

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

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LESSON 4

Problem + Technology = Progress

Unit:
TECHNOLOGY

PRECEPTS

- F. Continuous Improvement
 - F3. Use innovative problem-solving strategies
- N. Decision -making
 - N2. Demonstrate problem-solving skills



Lesson Type:
Large Group

NATIONAL STANDARDS

- NM-PROB.PK-12.2 Solve Problems That Arise in Mathematics and in Other Contexts
- NT.K-12.6 Technology Problem-solving and Decision-making Tools

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

1. Explain how technologies in agriculture emerged as a result of problems in agriculture.
2. Demonstrate solving a problem by developing a new technology.





TIME

Instruction time for this lesson: **45 minutes.**



RESOURCES

None



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ hammer
- ✓ clock
- ✓ calculator
- ✓ PALS.4.AS.A - 1 set for the entire class
- ✓ PALS.4.AS.B- 1 per pair
- ✓ construction paper
- ✓ scratch paper
- ✓ markers
- ✓ scissors
- ✓ glue

KEY TERMS



*agriculturalist
technology*

INTEREST APPROACH

*Begin by asking the questions listed below while holding up a hammer, clock and calculator. These are all examples of **technology**. At one time a person was faced with a problem and came up with an idea of how to address that problem. Use the items to get the students thinking about all the examples of **technology** around them.*

Or pass each item around the room, allowing the students to examine them first and then collect the items and continue.



What is this?

Hold up the hammer and allow students to answer.



What is it used for?

Allow students to answer.



Why was it invented?

Allow students to answer and lead them to the answer that it was used to address a problem – example might be to pound items together and a rock didn't work very well



What is this?

Hold up the clock and allow students to answer.



What is it used for?

Allow students to answer.



Why was it invented?

Allow students to answer and lead them to the answer that it was used to address a problem – example might be that we needed some way to consistently measure time and the sun doesn't shine every day



What is this?

Hold up the calculator and allow students to answer.



What is it used for?

Allow students to answer.



Why was it invented?

Allow students to answer and lead them to the answer that it was used to address a problem – example might be that we needed a quicker way to figure out math problems in business and industry.



These are all examples of **technology**. We maybe don't always think of them as **technology** but when they were designed, they were cutting-edge **technology**. **Technology** is the application of science and innovation to make tasks easier and/or better. We use **technology** all the time. People use many different types of **technology** every day in their homes and at work.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Explain how technologies in agriculture emerged as a result of problems in agriculture.



I. Match the following technologies with the problems that they were designed to solve.

(Technology/Picture)

- a. Animal Identification Chip
- b. Combine
- c. Fertilizer
- d. Genetically Enhanced Crops
- e. Global Positioning System (GPS)
- f. Herbicide
- g. Insecticide
- h. Irrigation
- i. Medicine Vaccination
- j. Radio Systems
- k. Refrigeration Tanks
- l. Shrink Wrapping of Food
- m. Tamper Resistant Seal
- n. Terraces
- o. Tractor
- p. Variable Rate Application
- q. Windbreaks
- r. Windmill

(Problem/Words)

- Being able to track sick and diseased animals
- To cut, gather and thresh crops all in one
- Poor growth and health of plants
- Needing plants with desired characteristics
- Accurately navigating equipment in a field
- Weed invasion and infestation
- Insect invasion and infestation
- Plants and crops needed more water
- Prevent animal diseases and sickness
- Agriculturalists needed to communicate on the go
- Milk would spoil too quickly
- Meat would spoil too quickly
- Dangerous items being added to food
- Soil erosion due to water
- Needed more power than animals can produce
- Did not want to over-use seed and chemicals
- Soil erosion due to wind
- Being able to pump water out of the ground

Engage the students in a matching challenge. You will need to have a set of the Technology Problem Cards. These cards can be cut out from Technology-4-AS-1. Give them the directions listed below. Upon completion of the directions, you will give students each a card and tell them their task is to move around the room and match themselves with either the corresponding **technology** or problem. Some students will have a **technology** card and others will have a problem card. Make sure that you hand out the matching combinations of technologies and problems so that you do not end up with students that do not have a match. Move around the room during the time and answer questions the students might have. As the mentor, you may need to help them figure out the correct matches.



Agriculturalists use a lot of different types of technologies every day. An **agriculturalist** is someone working in or concerned with the food and fiber industry. Just like the example of the hammer, clock and calculator, the **technology** that **agriculturalists** use is based upon problems they have encountered over time. They then used science and innovation in an attempt to make the task or situation better.



These are a set of Technology Problem Cards (*hold up cards*) and they will challenge your agricultural knowledge. On that card will either be a form of **technology** or a problem faced by **agriculturalists**. When you hear the word MATCH, your task will be to stand up, push your chair in and find your match in the room. If you are a **technology**, you are looking for a problem you might be able to solve, but if you are a problem, you are looking for a **technology** to help **agriculturalists** take care of you.



When you think you have a match. raise your hand and a mentor will come over and see if you have made a correct match. When you have made your correct counterpart, you and your partner should find chairs and sit next to each other. What questions are there?

Hand out cards, making sure that everyone has a potential match.

MATCH!

*Move around the room to help students that may be struggling or have questions. When students have made correct matches, have them sit down together because they will work with this partner in the next activity. Once all pairs have matched up and sat down, have them tell the rest of the class what the problem was and how **agriculturalists** have addressed the problem with **technology**. Remind them that this is an ongoing process and we are adapting and adding to **technology** all the time.*



Great job. All of you found your match. When I point to you and your match, please read the problem that **agriculturalists** had and then tell us what **technology** was developed to remedy the problem.

Point to each group so that all the matches are shared. If students have questions about the matches, give brief explanations of them.



Agriculturalists are always adapting and updating **technology** to address old and new problems. It is an ongoing process with the goal being to innovate and invent **technology** to address problems. We may not always realize it but we are faced with many problems each day that require us to think innovatively to make tasks easier and/or better.

OBJECTIVE 2. | Demonstrate solving a problem by developing a new technology.



I. Construct the ultimate bicycle to ride to school.

Challenge the students in their pairs to design the ultimate bicycle to ride to school. They should innovate and invent to make sure all the problems they may encounter are handled. Give them the following directions and allow about 10 minutes for them to design their bicycle. Make sure to hand out Technology-4-AS-2 to the students, because it will help remind them of the problems they are attempting to address. When they are done, have them show off their high-tech bicycle.



Now is your chance to innovate and invent your own form of **Technology**. Think about getting ready for school. You are just about to leave when you realize the only way you can get to school is to ride your bike. Your bike is not the typical bicycle, but rather one you have designed to take care of all the problems you face when you ride that bike to school.



Those problems include:

- eight-mile ride to school (uphill both ways)
- neighbor's huge biting dog
- crossing a river (without a bridge)
- rain every morning
- must carry your homework (includes four heavy textbooks)



Picture this ultimate bicycle in your mind. When I say GO INNOVATORS, GO, you will have 10 minutes to design this high-tech bicycle. You may draw it on paper or you may cut out the pieces and glue them together to make a miniature version. When the time is up, we will go around the room and you will have 30 seconds to describe your ultimate bicycle. Innovation takes the effort of many people so you will be working with the person you were previously matched up with to devise the best high-tech bicycle. What questions do you have? Here are the supplies.

Have the following ready for the mentees to retrieve: PALS.4.AS.B, construction paper, scrap paper, markers, scissors and glue.

GO INNOVATORS GO!

Move around the room to help students that may be struggling or have questions. Remind them to address all the problems that have been mentioned in the scenario. Tell the students when they have five minutes, two minutes and one minute left. When time is up, give all the groups 30 seconds to describe their ultimate bicycles. Thank them at the end for sharing their innovative ideas.

Five minutes remaining.

Two minutes remaining.

One minute remaining.



And your time is up. It is time to share your high-tech creations. When I point to your team, you will have 30 seconds to describe your ultimate bicycle to your classmates and make sure to mention the technological advances you have added.

Point to each group so they all have a chance to share.



Thank you for sharing the technological advancements you made to your bicycles. You were given a problem and all of you used your minds to innovate and implement types of **technology** to make the bicycle better.



REVIEW / SUMMARY

Listed below are the directions to quickly review the main objectives from the session. You will give them an example problem that agriculture has faced and have them recall the **technology** designed to address it. Then have them repeat that **technology** is used to address problems.



The bicycle was a fun example of how when faced with a problem we can use **technology** to solve it. Think back to the problems and **technology** examples in agriculture from the beginning of class. I'll give you the problem and you tell me the **technology** that was designed to address it.

Choral Response e-Moment allows the students to respond in unison to the posed question. Saying the answer aloud will help them to recall and remember the content.

Poor growth and health of plants ... Fertilizer
Meat would spoil too quickly ... Shrink Wrapping of Food
Needed more power than animals can produce ... Tractors
Being able to track sick and diseased animals ... Animal Identification Chips
Dangerous items being added to food ... Tamper Resistant Seal
Insect invasion and infestation ... Insecticide

Agriculturalists have been faced with several problems over the years and will continue to face more in the future. But just as you used **technology** in designing the bicycle, **agriculturalists** will continue to solve problems through inventing and innovating **technology**. **Technology** is used to solve _____ (allow students to say "problems").

APPLICATION



Small Group Suggestion: Use the Technology Problem Cards in a different format. Post the problem cards around the room and give each student a **technology** card. Have the student stand by the problem that they think their form of **technology** could solve. Work around the room and discuss the technologies that match the problems.



One-on-One Session: Brainstorm with the mentee about problems that the two of you can think of that students and people face every day. Take the list and narrow it down to two or three problems. Then work through those problems and see if the two of you could come up with ideas of how **technology** could be used to address the problem. Then put together a list of people that could help develop and innovate the **technology** to address the problem.

PALS.4.ASSESS.A | EVALUATION KEY

1. Define **technology**. (*Technology is the application of science and innovation to make tasks easier and/or better.*)
2. **Agriculturalists** have used (**technology**) to address (problems) faced in agriculture.
3. Give two examples of problems **agriculturalists** faced and the **technology** that was designed to address the issue. (*Answers will vary. Examples can be found on the Technology Problem Cards.*)
4. In two sentences explain what makes the ultimate bicycle that your team created so great. (*Answers will vary.*)

PALS.4.ASSESS.A | EVALUATION

Name _____

Problem + Technology = Progress

Answer the following questions to the best of your ability.

1. Define technology.
2. *Agriculturalists* have used _____ to address _____ faced in agriculture.
3. Give two examples of problems *agriculturalists* faced and the technology that was designed to address the issue.
4. In two sentences explain what makes the ultimate bicycle that your team created so great.

PALS.4.AS.A

Technology Problem Cards

Match the following technologies with the problems that they were designed to address.

(Technology/Picture)	(Problem/Words)
a. Animal Identification Chip	Being able to track sick and diseased animals
b. Combine	To cut, gather and thresh crops all in one
c. Fertilizer	Poor growth and health of plants
d. Genetically Enhanced Crops	Needing plants with desired characteristics
e. Global Positioning System (GPS)	Accurately navigating equipment in a field
f. Herbicide	Weed invasion and infestation
g. Insecticide	Insect invasion and infestation
h. Irrigation	Plants and crops needed more water
i. Medicine Vaccination	Prevent animal diseases and sickness
j. Radio Systems	Agriculturalists needed to communicate on the go
k. Refrigeration Tanks	Milk would spoil too quickly
l. Shrink Wrapping of Food	Meat would spoil too quickly
m. Tamper Resistant Seal	Dangerous items being added to food
n. Terraces	Soil erosion due to water
o. Tractor	Needed more power than animals can produce
p. Variable Rate Application	Did not want to over-use seed and chemicals
q. Windbreaks	Soil erosion due to wind
r. Windmill	Being able to pump water out of the ground

Example Technology Problem Cards:

	Needed more power than animals can produce.
	Being able to pump water out of the ground.



PALS.4.AS.B

Ultimate Bicycle Challenge: Create the ultimate bicycle to ride to school.

Your team must create the ultimate bicycle to ride to school. Along the way there will be some potential problems, so make sure you innovate and develop a high-tech riding vehicle.

Problems include:

Eight-Mile Ride to School (uphill both ways)

Neighbor's Huge Biting Dog

Crossing a River (without a bridge)

Rains Every Morning

Must Carry Your Homework (includes four heavy textbooks)

You may draw the bicycle on the paper provided or you may cut out pieces from the construction paper provided and assemble a small version of your ultimate bicycle if you would like. Be a technological innovator and create!