Soil Triangle #5 p861 Organic Matter 863 USDA NRCS Soil Test 864 |
| Indicator 5: Examine moisture-holding capacity and the characteristics of soil water. | Sand 862 Silt 862 Clay 863 Organic Matter 863 Water, Air, and Pore Spaces 863-864 Loamy Soil 865 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
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| Indicator 6: Explain soil pH. | Precipitation 859 Leaching 859 |
| Indicator 7: Describe the testing and importance of soil fertility. | Soil Enrichment and Preservation 865-868 USDA NRCS Soil Test 864 |
| Indicator 8: Investigate soil degradation. | Soil Erosion 866-867 Compaction 867 Salinization 868 |
| Indicator 9: Describe soil erosion and management practices. | Rotating Crops 866 Limiting Cultivation 866 Soil Erosion 866-867 Windbreaks, Cover Crops, Tillage Systems 866 No-Till and Reduced Tillage 866-867 Water Erosion 867 |
| Indicator 10: Identify careers in soil science and determine educational requirements, working conditions, and earning potential for those careers. | Career Connection: Soil Scientist 869 Career Connection: Agricultural Engineer 144, 293 Career Connection: Ecologist 786 |
| Objective 2. Investigate basic principles of the plant science industry. | Chapter 13 Plant Production 684-775 |
| Indicator 1: Explain plant classification and nomenclature. | Plant Classification 695 |
| Indicator 2: Examine plant structures and functions. | Plant Structure 687-689 Plant Parts 689-695 |
| Indicator 3: Classify plants according to plant use; status as annual, biennial, and perennial; and status as monocotyledons or dicotyledons. | Growth Cycle 696 Plant Use 696 Figure 13-16 Comparison of monocots and dicots 696 Figure 13-17 Growth cycles 696 |
| Indicator 4: Explain the basic process of photosynthesis and its importance to life on Earth. | Photosynthesis 697-698, 801 STEM Connection: Artificial Photosynthesis 698 |
| Indicator 5: Explain cellular respiration and its importance to plant life. | Cellular Respiration 698 |
| Indicator 6: Identify careers in plant science and determine educational requirements, working conditions, and earning potential for those careers. | Career Connections: Production Agriculturist 12; Geneticist 27; Community Garden Program Manager 455; Crop Consultant 718; Floral Designer 770; Arborist 970 |

Correlation of *Horticulture Today* to Precision Exams Plant and Soil Science—page 10

| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
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| Objective 3. Investigate basic principles of the animal science industry. | Production Cycle of Beef Cattle 493 (illustrated) Dairy Cattle 511 (illustrated) Poultry 555 (illustrated) Swine 578 (illustrated) Sheep 591 (illustrated) Goats 604 (illustrated) Bees 658 Llamas and Alpacas 661 Rabbits 662 Deer 664 Elk 665 Bison 667 |
| Indicator 1: Compare differences between plants and animals. | Chapter 10 Large Livestock Production 490-549 Chapter 11 Small Livestock Production 550-615 Chapter 12 Other Animal Production 616-683 Chapter 13 Plant Production 684-775 |
| Indicator 2: Identify basic characteristics of animal cells, tissues, organs, and organ systems. | Nutrients 472-477 The Basics of Digestion 479 Ruminant Digestive Systems 480 Monogastric Digestive System 481 Modified Monogastric Digestive System 481 Avian Digestive System 482 |
| Indicator 3: Describe the skeletal, muscular, nervous, respiratory, digestive, circulatory, excretory, and reproductive systems of animals. | Reproductive Technology 222-224 Ruminant Digestive Systems 480 Monogastric Digestive System 481 Modified Monogastric Digestive System 481 Avian Digestive System 482, 558 Anatomy of Beef Cattle 495 Anatomy of Dairy Cattle 513 Anatomy of an Equine 530 Leg Conformation (equine) 531 Hoof Composition (equine) 531 STEM Connection: Poultry Reproductive System 556 Anatomy of Poultry 558 Anatomy of Swine 580 Anatomy of Sheep 592-594 Anatomy of Goats 605-607 STEM Connection: Water Movement (fish) 643 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator 4: Describe the basic physiological functions of animal bodily systems. | How Digestion Works 479-483 Types of Digestive Systems 480-482 STEM Connection: Poultry Reproductive System 556 Egg Production (ducks) 569 Reproduction (geese) 571 |
| Indicator 5: Compare and contrast ruminant and non-ruminant digestive systems. | How Digestion Works 479-483 Types of Digestive Systems 480-482 Ruminant Digestive Systems 480 Monogastric Digestive System 481 Modified Monogastric Digestive System 481 Avian Digestive System 482 |
| Indicator 6: Compare and contrast cattle, sheep, and swine breeds, uses, and products. | Lesson 10.1 The Beef Industry 492-508 Lesson 10.2 The Dairy Industry 509-523 Lesson 11.2 The Swine Industry 577-589 Lesson 11.3 The Sheep Industry 590-602 Lesson 12.4 By-Products from Animal Industries 671-683 |
| Indicator 7: Compare and contrast nutritional needs of cattle, sheep, and swine. | Lesson 9.3 Animal Feeds and Feeding 471 Nutrients 472-477 Nutrient Requirements 476-477 Animal Feeding Considerations 478-479 |
| Indicator 8: Identify careers in animal science and determine educational requirements, working conditions, and earning potential for those careers. | SAE for ALL Profile: Karley Rayfield 490 Careers (beef industry) 493 SAE for ALL Profile: Matthew Collins 550 SAE for ALL Profile: Nathan Kindall 616 Careers in the Companion Animal Industry 635 Careers in the Aquaculture Industry 650-651 Career Connections: USDA FSIS Veterinarian 467; Equine Chiropractor 534; Livestock Veterinarian 584; Avian Veterinarian 635; Aquaculture Managers 651; Hunting Preserve Manager 667; Rendering Plant Operator 678 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
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| Objective 4. Explain the role of genetics in agricultural science. | Biotechnology 27 Career Connection: Geneticist 27 SAE for ALL Profile: Shelle Lenssen 190 Natural and Artificial Selection 215 Genetic Engineering 216 Genetically Modified Organisms 216-221 STEM Connection: Genetics in Agriculture 217 STEM Connection: DNA and Genetic Engineering 218 Genetic Engineering and Animal Production 221-224 AA #1 p229 TC #1-2 p229 SAE #1-3 p229 |
| Indicator 1: Define genetics and discuss its importance. | Genetic Engineering 216 STEM Connection: Genetics in Agriculture 217 STEM Connection: DNA and Genetic Engineering 218 Individual Genetics (nutrient requirements) 477 EX #3 p231 TC #3 p262 |
| Indicator 2: Identify and discuss the contents of a genome. | STEM Connection: Genetics in Agriculture 217 ST #2 p230 |
| Indicator 3: Distinguish heredity type, including genotype and phenotype. | STEM Connection: Genetics in Agriculture 217 |
| Indicator 4: Describe genetic trait expression and prediction. | STEM Connection: Genetics in Agriculture 217 STEM Connection: Domesticating the Silver Fox 19 |
| Objective 5. Explore means of conserving natural resources. | SAE #2 p790 Sustainable Practices: Conserving Water 795 CH 15 Soil and Water Conservation 842-915 SAE for ALL Profile: Therese Becher 842 Lesson 16.3 Stewardship of Natural Resources 945-957 |
| Indicator 1: Identify types of natural resources. | Types of Natural Resources 946 |
| Indicator 2: Classify natural resources into renewable and non-renewable resources. | Renewable Energy Sources 266-273 Nonrenewable Resources 273-280 Types of Natural Resources 946 AA #2 p955 TC #3 p955 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
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| Indicator 3: Describe components and processes in ecosystems. | Lesson 14.1 Ecosystems 778-790 Ecosystems 779-780 Ecosystems in the United States 780-784 Ecosystems outside the United States 785 Lesson 14.2 Ecological Cycles 791- |
| Indicator 4: Determine sources of environmental pollution and describe methods for reducing pollution. | Environmental Impact (natural gas) 274-275 Environmental Impact (crude oil) 277 Environmental Impact (nuclear energy) 280 Agriculture’s Impact on Ecosystems 785-786 Surface Water Pollution 795 Acid Rain 796 Nitrification of Water Supplies 799 Carbon in the Atmosphere 800-802 Carbon in the Oceans 802 Today’s Agriculture 816-817 Water Pollution 895-896 Pollution Sources 896 AA #3 p808 TC #2 900 |
| Indicator 5: Compare methods of waste disposal. | Work Area 153 Manure Pits 175-176 Waste Management (poultry house) 238 Waste Management (swine barn) 239 Waste Management (equine facility) 242 Wastewater (aquaculture) 242, 647 Waste Storage Structures 244-245 Waste Control (vertical farming) 257 Wastewater Recycling 272 Biomass Energy 272 Coal (plant waste) 274 Refineries 278 Environmental Impact (nuclear waste) 280 Methanol (livestock waste) 290 Septic Systems 388, 877 Wastewater Treatment Systems 388-389 <i>(continued on following page)</i> |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Indicator 5: Compare methods of waste disposal. | <i>(continued from preceding page)</i> Food Disposal 440 Litter (poultry) 563 Wastewater (aquaculture) 647 Chemicals (in groundwater) 876 Groundwater Contamination 877 Water Pollution Control 905-906 Livestock Waste Management 906-907 Negative-Impact Activities on the Farm 949-952 TC #3 p147 TC #2 p392 AA #4 p887 |
| Indicator 6: Determine how to reduce agricultural pollution. | Sustainable Agriculture 34 Global Positioning System Application 253 Crop Telemetry 255 Carbon Credits 803 Agricultural Pollution 896 Organic Farming 256 Vertical Farming 257-258 Biomass Energy 272-273 Soil Management 745 Fertilizer Application 746 Cover Crops and Mulches 746 Cultural Practices 748 |
| Indicator 7: Determine the importance and methods of natural resource conservation. | Biofuels 255 Organic Farming 256 Organic Farming 256 Vertical Farming 257-258 Vertical Farming 257-258 Biofuels 286-296 Soil Management 745 Fertilizer Application 746 Cover Crops and Mulches 746 Cultural Practices 748 How Much Will the Land Sustain? 829-830 |
| Indicator 8: Identify careers in natural resources and determine educational requirements, working conditions, and earning potential for those careers. | SAE #3 p790 Career Connections: Ecologist 786; Reservoir Manager 804; Surveying and Mapping Technicians 836; Meteorologist 820; Natural Resources Conservation Service Civil Engineer 851; Soil Scientist 869; Water Quality Specialist 897 |

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| Standards / Objectives / Indicators | Textbook Pages (The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objective 6. Describe food science technology. | Chapter 9 The Importance of Food 436- Emerging Technology in Food Safety 466 |
| Indicator 1: Research the scope of the food science industry and the world food supply. | Food Safety and Processing Continuum 462-463 |
| Indicator 2: Explain food preservation methods including canning, fermenting, irradiation, dehydration, and freezing. | Emerging Technology in Food Safety 466 |
| Indicator 3: Describe food spoilage prevention. | Electrical Systems 347 Transporting Food 446-447 Harvesting (cooling) 750 |
| Indicator 4: Describe food safety and sanitation. | Lesson 9.2 Maintaining a Safe Food Supply |
| Indicator 5: Identify careers in food science and determine educational requirements, working conditions, and earning potential for those careers. | Career Opportunities in Food Safety 467 Career Connections: USDA FSIS Veterinarian 467; Animal Nutritionist 483; Food Safety Inspector 755; |
| Standard 5: Students will explain basic agribusiness principles and demonstrate employability skills. | |
| Objective 1. Explore personal finance management. | Hands-On Ag: Developing a Personal Leadership Plan 53 Foundational SAEs: Personal Financial Management and Planning 95 Figure 3-4 Foundational SAEs at Each Level 96 |
| Indicator 1: Investigate personal finances and goal making. | Foundational SAEs: Personal Financial Management and Planning 95 Figure 3-4 Foundational SAEs at Each Level 96 Setting SAE Goals 102-103 Return on Investment (goals) 407 |
| Indicator 2: Distinguish the pros and cons of borrowing money. | Loans 404 Interest 404 |
| Indicator 3: Identify benefits associated with long-term and short-term loans. | Loans 404 |
| Indicator 4: Determine sources of credit. | Loans 404 |
| Indicator 5: Calculate interest rates. | Interest 404 |
| Objective 2. Examine business structures and management. | Business Structures 408-409 Risk Management 407-408 Business Management and Marketing 408-412 |
| Indicator 1: Describe basic principles of business management. | Accounting Basics 401 |
| Indicator 2: Explain different types of business structures. | Business Structures 408-409 Developing Niche Markets 401 |
| Indicator 3: Define and explain ethics in agribusiness. | Business Ethics 412-413 |

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| Standards / Objectives / Indicators | Textbook Pages <small>(The end of lesson and end of chapter questions and activities are abbreviated as follows: AA = Analyze and Apply, TC = Thinking Critically, SAE for All Opportunities = SAE, ST = STEM and Academic Activities, Communicating about Agriculture CA = Extending Your Knowledge = EX)</small> |
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| Objective 3. Explain keeping and using records in agricultural occupations. | Keeping Accurate Agribusiness Records 401-407 |
| Indicator 1: Explain the purpose of record keeping. | Keeping Accurate Agribusiness Records 401-407 |
| Indicator 2: Describe net worth, assets, liabilities, depreciation, expense, income, cash flow, income statements, and computerized record keeping. | Economics in Agribusiness 397-401 STEM Connection: Calculating Net Worth 405 |
| Indicator 3: Develop a budget for an agricultural enterprise. | TC #1 p417 |
| Objective 4. Demonstrate communication skills needed for successful employment. | Lesson 2.2 Communication Skills in the Agriculture Industry 61-74 Communication Basics 62 Nonverbal Communication 62 Verbal Communication 62-66 Written Communication 66-69 Communication Systems 69-70 Conducting a Meeting 76-77 |
| Indicator 1: Define communication and its components and processes. | Introduction 61 Lesson 2.2 Communication Skills in the Agriculture Industry 61-74 Communication Systems 69-70 |
| Indicator 2: Describe effective communication techniques. | Conversation 64 Figure 2-18 Types of Oral Communication 63 Analyze and Apply 1-3 p73 |
| Indicator 3: Identify effective speaking techniques. | Public Speaking 64-65 Presentation Skills 67 Thinking Critically 1 p74 Communicating about Agriculture 3 p88 Extending Your Knowledge 2 p89 |
| Indicator 4: Develop listening techniques. | Listening 66 Passive and Active Listening 66 Becoming an Active Listener 66 Communicating about Agriculture 1-2 p88-89 |
| Indicator 5: Organize and present a persuasive message. | Written Communications 66-69 Presentation Skills 67 Public Speaking 64-65 Hands-On: Writing a Speech 65 Analyze and Apply 1 p73 STEM and Academic Activities: Language Arts 5 p88 |
| Indicator 6: Demonstrate communication skills in appropriate situations | Communication Systems 69-70 Conducting a Meeting 76-77 |

