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Use a smart phone or other device with a QR Code app to scan the code. It will provide a quick connection to the Web site of the National Association of Agricultural Educators and a wealth of useful resources. Links to other organizations can also be made, including the National FFA Organization and the National Council for Agricultural Education. (Used with permission of the NAAE, Lexington, Kentucky.)

The overall instructional approach advocated in the Teacher’s Manual is research-based: students learn more when they are actively involved in the process. The Teacher’s Manual stresses regular reading by students to learn the content as well as enhance their reading skills. Many activities are suggested for students to apply the content. “Learning by doing” should involve all three learning domains: cognitive, affective, and psychomotor skills. This serves as the basis for the instructional strategies in the Teacher’s Manual.

**THE TEXTBOOK**

*AgriScience Explorations*, Fourth Edition, builds on the successful use of previous editions that were initially published in 1997, 2000, 2004, and 2009. It is designed for use in the upper middle school grades and can be used as the first book in high school agriculture classes. The book is particularly suited for grades 7 through 9.

Curriculum guides and state course frameworks were carefully studied in designing the subject matter content of *AgriScience Explorations*, Fourth Edition. The textbook was structured with information from agricultural educators throughout the United States. Careful review of the outline, objectives, and chapter content has ensured an accurate, user-friendly book. National and state standards for agricultural education were investigated and carefully integrated into the book, particularly the Fourth Edition.

*AgriScience Explorations*, Fourth Edition, is appealing to students and teachers. Hundreds of photographs and line art items have been used to illustrate the content. Major effort has been made to use youthful models in many of the photographs. Reading levels for each chapter were checked and adjusted using computer-based reading ease formulas.

**Book Contents**

The contents of *AgriScience Explorations*, Fourth Edition, have been carefully selected to serve a wide range of audiences. The book has 25 chapters divided into four units. The chapters provide agricultural information and orient students to the FFA, supervised experience, and personal and leadership development, including an introduction to parliamentary procedure.

Additions in the Fourth Edition focus on veterinary science and horticulture science. Marketing and management have been restructured and made more appropriate for this book.
Additions in the Fourth Edition deal with more thorough coverage of the Agriculture, Food & Natural Resources career cluster and its eight pathways. The technical content has been updated to reflect new and emerging areas in the agricultural industry, the greatest changes in this edition relate to added content on veterinary science and horticulture science. In addition to updating and expanding the content, the illustrations have also been updated and expanded with many new illustrations in the Fourth Edition.

The units and chapters are:

**Unit One—AgriScience Today**
- Chapter 1—Agricultural Industry
- Chapter 2—Finding Your Place—Careers
- Chapter 3—Moving Ahead
- Chapter 4—Technology
- Chapter 5—Human Well-Being
- Chapter 6—Doing Business
- Chapter 7—Safety

**Unit Two—Science Applications**
- Chapter 8—Science in Action
- Chapter 9—Agricultural Biotechnology
- Chapter 10—Environment and Natural Resources
- Chapter 11—Agricultural Mechanics and Power

**Unit Three—AgriScience in Action**
- Chapter 12—Solving Problems
- Chapter 13—Animals
- Chapter 14—Veterinary Science
- Chapter 15—Plants
- Chapter 16—Soil
- Chapter 17—Horticulture Science
- Chapter 18—Food Science
- Chapter 19—Technology Systems
- Chapter 20—Management and Marketing

**Unit Four—Personal Growth and Leadership**
- Chapter 21—Communication
- Chapter 22—FFA
- Chapter 23—Supervised Experience
- Chapter 24—Personal Skills
- Chapter 25—Leadership Skills

The Fourth Edition has Appendix A: Common Motions Used in Parliamentary Procedure. This appendix provides details on the use of parliamentary procedure in meetings. This content will be useful to students who seek to advance in FFA degrees of membership, particularly to the chapter degree.

In addition, an updated glossary and a bibliography are useful features in the book.
Chapter Format

Each chapter in the textbook follows a similar format. The format was developed using research methods with students, teachers, and others in the field of agricultural education. This format has become the standard for textbooks used in agricultural education. The format components are designed to meet the needs of students and teachers in a quality educational environment. In addition to the features described here, some chapters also have a personal development feature. The use of Internet sites as resources is also suggested in the chapters.

Major features of the format in each chapter are:

- First chapter page—The first page of each chapter has objectives and a terms list. The objectives were carefully selected and sequenced before the chapter was written. Additional modifications were made to better address standards established by the various states for agricultural education and by the National Agriculture, Food, & Natural Resources Career Cluster Content Standards. The sequence of the objectives was based on learning readiness and prerequisite learning in an instructional situation. The terms list contains the 10-15 most salient terms in the chapter. These terms are presented in bold italics typeface where they are defined.

- Second chapter page—A short narrative section and an appealing photograph are used on the second page. The narrative is designed to introduce chapter content and gain the interest of students. In most cases, the photograph depicts a scene or an activity that has immediate appeal. Many youthful models have been used in the photographs. From a teaching perspective, this page is designed to be used as an interest approach.

- Third chapter page through end of the content—The content of the chapter begins on the third page. The narrative has been written at the 7-8th grade reading level. Age-specific and numerous photographs and line art drawings have been included. These are designed to enhance the narrative. In addition, each chapter contains inserts to add extra interest. These are the Career Profiles and AgriScience Connections. Each has a photograph or illustration plus narrative. These have been carefully selected and developed to go with the content of the chapter.

- Reviewing section—The Reviewing section follows the chapter content. This section has two parts: Main Ideas and Questions. The Main Ideas section summarizes chapter content. The Questions review and reinforce important concepts in the chapter. Some teachers also use the Questions in evaluation. All questions are easily answered from content of the chapter. Some questions have probing-type questions that require students to select or make choices. Guidelines are presented to help assess how students respond with these types of questions. The Main Ideas and Questions are correlated with the objectives for the chapter.

- Evaluating—The Evaluating section has matching items to evaluate mastery of selected chapter terms or concepts. These are all covered in the chapter content.

- Exploring—The Exploring section has two or more activities to apply chapter content. They often involve using community resources or conducting experiments in the school laboratory. Always emphasize safety with any learning activity. Students often need to be taught the proper procedures to follow in doing the Exploring items.

- Integrated Items—Each chapter has items integrated into the content that are intended to gain attention and motivate students. These are AgriScience Connections and Career Profiles. Each of these is intended to relate to overall chapter content. In addition, a few chapters have Personal Growth features integrated into the layout.
THE AUTHORS

The authors have a wide range of experience in teaching and instructional materials development for agricultural education. One of the authors has been an outstanding high school teacher in Maine, one author is a former teacher and teacher educator now involved in instructional materials development, and the other author is a former teacher who is now a teacher educator.

Feel free to contact the authors. You may ask questions or provide suggestions. You may also have your students make contact. To do so, contact Jasper S. Lee as follows: jasperlee@windstream.net.

ADDITIONAL MATERIALS

Several additional materials are available to assist teachers in using the textbook. These include a student Activity Manual and Instructor’s Guide to the Student Activity Manual. Contact Prentice Hall Interstate for additional information.

Additional textbooks that might be useful are listed here:

- AgriScience (grades 9-11)
- Introduction to Horticulture (grades 10-12)
- Introduction to Livestock and Companion Animals (grades 10-11)
- Landscape Design, Construction, and Maintenance (grades 11-12)

ORGANIZATION OF THE TEACHER’S MANUAL

The Teacher’s Manual for AgriScience Explorations, Fourth Edition, is organized into 25 chapters. These are parallel to the chapters in the textbook. Each chapter in the Teacher’s Manual is designed to provide useful information for teachers to use in providing quality instruction. To do so, the manual is divided into the following parts:

- Chapter Summary—The Chapter Summary provides a brief overview of the chapter in the textbook. In some cases, information for the teacher may be included that is not in the textbook. In no way does the chapter summary cover at the same depth the content of each chapter in the textbook.
- Instructional Objectives—The Instructional Objectives section includes objectives from the textbook but written from the perspective of a teacher. Each objective is stated as behaviors that students will have upon completing the instruction.
- Instructional Strategies—This section includes suggestions that will be helpful in preparing teaching plans. The Teacher’s Manual will present suggestions for the interest approach and how to introduce the objectives for systematic instruction. Emphasis is on involving students in mastering the content of the chapters. The suggestions are based on research that found that students who are active in the learning process have higher achievement. Each student will be expected to have and use a notebook, laptop, or tablet computer for recording important information, study purposes, and as a record of class activities. Meaningful homework can well be a part of the instructional strategies in each lesson.
Review and Evaluation—Two sections in the textbook can be used in reviewing and evaluating. The Reviewing section has two subsections: Main Ideas and Questions. The Main Ideas subsection is a narrative summary of chapter content. The Questions subsection includes several questions that review, reinforce, and evaluate student achievement. The Evaluating section contains matching items to help assess student mastery of concepts and terms. In addition, teachers are encouraged to use teacher-made approaches designed to meet the needs of students and specific instructional content.

Additional Resources—This section lists a few additional resources that might be particularly useful with the chapter.

Answers to Questions and Evaluating—This section contains answers or suggestions about answers to items in the Questions and Evaluating sections of the textbook.

INSTRUCTIONAL INTERACTIONS

Teachers want their students to be successful learners. They know that student achievement promotes their success as teachers. Student achievement also promotes higher standardized test scores, which are widely used measures to assess teacher performance. It is beneficial to take a few minutes to review important information on the processes that occur in classrooms and laboratories that promote student achievement.

Important instructional interactions occur in an agricultural education classroom and laboratory. These interactions reflect a “contract” between the teacher and the learners. The strength of the contract depends on the commitment of each to the learning interactions. Teachers are there to teach; learners are there to learn. Both must be involved for a transaction (learning) to occur. A teacher is responsible for promoting an efficient interaction with all students—even those who may not be committed to the process.

A short summary of proven teaching strategies is presented here.

Teaching and Learning

Two major interactions occur in agriscience instruction: teaching and learning. Teaching is directing the learning process of others. A wide variety of strategies and resources are available. Teachers must select those that have the greatest return in terms of student achievement.

Learning is the acquisition of information, skills, or attitudes so that future responses are different from those of the past. These are acquired in terms of previous learning. What is learned may vary widely. They may involve, among others, the ability to read and comprehend information, to carry out a demonstration, or to perform a skill related to a process.

The ultimate goal of all teaching is to facilitate learning. The learning process must be so managed that students efficiently and maximally acquire the desired outcome. The focus must be on the student.

Student-Focused Teaching

Student-focused teaching is instruction that actively involves students in the teaching-learning interaction. It is a directive process but allows flexibility for student and situational differences. Students may need to be taught how to benefit from student-focused teaching. Contrast student-focused teaching with teacher-focused teaching in which only the teacher has learning materials and the teacher is the sole source of information.
The teaching strategy for student-focused teaching in agriscience is RLRWP-E. The model is supported by planning and resources. Planning includes both curriculum and instructional areas. Resources include those used by both students and the teacher. Each student should have a personal copy of *AgriScience Explorations*, Fourth Edition. Students who do not have the book are deprived of the most valuable learning tool for the class. They will be unable to participate fully in learning experiences based on student involvement. The process of student involvement also uses continual student assessment and feedback. The process is carried out with teacher involvement and learner direction. Both teachers and students are active.

Here is the meaning of RLRWP-E:

- R - Reading
- L - Listening
- R - Responding
- W - Writing
- P - Practicing
- E - Evaluation

All stages of RLRWP-E engage students in meaningful activity directed toward mastering agriscience content objectives. Repetition using varied student roles and sensing receptors (seeing, hearing, etc.) enhances learning. The stages do not necessarily fall in a specific sequence though some sequence is inherent in RLRWP-E. Students can read, listen, respond, write, and practice at various times throughout a lesson. Teachers enrich the process with locally-relevant examples, applications, and instructional resources.

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**Figure 1.** A student-focused teaching model using RLRWP-E.
Reading

Students learn by reading. Students also learn to read and expand their vocabulary by reading. Reading should be carefully directed by the teacher on content that promotes achievement of the instructional objectives. Reading involves visual acuity. The sense of vision detects codes, known as letters, that are used to form words. The reader derives meaning from the words and supporting illustrations. Student-friendly textbooks are essential. That is why *AgriScience Explorations*, Fourth Edition, was so carefully designed. It has appropriate terms, is well illustrated, and provides for the needs of the teaching-learning interaction. Only textbooks that are written at the appropriate reading level can enable students to attain this goal. Reading may be as homework, supervised study, or aloud in class.

When combined with listening, responding, writing, and practice, directed reading helps produce strong learning results.

Listening

Listening uses the sense of hearing. Students hear words and subjects discussed. Some students may lack the ability to listen. If so, the ability to listen may require some skill development by speaking and having students orally and respond by rote with information that was spoken.

Listening helps students internalize information and become articulate in the content they have read. Realia (real things) may be used by the teacher in presentations to help students make connections between what they hear and technical content. Realia include models, specimens, demonstrations, experiments, supervised experience, audiovisual and computer-based media, and other enriching resources.

Responding

Responding requires an active role by students. They are expected to speak, write, or otherwise communicate the information involved in the teaching-learning interaction. Responding may involve students answering questions, providing oral reports, and discussing content topics. Other approaches involving student response include having them prepare computer-based presentations, develop posters, or build displays.

Responding can follow reading. As some students respond, others are listening and hear content information being spoken. Responding may also increase the need for additional reading to prepare a report, or to carry out an activity or practice. How the teacher directs the process involves continual assessment of student engagement, mastery, and participation.

Writing

Writing further reinforces terms, meanings, processes, diagrams, and other content-oriented information. It also promotes reading, spelling, and communication skills. Writing involves having students record key concepts from their reading, listening, and responding.

The writing stage is recording information in notebooks. The information is often that which was summarized on the writing surface by the teacher. This may be partially accomplished by having students answer questions and define terms from the textbook or “do” the activities in a lab or activity manual. Students may prepare written reports on field trips, resource person presentations, or other observations or feelings about subjects related to the class. In some cases, laptop computers may substitute for paper notebooks.
Practicing

Practice is a major time for reinforcing student mastery and providing meaning to abstract concepts. Experiments, demonstrations, “doing” skill-oriented activities, and manipulating devices are examples of practice.

Practice is often carried out in the school laboratory but may be done in other ways. Supervised experience is an excellent opportunity for practice in a real-world setting. FFA activities also promote practice in career events, proficiency awards, and leadership development events.

Practice activities should be selected to support the instructional objectives. Choosing activities that are not related to the objectives is contrary to the notion of systematic instruction.

Many resources are available to help with practice. One example is the student activity manual. These resource materials, including lab manuals, integrate review and enhancement of basic information with hands-on learning. Many of today’s textbooks have activity manuals that are directly correlated with the content of the textbook.

Evaluation

Evaluation is a continuing process. Teacher observation of student focus on achieving the objectives is ongoing. Student participation and response in RLRWP is the base of evaluation. (Note that in the graphic model shown in Figure 1 evaluation is referred to as “assessing.”) The “Evaluating” section at the end of each chapter is useful but is only the beginning of continual student assessment, feedback, re-teaching, and other teacher functions to ensure learning. Teacher-made tests as well as test banks, activity manual results, and actual performance are important in evaluation.

SUMMARY

Learning requires mental activity by the student. Teachers promote activities that stimulate mental activity. Using AgriScience Explorations and its ancillaries also promote mental stimulation. The Activity Manual is the major student-focused ancillary.
CHAPTER SUMMARY

Life is ever-changing. How people go about daily living has changed. Food, clothing, and housing are available in convenient and high quality forms. People no longer spend long hours hunting and searching for simple items to meet their needs just to stay alive. A large, interconnected industry has emerged to serve people’s needs: the agricultural industry.

The agricultural industry is all of the activity needed to get food, clothing, and shelter to people. The industry is big and diverse. Agribusiness is all of the non-production agriculture components of the agricultural industry. Agribusiness includes two major areas: 1-supplies and services; and 2-marketing and processing. Of course, the roots of the agricultural industry are in production agriculture!

Agriculture is growing crops and animals to meet the needs of people. It focuses on the farm and ranch. This is different from the agricultural industry, which has a much broader focus. The number of people in farming has been declining. Production per farm worker has gone up. This means that each farm worker is far more important in providing for our needs than in the past. Even some farming is carried on around cities, known as suburban farming.

Forestry, aquaculture, horticulture, natural resources, companion and service animals, and environmental areas are now a part of the broad notion of agriculture. These provide for important needs of people. They use many of the same basic areas of science as does farming and ranching. These are often very popular areas with students.

Much has changed about agriculture in the history of the United States. Human power has been replaced with animal power that has since been replaced with mechanical power. This allows one individual to get far more done than a couple of centuries ago. Many early farmers were self-sufficient.

Today, commercial agriculture has changed how people farm. Commercial agriculture is producing commodities to sell to others. Initially, the commodities might be sold to warehouses, processing plants, or other outlets. Some commodities go into international trade. Technology is increasingly important. All of the advances in agriculture tend to provide important benefits to the way of life in the United States.

INSTRUCTIONAL OBJECTIVES

The goal of Chapter 1 is to explain the modern agricultural industry. This includes the major events in the emergence and adoption of new technology and the benefits of agriculture in the United States. To achieve this goal, learners will be able to:

1. Describe the modern agricultural industry.
2. Trace major developments in the history of agriculture.
3. Explain the rise of commercial agriculture.
4. List the benefits of agriculture to the United States.
5. Identify factors impacting food and fiber in the future.

INSTRUCTIONAL STRATEGIES

Instructional strategies used with this chapter should emphasize the importance of the agricultural industry, how it emerged, and the benefits of agriculture to the United States. The chapter should also prepare students for the next lessons and chapters in the textbook. The best learning will result from actively involving students in the learning process. Reading, responding, discussing, recording, reviewing, applying, and evaluating will serve well in their achievement. All students should have notebooks for recording important information and reviewing after class.

The teaching plan should have an interest approach. This is followed by presenting the objectives and covering the content of the chapter so that the objectives are achieved. The teaching plan should include techniques which are a part of the RLRWP-E approach.

Begin the interest approach by having students read the introductory page of the chapter. Reading can be done as homework or during supervised study in class. This is a short passage and will not take long for stu-
dents to read. Afterward, call on one or more students to orally summarize each paragraph. Ask students to give examples of how life has changed from colonial times in the United States. List a few answers on the writing surface.

Move from the interest approach into the objectives. Have students read the objectives on the second page of the chapter or list the objectives on the writing surface or overhead transparency.

After the objectives have been presented, begin covering the content of the chapter to achieve the objectives. Have students read in class as supervised study or as homework the various sections of the chapter. Begin with the section “Agriculture Is an Industry.” List key terms on the writing surface. Ask students to explain the terms. List short definitions of each term on the writing surface. Encourage students to keep notes. Initially, getting them to take notes may require encouragement. Reading, note taking, class discussion and activities, reviewing, and evaluating are needed for students to achieve. Have students provide examples of definitions and provide explanations of terms. Be sure to go over the AgriScience Connection and Career Profile in the chapter.

Have students read “History Helps Understanding” as homework or during supervised study. Outline the content on the writing surface. Afterward, follow the same procedure with the “Commercial Agriculture,” “Benefits of Agriculture,” and “The Future” sections. Involve all students in discussing, taking notes, and responding.

**REVIEW AND EVALUATION**

Review should involve the Reviewing section at the end of the chapter. Begin by having students read the Main Ideas section. Call on one or more students to explain the content of this section. Afterward, have students answer the items in the Questions section. The items can be answered as homework, during supervised study, or orally during class. Insist on quality answers. Hold to high expectations for the students. The Questions can be used in evaluation and to review and reinforce learning.

Use the Evaluating section as one means of evaluating student learning. Students should match the terms with the definitions. This can be done in supervised study followed by oral discussion and review. In addition, teachers can prepare teacher-made tests or use tests from a computer-generated test bank or the state end-of-course test bank, if your state has such.

The Exploring section can also be used in review and evaluation. This section provides activities to carry learning beyond the classroom.

**ADDITIONAL RESOURCES**

Additional resources may be useful in applying chapter content to the local community and state. Use local materials that summarize the major areas of agriculture. Materials can be from the U.S. Census of Agriculture, the local chamber of commerce, or another source. The Internet offers good opportunities for expanding beyond the classroom. A good Web site at this point in instruction is the U.S. Department of Agriculture: [www.usda.gov](http://www.usda.gov). Several textbooks listed under Additional Resources in the introduction to the Teacher’s Manual may be useful.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 1 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is farming?

   *Farming is using the land and other resources to grow crops and raise animals.*

2. What is the agricultural industry?

   *The agricultural industry is all of the activity needed to get food, clothing, and shelter or housing to people. It includes agribusiness, production agriculture, and related areas.*

3. What role did the Native Americans have in the early history of U.S. agriculture?

   *The Native Americans taught Colonists how to use practices to grow new plants. They taught the Colonists how to collect seed and select the best soil for plants.*

4. How did settlers approach farming in the Colonies?

   *The Colonists brought crops and animals from Europe and other countries. They tried to use European practices with the crops and animals. These sometimes failed. The Colonists were more successful after learning from the Native Americans.*
5. Name two early U.S. government leaders who were strong supporters of agriculture.

Two early U.S. government leaders who were strong supporters of agriculture were George Washington and Thomas Jefferson.

6. What is agriculture policy?

Agriculture policy includes the laws of government that influence agriculture.

7. What is the nature of agriculture today?

Today, agriculture is commercial. There are fewer farms and farm workers. Each produces enough food and other agricultural products for about 155 other people. Modern farm machinery and other practices are used.

8. What is the difference between self-sufficient agriculture and commercial agriculture?

Self-sufficient means that the farms used what they produced. Little is left over for selling or trading to others. Commercial agriculture is producing specifically to sell to others. Little or none of what is produced may be used on the farm.

9. What are the major benefits of agriculture to the U.S.?

Major benefits of agriculture to the U.S. are: meets the needs of people, makes country strong, provides jobs, provides trade, and supports industry.

10. What is the name of the town where the first livestock entered the U.S.?

Jamestown

Evaluating

1=g, 2=d, 3=a, 4=b, 5=c, 6=e, 7=h, and 8=f

FINDING YOUR PLACE—CAREERS

CHAPTER SUMMARY

Many careers are available for those with interests in the Agriculture, Food and Natural Resources Career Cluster. A career is the general direction of an individual’s life as related to work. Some people work for others; some people are self-employed, which means that they work for themselves. Regardless, work is a natural and integral part of life.

In order to advance (move up the career ladder), career planning is needed. Begin by setting goals. A goal is an end to be reached. We have goals related to all areas of life, with careers being among those goals. We go through a process of establishing goals, which is known as goal setting. Some goals are short-term and one year or less in duration; other goals are intermediate or 1 to 4 years duration. Long-term goals are four or more years in duration. Short-term goals are steps toward intermediate goals and intermediate goals are steps toward long-term goals. As life progresses, goals need to be assessed and revised to meet new accomplishments and situations.

Career skills are needed in at least three areas: education, people skills, and experience. Some schools and states use career pathway plans of study. A career pathway plan of study is a written document that details the education needed by a student to enter an occupation. Such plans are typically developed upon entering high school. People skills are the abilities that help people get along and work well together. These include common courtesies and involving others in making decisions that matter to them. Experience may be obtained through supervised experience or otherwise. Most middle school students are just reaching a time when they can begin to gain experience.

All occupations are organized into 16 career clusters. Agriculture, Food and Natural Resources is one of the clusters. It is divided into eight career pathways: animal science, plant science, natural resources, food products and processing, environmental service, agribusiness, biotechnology, and power, structural and technical. Officially, each of the pathways ends with the word “systems.” In agricultural
education, we have not traditionally used that terminology but it is increasingly being done. If the seven pathway organization is used, biotechnology is covered under the other appropriate pathways.

Employers hold certain expectations. These are in three areas: general, personal skills and work habits, and citizenship. Each of these has important attributes that are described for the students in the textbook.

**INSTRUCTIONAL OBJECTIVES**

The overall goal of Chapter 2 is to explain the importance of careers and career success in the agriculture, food and natural resources (AFNR) career cluster. To achieve this goal, learners will be able to:

1. Explain career planning.
2. Relate planning to career ladders.
3. Identify skills needed for career success.
4. Name and describe career pathways.
5. Discuss examples of occupations in agriculture, food and natural resource
6. Relate employer expectations and work habits to career success.

**INSTRUCTIONAL STRATEGIES**

Choose overall instructional strategies that are relevant to the educational and social development of the students, i.e., developmentally appropriate. Use of the textbook will be a central focus of the strategy that is used. This will include involving students in strategies that make the textbook an integral and exciting part of the learning process. You will also want to consider the RLRWP-E approach for mastery learning. Local individuals in AFNR occupations can be good resource persons to share the nature of their careers with the class. Students can also research a career field and provide a written and/or oral report on their findings. In some cases, students may be involved with job shadowing in supervised experience. If so, they may be able to use a digital camera to record impressions of the work and prepare an electronic presentation for class use.

Begin the chapter by having students read the introductory paragraphs. Call on one or more to respond by summarizing these paragraphs orally in class. Refer students to the objectives and have various members of the class read each. You may also refer to the list of terms indicating that these are the key words to be learned from study of the chapter.

Move into the first section of the chapter, “Career Planning.” Students should read this as supervised study or as homework. In some cases, individuals may be called on to read paragraphs aloud in class. Use the writing surface to list key terms and concepts, such as career, self-employed, goal, and goal setting. Call on students to offer definitions of these terms. Write the definition on the writing surface. Students may also write the definitions in their notebooks. You may also have each student write tentative goals along with ways and means and target dates for achieving the goals.

Next, cover the section on “Career Ladders.” After it has been read, call on individuals to explain the meaning of career ladder. Ask them to give examples of people in careers that have progressed up the career ladder.

Cover the chapter section on “Career Skills.” This section is organized into the areas of education, people skills, and experience. A resource person could be used to reinforce these areas. Each student could interview someone about how his or her education, people skills, and experience have led to success. Students should prepare a report on their observations. Introduce supervised experience as a means of gaining experience. Indicate that supervised experience will be covered in Chapter 23. If it is appropriate, you may wish to skip to that chapter after this chapter.

Go into the section on “Career Clusters and Pathways.” Emphasize the eight pathways and review the list of occupations in Table 2-2. Ask students to name individuals they know who may be in one of the occupations. Students could be assigned one of the occupations and asked to research it and report back to class. Their research and reports should include four areas: nature of the work, where jobs are found, education and experience needed, and opportunities for advancement. The school agriculture lab may have equipment that is used in some of these occupations that students can observe.

The section on “Employer Expectations and Work Habits” is a good sequence to specific study and investigation of AFNR occupations. After students have read the section, cover each general expectation by placing key words on the writing surface. Have students explain what the key words mean. A resource person who is in human resources or a manager would be good to cover these points. Cover the personal skills and work habits in the same way. Go over each. Ask students to explain what each means and how it is important to success. Next, cover citizenship. Have students identify examples of good citizenship.
REVIEW AND EVALUATION

Review and evaluation can involve a number of strategies. Observation of student performance throughout the chapter provides good evidence of the extent of review that is needed and how to approach evaluation. It is suggested that students read and orally summarize the Main Ideas in class. You may need to re-teach some of the content if, during review, students appear to lack mastery.

The end of chapter questions can be used in both reviewing chapter content and evaluating student learning. Having students answer the questions in writing and then discussing them in class reinforces as well as assesses student performance.

The evaluating section can be used to assess student mastery of selected terms in the chapter. It can be done individually in writing and then orally discussed.

The items in the Exploring section may be useful in review and evaluation. These items also expand class and chapter content.

If your school uses career pathway plans of study with students, now is a good time to get your students into their plans. Follow school policies on this. Plans could be initially developed or updated, as the need may be. Preparing a career pathway plan of study involves students in thinking about much of the content of this chapter. If these career plans are not used at your school, you may begin discussing supervised experience and developing student interest in planning their supervised experience.

ADDITIONAL RESOURCES

Many resources are available to support instruction in this chapter. Local resource people who are employed in various AFNR occupations can provide an exciting and motivating opportunity in the class.

A wide range of occupational literature and online resources is available. You may use the school counselor as a resource person in this regard. One of the best known resources on occupations is the Occupational Outlook Handbook, which is updated every other year. It is published by the U.S. Department of Labor. A supportive resource of this Handbook is the associated Web site: www.bls.gov/OCO. As you use this Handbook and online resource, remember that definitions of agriculture and the terms used by writers in the U.S. Department of Labor are different from the terms and definitions used in agricultural education. Students can use the Handbook and Web site for gathering occupational information.

Another resource is the States Career Clusters Initiative (SCCI). This is a collaborative effort of the states in developing and refining career clusters and pathways within the clusters. Various published materials are available. You may access information at the SCCI Web site: www.careerclusters.org/.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 2 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is a goal?

   A goal is an end to be reached or achieved.

2. What are the kinds of goals based on length of time?

   The kinds of goals based on length of time are: short-term—a year or less, intermediate—1-4 years, and long-term—more than four years.

3. What are ways and means?

   Ways and means are the actions we need to take to achieve a goal.

4. What is a career ladder?

   A career ladder is the upward movement of people in their careers.

5. What are three important people skills?

   Any three of the following people skills could be listed: being courteous, being honest, respecting other people, seeking suggestions from other people, having good communications skills, allowing other people to help make decisions, having a pleasant personality—with a smile on your face, and helping other people feel good about themselves.

6. What is a career?

   A career is the general area of work a person follows.

7. What is goal setting? Why is it important?

   Goal setting is making goals. It is important because we describe what we want to accomplish in life. It gives direction to our efforts.
8. What is a career pathway plan of study?

A career pathway plan of study is a statement of the education an individual needs to enter an occupation. It may list high school courses to take as well as extend beyond high school. Other experiences may also be included. The plan is often developed by a group of educators, the student, and parents.

9. What is experience? Why is experience important in gaining a new job?

Experience is having personally done something. Experience helps people know the nature of work and develops job skills.

10. What are the eight career pathways in Agriculture, Food, & Natural Resources? Briefly describe each.

The eight career pathways are: animal science—careers related to animal care and production; plant science—careers related to the production and care of plants; power and technical systems—careers related to a wide range of tractors, implements, structures, resources, and technology in agriculture; natural resources—careers related to the use and protection of natural resources; environmental service—careers related to studying and caring for the environment; food and nutrition—careers related to food development, processing, and safety; agribusiness—careers in a wide range of occupations that support agriculture with supplies and services; and biotechnology—gaining useful products from organisms—if it has been introduced by the teacher in class.

Evaluating

1=f, 2=d, 3=c, 4=a, 5=b, 6=g, 7=h, and 8=e
cultural work or other activity. It includes natural resources as well as those that are manufactured. It may also include financial resources and human resources.

INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 3 is to explain the importance of agricultural education, research and information. To achieve this goal, learners will be able to:

1. Describe agricultural education in the United States.
2. Explain secondary agricultural education.
3. Describe the importance of research and development.
4. Relate education and development to resources and information.

INSTRUCTIONAL STRATEGIES

Emphasis in Chapter 3 should be to help students understand more about agricultural education, especially the program in which they are enrolled. This is done by carefully involving the students in the content of the chapter. Have them read, respond in class, take notes, review, and assess what has been learned.

Begin covering the chapter by having students read the introductory paragraphs on the first page. Afterward ask one or two students to explain what each paragraph means. Encourage all students to participate in the discussion. Move from the interest approach into the objectives. Have students read the objectives or list them on the writing surface. Review the list of terms to highlight the major concepts in the chapter. Refer students to the Internet site listed at the bottom of the page.

Cover the content of the chapter sequentially beginning with the first section and moving through the chapter. Have students read each section before covering it in class. Reading may be as homework or during supervised study. In a few classes, students may orally read the content in class. Outline each major section beginning with the section on “Agricultural Education.” List the key terms and events. Have students keep notes. Relate the areas listed to opportunities or situations in the local area, such as fairs, libraries, secondary schools, and colleges with agriculture. As part of this section, refer students to the AgriScience Connection. Ask students why the Morrow Plots have been kept in agricultural experimentation.

Cover the section on “Secondary Agricultural Education.” Include information about the program in the local school. Describe opportunities and requirements, such as in supervised experience and the FFA. Invite a chapter FFA officer to meet with the class and explain the local chapter. Arrange a chapter meeting that all members of the class can attend. Provide leadership and encouragement for the students to get involved. As part of education, refer students to the Career Profile on an agriculture teacher. Encourage students to consider teaching agriculture as a career opportunity. (Most states in the United States do not have enough teachers. The teacher shortage creates better job opportunities for those who qualify.) Indicate that you can help them in planning and with information on qualifying to enter teaching.

Cover the section on “Development.” Arrange to visit an agricultural experiment station or other site where agricultural research is carried out. Sometimes this can be combined with other educational purposes. Students can use the Internet to learn about agricultural research. One example is the Web site for CGIAR: http://www.cgiar.org/.

Have students explore various resources used in agriculture, especially up-to-date and accurate information. This may involve magazines, bulletins, books, Web sites, and other resources.

REVIEW AND EVALUATION

Use the Reviewing section at the end of the chapter. Have students read the Main Ideas subsection. Ask one or more students to explain the content of each paragraph. Allow the entire class to get involved in a discussion about agricultural education and research.

Use the Questions section for additional review as well as for evaluation. Students can prepare written answers as homework or during supervised study. The questions can also be answered orally in class. Oral answering allows you to assess achievement and do the necessary reteaching.

Use the Evaluating section to assess student understanding of selected terms in the chapter. Teacher-made tests can also be used.
ADDITIONAL RESOURCES

Additional resources that would be useful with this lesson include information about agricultural education at the school the students are attending. Details on supervised experience and the FFA will be helpful. The resources used should motivate students to set goals in supervised experience and FFA. Sometimes, students may refer to the Internet for information. One good site is that of the National FFA Organization: http://www.ffa.org/.

The Exploring section at the end of the chapter introduces useful activities. These can be viewed as learning resources for the students.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 3 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is agricultural education?
   
   Agricultural education is education in and about agriculture.

2. How have societies and fairs been important?
   
   Societies and fairs were formed for educational purposes. The agricultural society movement was particularly important in the early 1800s. Fairs came along about the same time. Hundreds of societies and fairs provided education around the United States.

3. What was one of the most important agricultural societies?

   One of the most important societies was the Philadelphia Society for the Promotion of Agriculture (formed in 1785).

4. What was the title of the first magazine about agriculture?
   
   The American Farmer

5. What was the purpose of the Morrill Act?
   
   The Morrill Act set up a system of colleges to teach agriculture and related subjects. These are known as land-grant schools.

6. How have the broadcast media been a part of agricultural education?

   The broadcast media have aired programs on radio and television about agriculture. Some regional and national programs continue to be popular.

7. What are the three main areas of secondary agricultural education?

   The three areas are instruction, supervised experience, and student organization.

8. Why is development work important?

   Development work is important because it deals with creating new products and services.

9. What is the purpose of research?

   The purpose of research is to use systematic methods to answer questions. Facts result that can be used to improve on what is being done.

10. What group of colleges and universities carry out agricultural research?

    The land-grant colleges and universities have agricultural experiment stations to carry out research.

Evaluating

1=g, 2=e, 3=d, 4=c, 5=b, 6=a, 7=h, and 8=f
CHAPTER SUMMARY

Technology is using inventions in working and living. Most technology has a strong base in science. The technology used in agriculture is sometimes called agricultural technology. People are not always ready for new technology. They must be prepared to adopt new methods. In some cases, technology is inappropriate because of the lack of readiness of individuals and the mass of the society in which they live. For example, developing countries often cannot benefit from the immediate use of technology practiced in the developed countries.

Inventions are new products or devices. Inventions made in prehistoric times continue to be useful today, with the wheel being an example. The nature of agriculture has had considerable change because of new technology. Farming has had mechanical technology, plant and animal technology, and pest control technology, among others. Food processing has also been affected by technology, including food preservation. The work of Louis Pasteur is most notable in food safety. Technology also includes the use of computers in a wide range of applications. Site-specific farming is a newer technology receiving much attention.

INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 4 is to introduce the concept of technology and offer a few examples in the agricultural industry. To achieve this goal, learners will be able to:

1. Explain agricultural technology.
2. List important inventions in agriculture.
3. Describe technology with machinery, plants, animals, pests, and food preservation.
4. Describe the role of computers.
5. Explain the meaning of site-specific farming.

INSTRUCTIONAL STRATEGIES

Introducing agricultural technology may involve stressing the relationships between chapter content to examples found in the local area. A field trip to a farm show, local equipment dealer, garden center, or processing facility will likely offer an excellent opportunity for students to see technology on a first-hand basis.

As with all chapters, involving students intellectually in reading, discussing, reporting, and evaluating will strengthen learning. Begin by having students read the introductory page of the chapter. Call on one or more students to explain the meaning of the three paragraphs. Refer students to images in the chapter that relate to technology. Move from the interest approach into the objectives. Also, depending on teaching strategy, have students review the list of terms.

Begin covering the chapter with the first section. Move sequentially through the chapter. Have students read each section before outlining the content on the writing surface. Solicit student input in making the outline. Have students maintain careful notes on the outline. Refer students to the AgriScience Connection and Career Profile. Have students read and discuss each of these. Have students complete appropriate items in the Activity Manual.

In covering chapter content, have students relate technology to the local agricultural practices. Examples can be used to bring a practical orientation to the Internet.

REVIEW AND EVALUATION

Review and evaluation can be achieved using the appropriate sections in the textbook as well as the Activity Manual and teacher-prepared materials.

Begin the review by having students read the Main Ideas paragraphs in the Reviewing section. Call on one or more students to summarize the information. Have students answer the Questions in class or as homework. Some re-teaching may be needed based on your observations following the review.

Use the items in the Evaluating section to help assess student achievement. These items may also be used in reviewing the chapter. Teacher-made tests may be used. End-of-course tests also help assess learning. (Some states mandate end-of-course testing. If this is in your state, you will want to become very familiar with the process. You will want to enable your students to perform well. Their performance not only is
an indication of achievement but it is an indication of teacher proficiency.)

**ADDITIONAL RESOURCES**

Information on technology and examples of technology in agriculture in the local area will be excellent to incorporate into the instruction. Representatives of some agribusinesses in areas of technology may be good resource persons. Chapter 18 of the textbook could be used as a resource because of its emphasis on technology systems.

An online resource that you or the students may wish to explore is the Technology Transfer Information Center. It is a part of the National Agricultural Library in the U.S. Department of Agriculture. Begin by checking out what is being done with biofuels. The Web site is: [www.ttic.nal.usda.gov/nal](http://www.ttic.nal.usda.gov/nal).

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 4 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is agricultural technology?

   *Agricultural technology is technology used in agriculture. This includes inventions, which often have a science base.*

2. What are three benefits of technology?

   *Three benefits of technology are: makes work easier, increased production, and created a higher standard of living.*

3. What prehistoric inventions are important today in agriculture?

   *The plow and wheel are two important prehistoric inventions that are important in agriculture today. The use of yeast and cheese making are two inventions in food processing.*

4. What is mechanical technology? What areas are included?

   *Mechanical technology is using physical force to do work. Devices push, pull, and rotate. Plows, planters, harvesters, and source of power are included.*

5. What sources have been used as power to operate machines?

   *Sources of power to operate machines have included humans, draft animals, and mechanical devices, such as water wheels. The internal combustion engine is now used as a source of power.*

6. What methods have been used to improve plants?

   *Methods used to improve plants include mass selection, hybridization, cloning, and genetic engineering.*

7. What is Bt corn?

   *Bt corn is corn with a gene from the Bacillus thuringiensis bacteria to resist damage by the corn borer.*

8. How are computers used in agriculture?

   *Computers are used in agriculture for help in making decisions, controlling equipment, and keeping records.*

9. What is site-specific farming?

   *Site-specific farming is using practices based on the specific needs of a field. Fields are divided into smaller areas for practices that meet the needs of these areas.*

**Evaluating**

1=g, 2=h, 3=b, 4=a, 5=c, 6=d, 7=f, and 8=e
CHAPTER SUMMARY

Agriculture makes a major contribution to how people live—to their health and well-being. It determines much about the quality of their lives even if they are not involved in the agricultural industry. This is because the productivity of agriculture influences what is available to them at a price that they can afford.

Quality of life is having a good environment for living. Agriculture shapes quality of life in the United States. It makes the nation strong, provides for international trade, and helps reduce poverty. The abundance of natural resources helps in having good agricultural yields. Agricultural commodities are the major sources of nutrients in the human diet.

Some people do not get a sufficient amount of the "right" food. They have nutritional deficiencies. Some suffer from hunger because they do not have enough food. A few countries (such as those in Sub-Saharan Africa) do not have advanced farming systems. Countries with advanced farming systems are more likely to produce adequate food for their citizens.

Eating right depends upon your needs. One of the first measures of food nutrition is calories. Understanding calories is sometimes confusing. Note if it is abbreviated as a capital or lower case c. Here is why: A calorie is the amount of heat required to raise the temperature of 1 gram of water 1° C (1.8°F). These measures are small. Most people use a big C to represent 1,000 little c. Information is often based on C.

People should eat right and enjoy the benefits of good agriculture. The Choose MyPlate of the U.S. Department of Agriculture helps people organize their diets so that they have proper nutrition. By going online, people can individually tailor an eating plan. Besides food, agriculture provides clothing and housing.

Where are all these nutritious foods grown? The majority are grown right here in the United States. We import and export some of these products and this becomes a part of the United States’ balance of trade. Grains, fruits, vegetables, meats (including poultry, beef, lamb, pork, seafood, and others), and milk (for dairy foods) are produced on farms throughout the United States. These are moved through an elaborate industry to get wholesome food products to consumers.

Food products must be properly labeled. The U.S. Food and Drug Administration (FDA) regulates the labeling of most food products, particularly those that have undergone any processing. Labels provide nutrition information as well as information about the source or manufacturer of the product, quantity in a container, and may offer information on preparation.

Human population trends also create pressure on food supply adequacy. Earth’s population has been increasing over the years. Today, there are over 7 billion people on the Planet. By the year 2050, it is projected to be 9 billion. Some countries have policies that provide some control over human population growth by limiting the number of children in a family.

INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 5 is to illustrate the importance of agriculture to quality of life. To achieve this goal, learners will be able to:

1. Explain quality of life.
2. Identify global nutrition and health trends.
3. Describe the food needs of people and how to use MyPlate.
4. Discuss sources of food products.
5. Explain food labeling and safety.
6. Describe how agricultural provides clothing, wood products, and a quality environment.
7. Discuss world population trends.

INSTRUCTIONAL STRATEGIES

Instructional emphasis should be on helping students appreciate the role of agriculture in quality of life. This includes students knowing and using the Choose MyPlate at www.choosemyplate.gov in making diet choices. Involve students in the content of the chapter by having them read and participate afterward in discussing, reviewing, and evaluating activities.

Begin the chapter by having students read the first page. Afterward, ask a student to summarize what the paragraphs mean. Have students describe how they live well. Move from the discussion into the objectives. Have a student read the objectives aloud in class. Also,
as a part of the teaching process, review the list of terms.

Cover the sections of the chapter sequentially. Have students read each section as homework or during supervised study in class. Outline the major points on the writing surface. Have students keep notes on the information. Move through the chapter covering each area. Call attention to the Career Profile, Personal Growth, and the AgriScience Connection features in the chapter.

Spend some time explaining the MyPlate guide to food intake. Have students go online and prepare a personalized diet plan that meets their needs as well as prevents excesses of foods that may not promote desired well-being. The school's family and consumer science teacher may be a good resource on planning food intake as related to nutrition needs.

**REVIEW AND EVALUATION**

Use the Reviewing and Evaluating sections at the end of the chapter. In the review, have students read the Main Ideas. Afterward, call on one or more to orally summarize the content. Have students answer the Questions as homework or in supervised study. Discussion of the questions in class after students have prepared written answers will enhance learning.

Evaluation can involve the items in the Evaluating section as well as teacher-made tests and tests from the Instructional Resource Guide.

**ADDITIONAL RESOURCES**

Additional resources that relate the content of the chapter to the lives of students will be useful. Some students can bring to class food labels that give nutrition information. Use the labels as the basis for discussing nutrition labeling in class. The MyPlate Web site is an excellent online resource. It is at: www.choosemyplate.gov. The POPClock maintains information on population on Earth as well as by nations. Use this Internet address: www.census.gov/main/www/popclock.html.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 5 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of the student answers.

1. **What is quality of life?**
   
   Quality of life is having a good environment for living. Food, clothing, and housing are good and meet human needs.

2. **What is the MyPlate?**
   
   The MyPlate is an online tool to help people eat the right things to ensure proper nutrition. It guides individuals in preparing a personalized dietary plan.

3. **List the five main nutritional groups.**
   
   The five main nutritional groups are: bread, fruit, vegetable, milk, and meat.

4. **What is the difference between imports and exports?**
   
   Imports are products brought into a country from another country. Exports are goods sold to another country or to individuals or businesses in that country.

5. **What is the purpose of the nutrition facts label?**
   
   The purpose of the nutrition facts label is to help consumers follow a well-balanced diet. It gives information about the nutritional value of food.

6. **What are two plant fibers used for clothing?**
   
   Two plant fibers used for clothing are: cotton and flax.

7. **What are two animal fibers used for clothing?**
   
   Two animal fibers used for clothing are wool and fur.

8. **How are trees used to increase the quality of life?**
   
   Trees produce materials that are used to construct housing and other items that we need for living, such as furniture.

9. **List the two major types of trees grown for wood products.**
   
   The two major types of trees grown for wood products are hardwood and softwood.

10. **How does agriculture help make a good environment?**
    
    Beautiful landscapes enhance the environment. Horticulture deals with the growth of plants for ornamental and food purposes.

**Evaluating**

1=i, 2=a, 3=c, 4=b, 5=e, 6=j, 7=h, 8=d, 9=f, and 10=g
CHAPTER SUMMARY

People must be able to buy and sell what they want. Such activities are made possible by an economic system. Several components contribute to the overall processes carried out by our economic system. It is the way people go about doing business. In the United States, free enterprise is the form of capitalism used.

Economics is an important area that deals with how people go about meeting their needs for goods and services. Three areas included in economics are supply and demand, prices, and monetary system. Each of these is important in the success of the agricultural industry.

Free enterprise is characterized by allowing people to go about business, including farming, with a minimum of government control. People can work and earn money. They can own property and make decisions about their property.

Three major ways are used to do business: sole proprietorship, partnership, and corporation. Special kinds or modifications of traditional corporations are covered, including the LLC and S corporation. A special kind of corporation often used in agriculture is the cooperative. Cooperatives are associations people formed to provide services to members. Cooperatives are of two major types: purchasing and marketing. By joining together, individuals pool their purchases and sales into larger amounts. Greater quantity allows more favorable prices.

Consumers have a big influence on agriculture. What they want influences what is produced. Consumers make choices, which leads to competition.

Entrepreneurship is receiving more attention. It involves meeting the unique marketing needs of people. A new product or service may be developed and produced. It involves more than just owning a business. Entrepreneurship includes creativity and important approaches to problem solving.

All people need to be aware of the importance of agriculture, especially in the political arena. Agriculture is so important to all people; it must have appropriate political representation. Policies are the principles that guide our work and living. We often think of laws as policies. Elected and appointed politicians enact laws. Agricultural groups try to persuade officials to enact laws that are favorable to maintaining an abundance of quality food and fiber.

INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 6 is to show important relationships between our economic system and how people get what they want. To achieve this goal, learners will be able to:

1. Define economics and explain economic system.
2. Describe free enterprise.
3. List three ways of doing business.
4. Describe the role of consumers and competition.
5. Explain entrepreneurship.
6. Identify the political impact of agriculture.

INSTRUCTIONAL STRATEGIES

Begin Chapter 6 using the introductory page as the major component of the interest approach. Have students read this page as homework or during supervised study. Call on one or more students to explain each paragraph. Students might be asked to name local businesses that provide goods and services that meet human needs. In some cases, agricultural businesses may be named. Move from the interest approach into the objectives and list of terms. Cover the chapter sequentially, beginning with the first section on “Economics and Systems.” Have students read this section. Outline the major concepts on the writing surface using student ideas. Have students keep notes on the major areas, including economics, supply and demand, prices, and money. Bring a sample of foreign money to class. Have students determine the exchange rate with the U.S. dollar by calling a local bank or looking up the information in a newspaper.

Cover the sections on “Free Enterprise,” “Ways of Doing Business,” “Consumers and Competition,” and “Entrepreneurship” using an approach that involves reading, discussing, outlining, recording, and applying. Use local examples of business, especially those in agriculture, to help students better understand the importance of economics and related areas.
Cover the last section of the chapter, “Political Impacts.” Identify one or more local agricultural organizations that promote agriculture in the political arena, with the Farm Bureau and a livestock producers association being examples. Use a resource person from one of these organizations to discuss how it helps promote favorable government policies at the state and national levels.

REVIEW AND EVALUATION

Use the end of chapter materials for review and evaluation. The Reviewing section contains Main Ideas and Questions. Use these in reinforcing, reteaching, and beginning the assessment of student achievement. Have students read Main Ideas in supervised study or as homework. Call on students to explain the content and extend this area to other content in the chapter. Have students answer the Questions as homework or during supervised study. Collect written answers and provide feedback. Also, cover the answers orally in class.

The Evaluating section at the end of the chapter can be used to assess student understanding of important terms. Teacher-made tests or those in general test banks can be used. Some states have end-of-course testing which should also be helpful in evaluation.

ADDITIONAL RESOURCES

Additional resources will include any relevant materials on doing business in the free enterprise system. Materials on entrepreneurship will also be useful in that section of the chapter. Local business people will likely be willing to serve as resource persons in class to discuss how their businesses operate. A local attorney can cover the procedures to follow in your state as related to corporations.

Web sites of state government agencies that handle the setting up of artificial entities for doing business will also be useful.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 6 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is economics?

Economics is a study of how people get what they want, including producing goods and services and getting them to people.

2. How does supply and demand relate to the prices consumers pay?

Prices vary with the interaction of supply and demand. As supply goes up, prices typically go down if demand remains about the same. The reverse can also happen.

3. What is currency? Give examples for three countries.

Currency is the money used in a country. Examples include the peso in Mexico, the euro in Europe, the pound in England, and the Canadian dollar in Canada.

4. Why is creating goods and services a goal in any nation?

Goods and services are needed to meet the needs of people.

5. What are the principles of free enterprise? Briefly explain each.

The principles of free enterprise are property ownership, business ownership, choices, and control. Property ownership gives individuals the right to own property. Business ownership allows individuals to form businesses to produce goods and services. Choices refers to allowing people to choose what they want to produce, buy, and sell. Control refers to a minimum of government regulations over doing business.

6. What is the difference in real and personal property?

Real property is land and what is found on the land. Buildings, landscaping, and fences are real property. Personal property is things that people use personally, such as clothing, boats, and computers.

7. What are the ways of doing business? Briefly describe each.

The ways of doing business are sole proprietorship, partnership, and corporation. A sole proprietorship is when one person owns a business. A partnership is when two or more people own a business. A corporation is an association of people for the purpose of doing business. A cooperative is a special kind of corporation.

8. Who is a consumer?

A consumer is any person, business, or agency that uses goods and services.
9. What is the difference between competition and monopoly?

Competition occurs when consumers can buy from two or more businesses. Each business tries to attract consumers. A monopoly exists when one business or producer controls products and prices.

10. What is entrepreneurship?

Entrepreneurship is creating goods and services to meet unique needs. New approaches or products are often involved.

Evaluating

1 = i, 2 = a, 3 = c, 4 = e, 5 = d, 6 = b, 7 = j, 8 = h, 9 = f, and 10 = g

7

SAFETY

CHAPTER SUMMARY

Accidents while performing agricultural work injure many people each year. Sometimes the accidents result in death. Following proper safety precautions can reduce the number of accidents. An accident is an event that occurs unintentionally. Some situations pose more hazards than others. A hazard is a danger that may cause injury to people and property.

Safety includes both personal safety and occupational safety. These sometimes overlap; other times they are separate. All people need to “think safety” in all that they do.

Particular hazards are associated with using power tools and machinery, operating tractors and motor vehicles, careless handling of animals and plants, improper use of pesticides, using materials that cause fires and explosions, doing repair work, and falling.

The Worker Protection Standard is a federal law on safety in using pesticides. All workers are to be trained in how to use pesticides safely.

Accidents are prevented by following safe procedures. Safety is preventing injury and loss. People can take precautions to prevent injury. Being safe begins with a mind set of safety consciousness. Properly using personal protective equipment is needed in many kinds of jobs. This includes protecting the eyes, hearing, skin, respiratory system, and other parts of the body.

First aid is providing initial care to an individual for an illness or injury. Minor cuts and other abrasions may not require professional medical care. Minor injuries can become major if other health conditions exist such as failure of blood to clot or a weakened immune system. Failure to properly manage a wound can result in infection and other problems. In general, minor wounds can be handled with a five-step process: stop bleeding; cleanse the wound; apply antiseptic; cover the wound; and secure the cover.

In some cases, injuries that appear minor at first may need medical attention. A cut that is open may need suturing. Never hesitate to seek the assistance of
the school nurse, athletic trainer, teacher, or trained emergency responder if the situation warrants such care. Of course, going to a physician may be appropriate.

**INSTRUCTIONAL OBJECTIVES**

The overall goal of Chapter 7 is to raise the safety consciousness of students and provide some principles of avoiding unnecessary risks. To achieve this goal, learners will be able to:

1. Explain the importance of safety.
2. Define personal protective equipment and give examples.
3. Explain important areas of safety with machinery and tools.
4. List safety practices in laboratory work.
5. Identify safety practices when working with animals and plants.

**INSTRUCTIONAL STRATEGIES**

Follow a sequential, thorough, student-involvement approach. Begin with the first page of the chapter and have students read and respond about what they have read.

The interest approach can be based on the first page of the chapter. Have students read the page as homework or during supervised study. Call on one or more students to express their feelings about the accident that is described. Ask if any have personally known of accidents similar to the example. Ask how these could have been avoided. Present the objectives for the chapter by having students read them aloud or in any way that fits your teaching style. Refer students to the list of terms.

Begin covering content of the chapter with the section “Being Safe.” Have students read the section. Ask them to provide information as you outline the major concepts on the writing surface. Have students take notes on the major terms and ideas. Follow a similar procedure throughout the chapter. Bring the various personal protective equipment items into the classroom and show how they are used. Be sure students can identify each and explain when it is used. Make a tour of the laboratory to identify safety symbols and areas and hazards.

Have students practice putting on and wearing certain PPE such as goggles, gloves, and ear plugs. Be sure these are sanitized before use. Cover the practices involved in sanitation of PPE.

Review the contents of a first aid kit. Explain the purpose of each item. Discuss school policies for injuries and how to respond should an injury occur.

**REVIEW AND EVALUATION**

Use the Reviewing and Evaluating sections at the end of the chapter as well as teacher-made approaches to review and evaluate learning. The Main Ideas and Questions sections are helpful in reviewing. Having students answer the questions in writing as homework extends quality instructional time. Go over the answers in class to reinforce responses and reteach areas, as needed.

The Evaluating section can be used to assess how well students have mastered selected terms and concepts. Teacher-made tests and tests from test banks will also be useful. Observing students as they go about laboratory and supervised experience work will allow an opportunity to assess the long term impact of the safety instruction.

**ADDITIONAL RESOURCES**

Additional resources include a range of materials on safety. The local community will have people who are safety experts. For example, the local fire department will have personnel who can be resource persons in class to cover how to respond in case of an accident that results in injuries to people. The Farm Bureau, Cooperative Extension Service, and agribusinesses may have safety specialists. In addition, the game conservation officer in the area may offer hunter safety education. Many students are interested in this area. In addition, law requirements in most locations include safety training before sport hunting.

**ANSWERS TO QUESTIONS AND EVALUATING**

Questions

The questions at the end of Chapter 7 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is an accident?

   An accident is an event that occurs unintentionally. If we know an accident was going to happen, we could take steps to prevent it.
2. What is safety? Who is responsible for safety?
   Safety is preventing injury or loss. All people are responsible for safety.

3. What is personal protective equipment?
   Personal protective equipment includes devices to protect people from injury.

4. What eye protection may be used?
   Eye protection includes safety glasses, safety goggles, safety shields and helmets, and eye wash.

5. What hearing protection may be used?
   Earplugs and earmuffs are most commonly used to protect hearing.

6. When is respiratory protection needed?
   Respiratory protection is needed when people are in conditions where dust, mist, fumes, and vapors may cause injury.

7. Why are skin and body protection important?
   The skin, hair, and body may be exposed to a variety of hazards such as toxic substances and falling objects.

8. What are the major safety hazards from power and engines?
   The major safety hazards from power and engines are fuel safety, battery safety, electrical safety, PTO and pulleys, cooling system, and moving parts.

9. What should be considered in safely operating tractors and equipment?
   Major safety considerations with tractors and equipment are to operate them at the proper speed, use care on slopes, hitch properly, keep tractors and equipment in good condition, and be sure all safety features are in place and working properly.

10. What are the hazards with power tools?
    Hazards with power tools include electrical safety, eye injury, hearing damage, and cuts.

11. What is first aid?
    First aid is providing initial care to an individual for an illness or injury.

12. What is the process for treating a minor cut?
    In general, a minor cut or other wound can be handled with a five-step process: stop bleeding; cleanse the wound; apply antiseptic; cover the wound; and secure the cover.

Evaluating:
1 = c, 2 = a, 3 = h, 4 = g, 5 = b, 6 = e, 7 = d, and 8 = f

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**SCIENCE IN ACTION**

**CHAPTER SUMMARY**

Agriculture is science in action! To show this relationship, the words “agriculture” and “science” have been combined to form agriscience. All areas of science are in agriscience. The most important areas relate to plants, animals, soil, water, machinery, and the environment.

The important science areas are life science, which includes plants and animals; physical science, which includes earth science, chemistry, and physics; mathematics; and social science. All of the sciences are important in the agricultural industry. The life and physical sciences help understand living organisms and the environment in which they live. Providing for the well being of living things requires an understanding of their life processes and needs. Caring for the earth’s natural resources requires knowledge of important areas of physical science. In addition, much of the technology used in agriculture makes considerable application of areas of physical science.
The environment is an important part of agriscience. This includes ecosystems, human ecosystems, damaging practices, and sustainable agriculture.

INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 8 is to show how agriculture is the application of science. This includes important environmental areas. To achieve this goal, learners will be able to:

1. Explain agriscience.
2. Relate agriscience to important areas of science.
3. Describe the relationship of agriscience to the environment.

INSTRUCTIONAL STRATEGIES

Use instructional strategies that result in high student involvement in the content. This includes reading the material, responding in class, keeping notes, reviewing, and assessment. Re-teaching as needed is also a part of student mastery. The RLRWP-E model is most appropriate.

Begin the chapter by having students read the first page as homework or during supervised study. Call on one or more students to orally summarize the content. Ask about the science classes they are taking. Ask the students to offer ways these classes relate to the broad area of agriculture. Move from the interest approach into the objectives and terms. Also, refer students to the Web site, as appropriate.

Cover the chapter content sequentially beginning with the section on “AgriScience.” Have students read the section, help as you outline it on the writing surface, and take notes on the information. Move to the next section on “Science Areas,” and use a similar teaching strategy. Complete each section of the chapter in sequence. Demonstrate how vinegar and baking soda react using a procedure similar to that shown in Figure 8-12 of the textbook. Place a few drops of vinegar on a small mound of baking soda. Watch the reaction and ask what is happening. (With this activity, be sure to follow appropriate safety protocol, including goggles.)

REVIEW AND EVALUATION

Use the Reviewing and Evaluating sections after the content of Chapter 8 has been covered. Have students read Main Ideas and call on individuals to orally summarize each paragraph. Reteach as needed. Have students answer the questions in writing as homework or during supervised study. Involve students in going over the answers in class. Take up written answers and provide feedback to students.

Use the items in the Evaluating section as a part of learner evaluation. Have students individually match the terms and definitions followed by class discussion. Use a teacher-made test or a test from a test bank.

Another approach that can be used with either or both the review and evaluation is to have students demonstrate that they have achieved the objectives for the chapter. Call on different students to review the content associated with each objective. Reteach the content as necessary to ensure that the students have achieved essential understanding of the material.

ADDITIONAL RESOURCES

Any materials on the application of science in agriculture should be useful. This includes textbooks as well as journal articles and other materials. Resource persons include science teachers in the school, scientists with agricultural agencies and businesses, and guests from colleges and universities.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 8 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is agriscience? Why is it important?

   Agriscience is the use of science in producing food, clothing, and shelter. Because of the science base, it covers both the “why” and “how” things are done in agriculture.

2. What are the four major areas of science? Briefly explain each.

   The four major areas of science are life science, physical science, mathematics, and social science. Life science is the study of living things such as plants and animals. Physical science is the study of nonliving materials or things that never lived. The major areas are earth science, chemistry, and physics. Mathematics is the science of numbers. Social science is the study of human society.
3. What is the major difference in how plants and animals have food?

Plants make their food; animals obtain their food.

4. Why is physical science important in agriculture?

Physical science is important in agriculture because it deals with the relationships between living and nonliving things.

5. What is the environment?

The environment is the surroundings of an organism. It includes the air, water, and much more.

6. What is an ecosystem? How do changes in an ecosystem influence life?

An ecosystem is all of the parts of an organism’s environment that help it live and grow. It is a community of living and nonliving things. Changes may result in the ecosystem no longer supporting life.

7. What are examples of activities that can damage the environment?

Activities that can damage the environment include clearing land, plowing the wrong way, using chemicals incorrectly, manufacturing that produces wastes, dumping wastes improperly, and using engines that release exhaust.

8. What is sustainable agriculture?

Sustainable agriculture is using practices that maintain the ability to grow crops and raise livestock. This ensures that the needs of future generations will be met.

Evaluating

1=b, 2=c, 3=d, 4=f, 5=g, 6=h, 7=a, and 8=e

Agricultural Biotechnology

Chapter Summary

Biotechnology is the use of science to change and/or improve living organisms to get useful products from them. Knowledge of the anatomy and physiology of organisms, genetics, and molecular biology is needed for advanced work in biotechnology.

A genome is the hereditary material of an organism. It is encoded in its DNA or RNA. DNA (deoxyribonucleic acid) contains the instructions for the development and function of an organism. DNA stores information on a long-term basis. RNA (ribonucleic acid) is made from DNA by certain enzymes and helps translate genes into protein by transferring amino acids to the ribosome of a cell. The genome of an organism is a complete DNA sequence of one set of chromosomes. This sequence in a genome is sometimes referred to as the genetic makeup of an organism. RNA may also have a role in the makeup of an organism. Genome information is important because it gives insight into the heredity of an organism. Heredity material passes the traits of parents to offspring and determines the species of an organism along with its unique traits, such as eye and hair color. Organisms can be changed by altering the material in the genome. Genomes are made of chromosomes. A chromosome is a threadlike structure that contains genetic material and protein. Chromosomes are in pairs. The genetic material in chromosomes is in genes.

Biotechnology is divided into two areas: organismal and molecular. Organismal biotechnology uses living organisms without changing their genetic makeup. Common examples include cloning and altering growth. Molecular biotechnology is often known as genetic engineering. It involves changing the genetic material in an organism. The genetic material may be moved from one species of organism to another.

Genetic engineering uses heredity material to change the traits of living things. Genetic material in a cell is in the genome, which is made of chromosomes. A chromosome has genes, which are units of heredity. Recombinant DNA technology is used to remove and replace segments of genes in a chromosome. The process used is sometimes known as gene splicing. A particle gun is a device used to “shoot” tiny particles.
coated with DNA into cells. The technology used results in some successful splicing and a high proportion of attempts that are not successful. Future technology may improve the rate of success.

Biotechnology has many benefits. People sometimes do not understand the processes and benefits. They need good information to make informed decisions. (Note: Chapter 9 probably has more science depth than other chapters. Students who have completed biology will be better prepared for instruction in this chapter. Students who have not had biology will need an instructional pace that thoroughly covers the detailed information in the chapter.)

The emergence of stem cell technology is now impacting agriculture—and all of human life. As unspecialized cells, stem cells can become specialized kinds of cells under certain conditions. This involves the “reprogramming” of cells to express certain traits. Two kinds of stem cells are used: adult and embryonic. Adult stem cells are nonspecialized cells found in certain body tissues. They can be used to renew themselves as specialized cells such as cells harvested from animal fat tissues can be reprogrammed to develop into cartilage for worn joints. Embryonic stem cells are obtained from embryos and used in ways associated with adult stem cells. The harvest and use of embryonic stem cells is controversial because, in some cases, the cells might be the product of embryo destruction.

INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 9 is to develop a basic understanding of how biotechnology is carried out and what the benefits are in using it. To achieve this goal, learners will be able to:

1. Define biotechnology and list examples in agriculture.
2. Discuss the meaning and importance of genomes.
3. Explain the meaning of recombinant DNA.
4. Describe the benefits of biotechnology.
5. Identify the meaning and potential uses of stem cells.

INSTRUCTIONAL STRATEGIES

This chapter provides a simple overview of complex processes used in biotechnology, especially genetic engineering. Depending on the science classes that students have taken, this chapter may require additional time and explanation to achieve the objectives. Use a deliberate, sequential approach.

Begin covering the chapter by having students read the first page. Call on one or more students to orally summarize each paragraph. Ask students to name examples they know of where plants and animals have been improved. Also, ask students if these examples were good or bad. Move from the interest approach into the objectives and terms, as listed on the second page of the chapter. Also refer students to the Web site, as appropriate. (This Web site has many links for information on biotechnology.)

Begin covering the chapter with the section, “Biotechnology: What It Is.” Have students read this section as homework or during supervised study in class. Move sequentially through the other sections in the chapter. Have students read the material ahead of time and assist as you outline it in class. Have the students keep notes on important areas, as you outline. If possible, show at least one method of cloning, such as tissue culture, air layering, grafting, or using cuttings. Refer students to figures and the AgriScience Connection. These show some of the cloning in progress.

REVIEW AND EVALUATION

Use the Reviewing and Evaluating sections at the end of the chapter. In the review, have students read Main Ideas and orally summarize the content in class. Also, ask students to explain the content associated with each objective. Students should answer the Questions in writing and orally discuss the answers in class.

Evaluation can involve using the Evaluating items. These will help assess and reinforce the definitions of concepts. Use teacher-made tests and tests from test banks.

ADDITIONAL RESOURCES

Additional resources include any business or agency in the community involved with biotechnology, especially cloning or genetic engineering. Use people from these places as resource persons or arrange a field trip to observe their laboratories and work. Other materials on the fundamentals of biotechnology may be useful.

Textbooks and other materials used in biology classes may also be useful. The high school biology or biotechnology teacher may be a useful resource.
ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 9 and repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is biotechnology?
   Biotechnology is using science to change living organisms and/or to get new products.

2. What is cloning? What are three ways cloning is used with plants?
   Cloning is making two or more organisms out of one. Three ways of cloning are tissue culture, cuttings, and grafting.

3. What is a hormone? Give one example of how hormones have been used to increase production.
   A hormone is a substance produced by an organism that has a specific effect. Animals and plants may be given additional hormones to increase production. An example is the use of growth implants. Another example is the use of bST to increase milk production.

4. What is a transgenic organism?
   A transgenic organism is an organism that has new genetic material combined from two widely varying organisms.

5. What are two examples of transgenic crops? Why are these useful?
   Two examples of transgenic crops are tomatoes and cotton. The transgenic tomato will store longer without spoiling. The transgenic cotton (known as Bt cotton) resists attacks from bollworms, which means that no pesticide is needed.

6. Where is heredity material?
   Heredity material is in the genome.

7. What does a genome contain?
   A genome contains chromosomes which contain genes. A gene is the unit of heredity in a chromosome.

8. What is gene splicing?
   Gene splicing is joining DNA from one organism with the DNA in another.

9. What are the benefits of biotechnology?
   Some benefits of biotechnology are: reduce pollution, improve food, conserve resources, reduce hunger, and improve health.

10. What issues are associated with biotechnology?
    Issues associated with biotechnology include: dangers of new life forms, safety of food from new life forms, keeping organisms natural, joining plants and animals, labeling, and fear of people.

Evaluating

1=f, 2=b, 3=d, 4=a, 5=h, 6=g, 7=c, and 8=e
ENVIRONMENT AND NATURAL RESOURCES

CHAPTER SUMMARY

Natural resources are the things found in nature that humans use to meet their needs. Examples include soil, water, air, wildlife, minerals, fossil fuels, and people. Some of these resources are important in the life needs of people; others are important in our way of living, with fossil fuels being an example.

Some natural resources are renewable. These are the ones that can be replaced or restored after use. Sometimes, no more of the natural resource is made. It is a matter of cleaning and preparing the resource for use again. Nonrenewable natural resources are not replaced after being used. Some can be recycled to make other desired products.

Sustainable resource use is using resources so that they will last a long time. This involves renewing, reusing, and recycling. Conservation is an important part of sustaining a resource such as soil and water. Preservation is used to keep some natural resources without using them. Except for a few cases, having a resource is of little benefit if it cannot be used!

Sustainable agriculture is using practices that make it possible to produce forever. We cannot accept anything less. If we do, people in future generations won’t have food, clothing, and shelter. We must use resources so that they last indefinitely.

Environment is our surroundings. Air, water, plants, animals, cars, and structures are a part of our environment. Of course, there are many more things that go into our environment. We can place these into natural and artificial groups. In agriculture, many artificial environmental practices are done to ensure an abundance of production.

An alternative fuel is a fuel that is not of fossil origin, such as coal and petroleum. Many are made from farm commodities such as corn and soybeans. Examples include biodiesel, electricity, ethanol, methanol, solar energy, and hydrogen. (Note: This chapter provides an excellent overview before students take a course in environmental science.)

INSTRUCTIONAL OBJECTIVES

Chapter 10 introduces important concepts in using natural resources. It distinguishes between renewable and nonrenewable resources and describes the important role of sustainable use. To achieve this goal, learners will be able to:

1. List and describe major kinds of natural resources.
2. Classify natural resources as renewable or nonrenewable.
3. Explain sustainable resource use.
4. Relate sustainable resource use to agriculture.
5. Compare and contrast conservation and preservation.
6. Relate agriculture to the environment.
7. List kinds of alternative fuels and tell why they are important.

INSTRUCTIONAL STRATEGIES

Begin instruction in Chapter 10 with an interest approach based on the first page of the chapter. After students read this page, ask one or more to explain why we should not take natural resources for granted. They may offer comments such as “they will be used up” or “we will run out of them.” Use this discussion as the basis for presenting the objectives, term list, and Web site for the chapter.

Sequentially cover chapter content beginning with the section “Kinds of Natural Resources.” Have students read each section before class. Outline the major points on the writing surface with student input. Have students keep notes on what they have studied. Review and assess student achievement.

In the chapter, ask students to give examples of natural resources found in the local area. Have them assess how these natural resources influence the area, such as water is used for manufacturing, irrigation, transportation, and recreation. Sometimes, examples
of pollution may be present such as a factory that releases gases into the air. Wildlife, especially animal wildlife, are always of high interest to youth.

Cover the section on alternative fuels using RLRWP-E. Have students investigate the availability and use of alternative fuels in the local area. Have them identify the kinds used and how vehicles are constructed or modified so that the fuels can be used.

Refer students to the Career Profile on Game Management Technician. Have students read the content and ask for discussion on the nature of the work. Also refer students to the AgriScience Connection and, after they have read it, ask for discussion on any trails or natural resource areas in the local community.

**REVIEW AND EVALUATION**

Review and evaluation are important in mastery learning. Use the sections at the end of Chapter 10 to help students review the content and determine their understanding of terms and concepts.

Have students read Main Ideas and orally summarize the content. In some cases, students may be asked to elaborate on the content. How students perform with this may indicate a need for reteaching. Also, have students answer the questions at the end of the chapter. First, they should answer the questions as homework in writing. This should be followed by oral answers and discussion in class.

Evaluation can involve using the Evaluating section as well as teacher-made materials and tests from test banks. State end-of-course testing may also be useful.

**ADDITIONAL RESOURCES**

Additional resources can include any information on natural resources in the local area. Resource persons may include soil and water conservationists, game and wildlife conservationists, and pollution control officials.

A suggested textbook and associated materials that will be useful tools with this chapter is *Environmental Science and Technology* (available from Pearson Prentice Hall). This book covers the broad areas included in environmental study using an agriculturally-friendly approach. An activity manual, instructional resource guide, transparencies, and other materials are available to support this book.

**QUESTIONS AND EVALUATING**

Questions

The questions at the end of Chapter 10 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What are natural resources?

   *Natural resources are things in nature that humans use for their benefit.*

2. List and briefly define seven groups of natural resources.

   *The seven groups are:*
   * Soil—the outer layer of the earth’s surface that supports terrestrial plant life.*
   * Water—material found in three forms in nature: liquid, ice, and gas.*
   * Air—mixture of gases that covers the earth.*
   * Wildlife—plant, animal, and other organisms that are not domesticated.*
   * Minerals—material that has never lived, such as iron and calcium.*
   * Fossil fuel—material used to provide energy that formed from dead plants and animals over thousands of years.*
   * People—the species of living thing that uses and sometimes damages the earth’s environment.*

3. What is wildlife? What kinds are important?

   *Wildlife is the species of any living organism that has not been domesticated. Plants, animals, and other organisms are included.*

4. What should hunters know about their sport?

   *Hunters need to respect wildlife and follow laws on hunting.*

5. What is habitat? What can be done to provide habitat?

   *Habitat is the physical area where an organism lives. It contains the essentials for life. People can try to maintain areas of habitat such as strips of unplowed land around fields.*

6. What is the difference in renewable and nonrenewable natural resources? Give examples of each.

   *Renewable natural resources can be replaced after they are used. Examples include air, soil, water, and wildlife. Nonrenewable natural resources cannot be replaced after use. Examples include fossil fuels and minerals.*
7. What is sustainable resource use?

*Sustainable resource use is using natural resources so that they last a long time. People use no more than needed.*

8. What are three important steps in sustainable resource use? Briefly explain each.

*Three important steps are in sustainable resource use involve renewing, reusing, and recycling. Renewing is helping natural resources to replenish themselves. Reusing is using something again. Recycling is using materials to make another product.*

9. What is conservation? Preservation?

*Conservation is the wise use of resources and taking steps to ensure that they will be available in the future. Preservation is keeping resources without using them. Some resources deteriorate during preservation, such as a forest.*

10. What are the two major areas of conservation? Briefly describe each.

*The two major areas of conservation are soil conservation and water conservation. Soil conservation is using practices that protect the soil and prevent erosion. Water conservation is using practices that prevent the loss of good water.*

11. What is an alternative fuel?

*An alternative fuel is a fuel that is typically not a fossil fuel. It is not made from coal or petroleum.*

12. Name two alternative fuels and briefly describe each.

*Note: Any two examples of alternative fuels listed in the textbook could be listed. A brief description of two or three sentences would be sufficient.*

**Evaluating**

1 = b, 2 = j, 3 = a, 4 = c, 5 = d, 6 = f, 7 = e, 8 = g, 9 = i, and 10 = h

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11

**AGRICULTURAL MECHANICS AND POWER**

**CHAPTER SUMMARY**

Machines and power make work easier and make people more productive. Many mechanical devices are used in the agricultural industry, including farming and ranching. The area of mechanics and power involves using mechanical devices, engines and motors, and much more in the agricultural industry.

The areas of agricultural mechanics are based on skills in general agricultural mechanics, such as the use of hand and power tools, materials, and hardware. Agricultural mechanics includes agricultural electrification, agricultural structures, agricultural power, and resource conservation practices.

Hand tools are small, powerless tools. Major kinds include measuring devices, squares, cutting tools, boring tools, hammers, wrenches, pliers, and screwdrivers. Many other specialized kinds of tools are included. Power tools may be portable or stationary. Power to operate the tool is provided by electricity, engines, pneumatics, or hydraulics. Power tools include saws, drills, and grinders and sanders.

A major source of power is the internal combustion engine. Engines have systems which must be in order for the engine to operate. Regular maintenance is needed to keep engines in good condition. Electricity is another source of power. Most electricity is flowing electrons, known as current electricity. A circuit is the complete path so that electrons can flow. Insulators and conductors are needed to properly use electricity.

Plans are needed before beginning the construction of a project in a shop or lab. A plan is a sketch or drawing of the intended project along with a bill of materials and other information to help ensure a good finished
product. Cost estimates are needed with most project plans.

Metal working is important in agriculture. The ability to fabricate and repair equipment and facilities made of metal is needed. Welding is frequently used. Several kinds of welding may be used with shielded arc welding and oxyacetylene welding being most widely used.

INSTRUCTIONAL OBJECTIVES

The overall goal of this chapter is to introduce the broad area of agricultural mechanics. The role of safety is integrated throughout the chapter. To achieve this goal, learners will be able to:

1. Describe important areas of agricultural mechanics.
2. Name and identify important hand tools.
3. Name and identify important power tools.
4. Explain the basic operation of an internal combustion engine.
5. Describe the use of electricity.
6. Prepare and use a project plan.
7. Perform basic metal-working skills such as welding.

INSTRUCTIONAL STRATEGIES

Instructional strategies should focus on students mastering the content of the chapter. As appropriate, students may go into an agricultural mechanics laboratory and learn tool identification and use. Use every opportunity to stress safety.

Begin the interest approach by having students read the first page of Chapter 11. Ask one or more students to explain each paragraph. Ask students to name examples of simple mechanical skills needed in their daily living, such as how to select and drive nails or bore a hole in wood. After the interest approach, go over the objectives for the chapter. Also mention the terms and Web site listed on the page.

Cover the chapter sequentially, beginning with the first major section. Have students read the material ahead of time. Use student input to outline the content on the writing surface. Students should take notes on the major points. Have students offer examples of each area of agricultural mechanics found in the local community and in their homes. Spending some time in an agricultural mechanics laboratory may be beneficial. These activities should be carefully planned and include instruction in safety, tool identification, and how properly to use tools.

REVIEW AND EVALUATION

Use the Reviewing and Evaluating sections at the end of the chapter to review chapter content and assess student achievement. Have students read the Main Ideas and orally summarize the information. Follow this by having them answer questions at the end of the chapter in writing. The questions should be orally reviewed in class to reinforce learning and assess areas that need to be retaught.

Use the items in the Evaluating section to aid in assessing the extent to which the objectives of the chapter have been achieved. In addition, teacher-made tests and tests from test banks may be used.

ADDITIONAL RESOURCES

A book that integrates basic agricultural mechanics skills and science is *Introduction to Agricultural Mechanics*. You may wish to refer to this book. In some cases, students will be provided with a copy of the textbook to use. (*Introduction to Agricultural Mechanics* (2004) is available from Prentice Hall Interstate.) A number of transparency sets on agricultural mechanics subjects are also available from Prentice Hall.

Brochures and other materials from equipment manufacturers and dealers may be useful. A field trip to a local farm machinery or garden equipment dealer may be beneficial.

Several Web sites are available dealing with hand tools and power tools. These may be useful to the teacher and the students. Examples of the Web sites are:

Stanley Tools: [www.stanleyworks.com/](http://www.stanleyworks.com/)
Black and Decker: [www.blackanddecker.com/](http://www.blackanddecker.com/)
Kobalt: [www.kobalttools.com/](http://www.kobalttools.com/)

ANSWERS TO QUESTIONS AND PROBLEMS

Questions

The questions at the end of Chapter 12 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is agricultural mechanics? Why is it important?

   *Agricultural mechanics is using mechanical devices to do agricultural jobs. Powered machines allow people to do much more work.*
2. What are the major areas of agricultural mechanics? Briefly explain each.

The major areas of agricultural mechanics are:
- general agricultural mechanics, which includes basic skills in selecting and using tools and materials;
- agricultural electrification, which is using electricity to do agricultural work;
- agricultural structures, which deals with the facilities used in agriculture;
- agricultural power, which deals with tractors, equipment and all forms of power; and
- resource conservation practices, which includes the installation of various practices in soil and water management.

3. What are the major kinds of hand tools?

The major kinds of hand tools are measuring devices, squares, cutting tools, boring tools, hammers, wrenches, pliers, and screwdrivers.

4. What measurement devices are used?

The measuring devices used include tapes, rulers, zigzag rulers, electronic measurers, and calipers.

5. What kinds of cutting tools are used?

The major kinds of cutting tools are saws, chisels, files and rasps, axes and hatches, and planes and sanders.

6. What kinds of hammers are used?

Several kinds of hammers are used in agricultural mechanics, including claw hammer, ball peen hammer, chipping hammer, and blacksmith’s hammer.

7. What are the major kinds of power tools?

The major kinds of power tools are power saws, including portable and stationary power saws; drills; and grinders and sanders.

8. What is the difference in stationary and portable power tools?

Stationary power tools are in fixed locations. Portable power tools are easily moved about.

9. What are the major systems on an internal combustion engine?

The major systems on an internal combustion engine are air, fuel, ignition, exhaust, lubrication, and cooling.

10. What are the four strokes in a four-stroke cycle engine?

The four strokes are intake stroke, compression stroke, power stroke, and exhaust stroke.

11. What is current electricity? What are the two kinds?

Current electricity is the flowing of electrons in a circuit. The two kinds are alternating current (AC) and direct current (DC).

12. What is a circuit?

A circuit is the complete path for the flow of electrons.

Evaluating

1=i, 2=c, 3=d, 4=a, 5=e, 6=b, 7=f, 8=j, 9=h, and 10=g
CHAPTER SUMMARY

Solving problems helps overcome difficulties plus provides new information. The scientific method is an important process in solving problems. The number of steps in the scientific method varies, depending on the source. Most have five, six, or seven steps. The difference is how the steps are listed and if reporting the results is included. A seven-step process is presented in the scientific method in AgriScience Explorations, as follows:

1. Identify a problem
2. Research the problem
3. Form a hypothesis
4. Design an experiment
5. Conduct the experiment and collect data
6. Analyze the data and form conclusions
7. Report results

Properly carrying out the process is crucial to having quality research.

Gregor Mendel is well known for using the scientific method in the study of genetics. His research with peas provided important information that served as the foundation for contemporary genetics. Agricultural scientists to this day are involved in field plot research attempting to continue to improve plants.

INSTRUCTIONAL OBJECTIVES

The goal of Chapter 12 is to introduce the scientific method as a process in solving problems. To achieve this goal, learners will be able to:

1. List and explain the steps in the scientific process (method).
2. Demonstrate the scientific process in a laboratory setting.
3. Analyze samples of research to identify steps in the scientific process.
4. Explain the role of the scientific process in agriculture.

INSTRUCTIONAL STRATEGIES

Use a systematic, thorough instructional approach throughout the chapter. Begin the interest approach by having students read the first page of the chapter. Call on one or more students to explain the meaning of these paragraphs. Afterward, ask the students to explain how they go about solving problems that they face. (Perhaps they are using the scientific method.) Move from the interest approach to the second page of the chapter. Cover the objectives, terms, and Web site as appropriate to your style of teaching.

Begin the content of the chapter with the section, “The Scientific Method.” Have students read this section as homework or during supervised study. Develop an outline of the content on the writing surface using student participation. Have students keep notes on the salient content. Be sure to carefully list the steps in the scientific method and go over how each step is carried out. Have a student name a simple problem and involve the class in using the scientific method to solve it.

Visit a research farm, laboratory, or field plot and have a scientist explain what is going on. Another strategy is to invite a research scientist to serve as a resource person in class and describe the nature of the work in doing research.

Refer students to the Career Profile and AgriScience Connection. Have students read each and call on one or more students to summarize the information.

You may wish to begin planning an agriscience fair or, in some cases, to collaborate with the science teachers on a science fair.

REVIEW AND EVALUATION

Use the Reviewing and Evaluating sections at the end of the chapter. Have students read Main Ideas and orally summarize the content. Ask probing questions to assess depth of understanding, especially questions related to the process of the scientific method. Also, have students answer the questions at the end of the chapter. This should first be done in writing by the students and followed with oral discussion in class. Take
up, mark, and return the written answers to the ques-
tions.
Use the Evaluating items at the end of the chapter to
assess student mastery of key concepts. Use a
teacher-made test or a test from computer-generated
test banks. Evaluation can also include regular obser-
vation of progress in carrying out agriscience fair pro-
jects or of the work of students with research and
experimentation supervised experience.

ADDITIONAL RESOURCES
Additional resources can include any materials that
explain the scientific method and research processes.
The publication entitled Managing Successful Science
Fair Projects (J. Weston Walch Publisher, Portland,
Maine) may be useful. Bulletins and magazine articles
reporting agricultural research may also be useful. The
items in the Exploring section at the end of the chapter
may help students understand the work of scientists.

ANSWERS TO QUESTIONS AND
EVALUATING

Questions
The questions at the end of Chapter 12 are
repeated here. Each is followed by a brief statement in
italics that is intended to guide the assessment of stu-
dent answers.

1. What are the steps in the scientific process?
   The steps in the scientific process are: identify
   a problem, research the problem, form a hypothe-
sis, design an experiment, conduct the experi-
   ment and collect data, analyze the data and form
   conclusions, and report the results.

2. List ten problems you think you could solve
   through the scientific method.
   Note: The answers will vary but should reflect
   some applicable problem.

3. What is the difference between popular and
   scientific literature? Which is likely to be more
   accurate?
   Popular literature is written for reading by the
general public, while scientific literature is written
to provide in-depth information for scientists. The
scientific literature is likely to be more accurate.

4. What is the difference between a hypothesis, a
   theory, and a scientific fact?
   A hypothesis is a tentative solution to a problem
   that is to be tested. A theory is an evolving princi-
   ple based on scientific information. A scientific
   fact is information that can be shown to be true at
   any time.

5. What factors should be considered when design-
ing an experiment?
   Careful planning of an experiment is essential.
   Describe the problem to be studied. State the
detailed procedure to be followed. Determine the
equipment and materials needed. Select a
method of collecting and analyzing information.
Review of a plan by other scientists is beneficial.

6. What roles do experimental variables, constants,
   and the control have in an experiment?
   The experimental variable is the only change or
difference allowed. Constants are all conditions
that remain the same in an experiment. The con-
trol does not receive the experimental variable.

7. Why is careful data collection important?
   Details observed during an experiment provide
information for data analysis and conclusions. Good
data are needed. Poor data may result in
the wrong conclusion.

8. Why should researchers report their findings?
   Researchers should report their findings so that
other people may know about what has been
learned.

9. Do you think the steps in the process should
   always go in the same order? Why or why not?
   Note: Student responses may vary. In general,
the steps will follow roughly the same sequence. If
not, the results may lack meaning.

Evaluating
1=b, 2=a, 3=g, 4=d, 5=c, 6=h, 7=f, and 8=e
CHAPTER SUMMARY

Animals mean so much to humans. They provide food products, clothing, friendship, service, and enjoyment. Animals also help keep our environment balanced and clean.

The major types of animals are livestock, small and companion animals, and poultry. Livestock include beef and dairy cattle, swine, sheep and goats, horses, and related animals. Small and companion animals include dogs, cats, rabbits, rodents, reptiles, fish, and birds such as parrots and canaries. Poultry includes chickens, turkeys, and several others of lesser importance. Millions of dogs, cats, and other animals are kept as companion animals (pets).

We are better able to look after the well being of animals if we know their general body structures and functions. The study of the basic structure of animals begins with cells—the building block of life. The cells form tissues and tissues form organs. Organs join to form organ systems. There are ten organ systems.

Nutrition is an important area of animal care. Animals must have proper food in order to live and grow. An important area to producers is reproduction. It is the process by which new animals are produced. Animal well-being is caring for an animal to its needs are met adequately. Citizens are increasingly paying attention to factors associated with animal well-being. With some animals, housing is important. With all animals, sanitation is important. Disease prevention and behavior management are important in caring for some animals.

INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 13 is to introduce students to important areas and concepts of animal science. Emphasis is on animal well-being. To achieve this goal, learners will be able to:

1. Explain how animals benefit people.
2. List and explain the major types of animals.
3. Describe animal structures and functions.
4. Explain nutrition and feeding.
5. Define reproduction and describe the processes involved.

INSTRUCTIONAL STRATEGIES

Use instructional strategies that result in student mastery of the chapter and relate the content to animals in the local area. Begin the interest approach by having students read the first page of the chapter. After one or more students have summarized each paragraph, develop a list of ways animals help people on the writing surface using student input. Present the objectives and refer students to the terms and Web site on the second page of the chapter.

Have students read the chapter prior to covering it in class. Begin with the section “How Animals Benefit People.” Use student participation to outline the content on the writing surface. Have students take notes on the information. Use this strategy to assure mastery of the other sections.

Relate the content to animals found locally. Arrange to visit one or more animal producers and/or a veterinary medicine clinic. Sometimes, a pet store or producer of laboratory animals may be available. These can be used for a field trip or to have an employee or owner serve as a resource person in class and describe the nature of their work. A fair or livestock show may have a variety of local animals available for viewing. Refer students to the Career Profile and AgriScience Connection. Ask students to read the sections and call on one or more to orally summarize the information. Relate the Career Profile to careers in the local area.

Animal well-being is an important notion. Have students describe the kind of environment and care different animals need to their well-being. This may involve having students prepare short reports on different species of animals.
REVIEW AND EVALUATION

Use materials at the end of the chapter in the review and evaluation. The Reviewing section has Main Ideas and Questions. Have students read the Main Ideas and orally summarize the content. Students should answer the Questions in writing or during supervised study and orally discuss the answers. Always take up written assignments, review the work, and provide feedback. Use observations of the students as a basis for reteaching as necessary.

Evaluation can involve using the Evaluating section plus teacher-made tests.

ADDITIONAL RESOURCES

Additional resources can include any materials on animals, including production, breeds, facility needs, showing, and well being. The Web site listed on the second page of the chapter has excellent information on a wide range of animals, including color photographs of animals by breed. Any animals or animal facilities in the local area are resources to consider. Local pet stores and online resources can be used to promote learning.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 13 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What are the common products from animals? Which of these products do you use?

The common products from animals are meat, milk and dairy products, eggs and poultry products, wool and mohair, animal by-products, and service and pleasure. (The products that students use may vary but most students will use examples in nearly all areas.)

2. What is a by-product? What roles do by-products fill?

A by-product is a secondary product from animals. The may or may not be edible. Use depends on the product and how it is processed.

3. What is the relationship between cells, tissues, organs, and organ systems?

Cells, tissues, organs, and organ systems are the body structures of animals. Cells are the building blocks that form tissues. Tissues form organs. Several organs that function together form organ systems.

4. Why do animals need food?

Animals need food because the components of food are used to support life processes, including growth, development, reproduction, and work.

5. What nutrients do animals require? What purposes does each serve?

The nutrients animals need include water, protein, carbohydrates, fats, vitamins, and minerals. Water is a component in cells and helps transport other nutrients. Protein is needed for the growth of muscles, tissues, and bones. Carbohydrates provide energy for an animal. Fats provide energy and may carry some vitamins. Vitamins are required for specific functions of an organism. Minerals are chemical elements needed by the skeleton and other systems.

6. Compare and contrast monogastric and ruminant digestive systems.

A monogastric digestive system has a simple stomach. A ruminant digestive system has a stomach divided into four compartments. Both systems have a mouth, small intestine, and large intestine. The kind of system determines what the animal eats. Animals with ruminant stomachs can eat more grass and other roughage. Animals with monogastric systems eat more concentrates, such as grain.

7. Why do animals require different quantities and amounts of feed at different times in their lives?

Because protein is needed for growth, young rapidly growing animals need feed with more protein than older animals.

8. Why are balanced rations and feed efficiency important to an animal producer?

Balanced rations provide nutrients in the correct proportions for animals. Feed efficiency is the amount of feed an animal eats in relation to production. Producers want animals to have balanced rations so that feed ingredients best meet the needs of the animals and is not wasted.
9. What are the steps in the reproductive process?

The steps in the reproductive process are production of sex cells, mating, pregnancy, and birth. With most birds and fish, the young develop outside the female’s body.

10. Why are animal producers concerned with animal well-being?

Animal producers are concerned with animal well-being because it deals with caring for animals so that their needs are met. The animals are healthy and do not suffer.

11. What roles do housing and sanitation play in animal well being?

Some animals need housing to protect them from bad weather; others are kept in a controlled environment so that they grow quickly and efficiently. Sanitation provides a clean environment for the animal. Both reduce disease and help animals grow better.

12. Why would a producer take steps such as castration and debeaking?

These are behavior management practices. Castration removes the testicles so that male animals are less aggressive and do not breed. Debeaking is removing the tip of a bird’s beak to prevent it from attacking and injuring other birds.

Evaluating

1=g, 2=c, 3=j, 4=l, 5=i, 6=a, 7=b, 8=e, 9=f, 10=d, 11=h, and 12=k

CHAPTER SUMMARY

Veterinary science is the study of the diseases and health of animals. Emphasis is on the application of science. A thorough knowledge of animal biology is essential. The overall goal is to assure the well-being of animals. Some areas focus on companion animals, while others focus on agricultural animals, exotic animals, and aquatic animals. Veterinary work is carried out in a range of settings.

A practice (veterinary practice) is the routine of the procedures carried out by veterinarians and those who assist them. It is all of the activities of a veterinarian in his or her work. Some practices are in hospitals; others in clinics, government agencies, and with industries. Most veterinarians are in local hospitals and clinics. A veterinary hospital is an animal health facility where animals can be boarded overnight or longer for health care reasons. A veterinary clinic is an animal health facility where animals are not boarded overnight for health care reasons. Some clinics may provide animal boarding but it is done from a kennel perspective and not for a health reason. Both hospitals and clinics have the equipment and instruments needed to treat the animals that are served.

Overall, veterinary science provides for the care of all animal species. Regardless, most veterinarians restrict themselves to certain species or groups of animals. The five areas of veterinary practice are: Agricultural animal practice (those on farms and ranches that are produced for food or other products); Companion animal practice (a practice that focuses on dogs, cats, and other species that people may keep at their homes as pets or companions); Exotic animal practice (non-native species such as canaries, snakes, hamsters, and guinea pigs as well as those in zoos, animal refuges, and other animal-related facilities); Mixed animal practice (deals with most all species and not specialized); and Referral practice (a practice that provides more advanced care in specialized areas with animals referred by other veterinarians). In addition some animal cases are cared for by teaching hospitals in veterinary medical schools. Further, some veterinarians are involved with military animals, food inspection, research, and teaching.

Animals may have health issues associated with diseases, traumas, and toxins. The nature of these var-
ies among the species but there are similarities. A disease is a condition of an animal in which it deviates from normal health. Its normal life functions have been disrupted. Sometimes only one organ is affected. At other times, the entire animal could be affected. Some diseases are infectious; others are noninfectious. An infectious disease is one resulting from the presence of a pathogen in the animal's body. Pathogens are typically viruses, bacteria, fungi, protozoa, and parasites, such as worms. Infectious diseases cause disruption in the life of an animal. Products produced, such as milk, may be damaged or unusable. A noninfectious disease is a condition that is not contagious—not spread from one animal to another. These diseases are not caused by infectious agents. Examples of noninfectious diseases include open wounds, broken bones, cancer, nutritional disease, and degenerative disease.

Trauma is a physical wound. The cause is an external force that cuts, tears, or punctures the skin. Dogs may get in a fight and inflict trauma. Wounds vary in size and condition. Some wounds are known as abrasions (on the surface of the skin) and others are deep into the skin and muscle. Trauma can also result in fractured bones. Depending on the animal, care will be needed by a veterinarian to align the bone for proper healing. A toxin is a poison. The poison may be absorbed through the skin or ingested with food and water. Food products should be protected from contact with toxins. Snake bites may release a toxin in the body of an animal. Chemical substances around an animal could become toxins if ingested.

Assessing the health condition of an animal involves several activities. These include doing a physical examination, observing vital signs, and testing specimens. A history is also compiled to gather information about the animal's past health situation. A physical examination is used to assess the condition of an animal. It involves collecting information about the animal's health. All body systems are checked, including digestive, respiratory, circulatory, and others. A veterinarian makes careful records of the observations. The vital signs of an animal are the indicators of the status of the living condition. They are the characteristics that are important in assessing animal health. They vary with the species. Each species has a range of normal conditions. Vital signs include temperature, pulse rate, respiration rate, and tissue color. Specimens may be taken for laboratory analysis to determine the nature of a health problem.

Animals may need medications to prevent or treat disease. The goal is to promote health and well-being of the animal. Veterinary personnel often refer to this as “drug administration.” It deals with how the drug is delivered. Dosage and methods of administration are important to assure response to the selected treatment.

Proper animal restraint is essential for examining and administering to an animal. Large animals may be restrained in a head squeeze. Small animals may be physically held by an assistant. Safety of both the animal and people around them is essential.

**INSTRUCTIONAL OBJECTIVES**

The overall goal of this chapter is to provide introductory information on veterinary science. To achieve this goal, learners will be able to:

1. Discuss the meaning of veterinary science and related careers.
2. Explain infectious and noninfectious diseases, trauma, and toxins.
3. Explain animal assessment and use of vital signs.
4. Discuss the administration of medications.
5. Describe the role of animal restraint.

**INSTRUCTIONAL STRATEGIES**

Instructional emphasis should be on helping students appreciate the role of veterinary science in animal production and assuring quality products. Involve students in the content of the chapter by having them read and participate afterward in discussing, reviewing, and evaluating activities.

Begin covering the chapter by having students read the first page (page 289). Afterward, ask a student to summarize what the paragraphs mean. This includes having students compare going to a physician when ill to taking an animal to a veterinarian when health issues appear to be present or follow preventative practices. Move from the discussion into the objectives.

Have a student read the objectives aloud in class. Also, as a part of the teaching process, review the list of terms. Cover the sections of the chapter sequentially. Have students read each section as homework or during supervised study in class. Outline the major points using electronic presentation software or on the writing surface. Also, list and define terms using input from the students. Have students keep notes on the information. Move through the chapter covering each area.

Begin by covering the section on “Meaning of Veterinary Science and Related Careers.” Have students read the section as homework or during supervised
study. Involve them in defining the terms and identifying careers and needed education and experience. Invite a local veterinary worker (veterinarian, veterinary assistant, or other person) to serve as a resource person and describe their education and nature of their work.

Cover the section entitled “Diseases, Traumas, and Toxins” by having students read the section and going over major concepts and terms in class presentation. Involve students in providing information that defines the terms. Also, have students give examples of experiences that they have had with animal diseases, traumas, and toxins.

Next, have students read the section entitled “Animal Assessment and Vital Signs.” This can be as homework or during supervised study. Cover the content by going over major concepts and defining terms. Use a writing surface or electronic presentation software. Have students keep notebooks on the information.

Begin the section on “Administering Medications” by having students read it as homework or during supervised study. Use student input to go over major concepts and defining terms. Students should record information in their notebooks. Various instruments used in administering medications may be shown and demonstrated in class.

Cover the section on “Animal Restraint” by having students read it ahead of class time. Involve students in identifying major concepts in the section. Have students keep notes on the content.

Refer students to the Career Profile on Veterinarian and the AgriScience Connection on Asepsis. Use these as a basis for discussion and covering relevant concepts.

**REVIEW AND EVALUATION**

Use sections at the end of the chapter to aid in review and evaluation. Students should read the “Main Ideas” section and be prepared to cover concepts that are included. Class discussion may result in the need for re-teaching sections of the chapter. The “Questions” can also be used in the reviewing process and to aid in assessing student mastery of the objectives.

The “Evaluating” section can be used to aid in determining student achievement of key terms. Student performance on this section may be used as an aid in determining the content that needs to be re-taught.

A strategy used by some teachers in reviewing and evaluating is for students to take objectives and demonstrate that they have mastered the content associated with each objective. This may be orally in class discussion or as written explanations by students of the content associated with each objective.

**ADDITIONAL RESOURCES**

The “Exploring” section at the end of the chapter offers several suggestions of additional learning resources. In some cases, the Web site of the American Veterinary Medication Association may have useful information. The address is: **www.avma.org**. In addition, each state has a veterinary association as well as a regulatory agency for veterinary medicine and these Web sites may be useful. The U.S. Department of Agriculture and the Food and Drug Administration have roles with veterinary medicine. The Web sites of these may be useful. A lead agency in the USDA is the Animal and Plant Health Inspection Service (http://www.aphis.usda.gov/). In the FDA, refer to this Web site: [http://www.fda.gov/AnimalVeterinary/default.htm](http://www.fda.gov/AnimalVeterinary/default.htm).

Local resources in veterinary clinics and hospitals, animal supplies stores, kennels, and related businesses might be useful resources. The school lab may be a good resource, particularly if the school has a veterinary assisting or veterinary science class.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 14 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is veterinary science?

   Veterinary science is the study of diseases and health of animals.

2. How does a veterinary hospital differ from a veterinary clinic?

   Both veterinary hospitals and clinics provide animal health services. The major distinction is that hospitals can board animals overnight for health purposes and clinics do not.

3. What are the five areas of veterinary practice?

   The five areas of veterinary practice are: agricultural animal, companion animal, exotic animal, mixed animal, and referral.
4. In addition to veterinarian(s), what staff may be found in a local hospital or clinic?

Staff may include veterinary technologist, veterinary technician, veterinary assistant, and others such as groomer, kennel technician, and office manager.

5. What is the distinction between an infectious and a noninfectious disease?

An infectious disease results from the presence of a pathogen (infectious agent); a noninfectious disease is not caused by an infectious agent such as an open wound or a degenerative condition.

6. What are some signs of an animal that it may have a disease?

Signs of disease in an animal are: changes in body temperature, loss of vigor, loss of appetite, inflammation, changes in breathing, diarrhea, decreased production, and death. Note: The answer provided here relates to infectious diseases.

7. What is trauma?

Trauma is a physical wound such as cuts, tears, or punctures in the skin.

8. What are four vital signs that are often assessed?

Four vital signs are: body temperature, pulse rate, respiration, and tissue color.

9. What forms of drugs are used in veterinary medicine?

The forms of drugs used in veterinary medicine are: tablet, capsule, liquid, inhalant, powder, aerosol, cream, and suppository.

10. What routes of administration are used in delivering medications to animals?

Major routes of drug administration that may be used are: oral, injection, topical, and ocular.

Evaluating
1=i, 2=f, 3=c, 4=j, 5=a, 6=b, 7=d, 8=e, 9=g, and 10=h

15

PLANTS

CHAPTER SUMMARY

Life depends on plants! Plants perform important roles in our environment. They make food through photosynthesis. This food serves as the food for many animals, including humans.

Plants are classified using a system of binomial nomenclature. The groups are, with the largest first, domain, kingdom, phylum, class, order, family, genus, and species. The genus and species form the scientific names of plants. Many plants are known by their scientific names because common names tend to vary from one local area to another. Using scientific names helps prevent confusion over the true identity of a plant.

Plants are also classified by life cycle. An annual is a plant that completes its life cycle in one growing season. Most are summer annuals, though some are winter annuals. A biennial completes its life cycle in two growing seasons. Perennials live more than two seasons. Common examples of each are found in the local area.

A third way of classifying plants is by seed leaves. A dicotyledon (dicot) is a plant with two seed leaves. Veins in the leaves are branching. Broadleaf plants are dicots. A monocotyledon (monocot) is a plant with one seed leaf. The veins in the leaves are parallel. Grassy plants are monocots.

Plants have three major vegetative parts: roots, stems, and leaves. Plants also have reproductive parts that are flowers, fruit, and seeds. The seed is the structure that will become a new plant.

Plants have many uses. Some plants are raised for human food. Other plants are raised for animal feed products, fiber crops, timber and pulp, and to improve the environment.

In order to grow, plants need proper conditions. They must have water, fertile soil or medium, nutrients, temperature, light, and be protected from pests. Agronomy, horticulture, and forestry are three main plant industry areas.
INSTRUCTIONAL OBJECTIVES

Chapter 15 includes fundamental information on plant science. The overall goal is to help students understand the structure and contributions of plants. To achieve this goal, learners will be able to:

1. Describe how plants are classified.
2. Name and explain the major parts of plants.
3. List and describe ways plants are important.
4. Explain the conditions needed for plants to grow.
5. Define the major plant science industries.

INSTRUCTIONAL STRATEGIES

Involve students in systematic and active learning throughout the chapter. Begin the interest approach by having students read the first page. Call on one or more to summarize the content. Ask a student to explain why plants are as important as they are to animals, including humans. Move from the interest approach into the objectives and terms. Occasionally, students may be using the Web site on at the bottom of the second chapter page.

Cover the chapter sequentially beginning with the section ‘Plant Classification.’ Have students read each section ahead of class discussion. Reading may be as homework or during supervised study—select the approach that is best for your class. Outline the major points on the writing surface using student input. The ways plants are classified should be listed along with brief notes of explanation. Have students give examples of plants in each class that are found in the local area. Students should take notes on what is covered. Move through the other sections of the chapter following a similar process. Students who have had biology or other life science classes may be familiar with the content. If so, involve them in summarizing the information and spend less time on the content. In either case, relate the content to plants in the local area.

Use resource people or field trips to add relevance to the chapter. The school greenhouse and grounds can be useful in teaching plant science. Have students make a collection of leaves from trees and identify the leaves. Use local tree identification materials or use the book *Forests and Forestry* (available from Pearson Prentice Hall). If time permits, visit a farm and/or vegetable garden to identify crop plants.

REVIEW AND EVALUATION

Use the end of chapter materials for review and evaluation. Use Main Ideas to review and summarize chapter content. The Questions can be used to reinforce learning and assess achievement. The responses to the questions may indicate a need for reteaching some areas.

Items in the Evaluating section can assess student mastery of key terms. Teacher-made tests and tests from test banks will also be useful in the evaluation of learning.

Student involvement with supervised experience, science projects, and other activities will help assess student mastery of the chapter. These will also provide the opportunity to reinforce or reteach relevant areas.

ADDITIONAL RESOURCES

Additional resources include materials about agronomic and horticultural crops, ornamental plants, forests, and wild plants. These should be used to relate plants grown in the local area to the principles in Chapter 15. Farms, garden centers, parks, and nature areas may be useful in providing the opportunity for students to observe different plant specimens.

Items listed in the Exploring section can also be used as resources to promote learning. The school lab activity (Exploring number 4) represents a good opportunity to promote thinking among students about future classes in agriculture and horticulture.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 15 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is the reason scientists classify plants?

   Scientists classify plants so that they can communicate better. They use terms that are understood by other scientists.
2. What is the difference between an annual, a biennial, and a perennial?

An annual completes its life cycle in one growing season. A biennial completes its life cycle in two growing seasons. A perennial lives three or more years.

3. What are the six parts of a plant? Which are vegetative and which are reproductive?

The six parts of a plant are roots, stem, leaves, flower, fruit, and seeds. Roots, stems, and leaves are vegetative. Flowers, fruit, and seeds are reproductive.

4. Do you think a plant could survive without one or more of its parts? Why or why not?

Note: The answers may vary somewhat and should justify the position taken. In general, a plant can survive if one or more leaves are lost but it will not if all leaves are lost. A similar thing is true with roots and stems. A plant can survive without reproductive parts but it will not reproduce itself.

5. What do you think is the most important function of the plant? Why?

Note: Answers can vary and might include one of the following: human food, animal feed, fiber crops, wood and paper, or the environment. Answers should defend the function selected.

6. What six factors influence plant production?

The factors influencing plant production are water, soil, nutrients, temperature, light, and pest management.

7. What is integrated pest management?

Integrated pest management uses a variety of methods to control pests. The goal is to reduce damage to an acceptable level to the grower.

8. What are the differences in agronomy, horticulture, and forestry?

Agronomy deals with the production of crops in fields, such as grain, forage, and fiber crops. Horticulture deals with crops for ornamental purposes and fruits and vegetables. Forestry deals with the production of trees on wooded areas.

Evaluating

1=f, 2=d, 3=a, 4=g, 5=e, 6=h, 7=i, 8=b, 9=j, and 10=c

CHAPTER SUMMARY

Soil supports all life on the earth! Most plants are grown with their roots firmly anchored in the soil. The roots take up water and nutrients for the plant to use in photosynthesis. Maintaining fertile soil is an important goal for agricultural and nonagricultural work that uses the land.

Soil is the material that covers the earth’s crust. It consists of minerals, organic matter, water, and air. The proportion of these materials varies, with the ideal being about 45 percent mineral matter, 5 percent organic matter, and 50 percent space for air and water. Mineral matter is from the gradual breakdown of parent rock material. Organic matter is from the decay of plants, animals, and other organisms. Many living organisms are found in the soil. These include bacteria, earthworms, protozoa, and burrowing animals, such as groundhogs.

Soil is classified based on its contents. Soil texture is the size of the particles in the soil. Large particles are sand, medium-sized particles are silt, and the smallest particles are clay. The soil triangle is a graphic approach to showing relationships between particle size and soil classification. Soil structure is based on particle size and how the particles group themselves together. Sandy soils have less structure than soils high in clay. A soil profile is the cross-section of soil. It is organized into layers known as horizons.

As an environment for the growth of plant roots, the soil has several factors that influence how well plants
grow. pH is the acidity or basicity or the soil. Nutrient content is a major factor in plant growth. Plants get nutrients from the soil. Nutrients that are missing are not available to plants. Fertilizer is used to add nutrients to soil.

Soil can be damaged or lost. Erosion is the wearing away of the topsoil. Some erosion is by physical action of water, wind, and other natural phenomena. Practices can be followed to reduce erosion. Among these practices are no-till farming, mulching, using windbreaks, strip cropping, contour tillage, terracing, and waterways and diversion ditches. Chemical erosion is the loss of nutrients from soil. Nutrients may be leached away or removed by harvested crops. Testing is needed to learn the nutrients that are low and need to be added through fertilizer.

**INSTRUCTIONAL OBJECTIVES**

The overall goal of this chapter is to provide basic information on the composition, use, and care of the soil. To achieve this goal, learners will be able to:

1. Describe the four major components of soil.
2. Explain how soil is classified.
3. Describe the chemistry of soil.
4. Explain erosion and name ways it can be reduced.

**INSTRUCTIONAL STRATEGIES**

Use a systematic approach in teaching Chapter 16 that integrates information about local soil characteristics and conditions. Begin the chapter with an interest approach that involves having students read the first page of the chapter. Ask one or more students to distinguish between dirt and soil. Help students understand that soil is not dirt unless it gets out of place much like a plant becomes a weed if it is growing where it isn't wanted. Go over the objectives for the chapter. Refer students to the terms and Web site as appropriate for the teaching style you use.

Begin covering the content of the chapter with the section, “Soil Composition.” Have students read the section as homework or during supervised study. Use student participation to outline the content on the writing surface. Have students keep notes on the salient points. Be sure content to achieve the objective is covered. Go over the remaining sections of the chapter using a similar sequential manner. Relate as much of the content to local soil and growing conditions as possible.

Call the attention of students to the Career Profile and AgriScience Connection. Have students read the Career Profile and ask one or more to describe the work a Soil Scientist. If appropriate, invite a local soil scientist to serve as a resource person in class and discuss the nature of the work. Have students read the AgriScience Connection on Home Composting. Encourage them to compost materials at their home. If time permits, build a compost bin at school and compost paper and other materials.

Students may be interested in land and soil judging. If so, organize the group into teams and go over the details of soil judging. Select the top interested students to be on the soil judging team to compete with teams from other schools.

**REVIEW AND EVALUATION**

Use the sections at the end of the chapter entitled Reviewing and Evaluating. In the Reviewing section, have students read Main Ideas. Afterward, ask one or more to explain the content of this section. Students should answer the items in the Questions section in writing as homework or during supervised study. Afterward, orally discuss the answers in class.

Evaluation can involve the Evaluating matching items, teacher-made tests, and tests from test banks or state end-of-course testing databases. Be sure all evaluations focus on the assessment of student progress in terms of the objectives. Use observations during the review and evaluation to reteach any areas, as appropriate.

**ADDITIONAL RESOURCES**

Information about soils in the local area will be very useful with this chapter. Also, materials on land and soil judging will be needed if this is used as a reinforcing and motivational tool. Soil surveys of the local area can be reviewed. If not available, contact the local soil and water conservation district or other agricultural agency for information.

The most meaningful additional resource for this lesson is the soil in the local community and around the school facility. This soil can be assessed for organic and mineral matter, tested for nutrients and pH, and otherwise examined. In some cases, students may be able to determine slope and other topography features that relate to land capability classes.

An experiment that would be appropriate in most classes is based on the depiction in Figure 16-1. What is the effect of soil (or media) color on plant growth? Such an experiment/demonstration could be set up in the school lab. Several weeks would be needed from
start to completion. Measures of plant growth would be needed. Another measure is the amount of time for seed to germinate and emerge from the soil based on its color.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 16 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is soil?
   
   *Soil is the material that forms the crust of the earth.*

2. What four components are in soil? What does each do?
   
   *The four components are mineral matter, organic matter, water, and air. In addition, soil contains living organisms.*

3. Do you think animals are part of the soil? Why or why not?
   
   *Note: The answer should say “yes.” Some kinds of animals are found in the soil.*

4. Why is soil classification important to soil scientists? What would the field be like without classification?
   
   *Classification is important because it allows scientists to group soils on the basis of certain characteristics. It would be difficult to discuss soil problems and other areas without classification.*

5. What is the difference between soil texture and soil structure?
   
   *Soil texture is the size of the particles in the soil. Soil structure is the arrangement or grouping of the soil particles.*

6. How does pH affect soil and plants?
   
   *Soil pH ranges between 4 and 9. Plants have a range in which they grow best. Species of crop plants must be grown in soil with a pH that is near the ideal for the crop.*

7. List the macroelements needed by plants. How do they help plants?
   
   *The macroelements (major elements) needed by plants are: nitrogen, phosphorus, and potassium. Nitrogen promotes the growth of stems, leaves, and other plants parts. Phosphorus encourages root growth and the formation of flowers and seed. Potassium helps plants resist disease and make starches and chlorophyll.*

8. What is erosion? What is the difference between physical erosion and chemical erosion?
   
   *Erosion is the wearing away or loss of the topsoil. Physical erosion results when soil particles are lost due to water, wind, and other physical forces. Chemical erosion is the loss of nutrients from the soil but leaching and harvesting crops.*

9. Do you think physical or chemical erosion is more important? Why?
   
   *Note: Students can select either physical or chemical erosion. They should defend the answer they have selected.*

**Evaluating**

1=b, 2=a, 3=g, 4=f, 5=h, 6=c, 7=d, and 8=e
HORTICULTURE SCIENCE

CHAPTER SUMMARY

Horticulture is the growing of a wide range of plants for food, beauty, and comfort. The practice of horticulture is a business though some people are involved as a hobby with gardening. People go into it for jobs and to create businesses. The goal of a horticulture business is to provide useful products that will yield a profit for the owner when sold.

Horticulture is often divided into two big areas: 1 - ornamental horticulture and 2 - horticultural food crop production. Ornamental horticulture is the growing and use of plants for their beauty and personal appeal. The plants are used because of their aesthetic qualities. People enjoy viewing the plants and having them where they live. Floriculture is growing and using flower and foliage plants, including the production, transportation, and marketing of flowers. Many flowers are grown in greenhouses, with some being marketed as cut flowers and others in pots or as bedding plants. Landscape horticulture is often referred to as landscaping. Landscaping is producing and using plants to make outdoor areas more appealing. Sometimes, non-plant materials may be used with the plants, such as park benches, gazebos, and rock walkways. In general, a plan is prepared to best highlight a home or other location. Plant materials are selected and established to achieve the plan. Once installed, maintenance is needed to keep the plants looking their best.

Horticultural fruits and vegetables are sometimes referred to as food crop horticulture. Many of the foods that are so important in providing nutrients in human diets are from horticulture. The two major areas of food horticulture are described here. Olericulture is the production of vegetables. Examples of vegetables include tomatoes, lettuce, broccoli, and green beans. Pomology is the production of fruits and nuts. Fruits include berries and citrus. Examples of fruits are apples, pears, oranges, strawberries, and cherries. Nuts are grown under similar conditions as many fruits. The trees are similar except the fruit matures to leave a nut such as the almond. There are exceptions such as the pecan and pistachio. In addition to tree nuts, there are ground nuts such as the peanut.

Various plant growing facilities are used in horticulture. A greenhouse is a plant growing structure that nurtures plants in a protective environment. Heating, cooling, lighting, and irrigation systems are often included. These assure that the plants are not subjected to poor weather conditions. In the winter, the inside of a greenhouse is kept warm. In the summer, it may be cooled. The ability to control the growing environment makes it possible to have fresh vegetables and flowers when it would not be possible to do so because of the weather.

A horticulture nursery is a place where plants for outside use are grown until digging and setting in an orchard or a landscape. This includes trees, vines, and shrubs. Depending on species, these plants may be used in landscaping or in fruit orchards, berry farms, or vineyards. In some cases, the plants may be started in greenhouses and then set out into the field to grow. Plants from nurseries may also be sold in garden centers. Field production is growing horticulture stock directly in the soil of a field. Small plants are set out in the field. When large enough, the plants are dug with the roots intact with soil and wrapped with burlap or other material.

Floral arranging is placing cut flowers and greenery in an attractive display. Some arrangements may have large amounts of flowers as wreaths on stands while others may be in vases or as a corsage and boutonniere. Ribbons and other non-plant materials may be included. These flowers last a few days if properly watered. Floral design is an area that allows the application of art principles.

Good planning is essential for an appealing landscape. With a home, the landscape is often divided into three areas: 1 - The public area is the part of the landscape that is seen from the street. Appealing landscaping is needed to impress the public. Good lawn areas of carefully maintained turf grass are needed. Shrubs are carefully selected and set to achieve the desired effect; 2 - The private area is the outdoor living area and often behind the house. It is out of the public’s view. The private area may be landscaped well to provide for personal enjoyment. This area may also be used to entertain friends when the weather is good; 3 - The service area is often on the side of the house that is isolated from public view and where cars are parked, garbage is picked up, and meter bases are located.
People often grow vegetable gardens for home use. Here are the major activities that will lead to success with a small vegetable garden:

- **Site**—Choose a site with good soil, that is moist but well drained, and receives full sun.
- **Soil preparation**—Before getting too far along in the process, take a soil sample and have it analyzed. Follow recommendations of the test. Till the soil really well. Add fertilizer and other soil amendments, including organic matter.
- **Planting**—Gardens are typically planted in the spring. Frost-hardy plants can be planted earlier than tender plants. Some plants should not be put in the garden until after the danger of frost has passed. The soil will need to be in good condition for planting. Most plants will be established with seed. The seed will likely be placed in rows a few inches apart to allow room for plants to grow (the distance depends on the mature size of the plant). The depth to plant seed is three to four times the width of the seed. Beans are planted deeper than radishes or beets. Some plants are transplanted, such as the tomato, eggplant, and peppers. Be sure to water the soil to promote germination and livability of transplants.
- **Managing pests**—Insects, weeds, and other pests can devastate a garden. Be sure to use practices to reduce these populations below the level of being a bother. Hoeing can get weeds. Unless an organic garden, insecticides can be sprayed on insects. In some locations, deer may be major pests. If so, a tall fence will be needed. Rabbits may be controlled with a small-meshed net wire (sometimes called chicken wire) pinned to the ground.
- **Watering**—Water will likely be needed throughout the growing season. Avoid spraying water from municipal systems onto the leaves of plants. Avoid wetting flowers. Be sure to soak the soil well. Hand watering or irrigation drip tapes may be used.
- **Fertilization**—After the initial fertilization at the time of planting, additional fertilizer should be added near the root zone (but not directly onto the roots). Use fertilizer with appropriate nutrients. Read the label.
- **Staking and training**—Some plants need to be staked and trained. Tomatoes are often staked. Cucumbers may also be staked and trained.
- **Harvesting**—Let the fun begin! Harvest vegetables when ready. Letting them stay too long reduces the quality and offers more time for pests to destroy them.

Many different fruits and nuts are produced, with some requiring specialized climates, soils, and equipment. Even though a pecan or an almond tree might not be appropriate for a location, others such as strawberries, grapes, or dwarf apples might be depending on land area and other requirements. An orchard is a field or area planted with fruit (and nut) trees. Peaches, apples, pecans, hazelnuts, and pears are produced in orchards. As with all horticultural crops, following proper cultural practices is essential.

**INSTRUCTIONAL OBJECTIVES**

The goal of Chapter 17 is to introduce the broad field of horticulture. It includes background career information as well as introductory horticultural practices. To achieve this goal, the learners will be able to:

1. Explain the meaning and areas of horticulture.
2. Discuss the use of greenhouses.
3. Describe the role of nurseries.
4. Explain the meaning and use of floral design.
5. Describe basic landscaping.
6. Discuss food crops in horticulture.

**INSTRUCTIONAL STRATEGIES**

Instructional emphasis should be on helping students appreciate the role of horticulture for aesthetic and food purposes. Involve students in the content of the chapter by having them read and participate afterward in discussing, reviewing, and evaluating activities.

Begin covering the chapter by having students read the first page (page 353). Afterward, ask a student to summarize what the paragraphs mean, such as the uses of plants. This includes having students compare ornamental horticulture to food crop horticulture. Move from the discussion into the objectives.

Have a student read the objectives on page 352 aloud in class. Also, as a part of the teaching process, review the list of terms. Cover the sections of the chapter sequentially. Have students read each section as homework or during supervised study in class. Outline the major points using electronic presentation software or on the writing surface. Also, list and define terms using input from the students. Have students keep notes on the information. Move through the chapter covering each area. Call attention to the Career Profile on floral arranger (page 368) and the AgriScience Connection (page 364) featuring content on using turf sod.
Begin by covering the section on “Horticulture” by having students read the section as homework or during supervised study. Involve them in defining the terms and identifying areas of horticulture science. Cover the areas of ornamental horticulture and fruits and vegetables. Invite a local horticulturist (landscaper, greenhouse operator, or fruit or vegetable producer) to serve as a resource person and describe their education and nature of their work. In some cases, a field trip to visit a greenhouse operation, vegetable farm, or fruit orchard might be highly appropriate.

Cover the section entitled “Greenhouse Production” by having students read the section and going over major concepts and terms in class presentation. Involve students in providing information that defines the terms. Also, have students give examples of experiences that they have had with greenhouses (note that the school greenhouse might be an excellent opportunity for students to make first-hand observations).

Next, have students read the section entitled “Nursery Production.” This can be as homework or during supervised study. Cover the content by going over major concepts and defining terms. Use a writing surface or electronic presentation software. Have students keep notebooks on the information.

Begin the section on “Floral Arranging” by having students read it as homework or during supervised study. Use student input to go over major concepts and terms. Students should record information in their notebooks. Use a resource person to demonstrate floral arranging, with emphasis on a simple design.

Cover the section on “Landscaping” by having students read it ahead of class time. Involve students in identifying major concepts in the section. Have students keep notes on the content.

The section “Horticultural Food Crops” should be covered by having students read the section as homework or during supervised study and use their input to present and summarize major concepts. Of particular interest is the content on establishing and growing a small vegetable garden. In some cases, a school garden might be established by the class.

**REVIEW AND EVALUATION**

Use sections at the end of the chapter to aid in review and evaluation. Students should read the “Main Ideas” section and be prepared to cover concepts that are included. Class discussion may result in the need for re-teaching sections of the chapter. The “Questions” can also be used in the reviewing process and to aid in assessing student mastery of the objectives.

The “Evaluating” section can be used to aid in determining student achievement of key terms. Student performance on this section may be used as an aid in determining the content that needs to be re-taught.

A strategy used by some teachers in reviewing and evaluating is for students to take objectives and demonstrate that they have mastered the content associated with each objective. This may be orally in class discussion or as written explanations by students of the content associated with each objective.

**ADDITIONAL RESOURCES**

Additional resources include those of the school and local community and those available via the Internet or other means. Here are some Web sites that might be useful:

- Association of Zoological Horticulture - [www.azh.org/](http://www.azh.org/)
- United Fresh Produce Association - [www.unitedfresh.org/](http://www.unitedfresh.org/)
- American Nursery and Landscape Association - [www.anla.org/](http://www.anla.org/)

In addition to the sites on this list, each state and land grant university may have Web sites of high benefit.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 17 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. How is horticulture related to science?

   *Horticulture applies several areas of science, including botany, agronomy soils, entomology, turf science, pest management, design science, and economics.*

2. What is ornamental horticulture?

   *Ornamental horticulture is the growing and use of plants for their beauty and personal appeal.*
3. What is floriculture? What are three areas of floriculture?

Floriculture is the growing and use of flowers and foliage plants. The three major areas of floriculture involve the production, transportation, and marketing of flowers.

4. What is a greenhouse?

A greenhouse is a structure for growing plants in a protective and controlled environment.

5. What are six major factors to consider in growing plants in a greenhouse?

The six major factors to consider in growing plants in a greenhouse are: temperature, light, air, watering (irrigation), fertilization, pest management, and support structures.

6. What is container production?

Container production is growing plants in cans, buckets, or similar containers.

7. What is floral arranging?

Floral arranging is placing flowers and greenery in an attractive display.

8. What are the four arrangements of plants in a home landscape?

The four arrangements of plants in a home landscape are: corner plantings, foundation plantings, line plantings, and accent plantings.

9. What is turfgrass?

Turfgrass is grass that forms a continuous ground cover. (Note: Plants that are not of grass species are sometimes used as ground covers.)

10. What are some examples of vegetables based on the part consumed? Name three above ground and three below ground.

Examples of vegetables based on the part consumed are: 1- above-ground--stem (asparagus), petiole (celery), leaf (lettuce), flower (broccoli), fruit (pepper), and seed (beans) and 2- below ground--root (carrot), tuber (potato), corm (water chestnut) and bulb (onion). (Note: Other examples of vegetables could be used.)

Evaluating

1 = c, 2 = i, 3 = h, 4 = a, 5 = d, 6 = g, 7 = j, 8 = e, 9 = f, and 10 = b

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**CHAPTER SUMMARY**

Having wholesome food begins with producing plants and animals; however, it is much more. The farm commodities must be processed into forms that consumers want to use and can safely eat. Wholesome food is nutritious and contributes to human health and well-being. Some foods are perishable and must be properly stored or preserved in some way to prevent spoilage. Food that spoils should not be eaten. Eating some spoiled food may result in food poisoning.

Since the late 1900s, much attention has been focused on “organic” foods. These are, in short, foods produced without the use of chemical fertilizers and pesticides. Consumers often paid premium prices for organic food. Research findings released by Stanford University in 2012 concluded that there is little evidence that organic food is healthier than food produced using modern agricultural practices to assure large yields of quality products. (Findings of the research were reported in The Atlanta Journal-Constitution and in other media on September 3, 2012.)

The food industry exists to provide quality food products. Products from farms and ranches throughout the United States and many foreign nations provide most of our food which is prepared for the consumer by the food industry. Millions of people work in the U. S. food industry. Here are a few examples: food manufacturing–1.5 million people; food service–7.5 million jobs; researchers and educators–several thousand individuals; and transportation and warehousing–hundreds of thousands of people.
Food processing is the series of steps that food products go through to make them usable. The nature of processing depends on the characteristics of the plant or animal product. Fabrication, preserving, packaging, and other steps are a part of processing. Most food spoilage is due to the action of microbes that are present in the food products. Preservation helps prevent the growth of these microbes. Common methods of preservation include refrigerating, freezing, canning, drying, fermenting, pickling, and irradiation. Pasteurization is a heat process used with some products to kill certain microorganisms.

**INSTRUCTIONAL OBJECTIVES**

The overall goal of Chapter 18 is to introduce students to the meaning, importance, and selected procedures in food safety. To achieve this goal, learners will be able to:

1. Relate the role of the food industry.
2. Explain the meaning of wholesome food.
3. Describe how food spoils.
4. List and explain methods of food preservation.
5. Explain food packaging.
6. Distinguish food quality traits.
7. Identify risks in food processing.

**INSTRUCTIONAL STRATEGIES**

Use a thorough, systematic approach in teaching Chapter 18. Actively involve students in the learning process. Begin the interest approach by having students read the first page of the chapter. Solicit student comments about their favorite foods and what it takes to get the food to them. An example is the hamburger. Use the meat, bun, pickles, and other ingredients and have students trace the products from the farm. After the interest approach, move to the next page and have students review the objectives. Refer students to the terms list and Web site, as appropriate.

Cover the chapter sequentially beginning with the section “The Food Industry.” Have students read this section as homework or during supervised study. Outline the major points on the writing surface. Ask students to suggest content to include in the outline. Next, cover the section “Wholesome Food.” Use examples of foods to illustrate wholesome and perishable. Set up an experiment with bread to observe the growth of mold. Have students use a microscope to closely see the mold spores. Ask students to draw what they see. Compare the molded bread with bread stored in a refrigerator. Ask students to explain the difference.

Develop a list of perishable and nonperishable foods that the students like to eat on the writing surface. Ask a student to explain food poisoning. Call on another student to explain the concept of food processing. Discuss the meaning of traceability. List all terms in bold italics type on the writing surface along with a brief definition. Have students to record information from the writing surface in their notebooks.

Have students read the section on “Food Spoilage.” List the five factors in food spoilage. Have students explain each factor and offer examples. Next, have students read the section, “Preservation Methods.” Outline the content on the writing surface with their input. Make a tour of a food processing plant to observe how food is preserved. If time permits, preserve a sample of food in the classroom by pickling, freezing, or canning. Cover the section on “Food Packaging” by having the students read, respond, apply, and record. Bring examples of different packaging materials to class. Cover the section on “Food Quality” using a sequential, student-involvement approach as used with previous sections. Next, cover “Risks with Food.” Be sure to include pathogens, pesticide residues, malnutrition, and food additives.

Refer students to the Career Profile and AgriScience Connection. Ask students to read these and call on individuals orally to discuss what they have read in class.

**REVIEW AND EVALUATION**

Use the sections at the end of the chapter to help in the review and evaluation. Procedures similar to those in previous chapters can be used with Chapter 18. Use teacher-made tests to enhance the assessment of student learning.

A good assessment procedure is to have students demonstrate that they have mastered the objectives for the chapter. This can involve having various class members orally describe the content associated with each objective. This is a good procedure because it reinforces student learning and allows reteaching areas where students appear deficient.

**ADDITIONAL RESOURCES**

Have students assist in providing product models brought from home to use in the class. Examples include food packages, labels, bulged cans, and other food products. A tour to a local food processing facility will be useful. Some schools have canneries, and these offer good opportunities to observe and do food preservation on a first-hand basis. The family and consumer science teacher at your school or the local
extension home economics agent may be good resource people. With the food industry, local supermarkets, food processing facilities, and the like may be good resources.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 18 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is the role of the food industry?
   
   The food industry exists to help people have quality food products. It is the link between producers and consumers. The industry takes raw materials and converts them into finished products for consumers.

2. What are the major areas of the food industry?
   
   Major areas of the food industry are manufacturing, service, research and education, and transportation and warehousing. Sometimes local supermarkets and grocery stores may be included.

3. What are some causes of food spoilage?
   
   Spoilage is caused by the invasion of bacteria or foreign materials in food. Rodents, insects, and chemicals spoil food.

4. What is the difference in perishable and nonperishable food?
   
   Perishable food is highly susceptible to spoiling and can be stored only a short time without some type of preservation. Nonperishable food is less susceptible to spoilage.

5. What factors contribute to food spoilage? How could these factors be controlled?
   
   Five factors contribute to food spoilage: food source, food nature, moisture content, time, and temperature. Each may require separate control measures. Sources should be free of contaminants and sanitary. Food nature varies so that some foods are more likely to be good places for microbes to grow. Moisture in food contributes to the growth of microbes. Time is an important factor because the passage of time allows microbes to grow. Temperature either promotes or inhibits microbe growth.

6. What is the difference between a pathogen and a toxin?
   
   A pathogen is something that causes disease, such as bacteria and fungi. A toxin is a chemical produced by pathogens that makes people sick or, in some cases, may cause death.

7. What types of food are most susceptible to spoilage?
   
   Perishable foods are most susceptible to spoilage.

8. Why is food preservation important?
   
   Food preservation is important because it prevents spoilage.

9. What are important factors when selecting packaging? Why?
   
   Important factors in selecting packaging are food safety and consumer sales. Packaging must protect the product, resist impact, be inexpensive, and attractive. The ability to recycle packaging is also important to some people.

10. What is risk? What are some risks associated with food?
    
    A risk is a possible threat that may be physical, mental, or monetary. Risks with food include pathogenic contamination, pesticide residues, malnutrition, and food additives.

11. What food labels must have the radura symbol?
    
    Those foods that have been irradiated as a part of preservation.
    
    Note: The chapter indicates that spoilage can occur as easily at home as at a processing plant. Take the same steps at home as would be needed in a processing plant.

**Evaluating**

1=f, 2=h, 3=a, 4=e, 5=c, 6=d, 7=g, and 8=b
TECHNOLOGY SYSTEMS

CHAPTER SUMMARY

Technology systems are widely used in the agricultural industry. A technology system is combining ideas and machines to achieve a purpose. It is a system of technology. A system is a thing or process made of several parts. All of the parts or elements work together to perform intended functions. The systems approach involves using knowledge, tools, and resources to solve problems. Systems approaches are used in many areas of agriculture. Examples include soil, plant production, animal production, processing, and supply systems.

Research and development is much a part of developing new technology systems. Known as R&D, it is carried out by colleges and universities, corporations, government agencies, and associations. All new systems undergo testing to ensure safety.

An emerging technology system is the use of variable rate technology (VRT). Practices are varied within a field based on the conditions that are present. This conserves the use of resource inputs, such as fertilizer and pesticide, and protects the environment from excessive use of potentially damaging materials.

INSTRUCTIONAL OBJECTIVES

The goal of Chapter 19 is to introduce students to new and emerging technologies, including variable rate technology. To achieve this goal, learners will be able to:

1. Explain technology systems in agriculture.
2. Describe research and development in technology systems.
3. Explain variable rate technology.
4. Describe how innovations influence labor requirements.
5. Explain how technology is related to sustainable agriculture.

INSTRUCTIONAL STRATEGIES

Chapter 19 may require more explanation and attention to detail because of the nature of the subject matter. The content as well as concepts may be new to students. A systematic, thorough approach will be needed.

Use the first page of the chapter in the interest approach. Have students read the page. Call on one or more students to explain the content of each paragraph. Ask students to tell what they feel agriculture was like 200 years ago. Also, ask students to name the technology that was available at that time. Afterward, have the students give a few examples of technology in agriculture today. Following the interest approach, go over the objectives and terms as appropriate for your teaching style. Also, have students use the Web site for information on a wide range of agricultural topics including emerging technologies.

Cover the content of the chapter sequentially. Begin with the section “Technology and Systems,” and have students read the content, respond in class as you outline the major points on the writing surface, and keep notes on these points. Use a similar procedure with other sections of the chapter. Arrange for students to observe variable rate technology in action.

Have students refer to the two AgriScience Connections and the one Career Profile. Have students read each and call on one or more to summarize the content. With the AgriScience Connections on Weather Watching, determine if any students have been to a weather reporting station. Ask what they saw. With the AgriScience Connection on Embryo Injection, have students explain how this saves stress to the newly hatched chick. With the Career Profile, ask students to assess how they feel about the work of an Agricultural Engineer.

REVIEW AND EVALUATION

Use the material at the end of Chapter 19 for the review and evaluation. Also, use teacher-made approaches appropriate to the educational needs of the students.

Use the Main Ideas in the Reviewing section as part of the review. Have students read the section and ask one or more to orally explain the content. After discussion is complete, use the Questions in the review. In some cases, students will answer the questions in writ-
ing as homework or during supervised study. The questions should be orally answered in class to assess student performance and reteach needed concepts.

Have students complete the Evaluating section to assess mastery of terms and concepts. Use teacher-made tests or tests from computer-generated test banks are further assessment measures.

**ADDITIONAL RESOURCES**

Additional resources can include any materials on new and emerging technology systems. In some cases, farm shows that demonstrate new technology will be available. In other cases, local dealers or users of technology may be good resource people to have in class.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 19 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is a technology system?
   
   A technology system is combining ideas and machines to achieve a given purpose.

2. How do technology systems help agriculture?
   
   Technology systems help producers use reasonable approaches to problems.

3. How is crop growing a system?
   
   Crop growing is a system that includes land preparation, planting, controlling pests, and harvesting. All functions must be carried out and all materials must be in place.

4. Select one of the technology systems and describe why it is beneficial.
   
   Note: The textbook has descriptions of five technology systems: soil, plant production, animal production, processing, and supply. Students may choose either and describe its benefits.

5. What is research and development?
   
   Research and development (R&D) is the way new technology is created in agriculture. It includes experimentation and investigation.

6. Name some groups involved in research and development. What do you think they achieve?
   
   Groups in R&D include colleges and universities, corporations, government agencies, and independent labs. Even though their goals may be different, the outcome is to be greater efficiency.

7. What are the steps of research and development?
   
   The steps in research and development involve the scientific method. Information is gathered. Experiments, developments, and testing are used. Safety testing is essential.

8. Why does the government require safety testing?
   
   Safety testing is needed to protect people and the environment from potential hazards.

9. How does technology reduce labor requirements?
   
   Technology reduces labor requirements by allowing for faster work and more efficient use of time.

10. Why do you need to get as much education as possible?
    
    Education helps people use technology.

11. What is sustainability? How does technology help achieve this goal?
    
    Sustainability is using resources so that the opportunities continue in that area. Technology helps prevent soil erosion and water contamination.

12. What is VRT? Why is it important?
    
    VRT is variable rate technology. VRT is varying crop practices based on field conditions. It is important in making appropriate applications to land in fields. It does not waste resources and helps protect the environment.

**Evaluating**

1=b, 2=f, 3=d, 4=e, 5=g, 6=a, and 7=c
CHAPTER SUMMARY

Good management and marketing are needed for success with agricultural enterprises. Management involves planning, organizing the enterprise, hiring workers, providing leadership, and assessing effectiveness.

Resource management involves using valuable materials and services in an agricultural enterprise. Financial management is part of resource management. Good people are needed to do the work. Typically, the inventory must be managed.

Marketing is all of the steps in moving products from the producer to the consumer. Producers of plant and animal products are often only involved with moving the product to a processor or another first step in marketing. In a consumer-driven market, the producer must initiate a product that the consumer is willing to buy.

In most marketing—especially retail marketing—the four Ps are often used to guide the marketing process: product, place, price, and promotion. These involve producing a product the consumer will buy, getting the product to a place assessable to the consumer, having a price that acceptable to the consumer, and use promotion to inform the consumer of the product. The manager must continually be evaluating how well the marketing process is going and make adjustments to improve it.

International differences exist in the management and marketing of agricultural products. Some countries are said to be “developed;” others are said to be “developing.” Developed countries use technology, value knowledge and education, have good infrastructure for marketing, and use improved crops and animals. In developing countries, agriculture does not use advanced technology.

World trade is an important part of agricultural industry. Many agricultural commodities and products are traded among nations. The World Trade Organization (WTO) sets most rules for international trade. Country of origin labeling (COOL) is voluntary on most agricultural products but most consumers expect such labeling to be present on products. International marketing is sometimes impeded by trade barriers used by a nation. Food safety is often a concern with imported products. Trade agreements are sometimes used to promote trade.

INSTRUCTIONAL OBJECTIVES

The overall goal of this chapter is to provide the fundamentals of management and marketing in the agricultural industry. To achieve this goal, learners will be able to:

1. Explain management and list management functions.
2. List and explain resources managed.
3. Explain areas of management.
4. Explain marketing.
5. Explain the four Ps in marketing.
6. Describe global differences among nations.
7. Describe trends in world trade.
8. List factors in international marketing.

INSTRUCTIONAL STRATEGIES

As a chapter dealing with important concepts associated with success of an agriculture enterprise, use a systematic teaching process that assures student mastery. Relate chapter content to management and marketing situations in the local community. Have students raise examples of situations for discussion.

Use the first page of the chapter for the interest approach. Have students read the page in supervised study. Afterward, ask one or two students to summarize the content. Ask them to explain the word, success. (Success is the achievement of worthy goals.) Indicate that management and marketing are needed to be successful. Once the interest approach has been completed, refer students to the objectives and terms. The Web site to the Kansas City Board of Trade may be a good source of information.

Cover the chapter sequentially beginning with the first section and moving through the chapter. Have students read each section as homework or during supervised study before covering it in class. Use a classroom procedure that involves student input in outlining the
content on the writing surface. Have students take notes on the salient content.

Refer students to the AgriScience Connection on Entrepreneurship. Have students read the section. Afterward, identify entrepreneurs in the local area. Emphasize that entrepreneurship involves creating a product to serve a market niche that is not now being served. Materials from The National Council for Agricultural Education and The National FFA Organization may be useful in this area.

Refer students to the Career Profile on Advertising Specialist. Have students read the section and orally summarize the work of the occupation. A person in an occupation in advertising may be used as a resource person.

**REVIEW AND EVALUATION**

Review and evaluation can involve sections at the end of the chapter as well as teacher-made approaches and materials. The Reviewing section contains Main Ideas and Questions. These can be useful in the review process.

The Evaluating section contains items to match terms with definitions. This helps assess mastery of the concepts involved. Evaluation can be supplemented with a teacher-made test or prepared using computer-generated test banks. In some states, end-of-course testing may be used in the evaluation process.

**ADDITIONAL RESOURCES**

Additional resources will include any materials that relate to management and marketing in the local agricultural industry. The National FFA Organization has materials on marketing and entrepreneurship that may be useful. Local resource persons in management, advertising, and other areas may be appropriate to use in teaching the chapter.

**ANSWERS TO QUESTIONS AND EVALUATING**

**Questions**

The questions at the end of Chapter 20 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is management? Why is it important?

   Management is the way a business is run. It is important because it is doing things to help the business achieve its goals—to be successful.

2. What are some skills a manager needs? Explain why.

   Managers need to have high energy, be friendly, know how to organize activities, and be honest and fair. Without these skills, a business is not likely to succeed.

3. Why do you think management can be explained so many different ways?

   Note: Student interpretation is needed for this answer. Overall, the student should indicate that management is explained in so many different ways because the nature of the work in management varies widely.

4. What is capital? How is it obtained?

   Capital is the resources of an agribusiness, including land, equipment, animals, money, and other things needed to operate the enterprise. Capital may be borrowed from a lending agency or saved returns to the enterprise.

5. What are the five functions in management?

   The five functions in management are planning, organizing, staffing, leading, and controlling.

6. What is marketing?

   Marketing is moving products from producers to consumers. It involves the steps needed to make products into forms that consumers will buy.

7. What is a consumer-driven market?

   A consumer-driven market is created by the decisions that consumers make in buying products.

8. What is competition? Why should competitors be studied?

   Competition exists when two or more producers try to persuade consumers to use their products. Studying competition gives information about demand for a product.
9. What is the difference between a wholesale and retail market?

A wholesale market buys and sells to other wholesalers or to retailers. A retail market sells to the final consumer of a product.

10. How could a wholesale market impact consumer prices?

Note: Students may offer different opinions on this higher-order question. In general, a wholesale market impacts consumer prices by adding to the costs of marketing. The prices that consumers pay are higher.

11. Why is evaluation important?

Evaluation helps determine the effectiveness of an activity. It can help identify problems before they arise.

12. What are two reasons nations may set trade barriers? Explain each in one sentence.

Nations may set trade barriers when they do not agree on food safety issues and practices including the use of transgenic crops for food. Another reason for trade barriers is to protect the income of the farmers in a nation.

Evaluating
1=d, 2=e, 3=g, 4=f, 5=b, 6=c, 7=a, and 8=h

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**CHAPTER SUMMARY**

Communication is the process of exchanging information. Information may be exchanged verbally or nonverbally. People receive messages with their senses—sight, hearing, smell, taste, and touch. The methods used to communicate must be received by one or more of the senses or receptors.

The communication process has five parts: source (initiator of message), message (the idea being communicated), medium (channel connecting sender with receiver), receiver (recipient of message who draws meaning from the symbols used), and feedback (return channels from receiver to sender that allow a message to be evaluated). Communication can occur if only the first four areas used but the sender may not know how effectively the information was exchanged.

The major methods used to communicate are written and orally. Common written forms are letters, reports, articles, and résumés. In business, letters are particularly important. Résumés are essential in getting most jobs. Oral communication involves speaking and listening skills. Speaking is ineffective if the receiver is not listening. Many people may give prepared speeches in their work.

Preparing and giving good speeches involves skills that can be learned. Knowing the proper approaches, practicing, and developing self-confidence are important in developing good skills in delivering prepared and extemporaneous speeches. In the business and professional world, speeches are often illustrated with electronic presentation materials, with PowerPoint® being an example.
INSTRUCTIONAL OBJECTIVES

The overall goal of Chapter 21 is to introduce basic areas of communication, with emphasis on writing letters and résumés and giving prepared speeches. To achieve this goal, learners will be able to:

1. Explain the communication process.
2. Describe the important written means of communication.
3. Identify major parts of a business letter and write a letter.
4. Explain the use of a résumé and prepare a résumé.
5. Describe important oral communication skills.
6. Discuss the importance of public speaking and identify the kinds of speeches.
7. Explain how to prepare and make a prepared public speech.
8. Explain how to prepare and make an extemporaneous speech.

INSTRUCTIONAL STRATEGIES

This chapter includes content that is often associated with contests and programs of The National FFA Organization. Some teachers may wish to structure the instruction around these contests and programs. It is preferable to teach the chapter before initiating the FFA-specific instruction about “Career Development Events,” “Proficiency Awards,” and other areas.

Use a systematic approach with Chapter 21. Begin the interest approach by having students read the first page of the chapter. Afterward, ask one or more students to orally summarize each paragraph. Ask other students to explain how information is important to them. For example, those interested in sports may look at the sports page of the newspaper first. They do so because they want information about what their favorite teams have done. After the interest approach, present the objectives for the chapter and refer students to the terms list. In some cases, students may wish to use the Web site.

Cover the chapter content beginning with the section “Communication Is a Process.” Have students read the section before covering the content in class.

Outline important concepts on the writing surface using student participation in developing the outline. Use examples of successes and failures in communication. Carefully cover the parts of the communication process and have students demonstrate why these are important. For example, ask questions about what has just been covered in class to illustrate source, message, medium, receiver, and feedback.

Use a sequential process to cover “Written Communication,” “Business Letters,” “Résumé,” “Oral Communication,” and “Public Speaking.” Have students do examples as class assignments/activities in each area. For example, each student can write a business letter, prepare a résumé, and make a short oral report. Some of these “action learning” approaches can be used with FFA events and participation. Be sure to appropriately critique and provide feedback on all written assignments that students do. Feedback helps strengthen student responses and allows individual reteaching. Students should prepare and deliver a short prepared speech. Students may also give an extemporaneous speech. It is suggested that guidelines of the National FFA Organization be followed.

In this chapter, use an overall tone of instruction that builds self-confidence. The undergirding theme should be that all students can develop effective communication skills. Use considerable positive reinforcement for communication efforts. Also, avoid embarrassing any students who have impediments such as speaking problems or hearing difficulties.

REVIEW AND EVALUATION

Review and evaluation can use sections at the end of the chapter and participation in FFA activities. Some of these will carry over into Chapter 22, FFA.

Two sections at the end of the chapter will be useful in the review: Main Ideas and Questions. Have students read the Main Ideas and orally summarize the content in class. Answers to items in Questions can be prepared as homework or during supervised study. The answers should be orally covered in class to reinforce learning and reteach areas that may need enhancement.

Use the Evaluating section to assess student understanding of selected concepts. Teacher-made evaluations and how letters, résumés, and oral presentations are prepared will help in assessing student achievement.
ADDITIONAL RESOURCES

Additional resources for this chapter include materials from The National FFA Organization on the various programs dealing with speaking and written communication. In some cases, state FFA associations may also have materials. The book *Developing Leadership and Communication* (available from Pearson Prentice Hall, copyright 2004) will be an excellent resource to have in classroom quantity for this chapter and those that follow.

ANSWERS TO QUESTIONS AND EVALUATING

**Questions**

The questions at the end of Chapter 21 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. **What is communication?**

   Communication is the process of exchanging information.

2. **Distinguish between verbal and nonverbal communication.**

   Verbal communication is the use of words to convey information. Nonverbal communication is the exchange of information without words.

3. **What are the major parts of the communication process?**

   The major parts of the communication process are: sender, message, medium, receiver, and feedback.

4. **What are the four most important forms of written communication?**

   The four most important forms of written communication are letters, reports, articles, and résumés.

5. **What are the major parts of a business letter?**

   The major parts of a business letter are: heading, inside address, salutation, body, complimentary close, and signature line. Parts that students may also list include reference initials, enclosure notation, and postscript.

6. **What is a résumé? What are the major parts of a résumé?**

   A résumé is a written summary of an individual’s education, experience, and accomplishments. The major parts are: name and address, date, career objective or goal, education, work experience, community or school service, and other items that would be useful in gaining a job.

7. **What is oral communication?**

   Oral communication is using spoken words to share information.

8. **What are several suggestions to speak well?**

   Use concrete words. Use short, familiar words. Use a good speaking rate. Select a pitch that is easy for listeners to understand. Smile while speaking.

9. **What is listening? Why is it important in communication?**

   Listening is drawing meaning from oral communication. It is important because oral communication a lot.

10. **What is public speaking?**

    Public speaking is giving an oral presentation to a group.

11. **What should be done to ensure giving a good prepared speech?**

    Getting ready to make a speech involves selecting a topic, getting information, developing an outline, developing the speech, preparing visuals, and practicing the speech.

12. **What should be considered in making a speech?**

    In making a speech, arrive early and study how the room is arranged. Test the microphone and any visuals that you will use. Arrange the podium comfortably for yourself. When making the speech, stand on both feet, look at the audience, do not lean on the podium, and speak clearly, loudly, and distinctly. Use a pleasant voice, correct grammar, and proper pronunciation. Look at the audience. Stay on time.

**Evaluating**

1 = h, 2 = a, 3 = b, 4 = g, 5 = c, 6 = d, 7 = e, and 8 = f
CHAPTER SUMMARY

The FFA is the curriculum-integrated organization for students enrolled in agricultural education classes. Membership has gone over the half million mark in recent years. Many authorities attribute increased membership to new programs and curricula that have been developed to appeal to students with diverse interests. The FFA continues with its purposes in student development through three areas: leadership, personal growth, and career success.

The FFA has undergone many changes since its founding in 1928 as the Future Farmers of America. The first step to initiate an organization for students in agricultural education was in Virginia during the mid-1920s. The national convention was held in Kansas City for 70 years but moved to Louisville, Kentucky, in 1999, later to Indianapolis, Indiana, and back to Louisville in 2013. The headquarters of the FFA are in Washington, D.C., and Alexandria, Virginia, with staff working at the National FFA Center in Indianapolis since 1998.

Much information about the FFA is in the Official FFA Manual. The Manual should be available to all students so that they can study requirements for membership, advancement, and other areas including the National FFA Constitution. In all cases, the hub of FFA activities is in the local chapter. Get all students involved here and all will benefit from FFA participation.

INSTRUCTIONAL OBJECTIVES

The goal of Chapter 22 is to provide background information about the FFA for beginning agricultural education students to see the benefits of membership and opportunities provided by the organization. To achieve this goal, learners will be able to:

1. Explain the purpose and history of the FFA.
2. Describe how to be an FFA member.
3. Explain how the FFA is organized.
4. Describe the activities offered by the FFA.
5. Explain how to be a good FFA member.

INSTRUCTIONAL STRATEGIES

Instructional strategies for the chapter will vary with the approach the teacher uses in teaching students about the FFA. This chapter is an ideal introduction to the FFA. It is probably best taught as a chapter in the book. In some cases, teachers may wish to make this the second or third chapter taught.

Follow a thorough, sequential approach beginning by using the first page of the chapter in the interest approach. Have students read this section and describe what success means. Have them name individuals they know who are successful. Try to help students see that all people can be successful—including themselves. After the interest approach, go over the objectives and terms. Refer students to the Web site for the National FFA organization.

Cover each section of the chapter sequentially. Begin with “Purpose and History” by having students read the section as homework or during supervised study. Outline the major concepts on the writing surface using student participation. Have students take notes on the major points. Move to the other chapter sections and use a similar instructional process. Have local FFA chapter officers talk about the local FFA, including the opportunities available and the benefits of setting goals to be an officer. FFA Alumni members in the local community may also be used as resource sources. Be sure that all students know how the local chapter is structured and when the meetings are held. Some schools may have minichapters in the various classes of agricultural education. Involving members of the class in setting up the meeting room and carrying out an FFA meeting will help them develop an understanding of the organization.

Be sure to cover requirements for advancing to the chapter and state FFA degrees. These are summarized in Table 22-1. Many of the requirements are built into the curriculum or class expectations, such as mastering the abilities in parliamentary procedure.

Students can be given assignments to complete outside of class time using the Web site of the National FFA Organization (www.ffa.org). The assignments can involve investigating a CDE, proficiency award, or other programs of the National FFA.
REVIEW AND EVALUATION

Use the sections at the end of the chapter in the review and evaluation. The Main Ideas provides a brief narrative summary that students can read and report orally to the class about. Use observations here as a measure of areas to be retaught. Use the items in Questions as another review tool. These can be answered in writing as homework or during supervised study. Go over the questions in class as well to reinforce student responses. Always review and provide feedback on the written work of students.

Use the matching items in Evaluating as one approach to evaluation. Use a teacher-made test or a computerized test bank. Observation of student performance in all FFA events will help assess achievement.

ADDITIONAL RESOURCES

Additional resources include FFA materials such as the Official FFA Manual, New Horizons, and Local Program Success materials. Students and teachers may find the FFA Web site (http://wwwffa.org) to have useful information. Materials about operation of the FFA in the state will also be useful.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 21 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is the early history of the FFA?

   The roots of the FFA are in Virginia, where students became involved in the Future Farmers of Virginia in the mid-1920s. In 1928, the Future Farmers of America was formed in Kansas City as an organization for male students enrolled in vocational agriculture. In 1969, females were admitted as members. The name was changed to FFA in 1988.

2. What are the three main purposes of the FFA? Briefly explain each.

   The three main purposes of the FFA are: leadership—the ability to influence other people toward goals, personal growth—developing skills for successful work and life, and career success—developing skills for entering and advancing in careers.

3. What are the four kinds of FFA membership?

   The four kinds of FFA membership are active FFA membership, alumni membership, collegiate membership, and honorary membership.

4. What are the major requirements for active FFA membership?

   The major requirements for active FFA membership are: be in grades 7-12 enrolled in agricultural education classes, pay dues, and interest in the organization.

5. What are the three levels in the FFA organization?

   The three levels in the FFA organization are national organization, state associations, and local chapters.

6. How is the National FFA Organization administered?

   The National FFA Organization is administered by a board of six national student officers and a Board of Directors comprised of adults in agricultural education.

7. What is a Career Development Event? Name two examples.

   A Career Development Event is an activity in which students can show the skills they have learned in their agricultural education classes. Of the sixteen or so offered, students can name any two, such as Agricultural Sales and Prepared Public Speaking. (Refer to Table 21-3 for a complete list.)

8. What is a Proficiency Award? Name two examples.

   A Proficiency Award is recognition of students who excel in a skill area of agriculture. Students can name any two of the more than 30 offered, such as Swine Production and Floriculture.

9. What is the motto of the FFA?

   Learning to do.
   Doing to learn.
   Earning to live.
   Living to serve.
10. What are the official FFA colors?
   The official FFA colors are national blue and corn gold.

11. What are the main items in the FFA emblem?
   The main items in the FFA emblem are a cross-section of an ear of corn with an owl sitting on a plow with the rising sun in the background.

12. What is the official FFA dress for males? Females?
   The official dress for male FFA members is black slacks, white shirt, official FFA tie, black shoes and socks, and the FFA jacket. The official dress for female FFA members is black skirt, white blouse, official FFA blue scarf, black shoes, and the FFA jacket. Females can wear black slacks while traveling or involved in outdoor activities.

13. What are the responsibilities of FFA members? Name and explain two.
   A lengthy list of FFA member responsibilities is shown in Chapter 21. Students may use any two, such as learn about the FFA and participate in meetings and other activities. A knowledge of FFA is needed to be a better member and advance in the organization. Participating in meetings and other activities helps develop leadership and personal skills.

   Evaluating
   \(1=g, 2=h, 3=a, 4=e, 5=f, 6=d, 7=b, 8=c\)

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### SUPERVISED EXPERIENCE

#### CHAPTER SUMMARY

Supervised experience (SE), or supervised agricultural experience (SAE), is an excellent vehicle to help students establish career goals and begin developing skills needed for career and educational success. Supervised experience is the application of classroom instruction after regular class time. With beginning students, the supervised experience may be exploratory. Later, supervised experience may be in ownership, placement, or research and experimentation experiences. Planning and record keeping are essential in supervised experience. Benefits of supervised experience accrue to the student, school, and community.

Note that supervised agricultural experience (SAE) is also known as supervised experience (SE). This slight change in name allows greater application with students in horticulture, environment and natural resources classes, and in other areas that are not agricultural in nature.

Supervised experience represents a great opportunity to develop skills that meet employer expectations and develop good work habits. It helps students learn what employers want and put the information into practice developing the appropriate work habits.

#### INSTRUCTIONAL OBJECTIVES

The overall goal of this chapter is to help students see relationships between instruction in agricultural education and career success, including the use of supervised experience. To achieve this goal, learners will be able to:

1. Explain supervised experience.
2. List and distinguish the types of supervised experience.
3. List the benefits of supervised experience.
4. Describe how to plan supervised experience.
5. Discuss how to advance in supervised experience.

#### INSTRUCTIONAL STRATEGIES

Chapter 23 involves helping students begin planning and establishing supervised experience. The content should be interpreted in terms of the expec-
tations in your school and state. Involving local resource people to describe the nature of their careers and related supervised experience opportunities may be valuable. In some cases, students need to make tours to agricultural industries to see for themselves what it is like to work in a particular place.

Begin the chapter with the interest approach. Have students read the first page of the chapter and call on individuals to orally summarize each paragraph. Ask a student to explain how life is like a trip—we need to plan both in order to reach our goals. After the interest approach, go to the second page of the chapter and go over the objectives and terms list. Refer students to the Web site address for the school to work initiative.

Cover the chapter sequentially and thoroughly beginning with the first section. Have students read the section and assist as you outline the major concepts on the writing surface. After this section has been covered, move into the next section followed by the remaining sections of the chapter.

Because this chapter provides details on supervised experience, this may be the best opportunity to begin assisting each student in planning appropriate supervised experience. Have older students describe their supervised experience. Invite a recent high school graduate to describe how supervised experience was beneficial to him or her.

Refer students to the Career Profile and AgriScience Connection. Have students read these and orally summarize their observations in class. Invite a school counselor to serve as a resource person and describe the nature of the work and the services available to students. Invite a chapter FFA officer to explain about the Career Development Events and how they are related to supervised experience.

REVIEW AND EVALUATION

Use the sections on Reviewing and Evaluating at the end of the chapter. Students can read the Main Ideas section and answer the questions in writing. All questions should be reviewed orally in class to reinforce learning and reteach areas where student achievement is not up to standard.

Use the matching items in the Evaluating section plus teacher-made tests and tests from computer-generated test banks. Some evaluation will occur as supervised experience programs are planned and carried out. Being certain that students grasp the concepts in this chapter is essential. This chapter can serve as the foundation for excellence in supervised experience and achievement of FFA awards. Time may be allocated to work individually with students in setting up initial supervised experience programs.

ADDITIONAL RESOURCES

Additional resources include information about agricultural careers in the local area. Planning materials and other items on supervised experience will be beneficial. In some cases, students should also learn about record keeping on paper or with a computer at this time. Use materials from the National FFA Organization or the state office for agricultural education. The National FFA Organization has materials on supervised experience designed for both teacher and student use.

An emerging area related to career goals and supervised experience is entrepreneurship. The National FFA Organization and The National Council for Agricultural Education have materials and programs to support instruction in entrepreneurship.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 23 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is supervised experience?

Supervised experience is the application of classroom instruction in agriculture in a wide range of activities. Some allow students to earn money; others help students advance in FFA membership.

2. What types of supervised experience programs are used? Briefly describe each.

The types of supervised experience programs are exploratory, ownership, placement, and research and experimentation. Exploratory is used in early years of enrollment in agricultural education to help identify interests. Ownership is when an individual owns the SE. Placement is when the individual works for another individual or business. Research and experimentation SE involves studying a problem to identify an answer much like a science fair project.

3. What are the benefits of supervised experience? Name any three.

Twelve benefits of supervised experience to students are listed in the textbook. Three of these benefits include students developing self-confi-
dence, developing job skills, and helping in making career and education decisions.

4. How does supervised experience relate to advancement in the FFA?

A strong relationship exists between supervised experience and the FFA. Achieving in the FFA, particularly the proficiency awards, requires a quality supervised experience program.

5. What records are kept of supervised experiences?

Supervised experience records include work experiences, hours worked, income earned, and FFA participation. Records may be kept on paper or with a computer.

6. What is a training plan?

A training plan is a form that lists the experiences to be gained from supervised experience. It lists the date each is done and when training will begin and end. It will include the name of the training station and will be based on your career and educational goals.

7. What type of supervised experience relates most closely to Agri-Entrepreneurship?

Ownership.

8. What is a supplementary activity? Improvement activity?

A supplementary activity is a skill learned outside of class that contributes to a student’s knowledge and skill. An improvement activity is something that contributes to the school, home, community or place of work that makes it better.

Evaluating

1=b, 2=c, 3=a, 4=f, 5=e, and 6=d

PERSONAL SKILLS

CHAPTER SUMMARY

Personal skills are essential in having good relationships with other people. Making a good impression is an important part of being successful, especially with a job interview.

Personality is a major part of getting along with others. It is the visible part of a person. It is what you see when you first meet another person. Personality includes both visual and spoken qualities. What we say and how we say it are parts of the “first impression.” It is how people respond to each other. The personality of another person is how that individual responds to you. Likewise, your personality is how you respond to other people and are viewed by them.

Personal appearance says a lot about a person. Clothing is selected to project the kind of person we want to be. Grooming is also an important part of personal appearance. Personal hygiene is another area that relates to personal skills. Regular baths, brushing teeth, using deodorant, and caring for the skin and hair are included. Posture and health are also included in personal appearance.

Etiquette is a system of social behavior that helps people relate to each other.Courtesy is using etiquette rules in daily living. This includes conversations and actions. Skills needed include how to make introductions, eat, and shake hands.

People should strive for personal excellence. Anything less is a waste of talent. Excellence in work, dealing with other people, and citizenship are three important areas. To some extent, these can be developed and reinforced through participation in FFA activities.

A job interview is a meeting between a job applicant and an employer. Interviews are relatively simple with the first job and tend to be more involved with advanced levels of employment. A job interview is set by the employer after reviewing an application. In doing so, the employer is indicating an interest in the person but it does not mean that the person will get the job. Several individuals may be interviewed for one job. In the case of a supervised experience interview, the
teacher may have had contact with the employer and vary from a regular interview in that regard.

INSTRUCTIONAL OBJECTIVES

The goal of Chapter 24 is to help students develop important personal skills. To achieve this goal, learners will be able to:

1. Explain the role of personality in making a first impression.
2. Describe the importance of personal appearance.
3. Apply social etiquette standards.
4. Describe how to achieve personal excellence.
5. Demonstrate how to give a job interview.

INSTRUCTIONAL STRATEGIES

Use instructional strategies that will help students develop needed personal skills. This may require selecting teaching techniques that best meet the needs of the students and make good use of local resource persons.

Begin the interest approach by having students read the first page of the chapter. This may be as homework or during supervised study in class. Call on one or more students to summarize each paragraph. Ask a student to explain the statement, “Personal skills help us avoid being embarrassed.” Following the interest approach, review the objectives with the students. If used in the instructional strategy, review the list of terms and Web site address.

Cover each section of the chapter sequentially. Have students role play various areas, as appropriate. Begin with the section “Making a Good Impression.” Have students read this section as homework or during class. Go over types of personalities in class and outline the major concepts on the writing surface using student participation. Use the last section of the chapter to go over job interviews. Have students role play job interviews in the classroom. Have students read the Career Profile and AgriScience Connection. Ask one or more students to relate these to personal or career success.

REVIEW AND EVALUATION

Use the sections on Reviewing and Evaluating at the end of the chapter. Students can read the Main Ideas section and answer the questions in writing. All questions should be reviewed orally in class to reinforce learning and reteach areas where student achievement is not up to standard.

Use the matching items in the evaluation section as a tool in assessing student achievement of selected terms and concepts. Teacher-made tests and tests from a computer-generated test bank can also be used.

Another approach to review and evaluation is to use the objectives as guides and ask students to explain the content associated with each objective. This allows additional reinforcement and reteaching.

ADDITIONAL RESOURCES

Materials on grooming, clothing selection, personal hygiene, and related areas may be useful. Having a knowledgeable local clothing store manager or employee put on a style show with students would be beneficial. This could be as part of an FFA chapter meeting or set up for students throughout the school. In some cases, this can be shared with other student organizations. Information on how to care for clothing would also be useful to some students.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 24 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is personality?
   Personality is the part of a person that is both visual and spoken. It influences relationships among people.

2. How do people with introvert and extrovert personalities differ?
   An introvert is a person who focuses on himself or herself. An extrovert is a person who focuses on the outer world.

3. How do people get their personalities?
   Personality is learned from the environment in which a person grows up and lives. People can strive to improve on certain traits.

4. What are the major considerations in clothing?
   The major considerations in clothing are style, fit, fabric, color, and accessories.
5. What is grooming?  What important areas are included?

Grooming is the neatness of an individual’s appearance. It includes hair, personal hygiene, and skin.

6. What can a person do to promote wellness?

Wellness can be promoted by several things in daily living, including: do not use drugs or alcohol, get regular exercise, get adequate rest, eat a nutritious breakfast and other meals, and maintain the body weight that is right for your body type.

7. Why is etiquette important?

Etiquette is important because it helps people get along with each other. Many areas are included, such as courtesy, making introductions, eating, and shaking hands.

8. What important words help people have polite conversations?

Important words in polite conversations are “please,” “may I,” “thank you,” “I’m sorry,” and “excuse me.”

9. What is one way of introducing yourself to another person?

One way to introduce yourself to another person is to say, “Hello, my name is __. I enjoy meeting you.”

10. What is a good handshake?

A good handshake is firm and friendly. Extend your right hand with the palm open to fit into the palm of the other person’s hand. Lightly grasp the other person’s hand and make a slight upward and downward movement for a few seconds. Release the hand. Do not squeeze too tightly. Do not hold the other person’s hand too long. While shaking hands, look the other person in the eye. Smile and offer a greeting, such as “hello” or “nice to meet you.”

11. What are three guidelines for personal excellence in work?  With other people?  With citizenship?

Note: Several guidelines are listed in the textbook for each of the areas. Three are listed here for work: have a positive attitude, be enthusiastic, and get along with coworkers. Three for getting along with other people are: follow the rules of etiquette, respect the wishes and rights of others, and help make life better. Three for excellence in citizenship are: keep informed, register to vote and vote, and drive responsibly.

12. What is a job interview?  What should be considered when going for one?

A job interview is a meeting between a job applicant and potential employer. The goal is for each to learn about the other and gather information for making decisions about the potential employment.

Evaluating

1=h, 2=j, 3=a, 4=c, 5=b, 6=d, 7=e, 8=i, 9=f, and 10=g

25

LEADERSHIP SKILLS

CHAPTER SUMMARY

Leadership is helping people reach goals. Leaders vary in how they relate to followers. Regardless, leaders need to be able to influence other people. A person is a leader by virtue of how others view him or her. A good relationship must exist between leaders and followers. A leader must view service as a high priority and may make sacrifice his or her own wishes for the welfare of the group.

Leaders have many important traits or attributes. These include being trustworthy, hard working, self-confident, flexible, and a good speaker. Leaders must have positive attitudes and accept differences of opinion. Leadership styles vary from autocratic to laissez-faire. In most situations, a democratic style of leader-
ship is preferred. Leaders must be able to build teams that share in goal achievement.

Leaders must often plan and run meetings. All meetings should have one or more purposes. Planning requires identifying the purpose of a meeting, determining the business to be acted on, selecting a program, setting a date and time, arranging a good location, allowing others to get involved in the meeting, and developing an order of business for the meeting.

Parliamentary procedure is an important area of organizing and running meetings to ensure that all individuals have an equal opportunity to express their feelings about a matter. It is a highly organized approach that involves principal (main) motions, privileged motions, incidental motions, subsidiary motions, and several unclassified motions. *Robert’s Rules of Order* is the major resource on parliamentary procedure. (Appendix A in the textbook provides considerable detail.)

**INSTRUCTIONAL OBJECTIVES**

The overall goal of Chapter 25 is to initiate the development of important leadership skills. To achieve this goal, learners will be able to:

1. Describe leadership as related to life skills.
2. List attributes of leaders.
3. Explain styles of leadership.
4. Describe team building in leadership.
5. Explain how to organize, plan, and conduct a meeting using democratic principles.
6. Discuss the basics of parliamentary procedure and demonstrate ten abilities.
7. Explain how minutes are kept.
8. Identify opportunities for leadership development.

**INSTRUCTIONAL STRATEGIES**

This chapter is designed to be taught as an independent lesson on leadership development. In some cases, the content can be integrated into FFA activities and other lessons that deal with areas where leadership instruction may be needed.

Begin the interest approach for Chapter 25 by having students read the first page of the chapter as homework or during supervised study. Call on students to explain the content of the paragraphs. Ask a student to review how enrollment in agriculture classes helps promote leadership development. Following the interest approach, present the objectives for the chapter and go over the terms and Web site, as appropriate to your style of instruction.

Cover the content of the chapter sequentially beginning with the section “Leadership.” Have students read the section before covering it in class. Ask students to relate examples they know about that will help them understand the important concepts of leadership. In the section on “Leader Attributes,” ask students to explain each attribute and describe how it is related to leadership. After students have read the section on “Leadership Styles,” outline the major points on the writing surface using student input. Ask students to give examples of each style that they have observed.

In the section on “Team Building,” relate that a group of people must work as a team to achieve goals. Have students read the sections and outline the content on the chalkboard using their input. The section on “Meetings” can involve practical application with meetings of the FFA chapter. Practice in how to plan an order of business can be provided by having students prepare one for a meeting of the FFA chapter. After the section on presiding over a meeting has been covered, have students practice presiding in front of the class. Go over the format of minutes and how they are recorded.

**REVIEW AND EVALUATION**

Use the sections at the end of the chapter in the review and evaluation. The Reviewing section has Main Ideas and Questions. Have students read the Main Ideas and orally summarize the paragraphs. Students can answer the Questions as homework or during supervised study in writing. This should be followed with oral discussion of the questions in class.

Use the matching items in the evaluation section as a tool in assessing student achievement of selected terms and concepts. Teacher-made tests and tests from a computer-generated test bank can also be used.

Another approach to review and evaluation is to use the objectives as guides and ask students to explain the content associated with each objective. This allows additional reinforcement and reteaching.

**ADDITIONAL RESOURCES**

Materials from the National FFA Organization may be useful in areas related to FFA activities. If instruction on parliamentary procedure is included, use the latest edition of *Robert’s Rules of Order* (published by Da Capo Press, 250 West 57th Street, 15th Floor, New York, NY 10107).
In some cases, state FFA associations may have materials on leadership that would be useful. Certainly, officers and aspiring officers of the local FFA chapter should participate in related FFA officer leadership training events.

Chapter or state FFA officers may be good resources to use with this chapter. They can provide information on leadership from an FFA perspective. Use only those who have a demonstrated interest in leadership who can inspire students to achieve in the FFA. Most all state FFA officers have the training in leadership areas to be successful in serving as a resource person for the class.

ANSWERS TO QUESTIONS AND EVALUATING

Questions

The questions at the end of Chapter 25 are repeated here. Each is followed by a brief statement in italics that is intended to guide the assessment of student answers.

1. What is needed for a person to be a leader?
   A leader must have followers. A person is not a leader if there are no followers.

2. What four concepts of leadership are important to leaders? Briefly explain each.
   The four concepts of leadership are: influence (encouraging other people to take action), process (how followers view the way a leader goes about working with people), relationship (establishes good relationships with others), and service (providing service to a group sometimes at the sacrifice of the leader’s wishes).

3. What are the attributes of a leader? (List four.)
   Note: The textbook lists many leader attributes. Four are provided here but any of those listed in the textbook can be used in the answer. Attributes of an effective leader include: hard working, trustworthy, self-confident, and flexible.

4. What are three leadership styles? Briefly explain each.
   Three leadership styles are autocratic, laissez-faire, and democratic. An autocratic leader decides and announces it to the group. A laissez-faire leader allows members to make decisions without any input from the leader. A democratic leader guides the group in making the best possible decisions.

5. What is team building? Why is it important?
   Team building is getting people to work together as a group. The group shares common interests and goals.

6. What are the characteristics of a good team?
   A good team has unity, good relationships, and works together well.

7. Why are meetings held?
   Meetings are because of several reasons. Some meetings are held to provide educational programs to members. Meetings may be held to carry out the affairs of an organization. Meetings may be used to recognize members for outstanding work and to announce future events. Meetings may be used to organize members into groups and to provide for the development of leadership skills.

8. Why is planning important to the success of a meeting? What should be done in planning a meeting?
   Planning helps meet the needs of members and promotes attendance if the meeting is well planned and carried out. In planning, determine the purpose of the meeting, identify the business to be acted on, organize an educational program, set and date and time for the meeting, select a convenient location, assign responsibilities during the meeting to different members of the group, and develop an order of business.

9. What is an order of business? Why are they prepared?
   An order of business is the plan that lists the events or items to be covered in a meeting. They are prepared to use time efficiently and assign responsibilities.

10. What are minutes?
   Minutes are the official written records of a meeting.

Evaluating

$1=h$, $2=a$, $3=g$, $4=b$, $5=c$, $6=d$, $7=f$, and $8=e$