Lesson A1–1

Identifying Basic Areas of Agricultural Mechanization

Unit A. Mechanical Systems and Technology

Problem Area 1. Introduction to Agricultural Mechanics and Technology Systems

Lesson 1. Identifying Basic Areas of Agricultural Mechanization

New Mexico Content Standard:

Pathway Strand: Power, Structural and Technical Systems

Standard: **I:** Apply physical science principles to engineering applications with mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.

Benchmark: **I-A:** Relate power generation to energy sources.

Performance Standard: **3.** Compare environmental impact of energy sources. **4.** Compare efficiency of energy source. **5.** Compare characteristics of energy sources. **6.** Discuss efficiency of systems (e.g., fuel cells, chemical, wind, hydro, nuclear, electric, mechanical, solar, biological).

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Identify the different areas of agricultural mechanics.
2. Identify careers available in agricultural mechanics.
3. Identify the important physical science areas in agricultural mechanics.

List of Resources.

The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Cooper, Elmer L. *Agricultural Mechanics Fundamentals & Applications.* Albany, New York: Delmar Publishers, 1997. (Textbook and Lab Manual, Unit 2)

Phipps, Lloyd J., et al. *Introduction to Agricultural Mechanics,* Second Edition. Upper Saddle River, New Jersey: Prentice Hall Interstate, 2004. (Textbook, Chapter 1)

Other Resources. The following resources will be useful to students and teachers:

Burke, Stanley R., and T.J. Wakeman. *Modern Agricultural Mechanics.* Danville, Illinois: Interstate Publishers, Inc., 1992. (Textbook, Chapters 6, 8, 12, 18, and 19)

Johnson, Donald M., et al. *Mechanical Technology in Agriculture.* Danville, Illinois: Interstate Publishers, Inc., 1998. (Textbook, Chapter 1)

Lee, Jasper S. and Diana L. Turner. *AgriScience,* Third Edition. Danville, Illinois: Interstate Publishers, Inc., 2003. (Textbook)

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached master

Terms.

The following terms are presented in this lesson (shown in bold italics):

Agricultural power
Carpentry
Chemistry
A Classification of Instructional Programs
Earth science
Electricity
Energy
Matter
Occupational division
Physical science
Physics
Surveying
Welding

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here:

Have students read from one of the recommended references. After they have done so, begin a conversation about what was discussed in that section. As the conversation progresses, tie in the objectives of this lesson.

Summary of Content and Teaching Strategies

Objective 1: Identify the different areas of agricultural mechanics.

Anticipated Problem: What are the different areas of agricultural mechanics?

I. Agriculture continues to be one of the most sophisticated and mechanized industries in the world. Mechanization was and is key to increasing the productiveness of the American worker. Agricultural mechanics has been divided into five major areas. They are:

A. Agricultural Power—The ***agricultural power*** area deals with working with small and diesel engines. Persons involved in this area must be familiar with all of the different systems of the engine.

B. Carpentry—The ***carpentry*** area deals with woodworking for a variety of purposes in agriculture. This area includes the building of agricultural structures. Persons involved in this area must be familiar with all the different tools and safety procedures used in carpentry.

C. Electricity—The ***electricity*** area deals with the uses of electric power in agriculture. This includes dealing with electric motors, lights, and other electric controls. Electricity is one of the most useful tools in agricultural mechanics. It is important that everyone involved in agriculture has a basic understanding of the benefits and dangers associated with electricity.

D. Surveying—The ***surveying*** area deals with the measurement of land. This includes not only finding the area of a piece of land, but also its legal description.

E. Welding—The ***welding*** area deals with the joining of two pieces of metal through fusion. This area of agricultural mechanics is used in manufacturing agriculture equipment and structures.

There are many techniques that can be used to assist students in mastering this material.

Objective 2: Identify careers available in agricultural mechanics.

Anticipated Problem: What careers are available in agricultural mechanics?

II. Agriculture is the largest industry in the United States. It is estimated that 20 to 25 percent of the nation's work force is employed in agriculture or agriculture-related occupations. A large number of this agricultural workforce is made up of persons involved in agricultural mechanics. A number of United States government agencies have worked to classify occupations. The National Center for Educational Statistics publishes ***A Classification of Instructional Programs***, a book that lists all occupations arranged into occupational clusters and divisions. An ***occupational division*** is a group of occupations or jobs within a cluster that requires similar skills. All jobs in agriculture are in one of three areas under the agriculture cluster. The agriculture areas are:

A. Agribusiness and agricultural production**.** This area contains eight divisions. They are:
   1. agricultural business and management
   2. agricultural mechanics
   3. agricultural production
   4. agricultural products and processing
   5. agricultural services and supplies
   6. horticulture
   7. international agriculture
   8. agribusiness and agricultural production, other

B. Agricultural Sciences**.** This area has six divisions. They are:
   1. agricultural sciences, general
   2. animal sciences
   3. food sciences
   4. plant sciences
   5. soil sciences
   6. agricultural sciences, other

C. Renewable Natural Resources**.** This area contains seven divisions. They are:
   1. renewable natural resources, general
   2. conservation and regulation
   3. fishing and fisheries
   4. forestry production and processing
   5. forestry and related sciences
   6. wildlife management
   7. renewable natural resources, other

D. There are several specific job titles in agricultural mechanics. They are classified under the following categories:
   1. agricultural mechanics, general

2. agricultural electrification, power, and controls
3. agricultural mechanics, construction, and maintenance skills
4. agricultural power machinery
5. agricultural structures, equipment, and facilities
6. soil and water mechanical practices
7. agricultural mechanics, other

A variety of techniques can be used to assist students in learning this material. Students need text material to help understand the careers involved in agricultural mechanics. Unit 2 in Agricultural Mechanics Fundamentals & Applications is recommended. Use Job sheet 2–1 in the Agricultural Mechanics Fundamentals & Applications Lab Manual to assist students in applying this material. It is also suggested that individuals currently employed in the agricultural mechanics industry come speak to the students about their career choice.

Objective 3: Identify the important physical science areas in agricultural mechanics.

Anticipated Problem: What are the important physical science areas in agricultural mechanics?

III. The agricultural industry is becoming increasingly technology based. Agricultural mechanics' foundation is the relationship of the laws of science and mathematics, which explains why what is done in this area is possible. Persons in agricultural mechanics must have a basic understanding of these principles. Many of these science principles used in agricultural mechanics fall into the area of physical science.

A. ***Physical science*** is the study of the nonliving factors in our environment. This includes matter and energy. Matter and energy may or may not depend on each other. ***Matter*** is anything that takes up space and has mass, such as a rock, piece of wood, or tool. Matter also includes gases and other substances that may not be easy to see, such as the air or vapors from fuel. ***Energy*** is the ability to do work or cause change. It is found in different forms, such as heat, chemical, light, and movement. Engines use heat energy. Batteries use chemical energy. Lasers make use of light energy. Movement, called mechanical energy, is seen when a wheel on a tractor moves.

B. Physical science has three important areas in agricultural mechanics:

1. Earth science—***Earth science*** deals with the environment in which plants and animals grow. This includes the composition of the earth and the atmosphere. Soil, water, and air are studied in Earth science.
2. Chemistry—***Chemistry*** deals with the makeup of matter. All matter is made of elements. Ninety-two natural elements have been discovered; 17 artificial elements have been developed in laboratories and named. All substances on the earth are made of these elements arranged in different combinations.
3. Physics—***Physics*** deals with matter and energy and how the two relate. Application of physics is very much a part of agricultural mechanics. Modern machinery involves many areas of physics.

There are many techniques that can be used to assist students in mastering this material. Students need text material to aid in understanding this material. Chapter 1 of Introduction to Agricultural Mechanics is recommended. Use TM: A1–1A to aid student discussion on this material.

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the end of the chapters in the textbook may also be used in the review/summary.

Application. Application can involve the following student activity:

Job Sheet 2–1 Agricultural Occupations found in Unit 2 in *Agricultural Mechanics Fundamentals & Applications* Lab Manual.

Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activity. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

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

Part Two: Completion

1. A Classification of Instructional Programs
2. Small, diesel
3. heat

Part Three: Short Answer

1. Earth science; chemistry; physics

Sample Test Name _____

Test

Lesson A1–1: Identifying Basic Areas of Agricultural Mechanization

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. physics
b. chemistry
c. Earth science
d. energy
e. matter
f. physical science
g. occupational division
h. welding
i. surveying
j. electricity

_____ 1. Anything that takes up space and has mass.

_____ 2. Science dealing with matter and energy and how the two relate.

_____ 3. Deals with the measurement of land.

_____ 4. Ability to do work or cause change.

_____ 5. Science dealing with the make up of matter.

_____ 6. Group of occupations or jobs within a cluster that requires similar skills.

_____ 7. Deals with the joining of two pieces of metal through fusion.

_____ 8. Science dealing with the environment in which plants and animals grow.

_____ 9. Deals with the use of electric power in agricultural mechanics.

_____ 10. Study of nonliving factors in our environment.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. The National Center for Educational Statistics publishes _____ _____ _____ _____ _____. In this book all occupations are arranged into occupational clusters and divisions.
2. The agricultural power area deals with working with _____and _____ engines.
3. Engines use _____ energy.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. What areas of physical science are important in agricultural mechanics?

TM: A1–1A

AREAS OF PHYSICAL SCIENCE

- Earth Science
- Chemistry
- Physics