# Agricultural Science 1

## Exam Information

**Exam number**
180

**Items**
48

**Points**
60

**Prerequisites**
None

**Recommended course length**
One year

**National Career Cluster**
Agriculture, Food, & Natural Resources

**Performance standards**
Included (Optional)

**Certificate available**
Yes

## Description

The Agricultural Science 1 industry certification exam assesses learners' knowledge of fundamental concepts and skills essential for progressing into advanced courses within various agricultural disciplines. The exam covers a broad spectrum, including basic animal, plant, and soil sciences, as well as natural resources management, food science technology, agribusiness principles, and personal leadership development. Additionally, learners are tested on their understanding of agricultural career opportunities and the significance of these fields in society. The exam gauges learners' agricultural literacy, ensuring they possess a solid foundation to pursue further studies in animal science, plant science, horticulture, agricultural systems and technology, or Agricultural Science 2.

## Exam Blueprint

| Standard | Percentage of exam |
|---|---|
| 1. Student Organizations in Agricultural Education (Optional) | 0% |
| 2. Supervised Agricultural Experience | 6% |
| 3. Sciences and Scientific Method | 32% |
| 4. Basic Principles of Agricultural Science | 44% |
| 5. Basic Agribusiness Principles | 18% |

## Standard 1 (Optional)

Students will explain the role of student organizations in agricultural education.

**Objective 1** Discuss the history and organization of student organizations as they relate to the a complete program of agricultural education.

1. Explain the interrelationship of classroom and laboratory instruction, supervised agricultural experience, and student organizations.
2. Describe how, when, and why student organizations were organized.
3. Identify key historical events within student organizations.
4. Identify the mission and strategies, colors, motto, emblem and parts of the emblem, and organizational structure of student organizations.
5. Recite and explain the meaning of student organizations creed.
6. Discuss the meaning and purpose of a program of activities and its committee structure. 7. List student organizations officers and discuss the role of each.

**Objective 2** Identify opportunities in student organizations.

1. Describe student organizations opportunities that develop leadership skills, personal growth, and career success.
2. Summarize major state and national activities available to student organizations members.

**Objective 3** Describe student organizations degrees, awards, and career development events (CDEs).

1. List and explain student organizations degree areas.
2. Identify student organizations proficiency awards.
3. List and discuss various team and individual CDEs, LDEs, and awards.

**Standard 1 Performance Evaluation included below (Optional)**

## Standard 2

Students will explain the role of supervised agricultural experience (SAE) programs in agricultural education.

**Objective 1** Examine the responsibilities and benefits associated with an SAE.

1. Explain the meaning and benefits of supervised agricultural experience.
2. Explain the characteristics of an effective SAE program and the responsibilities of those involved.

**Objective 2** Determine the types of SAE programs.

1. Compare entrepreneurship SAEs and placement SAEs.
2. Describe research/experimentation SAEs.
3. Describe exploratory SAEs.

**Objective 3** Plan an SAE program.

1. Identify the steps in planning an SAE program.
2. Describe the function of a business/training plan and/or agreement in an SAE program.
3. Develop a short-range plan and a long-range plan for an SAE program.
4. Relate classroom and laboratory instruction to an SAE program.

**Objective 4** Maintain and use SAE records.

1. Explain the importance of keeping records on an SAE program.
2. Explain how SAE records are organized.
3. Follow approved procedures to make entries in SAE records.

**Standard 2 Performance Evaluation included below (Optional)**

## Standard 3

Students will describe the relationship of agricultural science to the sciences and the scientific method.

**Objective 1** Describe how science is integral to agriculture.

1. Describe how life science, including botany and zoology, is integral to agriculture.
2. Describe how physical science, including earth science, chemistry, and physics is integral to agriculture.
3. Describe how mathematics, including calculation, measurement, and statistics is integral to agriculture.
4. Describe how the social sciences, including economics, geography, sociology, and psychology is integral to agriculture.

**Objective 2** Apply the scientific method in solvingagricultural problems.

1. Define the scientific method and explain why it is used.
2. List and explain the steps of the scientific method.
    a. Identify the problem
    b. Information gathering/research
    c. Hypothesis formation
    d. Experiment
    e. Conclusion
3. Maintain laboratory logs, including detailed and precise records of events and observations.
4. Use the scientific method to investigate a problem.
5. Explain the general guidelines for preparing a research report.

**Objective 3** Explore the role of research, development, and technology in the agricultural industry.

1. Explain the meaning and importance of research and development.
2. Identify major providers of agricultural research, such as the USDA's Agricultural Research Service, and review examples of their research.
3. Identify major areas of research in agriculture.

4. Define biotechnology and explore its impact on agriculture.
5. Describe current applications of biotechnology in agriculture.
6. Describe the benefits and risks associated with biotechnology.
7. Identify career opportunities in agricultural biotechnology.
8. Determine the role of science and technology in agricultural production and processing.
9. Describe the application of precision technologies in agriculture.

**Objective 4** Apply mathematics skills used in the agricultural industry.

1. Convert standard and metric measurements.
2. Determine length, area, and volume measurements.

**Objective 5** Describe safety skills needed in the agricultural industry.

1. Explain where accidents occur and identify agencies associated with workplace safety.
2. Explain why accidents occur and how to prevent them.
3. Demonstrate personal and laboratory safety, including correct use of personal protective equipment (PPE) and proper disposal of wastes.

**Standard 3 Performance Evaluation included below (Optional)**

## Standard 4

Students will explain the basic principles of agricultural science.

**Objective 1** Examine basic soil science principles.

1. Explain the components of soil.
2. Investigate soil texture and structure.
3. Explain soil profile. (O Horizon/Organic, A Horizon/Topsoil, B Horizon/Subsoil and C Horizon/Bedrock)
4. Explain what soil color indicates.
5. Examine moisture-holding capacity and the characteristics of soil water.
6. Explain soil pH.
7. Describe the testing and importance of soil fertility.
8. Investigate soil degradation.
9. Describe soil erosion and management practices.
10. Identify careers in soil science and determine educational requirements, working conditions, and earning potential for those careers.

**Objective 2** Investigate basic principles of theplant science industry.

1. Explain plant classification and nomenclature.
2. Examine plant structures and functions.
3. Classify plants according to plant use; status as annual, biennial, and perennial; and status as monocotyledons or dicotyledons.
4. Explain the basic process of photosynthesis and its importance to life on Earth.
5. Explain cellular respiration and its importance to plant life.

6. Identify careers in plant science and determine educational requirements, working conditions, and earning potential for those careers.

**Objective 3** Investigate basic principles of the animal science industry.

1. Compare differences between plants and animals.
2. Identify basic characteristics of animal cells, tissues, organs, and organ systems.
3. Describe the skeletal, muscular, nervous, respiratory, digestive, circulatory, excretory, and reproductive systems of animals.
4. Describe the basic physiological functions of animal bodily systems.
5. Compare and contrast ruminant and non-ruminant digestive systems.
6. Compare and contrast cattle, sheep, and swine breeds, uses, and products.
7. Compare and contrast the nutritional needs of cattle, sheep, and swine.
8. Identify careers in animal science and determine educational requirements, working conditions, and earning potential for those careers.

**Objective 4** Explain the role of genetics in agricultural science.

1. Define genetics and discuss its importance.
2. Identify and discuss the contents of a genome.
3. Distinguish heredity type, including genotype and phenotype.
4. Describe genetic trait expression and prediction.

**Objective 5** Explore means of conserving natural resources.

1. Identify types of natural resources.
2. Classify natural resources into renewable and non-renewable resources.
3. Describe components and processes in ecosystems.
4. Determine sources of environmental pollution and describe methods for reducing pollution.
5. Compare methods of waste disposal.
6. Determine how to reduce agricultural pollution.
7. Determine the importance and methods of natural resource conservation.
8. Identify careers in natural resources and determine educational requirements, working conditions, and earning potential for those careers.

**Objective 6** Describe food science technology.

1. Research the scope of the food science industry and the world food supply.
2. Explain food preservation methods including canning, fermenting, irradiation, dehydration, and freezing.
3. Describe food spoilage prevention.
4. Describe food safety and sanitation.
5. Identify careers in food science and determine educational requirements, working conditions, and earning potential for those careers.

**Standard 4 Performance Evaluation included below (Optional)**

## Standard 5

Students will explain basic agribusiness principles and demonstrate employability skills.

**Objective 1** Explore personal finance management.

1. Investigate personal finances and goal making.
2. Distinguish the pros and cons of borrowing money.
3. Identify benefits associated with long-term and short-term loans.
4. Determine sources of credit.
5. Calculate interest rates.

**Objective 2** Examine business structures and management.

1. Describe basic principles of business management.
2. Explain different types of business structures.
3. Define and explain ethics in agribusiness.

**Objective 3** Explain keeping and using records in agricultural occupations.

1. Explain the purpose of record keeping.
2. Describe net worth, assets, liabilities, depreciation, expense, income, cash flow, income statements, and computerized record keeping.
3. Develop a budget for an agricultural enterprise.

**Objective 4** Demonstrate communication skills neededfor successful employment.

1. Define communication and its components and processes.
2. Describe effective communication techniques.
3. Identify effective speaking techniques.
4. Develop listening techniques.
5. Organize and present a persuasive message.
6. Demonstrate communication skills in appropriate situations.

**Standard 5 Performance Evaluation included below (Optional)**

## Agricultural Science 1

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of 8 or higher on the rating scale. Students may be encouraged to repeat the objectives until they average 8 or higher.

**Student's Name:** _____

**Class:** _____

## Performance standards rating scale

| 0 | Limited skills | 2 | → | 4 | Moderate skills | 6 | → | 8 | High skills | 10 |
|---|---|---|---|---|---|---|---|---|---|---|

### Standard 1 – Student Organizations in Agricultural Education — Score:

- Attend a student organization activity
- Recite and explain the creed of a student organization and the requirements for degree advancement within a student organization

### Standard 2 – Supervised Agricultural Experience — Score:

- Implement an annual SAE Program and record system
- Develop a budget

### Standard 4 – Basic Principles of Agricultural Science — Score:

- Identify natural resource conservation methods and practices by investigation
- Label and/or model the anatomy and physiology of animals
- Label and/or model plant structures and functions
- Identify soil texture and structure by investigation

### Standard 5 – Basic Agribusiness Principles — Score:

- Organize and present a persuasive message
- Research and debate an agricultural topic

## Performance standard average score:

**Evaluator Name:** _____

**Evaluator Title:** _____

**Evaluator Signature:** _____

**Date:** _____