

# LESSON 3: Prescribe a Pollution Diet

## LESSON OVERVIEW

“Pollutey Judy” drives everywhere and never carools. She drives her vehicle that runs on gas out of convenience and does not realize the impact her choices have on the environment. In this lesson, students will use the calculation 1 mile = 0.97 pounds of air pollution\* to determine how much air pollution Judy is creating each day. Each student will work to put Judy on a pollution reduction plan, suggesting ways she can spare the air. Students will calculate how much air pollution is saved per day when Judy is on her pollution reduction plan and will write opinion pieces convincing Judy of the importance of making safe and eco-friendly transportation decisions.

## OBJECTIVES

- Learn how transportation choices impact air pollution.
- Identify the pros and cons of different modes of transportation.

## TOPIC

Environmental Impact of Walking and Bicycling

## STANDARDS SUPPORTED IN THIS LESSON

### Common Core State Standards for English Language Arts

#### Writing Standards

##### Grade Four

- **CCSS.ELA-Literacy.W.4.1:** Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

##### Grade Five

- **CCSS.ELA-Literacy.W.5.1:** Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

### Common Core State Standards for Mathematics

#### Grade Four

- **4.NBT.B.4** (CCSS.Math.Content.4.NBT.B.4): Fluently add and subtract multi-digit whole numbers using the standard algorithm.  
(Note: 4th graders who have not learned about decimals can use the calculation 1 mile = 1 pound of air pollution.\*)
- **4.NBT.B.5:** (CCSS.Math.Content.4.NBT.B.5): Multiply a whole number of up to four digits by a one-digit whole number, and multiply two, two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

#### Grade Five

- **5.NBT.B.7:** (CCSS.Math.Content.5.NBT.B.7): Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

\*<http://www.youcanbikethere.com/content/environmental-benefits-0>

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## California Health Education Content Standards

### Nutrition and Physical Activity – Grade Four

#### Standard 1: Essential Concepts

- 1.8.N: Identify ways to increase and monitor physical activity.

### Nutrition and Physical Activity – Grade Five

#### Standard 8: Health Promotion

- 8.1.N: Encourage and promote healthy eating and increased physical activity opportunities at school and in the community.

## National Health Education Standards for Grades Three to Five

### Standard 1: Essential Health Concepts

- 1.5.1: Describe the relationship between healthy behaviors and personal health.
- 1.5.2: Identify examples of emotional, intellectual, physical, and social health.
- 1.5.3: Describe ways in which safe and healthy school and community environments can promote personal health.

### Standard 8: Health Promotion

- 8.5.2: Encourage others to make positive health choices.

## MATERIALS NEEDED

- *A Day with Pollutey Judy* worksheet (1 per student)
- *Go on a Pollution Diet!* worksheet (1 per student)
- Chart paper (1 piece)
- Lined white paper (2 per student)
- Index cards (1 per student)

## PREPARATION ACTIVITIES

- Make copies of *A Day with Pollutey Judy* and *Go on a Pollution Diet!* worksheets.
- Read Teacher Supplemental Information.
- On the piece of chart paper make a chart similar to the one in the Teacher Supplemental Information. Make sure you have a place to write the pros and cons of walking, riding a bicycle, being driven in a car, and taking public transportation.

## STEPS FOR CLASSROOM ACTIVITY

### *Pros and Cons of Different Modes of Transportation* (10 minutes)

- Ask students to consider the pros and cons of different modes of transportation. Use the Teacher Supplemental Information to guide your discussion and record student responses on the chart paper.
- Ask students to consider the safety of each mode of transportation. How can each mode of transportation be made safer?
- Ask students to consider which pros and cons are most important to them. Is convenience more important than pollution? Why or why not? To what extent?

## PREPARATION TIME

10 minutes

## ACTIVITY TIME

60 minutes

## VOCABULARY

**Carpool**—An arrangement between people to travel together in a single vehicle.

**Con**—The negative side of an issue.

**Emissions**—The production and discharge of something.

**Inefficient**—Failing to make the best use of time or resources.

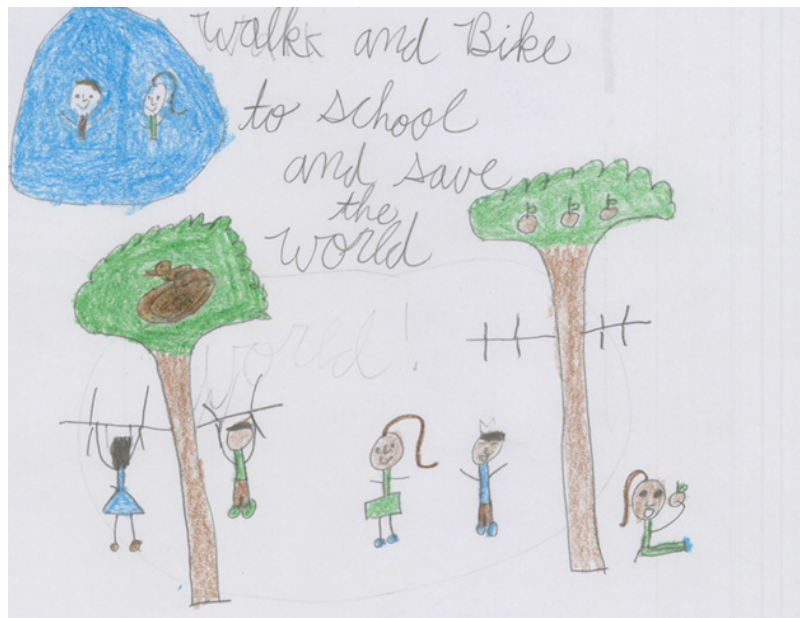
**Mode**—A way in which something is done.

**Pro**—The positive side of an issue.

# LESSON 3: Prescribe a Pollution Diet

## A Day with Pollutey Judy (15 minutes)

- Pass out the *A Day with Pollutey Judy* worksheet. Tell students that Pollutey Judy loves to drive. She drives everywhere, even places that are close enough to walk. Pollutey Judy never rides her bicycle, never carools, and never takes public transportation. She thinks driving is so convenient!
- Ask students what air pollution is. Tell them that cars, trucks, factories, power plants, trains, and planes create harmful gases that make the air dirty. When gases make the air dirty this is called air pollution. We can measure air pollution in pounds, with 0.97 pounds of air pollution = 1 mile of driving\* (round this to 1 pound = 1 mile of air pollution if your students have yet to learn about decimals).
- Have students complete the *A Day with Pollutey Judy* worksheet to calculate how much air pollution Pollutey Judy produces per day. If students have not yet learned how to compute with decimals, have them use the modified conversion of 1 mile = 1 pound of air pollution.\*
- After students have completed the worksheet, call the class back together. Ask students to share how much air pollution Pollutey Judy's driving produces on a daily basis. Work together to calculate how much air pollution Pollutey Judy's driving produces per week, per month, and per year.



## Pollution Diet (15 minutes)

- Ask for suggestions on how Pollutey Judy can reduce the amount of air pollution her driving creates.
- Hand out *Go on a Pollution Diet!* worksheet. Tell students that Judy has other transportation options: she can walk, bicycle, carpool, or take public transportation. Review the chart at the top of the *Go on a Pollution Diet!* worksheet. Briefly review the pros and cons of each transportation option.
- Have students complete the *Go on a Pollution Diet!* worksheet. After they have finished, call the class back together. Ask students to share how they reduced the amount of air pollution that Judy produced. Pick one student's pollution diet and work together to calculate how much air pollution Pollutey Judy will produce when she stays on that diet for one week, one month, and one year. Compare these computations to the amount of pollution Judy's driving currently produces per week, month, and year.

Joanna R., Citrus Heights, California

## Writing (15 minutes)

- Praise the class for their hard work creating pollution diets for Judy. Tell them that, unfortunately, Judy is not sold on their diets. She loves to drive and does not understand why she should try to reduce the amount of air pollution her driving creates.

\*<http://www.youcanbikethere.com/content/environmental-benefits-0>

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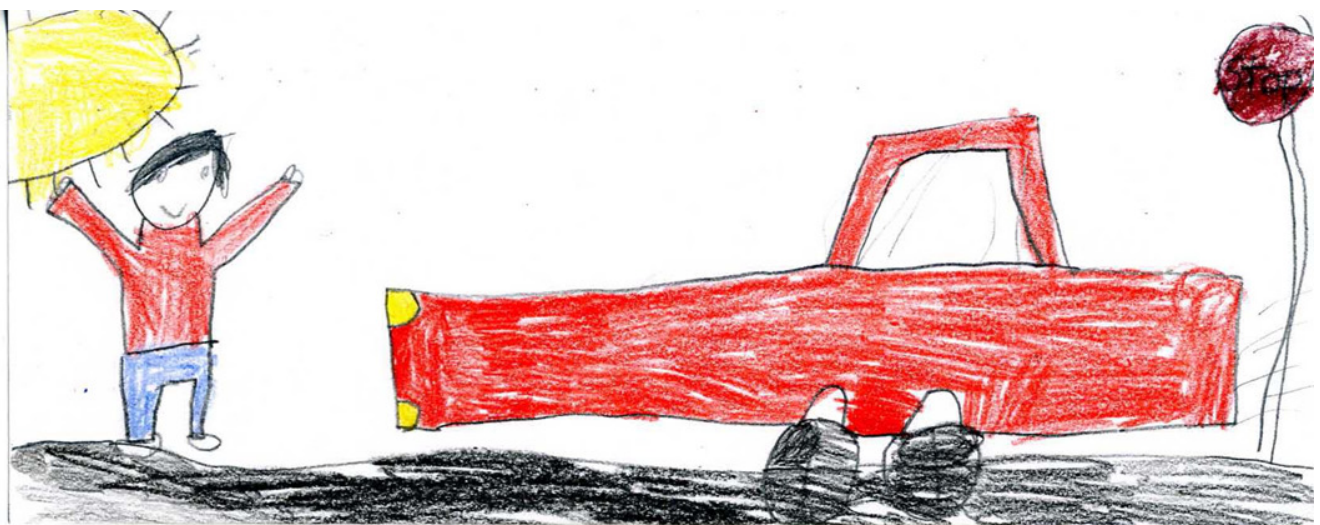
- Tell students that they will each write Pollutey Judy a letter trying to convince her to go on a pollution diet. Tell students to try to appeal to Judy by stating their opinions on air pollution, physical activity, and convenience. Remind students to support their opinions with reasoning and examples. Tell students to try and convince Judy of the importance of making both safe and eco-friendly transportation decisions.
- Hand out lined paper to each student. Have each student write a letter to Pollutey Judy. If students finish early they can share their letters with each other or design an advertisement about their pollution diet.

## Exit Tickets (5 minutes)

- Ask students to think about the relationship between their transportation choices and air pollution. Pass out an index card to each student; these will be their “exit tickets” to hand in before class is over. On the front of the index card, have students write down one way that they could reduce the amount of air pollution that their transportation choices create. On the back of the index card, have students write down one thing they learned during today’s lesson.
- Have students hand in their exit tickets. Use these tickets as a quick way to assess what students learned during this lesson.

## Ideas for Extending the Lesson

- Have students record their modes of transportation and approximate distances traveled for one week. Ask students to compute the amount of air pollution that their transportation choices produced and then put themselves on a pollution diet, identifying ways to reduce air pollution.
- Have students create a play or picture book about Pollutey Judy to perform for younger students. Ask students to identify the big ideas from this lesson and think about how the big ideas could be communicated to younger students.
- Read aloud Wump World by Bill Peet and discuss the book’s message about pollution. Have students write book reports on Wump World trying to convince Pollutey Judy to read the book.



Jake S., Long Beach, California

# Teacher Supplemental Information

## Pros and Cons of Different Modes of Transportation

Walking	
PROS	CONS
Travel is free.	Travel is inefficient for long distances.
Travel is also physical activity.	Limited by carrying capacity.
Does not create pollution.	Can be difficult or unsafe to walk on roads with no sidewalks or crosswalks.
Riding a Bicycle	
PROS	CONS
Travel is free.	Travel can be inefficient for long distances.
Travel is also physical activity.	Can be difficult or unsafe to ride alongside cars, especially when there is a lack of bicycle lanes.
Does not create pollution.	Have to park/lock bicycle at destination.
Driven in a Car	
PROS	CONS
Can travel both short and long distances.	Cost of gas.
Can travel with more than one person (often at least four people).	May have to pay for parking at places.
Do not have to worry about weather.	Have to factor cost of insurance and vehicle maintenance.
Convenient.	May have traffic congestion during peak hours (e.g., school hours).
	No physical activity.
	Gas emissions create smog/air pollution from car.
	Can be unsafe because of the potential of a motor vehicle accident.
Taking Public Transportation	
PROS	CONS
Do not have to worry about the weather (except when waiting for bus/train).	Physical activity is only gained in the short distance to and from the transit location.
Carries more passengers than a personal vehicle.	Gas emissions create smog/air pollution from bus.
Can be less expensive than driving in a personal vehicle.	People generally have to pay for it.
Creates fewer gas emissions per traveler than personal vehicle trips.	Restricted by transit schedule and routes.

# Student Worksheet

## A Day with Pollutey Judy

Pollutey Judy drives by herself every day. The chart below shows a typical day in Pollutey Judy's life. Calculate how much daily air pollution Pollutey Judy's driving produces. Round answers to the hundredths place. Use the calculation 1 mile = 0.97 pounds of air pollution.\*

Destination	Distance (Round trip)	Mode of Transportation	Air Pollution
Work	4.3 miles	Driving	
Coffee Shop	1.2 miles	Driving	
Friend's House	5.8 miles	Driving	
Home	0.6 miles	Driving	

Total \_\_\_\_\_

\*<http://www.youcanbikethere.com/content/environmental-benefits-0>

Pollutey Judy drives by herself every day. The chart below shows a typical day in Pollutey Judy's life. Calculate how much daily air pollution Pollutey Judy's driving produces. Round answers to the hundredths place. Use the calculation 1 mile = 0.97 pounds of air pollution.\*

Destination	Distance (Round trip)	Mode of Transportation	Air Pollution
Work	4.3 miles	Driving	4.17 pounds
Coffee Shop	1.2 miles	Driving	1.16 pounds
Friend's House	5.8 miles	Driving	5.63 pounds
Home	0.6 miles	Driving	0.58 pounds

Total 11.54 pounds

\*<http://www.youcanbikethere.com/content/environmental-benefits-0>

Other than driving, Judy has the following options for transportation:

Transportation	Air Pollution	Comfortable Distance
Walking	0 pounds/mile	2 miles or less
Bicycling	0 pounds/mile	8 miles or less
Carpooling with one other person	0.49 pounds/mile	Any

Put Pollutey Judy on a pollution diet! Instead of driving by herself, help Pollutey Judy find other transportation options. Fill in the chart below to calculate how much air pollution Pollutey Judy will create on her pollution diet. Then calculate how much less air pollution she is creating. Round answers to the hundredths place.

Destination	Distance (Round trip)	Mode of Transportation	Air Pollution
Work	4.3 miles		
Coffee Shop	1.2 miles		
Friend's House	5.8 miles		
Home	0.6 miles		

Total \_\_\_\_\_

Total Air Pollution Before the Pollution Diet (from *A Day with Pollutey Judy* worksheet): \_\_\_\_\_

Total Air Pollution on the Pollution Diet: \_\_\_\_\_

Total Decrease in Air Pollution: \_\_\_\_\_



Other than driving, Judy has the following options for transportation:

Transportation	Air Pollution	Comfortable Distance
Walking	0 pounds/mile	2 miles or less
Bicycling	0 pounds/mile	8 miles or less
Carpooling with one other person	0.49 pounds/mile	Any

Put Pollutey Judy on a pollution diet! Instead of driving by herself, help Pollutey Judy find other transportation options. Fill in the chart below to calculate how much air pollution Pollutey Judy will create on her pollution diet. Then calculate how much less air pollution she is creating. Round answers to the hundredths place.

Destination	Distance (Round trip)	Mode of Transportation	Air Pollution
Work	4.3 miles	Walking or Bicycling Carpooling	0 pounds 2.1 pounds
Coffee Shop	1.2 miles	Walking or Bicycling Carpooling	0 pounds 0.59 pounds
Friend's House	5.8 miles	Walking or Bicycling Carpooling	0 pounds 2.84 pounds
Home	0.6 miles	Walking or Bicycling Carpooling	0 pounds 0.29 pounds

Total \_\_\_\_\_

Total Air Pollution Before the Pollution Diet (from *A Day with Pollutey Judy* worksheet): 11.54 pounds

Total Air Pollution on the Pollution Diet: 0-5.82 pounds (answers will vary)

Total Decrease in Air Pollution: 5.72-11.53 pounds (answers will vary)