Nasco Education™

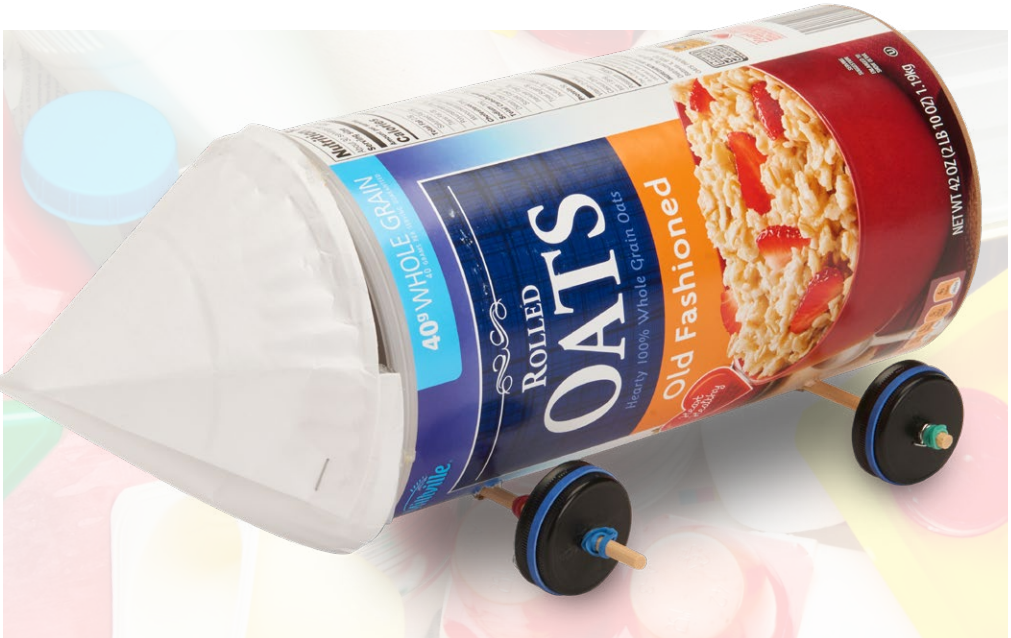
LESSON PLAN

AFNR/ SEL

Developed with Alison Parrott, Agriculture Teacher — Otselic, New York FFA Advisor, Otselic Valley Central School District

Problem solving through garbage car creations

Volume 30
Middle School
Time: 7–9 Days



Course: Intro to AFNR

Unit: Agriculture Sustainability

Standards: Common Core Literacy:

Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of rhymes and other repetitions of sounds (e.g., alliteration) on a specific verse or stanza of a poem or section of a story or drama.

AFNR Standards:

ESS.04.04.

Compare and contrast the impact of conventional and alternative energy sources on the environment and operation of environmental service systems.

ESS.04.04.02.b.

Identify advantages and disadvantages of alternative energy sources as they pertain to environmental service systems.

Materials list

- PowerPoint® presentation
- Student note packets
- Recyclable materials
- Glue (9742856)
- Scissors (9712473)
- Tape (9701124, BE01465)
- Eggs

Optional

- Egg cartons (C14067)
- Derby Car Kit, for wheel basics, etc. (SB52254)

Objective

Student will be able to define terminology used in this lesson and work with classmates to build a "car" out of recyclable materials.

Activities

Note-taking (can be done independently, as a class, or with partners), collection of recyclables (can be brought in from home), construction and decorating garbage car, and garbage car race day.

Step 1: Brainstorm with class about what materials they think are recyclable.
Homework: Have students bring in recyclable materials from home that they would like to use for this project.

Step 2: Students will learn what problem they are solving through note taking. A PowerPoint® will accompany it which will provide visual aid and will be read aloud. This can be done independently or as a group. Blank paper or typing device will be needed for students to take notes.

Step 3: Students will work with a partner or individually to construct a garbage car that will hold an egg. They will use their recyclable materials that they brought from home.

Step 4: Assessment – Students will test their car by having it go down a ramp. The ramp can be anything that will work in the classroom or can be easily built with a few pieces of wood.

Step 5: Students will reflect on their greatest success and challenge during this lesson.

SEL Power-Up Reflection

Suggested questions for an SEL-focused discussion after the project.

- What were some challenges that were faced when building the car?
- How could we solve these challenges if we were to do it again?
- What could we have done to be a better partner (if applicable)?
- How could we have worked better as a team for this project (if applicable)?
- Did we use good sportsmanship when other classmates were testing their cars?

GROUP REFLECTION

1. How could we make this project better?
2. What did we like and not like about it?
3. What did we learn about criteria and challenges?

SELF-REFLECTION

1. What materials could be used next time to make a better garbage car?
2. Did I apply my class time appropriately and therefore make the best version of a car that I could?

"Garbage car" problem–solving activity

Name: _____ Date: _____

1. What is a problem?

State the problem you need to solve.

2. What are constraints?

List the constraints placed on you for this project.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

cont. next page

3. **What are criteria?**

List the criteria for this project.

1.

2.

3.

4.

5.

Brainstorming session – think, think, **THINK!**

In the space below, make some lists of possible materials to use for the parts of the vehicle. Also, do some initial thumbnails of possible ideas. This page should contain all the information in your head as it relates to the design of your project. Leave nothing out because at this point all ideas must be considered.

Car Body	**Wheels**	**Axles**
Egg Holder	**Cushion**	**Weight**

Other stuff to bring in:

cont. next page

Thumbnail sketches – Side view only (please do 4 different ideas).

cont. next page

Designing the device

A. Develop **one** brainstormed sketch which can lead to a workable solution. This must be done before you begin building. Identify wheels, cargo holder, axle, and any other parts specific to your car.

B. Think creatively.

cont. next page

Maintain log of modifications – Either in words or in pictures.

Record any work you do or changes you make to the previous sketch to make your car run better. This should be done at the end of class **daily.** It is the record of the actual work you are doing on your car.

Check to make sure all changes are added. Can be done through words of drawings:

cont. next page

Final solution

This should look like your car and everything should be identified. Include decoration you add and all parts:

Top view

cont. next page

Final solution – continued

Side view (just one)

Head-on or front view

cont. next page

Final solution – continued

Rear view

Bottom view (don't drop your egg)

cont. next page

Garbage car evaluation

Name: _____

Filled out by instructor

1. Design Creativity (10) _____
2. Problem-Solving Ability (20) _____
3. Construction (15) _____
4. Wheel and Axle Design (20) _____
5. Roll Distance (25) _____
6. Daily Work Habits (10) _____

Total Score (100) _____

PROBLEM SOLVING ACTIVITY: GARBAGE CAR

7th Grade Technology

WHAT IS A PROBLEM?

- Something that needs solving.

WHAT ARE CONSTRAINTS?

- What you cannot do.

WHAT CONSTRAINTS DO WE HAVE?

- 1.) The vehicle must be made out of recyclable materials.
- 2.) All work is to be done in and during class time.
- 3.) Model or wooden wheels are NOT allowed.
- 4.) The vehicle MUST fit on the roadway itself.
- 5.) The cargo (egg) must be easy to put in and remove from the vehicle.
- 6.) No glass may be used.
- 7.) No pre-cut axles are allowed.
- 8.) All materials are to be brought in from home by the student.
- 9.) Groups of 2 may work together to make one car, for every additional person in a group, another car must be made.
- 10. Cans and bottle may not be used solely as a car. No putting an egg in a coffee can and rolling the can and calling it your car.

WHAT ARE CRITERIA?

- What you MUST do.

WHAT CRITERIA DO WE HAVE?

- 1.) Break down the problem to determine major criteria.
  2.) Design a car.
  3.) Make it out of recyclable materials
  4.) Go down a 30 degree slope
  5.) Should roll 25 feet
  6. Protect/carry an egg.

IT MUST HAVE AT LEAST TWO WHEELS.
IT MUST HAVE AT LEAST 1 AXEL