

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

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LESSON 23

Test and Observe the Effects of a Variety of Lubricants Used in Agriculture

Unit:
**AGRICULTURAL MECHANICS
AND TECHNOLOGY**

PRECEPTS

A. Action

A8. Evaluate and reflect on actions taken
and make appropriate modifications



Lesson Type:
Small Group

NATIONAL STANDARDS

NS.K-4.2. Physical Science

STUDENT LEARNING OBJECTIVES

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

1. Test and observe the effects of a variety of lubricants.





TIME

Instruction time for this lesson: **30 minutes.**



RESOURCES

None



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ **gelatin cubes made in advance**
(*Made by dissolving 4 envelopes of unflavored gelatin in a bowl with 2 cups hot water. Coat inside of a 9-inch by 12-inch pan with vegetable oil. Pour gelatin mixture into pan and refrigerate until firm, or about 3 - 4 hours. Then cut into 1-inch cubes. As an alternative to cutting the cubes, gelatin may be poured into plastic ice cube trays coated with vegetable oil.*)
- ✓ **two bowls**
- ✓ **liquid dish detergent**
- ✓ **water**
- ✓ **vegetable oil**
- ✓ **measuring cup**
- ✓ **watch with secondhand or a timer**
- ✓ **notebook paper**
- ✓ **writing utensil**

KEY TERMS



The following terms are presented in this lesson and appear in ***bold italics***:

lubricant
friction

INTEREST APPROACH



To get started today, let's put our hands together and rub them back and forth really fast.

Rub hands together as students rub theirs together, while encouraging them to go even faster. Rubbing will create heat. Make the connection that heat is a result of friction, which can be bad in many applications.



So what's happening as we rub our hands? Are they getting hot? OK, stop. Why do our hands get hot when we rub them together like that?

Allow for answers.



We call that **friction**, when we have resistance between two items, in this case our hands. Heat is one of the results of friction. In many cases, though, friction is very bad. Sometimes, we want items to slip seamlessly by each other without heat or noise. Who can give us an example of this?

Take examples or provide some of your own. Door hinges (prevents squeaking), wheels and bearings, parts in cars and machines, etc.



Great examples! For these situations, we can use what we call a **lubricant** to reduce friction. Lubricants can be items like oil, grease or even WD-40. Basically a **lubricant** is any substance that prevents two bare surfaces from rubbing together. Today, we are going to take a closer look at how these work.

Use the Motion Moment to reinforce what a lubricant does. Have students hold one hand up and make a circular motion as they say, "a lubricant helps things run more smoothly!"



Let's try out a cool way of remembering what a lubricant does. When I say, "What does a lubricant do?" you hold one hand up, make a circular motion, and say, "A Lubricant makes things run more smoothly!" Let's try it! What does a lubricant do?

Practice until they get it.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Test and observe the effects of a variety of lubricants.



Let's start by testing out some of these lubricants. We need four volunteers to get started.

Choose volunteers to conduct experiments. If a group is larger than four, give other students jobs such as recording results or keeping time. Try to give each member a job. The object is to move as many squares as possible in 15 seconds from one bowl to the other, while only using the thumb and index finger of one hand to pick up the pieces. Move step by step through the various tests as listed below:

1. Bowl to bowl, nothing added in 15 seconds
2. Bowl to bowl, with $\frac{1}{4}$ cup of detergent mixed on cubes in 15 seconds. Throw away used cubes and then clean and dry each bowl before moving to step 3. This is a good teachable moment to ask why we would wash the bowls. Point to residue left behind.
3. Bowl to bowl, $\frac{1}{4}$ cup of water. Throw away used cubes and then clean and dry each bowl before moving to step 4.
4. Bowl to bowl, $\frac{1}{4}$ cup of vegetable oil in 15 seconds



So we will test out some various liquids here as lubricants, but first we need to conduct a control. What is a control?

Explain that we need to try to move squares without any liquid, so we have a basis point to start from. And this is what we call a control.



So in 15 seconds or less, our first volunteer will use only one hand and only his or her index finger and thumb to pick up as many squares as possible and move them from one bowl to the other. This will be our control. Let's make sure we carefully watch what happens. **TIMER READY, GO!**

*After volunteer has been at it for 15 seconds, say **TIMER SAYS STOP!***



Great! What did we observe?

Continue through all lubricants and have brief discussion following each test, with a focus on what was observed.



Great work, team! So now we have results from all four experiments. Of all the experiments, which liquid allowed your PALS to move the cubes the most? Which allowed for the least movement of cubes? What was the slipperiest lubricant? Which one was the least effective as a lubricant?

Lead discussion and flesh out answers from students.



Great discussion! Lubricants are important in all areas of our life. We use them in our cars to help them run smoothly and efficiently; we use them to coat cooking pans so our food doesn't stick; we use them in planes, trucks and all types of agricultural equipment. If we did not have them, these parts would heat up, break down and eventually fail.

APPLICATION



Continued Discussion/Activity: *Have the group make a list of as many uses of lubricants and different types as possible.*



One-on-One Suggestion: *Have student list how lubrication has been a factor in his or her day so far. For example, the garage door opened, the car that drove them to school, the classroom door hinges, etc.*

Have student work at home with a parent on lubricating an item such as checking the car's oil, lubricating machinery, oiling a hinge, etc.



EVALUATION - ANSWER KEY

Have students answer the following questions on a sheet of notebook paper.

1. What is Friction? Can friction be a bad thing?
2. What is a lubricant? Give an example of how a lubricant can be used.

ANSWERS TO EVALUATION

1. Friction is the force of resistance between two items, such as rubbing your hands together. It can be bad if it is between two parts that should move easily against each other, such as a motor or piece of equipment.
2. A lubricant is a substance used to reduce friction between two items, making them slide by each other more easily. Any valid example such as: A lubricant is used to keep a hinge from squeaking, preventing heat in an automobile engine or tractor, or keeping items moving more efficiently.