

## Grade 9 Physical Science Lesson Plan Summary & Pacing

### Recycle Right: Reducing Contamination in Classroom Bins

**UNIT: Energy**

**DURATION: 5 days (80 minute class periods) with  
one-week interval between Days 3 and 4**

#### **SUMMARY:**

Students will learn the importance of recycling while minimizing contamination in recycling bins. They will act as ambassadors for correct recycling in the school by visiting other classes, speaking to those classes about the need to minimize contamination, and conducting audits of classroom bins and collecting quantitative data on contamination minimization.

This lesson takes place within the unit on Energy. Prior to the lesson, students have learned about various sources of energy and the concept of transforming energy into work; the lesson thus incorporates these concepts into real-world technological challenges, such as how to manage resource use in the most energy-efficient ways. The lesson precedes the unit on Thermodynamics, wherein students will expand the application of what they've learned and apply it to concepts of the laws of conservation of energy and entropy.

In 5E inquiry lessons, students will act as ambassadors for correct recycling in the school by visiting other classes, speaking to those classes about the need to minimize contamination, and conducting audits of classroom bins and collecting quantitative data on contamination minimization. They will work in groups to conduct peer review on their presentations and collect and analyze data collected in the audits. Work products will include posters for presentation, the presentations themselves, bar graphs of data collected, and recommendations for improving recycling and reducing contamination in the classroom bins. This will prepare students to participate in the four-week schoolwide Recycle Right Competition, and a possible field trip to a local sorting facility to see first-hand how sorting is done and the challenges faced by the city of contamination.

#### **KEY STANDARDS:**

##### Performance Standards

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

# MATERIALS AND PACING

## Materials

- Projector or SmartBoard with sound
- Disposable latex gloves
- Variety of recyclables (paper, cardboard, aluminum cans, plastic bottles) and non-recyclable
- Bins for trash, recycled paper, plastic/aluminum
- Colored pens and markers
- Rulers
- Graph paper
- Blank paper
- Large poster paper
- Supplied worksheets are original creations and images used are in the public domain.

## SUGGESTED PACING

### Pacing Overview

Students first research the relationship of recycling to energy use, and explore how recycling increases energy efficiency. Then they create presentations to make to other classes about what they've learned, conduct initial audits of recycling bins in those classrooms, then follow up a week later with another audit, and compile their data.

### DAY 1

#### Engage (40 minutes)

Students participate in a sorting activity in which they must separate recyclable paper, cardboard, aluminum cans, plastic bottles and non-recyclable trash and put them in appropriate containers. Student groups with correctly sorted materials will be “paid” with treats of the teacher’s choice.

**Teacher will need:** Projector or smart board with sound, cardboard boxes large enough to hold reasonable amount of trash samples (one box per group), assortment of trash (non-recyclables and recyclable paper, cardboard, aluminum cans, plastic bottles), cereal bars or other means of “payment” for recyclables.

**Students will need:** Science notebooks, disposable latex gloves, bilingual dictionaries (if available).

**Explore (40 minutes): Benefits of Recycling, Tied to Energy Efficiency.**

Students research the benefits of recycling in terms of energy efficiency, and how this is related to economic benefits.

**Students will need:** Science notebooks, “How Recycling Saves Energy” information sheet and questions, large index cards, markers, paper strips, Sentence Kernel Expansion sheet, dictionaries.

**Teacher will need:** Copies of “How Recycling Saves Energy” information sheet, copies of “Recycling and Energy” Sentence Kernel Expansion sheet, blank sheets of paper, sample trash, recycled paper and aluminum/plastic bins, variety of items for each (recyclable and non-recyclable).

## DAY 2

**Explore (55 minutes):** Students work in groups to create posters for visual part of presentation, write sentences for their presentation, and practice how to do an audit.

**Students will need:** Science notebooks, “How Recycling Saves Energy” information sheet and questions, large index cards, markers, paper strips, Sentence Kernel Expansion sheet, dictionaries.

**Teacher will need:** blank sheets of paper, sample trash, recycled paper and aluminum/plastic bins, variety of items for each (recyclable and non-recyclable).

## Day 3

**Explain (45 minutes):** Students act as ambassadors to other classes, making presentations to classes about the importance of recycling correctly and minimizing contamination.

**Students will need:** Science notebooks, large sheets of poster paper (1 per group) with each group member’s illustration taped or glued to it (four sheets per poster), latex gloves.

**Teacher will need:** List of classrooms prearranged for 10-minute visits.

**Elaborate (45 minutes): Auditing Bins in Classrooms, Before and After Presentations** Students conduct audits of classrooms they visit and consolidate the data.

**Students will need:** Science notebooks, latex gloves.

**Teacher will need:** List of classrooms prearranged for 10-minute visits.

### Day 4

**Elaborate (45 minutes):** Students conduct a follow-up audit one week later.

**Students will need:** Science notebooks, latex gloves.

**Teacher will need:** List of classrooms prearranged for 10-minute visits.

### Day 5

**Evaluate (45 minutes): Analyzing Data, Evaluating Success of Model, and Formulating Next Steps to Reduce Contamination School-Wide** Students evaluate the data, present it and devise an action plan to minimize contamination in classroom bins throughout the school.

**Students will need:** Science notebooks, graph paper, colored pens or markers, rulers.

**Teacher will need:** White board to post all data.

## CONSIDERATIONS FOR SPECIAL POPULATIONS

### SPECIAL EDUCATION AND ELL

Guidance has been incorporated into the lesson plan.

## FAMILY ENGAGEMENT

Families can be engaged by having students conduct audits of their own homes. Does the family recycle? If so, what materials? How can recycling at home be made easier?

Students bring in data collected from homes and share with the class. They can be engaged to write letters to their families saying why recycling is important and offering suggestions for how to recycle right.