



Lesson Plan

2 of 4

Agricultural Water Use and Conservation

Created: 07/2025 by the National FFA Organization

Description of Lesson: This lesson explores the various ways water is used in agricultural systems, including crop production and livestock management. Students will learn about different irrigation systems, livestock watering methods and how water is utilized in agricultural settings. Students will also investigate how the needs of the industry can be met while also being conscious of conserving water through various tools and strategies.

Thank you to our current partners in sustainability:



Student Learning Objectives:

After completing these activities, students will ...

1. Identify how water is used in crop production, livestock production and farm structures.
2. Compare irrigation and livestock watering systems, considering factors like water efficiency, climate adaptation and system design.

Suggested Grade Level:

Grades 9 and 10 (This lesson is written so instructors can scale up or down based on class needs.)

Suggested Time: 55 minutes (*Time requirements may vary based upon student understanding and class schedule.)

Resources/References:

1. Document: Kansas State University, Waterers and Watering Systems: A Handbook for Livestock Producers and Landowners, https://bookstore.ksre.ksu.edu/download/waterers-and-watering-systems-a-handbook-for-livestock-producers-and-landowners_S147
2. Video: Water Management in Agriculture, <https://youtu.be/ba0In5ezHXc?si=GGuAUZ8mvLZ7fLJN>
3. Website: Fruit Growers Supply Company, The Three Main Types of Irrigation Systems for Agriculture, <https://fruitgrowers.com/the-3-main-types-of-irrigation-systems-for-agriculture/>
4. Website: IFA Co-Op, Choosing a Livestock Water System, <https://grow.ifa.coop/cattle/livestock-water-system#:~:text=Automatic%20Waterers,dry%20up%20or%20system%20break>
5. Website: University of Michigan, Center for Sustainable Systems, U.S. Water Supply and Distribution Fact Sheet, <https://css.umich.edu/publications/factsheets/water/us-water-supply-and-distribution-factsheet>

Related Resources:

1. Food and Agricultural Literacy Curriculum, Natural Resources, Unit 3: Water, <https://FFA.box.com/s/w5ypjcs5s1v6h5er5819j2lcvicvzdoq>
2. AgExplorer Sustainability Systems Focus Area, AgExplorer.FFA.org/focus/sustainability-systems/
3. Introduction to Sustainability Lesson Series, <https://FFA.box.com/v/introtosustainability>
4. Darling Ingredients Educational Resources, <https://FFA.box.com/s/3ko8e9w6zygohvlewfsnc8byobjzeuxa>
5. Valent — Sustainability in Agriculture Lesson Series, <https://FFA.box.com/v/sustainabilityinagriculture>

Equipment and Supplies Needed:

1. A copy of the “Water Use in Agriculture” student activity sheet for each student
2. A copy of the “Conserving Agricultural Water” student activity sheet for each student
3. Internet access to play the video in real time or embed it in a PowerPoint ahead of time
4. Student devices with internet access

Vocabulary:

1. Automatic Livestock Waterer
2. Drip Irrigation
3. Flood Irrigation
4. Gravity-Fed System
5. Irrigation
6. Pasture Pump
7. Pump System
8. Sprinkler Irrigation
9. Surface Irrigation
10. Water Trough

Cross-Curricular Connections:

English/Language Arts

- Complete a crossword to learn irrigation and animal watering vocabulary.
- Compare and contrast irrigation and animal watering methods.

SAE and FFA Connections

1. Agricultural Technology and Mechanical Systems CDE, FFA.org/participate/cdes/agricultural-technology/
2. Environmental and Natural Resources CDE, FFA.org/participate/cdes/environmental-and-natural-resources/
3. Livestock Evaluation CDE, FFA.org/participate/cdes/livestock-evaluation/
4. Nursery/Landscape CDE, FFA.org/participate/cdes/nursery-landscape/
5. Agricultural Proficiency Areas: Agricultural Mechanics Design and Fabrication, Agricultural Mechanics Repair and Maintenance, Diversified Crop Production, Diversified Livestock Production, Environmental Science and Natural Resources Management, FFA.org/participate/awards/proficiencies/
6. Foundational SAE Connections: Agricultural Literacy

Student Activity Sheets:

Direct access to student activity sheets without lesson plan or answer key for easy upload to a learning management system or printing for classwork.

<https://ffa.box.com/s/y8u0i7bkmg3jh540vtpynwcivmyhixon> (Word)

<https://ffa.box.com/s/e7qx4md5ykhv85u472sgnb76wxppz940> (PDF)

<https://docs.google.com/document/d/1A-rIAHJMcKDG7HdCkOt36SKnkhX4B0G36nUR25Oy8gw/copy> (Google)

These Activities Are Aligned to the Following Standards:

AFNR Performance Element

- CS.03. Examine and summarize the importance of health, safety and environmental management systems in AFNR workplaces.
- CS.04. Demonstrate stewardship of natural resources in AFNR activities.

- NRS.01. Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.
- NRS.02. Analyze the interrelationships between natural resources and humans.
- NRS.04. Demonstrate responsible management procedures and techniques to protect, maintain, enhance, and improve natural resources.

FFA Precept

- FFA.PL-A.Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.
- FFA.PL-C.Vision: Visualize the future and how to get there.
- FFA.PL-F.Continuous Improvement: Accept responsibility for learning and personal growth.
- FFA.CS-N.Decision Making: Analyze a situation and execute an appropriate course of action.

Common Career Technical Core

- AG3 Examine and summarize the importance of health, safety, and environmental management systems in AFNR businesses.
- AG4 Demonstrate stewardship of natural resources in AFNR activities.
- AG-NR1 Plan and conduct natural resource management activities that apply logical, reasoned, and scientifically based solutions to natural resource issues and goals.
- AG-NR2 Analyze the interrelationships between natural resources and humans.
- AG-NR4 Demonstrate responsible management procedures and techniques to protect or maintain natural resources.

NASDCTEc

- AGPE01.01 Conduct system management activities in natural habitats to demonstrate recognition of the important relationships between natural resource preservation and human intervention.
- AGPE01.03 Apply scientific principle and processes when planning and conducting natural resource management activities to determine the need, feasibility and application of logical, reasoned solutions to natural resource system problems and issues.
- AGPE01.05 Practice responsible control and management procedures and techniques to protect or maintain natural resources in a variety of settings.

Common Core – Writing

- CCSS.ELA-Literacy.W.9-10.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
- CCSS.ELA-LITERACY.W.9-10.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Common Core – Literacy in Science & Technical Subjects: Writing

- CCSS.ELA-Literacy.WHST.9.10.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Next Generation Science

- HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Green/Sustainability Knowledge and Skill Statements

- AFNR Career Cluster, Statement 1 Apply understanding of ecosystems and systems thinking to the management of natural resources to maximize the health and productivity of the environment, agriculture, communities, and society.
- AFNR Career Cluster, Statement 3 Communicate the impact of green and sustainability principles on agriculture, food and natural resource systems.
- AFNR Career Cluster, Statement 7 Demonstrate an understanding of green and sustainability trends that are impacting processes and markets in AFNR.
- AFNR Career Cluster-Natural Resources Systems Pathway, Statement 2 Develop strategies to influence natural resource management and utilization policies and practices through application of sustainability principles.

AFNR Career Ready Practices

- CRP.02. Apply appropriate academic and technical skills. Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive.
- CRP.04. Communicate clearly, effectively, and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.
- CRP.05. Consider the environmental, social and economic impact of decisions. Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organizations and the environment.
- CRP.11. Use technology to enhance productivity. Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems.

Partnership for 21st Century Skills

- Communication
- Critical Thinking and Problem Solving
- Environmental Literacy
- Global Awareness
- Information, Communications, and Technology Literacy
- Initiative and Self-direction
- Leadership and Responsibility
- Technology Literacy
- Think Creatively

Lesson Plan:

1. **Bell Ringer:** Why is water important to agriculture? What impact would water shortages have on agriculture?
2. **Introduction:** Say: *Water is essential in agriculture for both crops and livestock, but it's not just about providing water for plants or animals. Farmers and ranchers have to choose the best watering method for their crops or livestock based on a variety of factors, including climate, cost and efficiency. Let's take a closer look at some of the different methods used across the industry of agriculture.* Show the video "Water Management in Agriculture" (<https://youtu.be/ba0In5ezHXc?si=GGuAUZ8mvLZ7fLJN>) and then transition into the activity.
3. **Activity:** (20 minutes) Each student needs a copy of the student activity sheet "Water Use in Agriculture."
 - a. **Part 1:** Students will solve the crossword puzzle containing various methods of crop irrigation and livestock watering using the clues provided. (*Depending on your students' prior knowledge, you may choose to display a word bank on the board or screen.*)
 - b. **Part 2:** Students will take the terms from the crossword puzzle in Part 1 and transfer them to the appropriate table (crop irrigation methods or animal watering methods) on their student activity sheets. In this table, students will write the term and a simple definition and draw a picture representing the water delivery method. Students may need to use the internet to research each of these methods if they are not familiar with them. They will then answer the conclusion questions.
4. **Activity:** (25 minutes) Each student needs a copy of the student activity sheet "Conserving Agricultural Water."
 - a. Say: *In many regions, water is a limited resource. Farmers and ranchers have to be smart about how they use it. Some methods, like efficient irrigation and crop selection, help reduce water waste. Today, we'll investigate some of the strategies farmers and ranchers use to conserve water.*
 - i. Split students into groups of five and assign each member of the group one of the following agricultural water conservation strategies.
 1. Efficient Irrigation Systems: Drip irrigation, center pivot irrigation, moisture sensors
 2. Soil Conservation: No-till farming, mulching, cover crops
 3. Water Recycling: Using runoff water, rainwater collection systems
 4. Crop and Livestock Selection: Choosing drought-resistant crops or breeds that require less water
 5. Technology and Automation: Using automated irrigation controllers, weather data or sensors to optimize water use
 - ii. Each group member will research their strategy and answer the following questions on their student activity sheets:
 1. What is your conservation strategy?
 2. How does this strategy help conserve water in agriculture?
 3. What are the benefits of this strategy for the farm or ranch?
 4. What are the potential challenges of implementing this strategy?
 5. How might climate or geography affect the effectiveness of this strategy?
 - iii. After about 15 minutes of research, each member will take turns presenting within the group the information they found and the other members will record the information on their student activity sheets.
 - iv. Students will then answer the conclusion questions.
5. **Follow-up:** Briefly review all five agricultural water conservation categories as a class. Ask students if there are any other conservation strategies they know of or could think of that would work in an agricultural setting. Reinforce how important it is for agriculturists to manage their water sustainably, since 80% to 90% of the water consumed in the United States is used for agricultural purposes.
6. **Exit Ticket:** Which water conservation strategy do you think would be most effective on a farm or ranch in your region? Why?

Name: _____

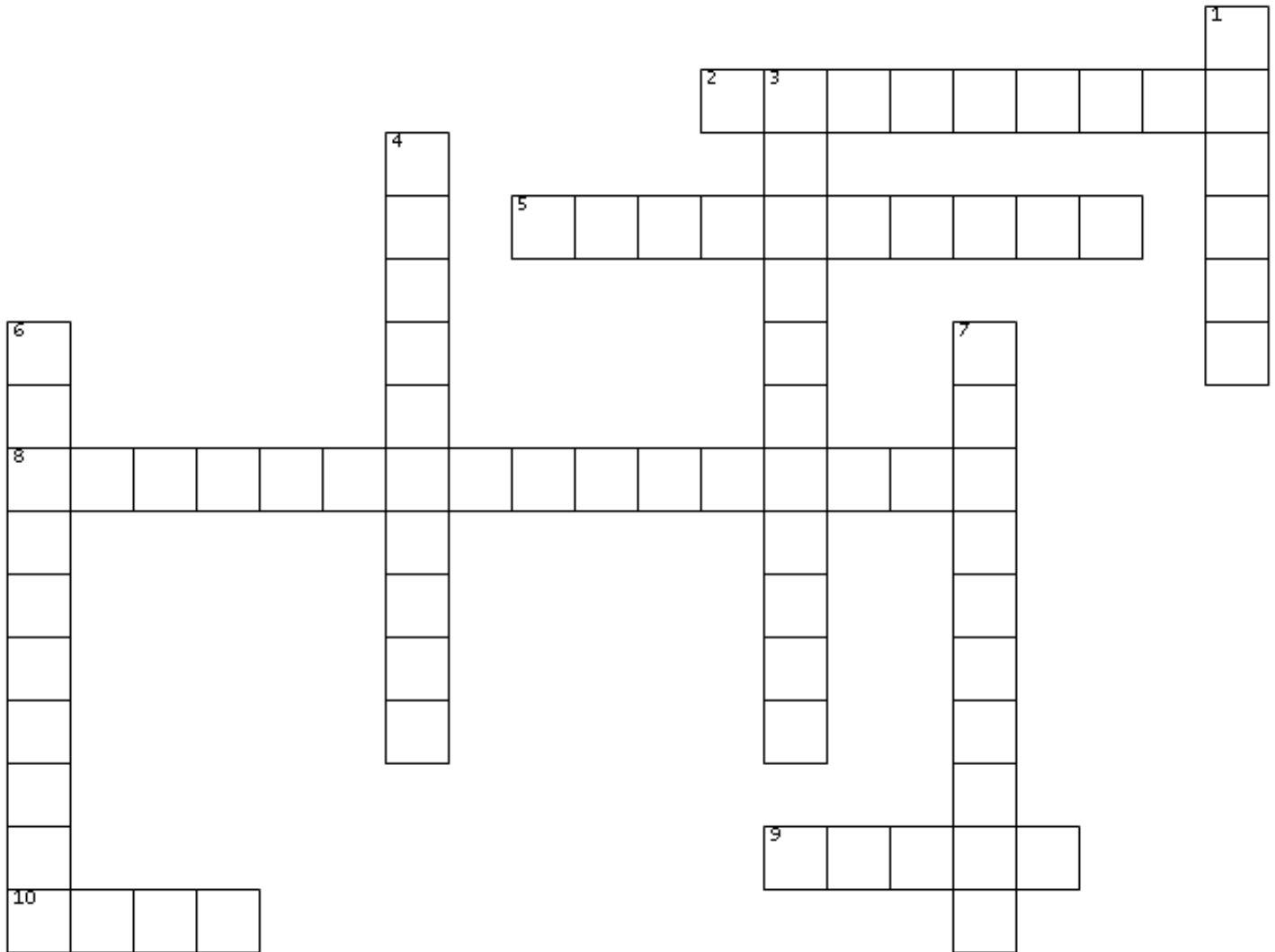
Water Use in Agriculture

Aligned to the following standards:

CS.03; CS.04; NRS.01; NRS.02; NRS.04; FFA.PL-A; FFA.PL-C; FFA.PL-F; FFA.PL-N; AG3; AG4; AG-NR1; AG-NR2; AG-NR4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.7; CCSS.ELA.WHST.9.10.7; HS-ETS1-3; CRP.02; CRP.04; CRP.05; CRP.11;

Part 1

Directions: Use the clues below to solve the crossword puzzle containing various methods of crop irrigation and livestock watering.



ACROSS

2. Using hoses, pipes and pressurized heads to apply water to the soil from above
5. Uses pumps to transport water from a source (well, etc.) to a trough or tank
8. Often connected to a water source; automatically replenishes water level as animals drink
9. Also called surface irrigation, water is distributed over the soil surface, typically by gravity
10. This irrigation method delivers water directly to the plant roots.

DOWN

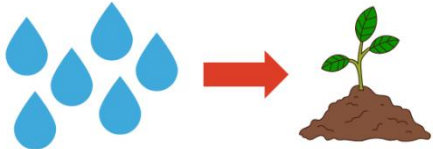
1. Open containers to provide a drinking source for livestock
3. Designed for animals to self-operate, often using a nose-paddle to get water
4. Can be used as a short-term or emergency water supply, particularly in remote areas
6. Water source at a higher elevation than the water trough, gravity used to deliver water
7. The supply of water to land or crops to help growth

Name: _____

Part 2

Directions: Transfer the terms from Part 1 to the appropriate table below. Record the term and a simple definition and draw a picture representing the water delivery method. You may use the internet to research each of these methods if needed. Then answer the conclusion questions at the end.

Example:

Term	Definition	Picture
Irrigation	The process of providing plants with water in addition to or instead of natural rainfall to help them grow	

Crop Irrigation Methods

Term	Definition	Picture

Animal Watering Methods

Term	Definition	Picture

Name: _____

Animal Watering Methods (Continued)

Term	Definition	Picture

Conclusion Questions:

1. Why do you think there are such diverse methods of irrigating crops and watering animals? Why are so many different methods required?
2. What do you think goes into a farmer's or rancher's decision in choosing an irrigation or watering method?
3. Which methods seem like the most efficient to you? Why do you think so?
 - a. I think the most efficient irrigation method is _____ because ...
 - b. I think the most efficient animal watering method is _____ because ...

Name: _____

Conserving Agricultural Water

Aligned to the following standards:
CS.03; CS.04; NRS.01; NRS.02; NRS.04; FFA.PL-A; FFA.PL-C;
FFA.PL-F; FFA.PL-N; AG3; AG4; AG-NRI; AG-NR2; AG-NR4;
CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.7;
CCSS.ELA.WHST.9.10.7; HS-ETS1-3; CRP.02; CRP.04; CRP.05;

Directions: Use the table below to research your assigned water conservation strategy for your group. Then present your findings to your group and record their findings using the next table.

My Assigned Water Conservation Strategy

What is your water conservation strategy? <i>(Explain in two or three sentences.)</i>	
How does this strategy help conserve water in agriculture? <i>(Explain in two or three sentences.)</i>	
What are the benefits of this strategy for a farm or ranch? <i>(List three.)</i> 1. 2. 3.	What are the potential challenges of implementing this strategy? <i>(List three.)</i> 1. 2. 3.
How might climate or geography affect the effectiveness of this strategy? <i>(Explain in one or two sentences.)</i>	

Other Water Conservation Strategies

Water Conservation Strategy:	
How does this strategy help conserve water in agriculture?	
Benefits to a Farm or Ranch: 1. 2. 3.	Potential Challenges: 1. 2. 3.
How might climate or geography affect the effectiveness of this strategy?	

Name: _____

Water Conservation Strategy:	
How does this strategy help conserve water in agriculture?	
Benefits to a Farm or Ranch: 1. 2. 3.	Potential Challenges: 1. 2. 3.
How might climate or geography affect the effectiveness of this strategy?	

Water Conservation Strategy:	
How does this strategy help conserve water in agriculture?	
Benefits to a Farm or Ranch: 1. 2. 3.	Potential Challenges: 1. 2. 3.
How might climate or geography affect the effectiveness of this strategy?	

Name: _____

Water Conservation Strategy:	
How does this strategy help conserve water in agriculture?	
Benefits to a Farm or Ranch: 1. 2. 3.	Potential Challenges: 1. 2. 3.
How might climate or geography affect the effectiveness of this strategy?	

Conclusion Questions:

1. Which strategy do you think would be the easiest to implement on a local farm in our area?
2. What incentives do farmers have for adopting water conservation strategies?
3. How do you think technology could help improve water conservation efforts?

Name: _____

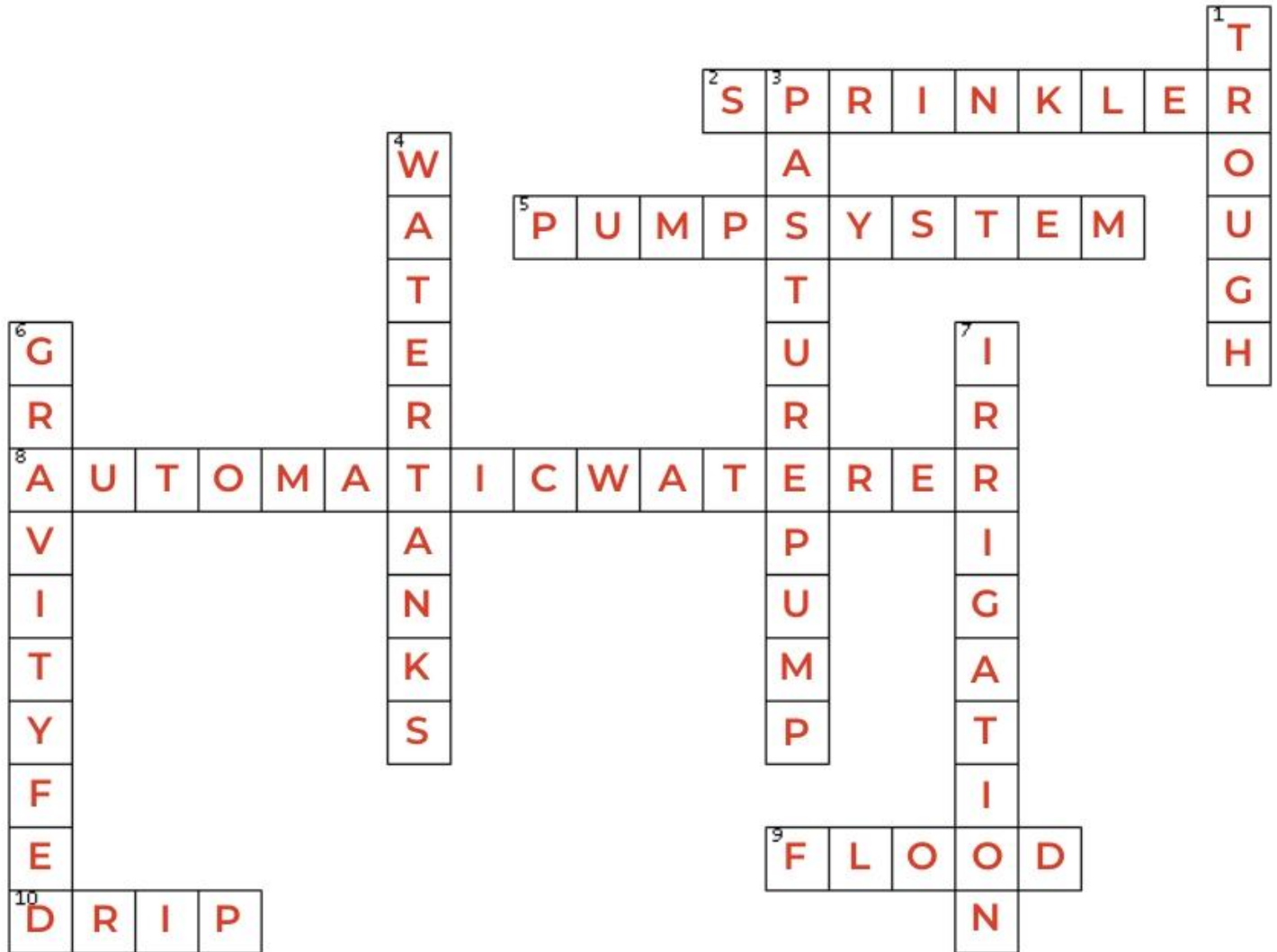
KEY: Water Use in Agriculture

Aligned to the following standards:

CS.03; CS.04; NRS.01; NRS.02; NRS.04; FFA.PL-A; FFA.PL-C; FFA.PL-F; FFA.PL-N; AG3; AG4; AG-NR1; AG-NR2; AG-NR4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.7; CCSS.ELA.WHST.9.10.7; HS-ETS1-3; CRP.02; CRP.04; CRP.05; CRP.11;

Part 1

Directions: Use the clues below to solve the crossword puzzle containing various methods of crop irrigation and livestock watering.



ACROSS

- Using hoses, pipes and pressurized heads to apply water to the soil from above
- Uses pumps to transport water from a source (well, etc.) to a trough or tank
- Often connected to a water source; automatically replenishes water level as animals drink
- Also called surface irrigation, water is distributed over the soil surface, typically by gravity
- This irrigation method delivers water directly to the plant roots.

DOWN

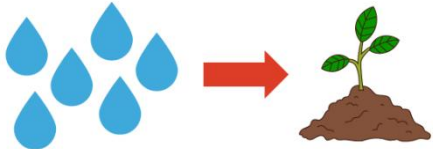
- Open containers to provide a drinking source for livestock
- Designed for animals to self-operate, often using a nose-paddle to get water
- Can be used as a short-term or emergency water supply, particularly in remote areas
- Water source at a higher elevation than the water trough, gravity used to deliver water
- The supply of water to land or crops to help growth

Name: _____

Part 2

Directions: Transfer the terms from Part 1 to the appropriate table below. Record the term and a simple definition and draw a picture representing the water delivery method. You may use the internet to research each of these methods if needed. Then answer the conclusion questions at the end.

Example:

Term	Definition	Picture
Irrigation	<i>The process of providing plants with water in addition to or instead of natural rainfall to help them grow</i>	

Crop Irrigation Methods

Term	Definition	Picture
Drip	An irrigation system that uses pipes, tubes and emitters to deliver water slowly and directly to the root zone of a plant	Answers will vary.
Flood	An irrigation system, also known as surface irrigation, which uses canals and open channels to deliver water flowing over the surface of the soil	Answers will vary.
Sprinklers	An irrigation system that uses a system of pipes, pumps and pressurized heads to spray water evenly through the air over an area of soil and plants.	Answers will vary.

Animal Watering Methods

Term	Definition	Picture
Automatic Waterers	Devices that are designed to provide animals with constant access to fresh water often using a float system to ensure a consistent water level	Answers will vary.
Gravity-Fed	A system involving keeping a water source at a higher elevation than the trough, pond or other source where livestock can access it so it can gradually flow by gravity	Answers will vary.

Name: _____

Animal Watering Methods (Continued)

Term	Definition	Picture
Pasture Pump	An animal-operated pump that delivers water from a source (like a well, stream or pond) to a drinking bowl. Usually, the animal pushes a lever with its nose, which activates the pump and delivers water.	Answers will vary.
Pump System	Pump water systems transport water from an underground well or surface water source that is lower in elevation than the desired water tank.	Answers will vary.
Trough	A simple water system which provides a large container of water available to animals; can be combined with other systems like pumps, gravity-fed, etc.	Answers will vary.
Water Tanks	A large container of water which typically is connected to a trough or other container for animals to access. Often these are used in more remote pastures or locations where water has to be hauled in	Answers will vary.

Conclusion Questions:

1. Why do you think there are such diverse methods of irrigating crops and watering animals? Why are so many different methods required?

Answers will vary.

2. What do you think goes into a farmer's or rancher's decision in choosing an irrigation or watering method?

Answers will vary.

3. Which methods seem like the most efficient to you? Why do you think so?

- a. I think the most efficient irrigation method is _____Answers will vary._____ because ...

Answers will vary.

- b. I think the most efficient animal watering method is _____Answers will vary._____ because ...

Answers will vary.

Name: _____

KEY: Conserving Agricultural Water

Aligned to the following standards:

CS.03; CS.04; NRS.01; NRS.02; NRS.04; FFA.PL-A;
FFA.PL-C; FFA.PL-F; FFA.PL-N; AG3; AG4; AG-NR1; AG-
NR2; AG-NR4; CCSS.ELA.W.9-10.2; CCSS.ELA.W.9-10.7;
CCSS.ELA.WHST.9.10.7; HS-ETS1-3; CRP.02; CRP.04;
CRP.05; CRP.11;

Directions: Use the table below to research your assigned water conservation strategy for your group. Then present your findings to your group and record their findings using the next table.

My Assigned Water Conservation Strategy

What is your water conservation strategy? *(Explain in two or three sentences.)*

Answers will vary.

How does this strategy help conserve water in agriculture? *(Explain in two or three sentences.)*

Answers will vary.

What are the benefits of this strategy for a farm or ranch? *(List three.)*

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

What are the potential challenges of implementing this strategy? *(List three.)*

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

How might climate or geography affect the effectiveness of this strategy? *(Explain in one or two sentences.)*

Answers will vary.

Other Water Conservation Strategies

Water Conservation Strategy:

Answers will vary.

How does this strategy help conserve water in agriculture?

Answers will vary.

Benefits to a Farm or Ranch:

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

Potential Challenges:

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

How might climate or geography affect the effectiveness of this strategy?

Answers will vary.

Name: _____

Water Conservation Strategy:

Answers will vary.

How does this strategy help conserve water in agriculture?

Answers will vary.

Benefits to a Farm or Ranch:

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

Potential Challenges:

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

How might climate or geography affect the effectiveness of this strategy?

Answers will vary.

Water Conservation Strategy:

Answers will vary.

How does this strategy help conserve water in agriculture?

Answers will vary.

Benefits to a Farm or Ranch:

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

Potential Challenges:

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

How might climate or geography affect the effectiveness of this strategy?

Answers will vary.

Name: _____

Water Conservation Strategy: Answers will vary.	
How does this strategy help conserve water in agriculture? Answers will vary.	
Benefits to a Farm or Ranch: 1. Answers will vary. 2. Answers will vary. 3. Answers will vary.	Potential Challenges: 1. Answers will vary. 2. Answers will vary. 3. Answers will vary.
How might climate or geography affect the effectiveness of this strategy? Answers will vary.	

Conclusion Questions:

1. Which strategy do you think would be the easiest to implement on a local farm in our area?

Answers will vary.
2. What incentives do farmers have for adopting water conservation strategies?

Answers will vary.
3. How do you think technology could help improve water conservation efforts?

Answers will vary.