High School Activities

Our School's Trash

Content Areas: Science, Social Studies, Health

Grade Levels: Grades 9, 10, 11, and 12

Time to Complete: Two weeks

1. South Carolina Curriculum Standards Addressed

SCIENCE

Grades 9–12

I. Inquiry

B. Design and Conduct Investigations

1. Design a scientific investigation based on the major concepts in the area being studied.
2. Select and use appropriate instruments to make the observations necessary for the investigation, taking into consideration the limitations of the equipment.
4. Select the appropriate safety equipment needed to conduct an investigation (e.g., goggles, aprons, etc.).
5. Suggest safety precautions that need to be implemented for the handling of materials and equipment used in an investigation.
8. Identify possible sources of error inherent in an experimental design.
9. Organize and display data in useable and efficient formats, such as tables, graphs, maps, and cross sections.
10. Draw conclusions based on qualitative and quantitative data.

SOCIAL STUDIES

III. People, Places, and Environments: Geography

10.8 The learner will demonstrate an understanding of interactions between the environment and society.

10.8.2 examine the global impacts of human changes in the physical environment

10.8.3 explain how to apply appropriate models and information to understand environmental problems

HEALTH

I. Personal Health and Wellness

Standard 4: Analyze the influence of personal beliefs, culture, mass media, technology, and other factors on health.

By the end of grade twelve, students should be able to

- analyze how the environment influences the health of the community

2. Brief Description of Lesson/Activity

This activity prompts students to look at trash in a new way by considering what items can be recycled, reused as is, or repaired, rather than just being thrown away. Students participate in a classroom activity that focuses on specific items of trash and then design their own at-home project with the ultimate purpose of reducing the amount of trash their families generate on a daily basis. Students are also actively engaged in researching the environmental impact of proper waste management.

3. Focus Questions for Students

1. What is the difference between trash and litter?
2. How much trash do you think you produce each day?
3. How much trash do you think that our school produces each day?
4. Is all trash the same, or are there different categories of trash?
5. What are the long-term implications for a world that has too much trash in it?
6. What is the connection between reducing trash, preserving the environment, and reducing and preventing litter?

4. Culminating Assessment

Students design an at-home experiment, do research, and participate in classroom presentations. They then analyze what they have learned from the varied activities and write up their findings as articles for the school newspaper.

5. Materials, Equipment, and/or Resources Needed

- chart paper and markers
- computers with Internet access
- one bag of clean trash weighing approximately 4 pounds and containing items that can be recycled, reused, thrown away, and/or repaired
- bathroom scales for weighing the bag as a classroom demonstration
- four clean paper grocery bags, each of which is labeled with one of the following terms for the kind of trash that will be put into it:
    1. “recycle” (denoting items of trash that are to be sent to a recycling center to be broken down and made into something new)
    2. “reuse as is” (denoting items of trash that can be used in their present form, although perhaps needing to be cleaned or freshened in some manner)
    3. “repair” (denoting items of trash that cannot be used in their present form because they are broken or inoperative but that could be used if they were rebuilt or repaired)
    4. “dispose of properly” (denoting items that can be neither recycled nor reused and that must therefore be discarded)

6. Teacher Preparation

1. Assemble the necessary items.
2. Label the four grocery bags.

7. Procedures

Teacher Activity	Student Activity	Assessment
Introduce the topic of the lesson and lead the class in a discussion of the focus questions. Have the class either respond orally to the questions or write their responses in their journals.	Students listen and then either discuss the focus questions as a group or respond to the focus questions in their journals.	Student participation in the discussion or journal responses to focus questions
Show students the bag of clean trash you have prepared. Ask volunteers to estimate the weight of the bag, first by just looking at it and then by lifting it. After you get their estimates, weigh the bag for the class. It should weigh approximately four pounds. Tell the class that four pounds is the amount of trash generated by a household in one day.	Volunteer students estimate the weight of a prepared bag of trash.	
Discuss with the class these terms as they relate to what we can do with items of trash: "recycle," "reuse as is," "repair," and "dispose of properly." (See the explanations in section E, above.) Ask students to consider what items they throw away on a regular basis.	Students discuss the meanings of the terms that are on the four grocery bags and consider what items they regularly throw away.	Student participation in the discussion
Next, have students take turns selecting an item from your prepared 4-pound bag of clean trash. Have each student categorize the item he or she has selected as something that could be recycled, reused as is, repaired, or trashed. Have the student then place that item in the appropriately labeled grocery bag." (See the section E,	Students take turns selecting an item from the prepared trash bag. They then categorize the items by placing them in the appropriately labeled grocery bag.	Student participation in the selecting and sorting activity

Teacher Activity	Student Activity	Assessment
above.)		
After the students have categorized the trash from the prepared bag, have them weigh the grocery bag that is labeled "dispose of properly" and compare its weight with the four pounds that the prepared bag originally weighed. Have students now weigh the remaining three grocery bags and compare and graph the results.	After all the items selected by the students have been sorted, the students weigh the bags, compare the results, and graph them.	Student participation in the weighing and graphing activity
Now that students have an understanding that not all items of trash are alike and that there are ways to reduce the amount of trash that we generate, have students brainstorm a way to measure the amount of trash generated by their households for one week. Explain to the class that their projects should include an analysis of the contents of their trash and a plan for reducing the amount of trash their households create. Remind students to practice safety procedures when handling trash such as wearing gloves.	Students brainstorm to develop a method for measuring and analyzing the amount and type of trash generated by their households for one week. They record and analyze their findings. Students then develop and write up a plan for reducing the amount of trash their households generate.	Student recorded findings, analysis of household trash, and written plan to reduce the amount of household trash generated
While the students are conducting their individual projects at home, assign them to classroom teams and have them use the Internet and materials in the library media center to locate articles on the amount of waste that is generated in South Carolina and in the nation, the systems that are currently in place to handle waste and the	Each student team locates and reviews articles on the assigned topic.	Student participation in the team work

Teacher Activity	Student Activity	Assessment
costs associated with the operation of these systems, and/or the impact of the waste problem on our society as a whole.		
Tell students that each team is then to select one article (two teams may not select the same article) to summarize and present to the class as a whole.	Each student team selects one article to summarize. Each team then designates a team member to present the summary to the class.	Student participation in the research and article selection and summary for class presentation
Have teams present their article summaries.	Each of the designated team members presents the article summary.	Summarized articles
After the students complete their at-home projects and analysis of their household garbage, have them share their findings and their plans for waste reduction.	Students present to the class their findings from their at-home projects and their plans to reduce the amount of waste their households generate.	Students presentations of findings and plans to reduce household waste
Review with the students how to write an article for a newspaper and then have each student use his or her research findings to write an article about the importance of controlling the amount of litter we generate. Students should incorporate into their articles specific ways that individuals and society can reduce the amount of garbage they produce on a regular basis and/or specific reasons why they *should* work to reduce it.	Students use their research to write articles about the importance of our controlling the amount of litter that we generate as individuals and as a society. They explain specific ways that individuals and society as a whole can reduce the amount of garbage they produce on a regular basis and/or specific reasons why this quantity must be reduced.	Completed articles
After every student has submitted an article, select several articles to send to the editor of the school newspaper. Compile the remaining articles into a folder to share with school administrators.		

Teacher Activity	Student Activity	Assessment
Have students discuss ways to expand what they have learned outward from their classroom to a service-learning project that encompasses the entire school and ultimately reduces the amount of trash the school itself generates.	Students offer ideas about ways to encourage all students and staff at their school to reduce, recycle, and properly dispose of their garbage.	Student participation in the activity

8. **Differentiation of Instruction**

Special-needs students can be given articles and sets of questions about the articles for them to answer. Rather than simply summarizing articles, advanced students can write a positional paper on waste management, citing several sources.

9. Service-Learning Connection

Preparation. After students complete their research and article summaries and write their own articles for the school newspaper, they brainstorm ways to educate others about recycling, repairing, and reusing trash items in an effort to reduce the overall amount of trash that is generated on a daily basis. Your students may want to implement a recycling-reusing-repairing program at the school, for example, or to partner with a grocery store to distribute reusable grocery bags.

Service. Students select and implement a program that effectively impacts the behavior of others with regard to their personal waste management.

Reflection. Students conduct a follow-up analysis of the impact of the project they implemented.

Celebration. The student project is highlighted in the school newspaper and acknowledged by the school board.

Litter and the Law

Content Areas: Social Studies, Health

Grade Levels: Grades 9, 10, 11, and 12

Time to Complete: Five 90-minute lessons

10. South Carolina Curriculum Standards Addressed

SOCIAL STUDIES

Grades 9 and 10

III. People, Places, and Environments: Geography

- 10.8 The learner will demonstrate an understanding of interactions between the environment and society.
  - 10.8. 3 explain how to apply appropriate models and information to understand environmental problems
- 10.9 The learner will demonstrate an understanding of the uses of geography.
  - 10.9.4 assess how different points of view influence the development of policies designed to use and manage Earth's resources;

Grades 11 and 12

II. Power, Authority, and Governance: Government/Political Science

- 12.3 The learner will demonstrate an understanding of government, its origins and functions, including civic life and politics.
  - 12.3.3 compare and contrast the terms "rule of law" and the "rule of man," explaining how the rule of law protects individual rights and the common good
- 12.4 The learner will demonstrate an understanding of the foundations of American democracy, including its basic principles and the foundations of the American political system.
  - 12.4.8 evaluate and take and defend positions on issues in which fundamental values and principles are in conflict, including conflicts between liberty and equality and conflicts between individual rights and the need to maintain social stability
  - 12.4.9 evaluate and take and defend positions on current issues involving the constitutional protection of individual rights
- 12.5 The learner will demonstrate an understanding of the role of the U.S. Constitution in American democracy, including the ways in which the U.S. government established by the Constitution embodies the purposes, values, and principles of American democracy.
  - 12.5.7 assess and apply criteria useful in evaluating rules and laws, including fairness, protection of individual rights, and promotion of the common good

HEALTH

I. Personal Health and Wellness
Standard 4: Analyze the influence of personal beliefs, culture, mass media, technology, and other factors on health.
By the end of grade twelve, students should be able to
- analyze how the environment influences the health of the community
- describe how public health policies and government regulations influence health promotion and disease prevention

IV. Preventing Injuries
Standard 1: Comprehend health promotion and disease prevention concepts.
By the end of grade twelve, students should be able to
- analyze laws and regulations related to health and safety
- analyze the short- and long-term results of safe, risky, and harmful behaviors

11. Brief Description of Lesson/Activity

This activity examines one way our state chooses to deter people from littering—the creation and enforcement of litter laws. Students locate information on current laws and programs that help prevent littering, preserve the environment, and protect people. In addition, students explore the impact of litter on human health and safety.

12. **Focus Questions for Students**

1. What is the purpose of a law?
2. Are there laws related to litter reduction? Why are these laws needed?
3. Have you ever seen someone tossing litter from a moving vehicle?
4. Have you ever been guilty of throwing litter out of your car? If so, why did you do it?
5. What type of litter do you think is usually thrown from cars?
6. What are some possible effects of throwing litter from a car or from having an object fly out the back of a truck?
7. How does litter impact a person's health and safety?

13. Culminating Assessment

After completing research on current South Carolina litter laws, students prepare a survey to distribute to teachers and students. They tally and post the results of the survey, create posters and write service announcements promoting antilitter laws, and design and distribute "Promise Not to Litter" pledge cards.

14. Materials, Equipment, and/or Resources Needed

- computers with Internet access

Web site:

PalmettoPride (for students to get information on litter laws in South Carolina)

- http://palmettopride.org/problem/laws.asp

15. **Teacher Preparation**

Alert teachers and school staff about the surveys your students will be conducting.

16. Procedures

Teacher Activity	Student Activity	Assessment
Lead the class in a discussion of the focus questions.	Students discuss their responses to the focus questions.	Student participation in the discussion
Have students use the Internet to conduct research on the focus questions. Direct students to the PalmettoPride as one source of information on South Carolina's litter laws and penalties.	Students use the Internet to research current South Carolina litter laws and penalties. They take notes on their findings.	Student participation in the research and note-taking activity
Have students use the focus questions and the information they gained from their research to design and conduct a survey that determines how knowledgeable students and faculty at their school are about the penalties in place for littering in South Carolina and the potential effect of litter on human health and safety.	Students design and conduct schoolwide survey concerning South Carolina's litter laws and penalties and the potential effect of litter on human health and safety. They tally the survey results.	Student participation in designing and conducting the survey and tallying the results
Have students use what they have learned from their research and their survey to design posters and write service announcements that detail the current South Carolina litter laws and the potential effect of litter on human health and safety. Display posters around the school. Have students share their service announcements with the student body and their parents as well.	Using their research and the results of their surveys, students design posters and write service announcements explaining South Carolina's litter laws and the potential effect of litter on human health and safety.	Posters and service announcements

Teacher Activity	Student Activity	Assessment
Have students design "Promise Not to Litter" pledge cards and ask their parents and schoolmates to sign one. Refer them to the PalmettoPride Web site for an example. Have students tally and record the number of pledge cards that are signed and returned.	Students design "Promise Not to Litter" pledge cards and work to get friends and their parents to sign the cards.	Student participation in creating pledge cards and collecting signatures

17. Differentiation of Instruction

Special-needs students can work with partners or within a small group to conduct the surveys, make the posters, and design the pledge cards. Advanced students can utilize technology to design an electronic survey.

18. **Service-Learning Connection**

Preparation. Students complete their research on South Carolina's current litter laws and penalties, conduct the schoolwide survey, design posters, and create "Promise Not to Litter" pledge cards for students and faculty.

Service. Students distribute and promote their "Promise Not to Litter" cards. The goal is for all students and faculty members to sign and return a card showing their commitment not to litter at school, in the community or while traveling on the highway. Pledge cards are distributed to students' families as well.

Reflection. Students discuss and react in their journals to what it means to make a pledge.

Celebration. Students tally and post the number of signed "Promise Not to Litter" cards they receive. This total is posted outside the classroom in a high-traffic area.

My Position on the Subject of Litter

Content Area: Social Studies

Grade Levels: Grades 9,10, 11, and 12

Time to Complete: Approximately three weeks

19. South Carolina Curriculum Standards Addressed

SOCIAL STUDIES

Grades 9 and 10

III. People, Places, and Environments: Geography

- 10.8 The learner will demonstrate an understanding of interactions between the environment and society.
  - 10.8.3 explain how to apply appropriate models and information to understand environmental problems
- 10.9 The learner will demonstrate an understanding of the uses of geography.
  - 10.9.4 assess how different points of view influence the development of policies designed to use and manage Earth's resources

Grades 11 and 12

II. Power, Authority, and Governance: Government/Political Science

- 12.3 The learner will demonstrate an understanding of government, its origins and functions, including civic life and politics.
  - 12.3.3 compare and contrast the terms "rule of law" and the "rule of man," explaining how the rule of law protects individual rights and the common good
- 12.4 The learner will demonstrate an understanding of the foundations of American democracy, including its basic principles and the foundations of the American political system.
  - 12.4.8 evaluate and take and defend positions on issues in which fundamental values and principles are in conflict, including conflicts between liberty and equality and conflicts between individual rights and the need to maintain social stability
  - 12.4.9 evaluate and take and defend positions on current issues involving the constitutional protection of individual rights
- 12.5 The learner will demonstrate an understanding of the role of the U.S. Constitution in American democracy, including the ways in which the U.S. government established by the Constitution embodies the purposes, values, and principles of American democracy.
  - 12.5.7 assess and apply criteria useful in evaluating rules and laws, including fairness, protection of individual rights, and promotion of the common good

20. Brief Description of Lesson/Activity

In this lesson, students conduct research on litter prevention programs, litter laws, and the environmental effects of litter. They then debate one another on issues related to these topics and write a position paper on one of these issues.

21. Focus Questions for Students

1. What is litter?
2. What are some important litter prevention programs? What kind of work are they doing in South Carolina and in the nation as a whole?
3. What are the current South Carolina laws regarding littering? How do these laws protect the citizens of South Carolina?
4. What are the environmental effects of litter?

22. Culminating Assessment

Each student writes a position paper on litter prevention programs, litter laws, or the environmental effects of litter. (The PACT writing rubric is used for grading the papers.)

23. **Materials, Equipment, and/or Resources Needed**

- PACT writing rubric
- computers with Internet access

24. **Teacher Preparation**

1. Assemble the necessary items.
2. Make a copy of the PACT writing rubric for every student.
3. Become familiar with the process of conducting research, documenting sources, and writing a position paper.

25. Procedures

Teacher Activity	Student Activity	Assessment
Lead the class in a discussion of the focus questions.	Students discuss their responses to the focus questions.	Student participation in the discussion
Introduce the writing project by giving each student a copy of the PACT writing rubric, the evaluation instrument that will be used in grading the papers they will write.	Students examine and discuss the PACT writing rubric.	Student participation in the class work

Teacher Activity	Student Activity	Assessment
Explain to the students how to research and write a position paper. Explain how to document research sources.	Students listen and take notes on how to research and write a position paper and how to document their research sources.	Student participation in the class work
Assign the following topics as choices for student research and position papers: litter prevention programs, litter laws, and/or the environmental effects of litter. Have students use the Internet and the resources in the library media center to conduct research for their position papers.	Students use the Internet and the resources in the library media center to conduct research for a position paper they will write either on litter prevention programs, litter laws, or the environmental effects of litter.	Student research work
Allow students one to two weeks to conduct their research, narrow their topics, take notes, and document their sources.	Students continue their research, narrow their topics, take notes, and document their sources.	Student research, note-taking, and source documentation
After students have completed their research, have them debate the three key issues: the value and fairness of litter laws in South Carolina and other states, the value of litter prevention programs currently in place such as Keep America Beautiful and PalmettoPride, and the impact of litter on the environment.		
To set up the debate, formulate a specific thesis or position regarding each of the three issues the students have researched ("Litter laws in South Carolina are ineffective," "Current litter prevention programs are not well managed," "Everyday litter has no measurable effect on the environment," for example). Have each student choose one of	Each student selects one of the three research and debate issues and then chooses a position either for or against the thesis or position that the teacher has stated regarding that particular issue.	

Teacher Activity	Student Activity	Assessment
the three issues and then chose a side either for or against the stated thesis. Tell students to be ready to cite three points supporting his or her position in the argument.		
Divide the class into three groups according to the issue they have chosen. Schedule and implement the three debates.	Groups engage in the debates, each student citing three points supporting his or her position in the particular argument.	Student participation in the debates
Have students write their position papers.	Students use their research material and the information they learned from the debates to write their position papers.	Position papers

26. **Differentiation of Instruction**

Special-needs students can observe the classroom debate and offer oral feedback. Advanced students can create a PowerPoint presentation that reflects both sides of the issues the class has debated.

27. Extension to Other Content Areas

Mathematics. Students can prepare different types of graphs to complement their position papers.

28. **Service-Learning Connection**

Preparation. Locate information on several environmentally based projects with volunteer opportunities such as Adopt-a-Highway, coastal cleanup programs, and beautification activities within your community.

Service. Individual students or student groups volunteer their time to assist an environmentally based group.

Reflection. Students write articles for the school newspaper describing their volunteer experience. The teacher encourages students to seek out additional volunteer opportunities and to make advocacy and volunteerism a part of their everyday lives.

Celebration. To acknowledge the students' efforts, the class is given a pizza party. The organizations that received the students' volunteer services may be willing to donate pizza or may want to recognize the efforts of the students in some other way.

This Is My State and My Country

Content Area: Social Studies

Grade Levels: Grades 9, 10, 11, and 12

Time to Complete: Five 90-minute lessons

29. South Carolina Curriculum Standards Addressed

SOCIAL STUDIES

Grades 9 and 10

III. People, Places, and Environments: Geography

- 10.5 The learner will demonstrate an understanding of places and regions.
  - 10.5.5 describe the structure of regional systems
  - 10.5.6 examine the ways in which physical and human regional systems are interconnected
  - 10.5.7 analyze geographic issues using regions
  - 10.5.8 describe the ways places and regions serve as symbols for individuals and society
- 10.7 The learner will demonstrate an understanding of the role of human systems on earth.
  - 10.7.2 describe the impact on physical and human systems of human migration
- 10.8 The learner will demonstrate an understanding of interactions between the environment and society.
  - 10.8.2 examine the global impacts of human changes in the physical environment
  - 10.8.3 explain how to apply appropriate models and information to understand environmental problems
  - 10.8.4 describe how changes in the physical environment can diminish its capacity to support human activity
- 10.9 The learner will demonstrate an understanding of the uses of geography.
  - 10.9.4 assess how different points of view influence the development of policies designed to use and manage Earth's resources

IV. Production, Distribution, and Consumption: Economics

- 10.10 The learner will demonstrate an understanding of how scarcity, choice, and the principles of trade impact economic activity.
  - 10.10.4 examine and provide examples of economic decision-making based upon geographic factors

Grades 11 and 12

IV. Production, Distribution, and Consumption: Economics

- 12.13 The learner will demonstrate an understanding of government in the operation of markets.
  - 12.13.4 compare the major sources of federal, state, and local revenues

30. Brief Description of Lesson/Activity

The students will develop a PowerPoint or videotape presentation as well as pamphlets to promote school and community awareness of the litter problem in South Carolina.

31. Focus Questions for Students

1. What do you think of when I say "litter"?
2. Do you think litter is a problem in South Carolina?
3. What can be done about the various types of litter in our state?
4. What is a plan of action that high school students can create to resolve the problem of litter?
5. Why do you think litter impacts the state's environment and how?
6. What do you think it cost the state to clean up litter?
7. What are some ways litter can affect the economy of South Carolina?
8. How can litter impact tourism, industry, and the quality of life in our state?

32. Culminating Assessment

After conducting research, students utilize various forms of technology to produce a videotape or PowerPoint presentation and informational pamphlets about the problem of litter in South Carolina.

33. **Materials, Equipment, and/or Resources Needed**

- computers with Internet access
- video camera, tapes, and television with VCR *or* computers with Microsoft PowerPoint software
- paper and supplies for making pamphlets

34. Teacher Preparation

Assemble the necessary supplies and equipment.

35. Procedures

Teacher Activity	Student Activity	Assessment
Lead the class in a discussion of the focus questions as an overview of the project and its value. Brainstorm with students to assess their level of understanding about the litter problem in South Carolina and to identify the contributions that high school students can make to the community with regard to the problem of litter.	Students discuss their responses to the focus questions and then participate in the brainstorming session.	Student participation in the discussion and brainstorming activity

Teacher Activity	Student Activity	Assessment
Divide the class into groups. Have the student groups use the Internet to locate current statistics and other information on litter in South Carolina—specifically, information on what litter has done and/or is doing to the state's environment, what the economic impact on the state has been, and what can be done and is being done to address the problem of littering in the state.	Students conduct research on the Internet and locate information on the topics assigned by the teacher.	Student participation in the research activity
Make the following assignment: student groups are to use the information they have found in their research to create a videotape or a PowerPoint presentation detailing the litter problem in South Carolina and ways to address it. Tell them the presentations will be made available for school and community use. Show students how to prepare a PowerPoint presentation or to use a video camera.	Students work together in their groups to create a videotape or PowerPoint presentation addressing the litter problem in South Carolina.	PowerPoint or video presentation
Have each group of students share their videotapes or PowerPoint presentations with the entire class.	Students share their videotapes or PowerPoint presentations in class.	Student participation in the sharing activity
Make the following assignment: students are to use the information they have found in their research to create pamphlets about the litter problem in the state to distribute at school and within the community. Help students explore the use of other technology such as digital cameras and computers as tools to create pictures, text, and the pamphlets themselves.	Utilizing technology and their research information, students create litter-awareness pamphlets, which they then distribute to fellow students and members of the community.	Student participation in the creation and distribution of litter-awareness pamphlets (Assess the pamphlets and promotional materials using a teacher-made rubric. The rubric may include organization of pamphlet; the use of graphs, objects, and/or pictures; and creativity.)

Teacher Activity	Student Activity	Assessment
Arrange for student groups to share their presentations and pamphlets with specific audiences—for example, school board members, middle school students, teachers, parents, local community organizations. Tell the appropriate officials that the student presentations are available for school and community use.	Student groups share their presentations and pamphlets with appropriate audiences.	Student participation in the sharing activity

36. **Differentiation of Instruction**

Special-needs students can select assignments to work on independently or in groups. For example, they can work within a group to design the pamphlets. Advanced students can research the economic impact of litter in other states and the methods these states have used to address the problem.

37. Extension to Other Content Areas

Mathematics. The students can compute the cost of litter to South Carolina by researching on the Internet and in the library media center. They can also create bar graphs or charts showing cost of cleaning up litter.

38. Service-Learning Connection

Procedure. Student groups research the effects of the litter problem on South Carolina, develop PowerPoint or videotape presentations, and create informational pamphlets. The teacher locates several places within the community such as civic organizations and garden clubs where the students can present their findings.

Service. Student groups show their videotapes or PowerPoint presentations and distribute their pamphlets at schools and at other sites in the community.

Reflection. Students discuss the impact their work has made on their school and on their community as a whole.

Celebration. Students groups give copies of their videotapes or the PowerPoint presentations to the school library. The PTO/PTA formally recognizes their efforts.

Uh! What Is in My Water?

Content Areas: Science, Health

Grade Levels: Grades 9, 10, 11, and 12

Time to Complete: Approximately one week

39. South Carolina Curriculum Standards Addressed

SCIENCE

Grades 9–12

I. Inquiry
   B. Design and Conduct Investigations
      2. Select and use appropriate instruments to make the observations necessary for the investigation, taking into consideration the limitations of the equipment.
      3. Identify technologies that could enhance the collection of data.
      4. Select the appropriate safety equipment needed to conduct an investigation (e.g., goggles, aprons, etc.).
      5. Suggest safety precautions that need to be implemented for the handling of materials and equipment used in an investigation.
      9. Organize and display data in useable and efficient formats, such as tables, graphs, maps, and cross sections.
   C. Use Technology and Mathematics to Improve Investigations and Communications
      1. Select and use appropriate technologies (e.g., computers, calculators, CBL's) to enhance the precision and accuracy of data collection, analysis, and display.

HEALTH

I. Personal Health and Wellness
   Standard 4: Analyze the influence of personal beliefs, culture, mass media, technology, and other factors on health.
   By the end of grade twelve, students should be able to
   - analyze how the environment influences the health of the community

40. Brief Description of Lesson/Activity

In this lesson, students collect and classify macro invertebrates from a nearby water source and calculate the biotic index value. They perform chemical tests to determine the pH, dissolved oxygen, nitrate, and phosphate concentration of the water. Students also determine general characteristics of the waterway through recording observations and making measurements such as water level, turbidity, and temperature. They measure the velocity of the stream, calculate and graph the stream profile, and calculate the volume flow rate of the water source.

41. Focus Questions for Students

1. What do you consider to be clean water? Would you want to drink water from a nearby creek, river, pond, or lake?
2. Is water that looks clean *really* clean? How can we determine if the water is clean and healthy?
3. If we drink polluted water, what might happen to us?
4. Is pollution the same thing as litter?
5. How does water become polluted?
6. What is being done now and what should continue to be done about polluted water?

42. Culminating Assessment

The students use various tests and measurements to determine the overall quality of the water in a nearby stream or river. They write up the results of their investigation and send these reports to the local and state offices of the Department of Health and Environment Control (DHEC).

43. Materials, Equipment, and/or Resources Needed

- tape measures and meter sticks
- water quality test kit
- graphing calculators
- temperature and pH probes
- the manual *Visual Stream Survey*, published in 2000 by the Environmental Protection Division of the Georgia Department of Natural Resources (You can find it on-line at <http://www.state.ga.us/dnr/environ/>: click the "Outreach" link in the menu on the left side of the page; then click "Adopt-A-Stream Educational Materials" link; and finally, click the "Visual Stream Survey Manual" link.)

44. **Teacher Preparation**

1. Assemble the necessary items.
2. Decide which stream or river you will be visiting and secure permission to test that particular site.
3. Make arrangements for your students to travel to the nearby stream or river to collect water samples and to perform such tasks as measuring the velocity of the stream and calculating and graphing the stream profile.

45. Procedures

Teacher Activity	Student Activity	Assessment
Lead the class in a discussion of the focus questions as an overview of the project and its value and then brainstorm with students to assess their level of knowledge about the pollution of our waterways in South Carolina.	Students discuss their responses to the focus questions and participate in the brainstorming session.	Student participation in the discussion and brainstorming activity

Teacher Activity	Student Activity	Assessment
Lead the class in identifying the contributions that high school students can make with regard to this problem. Have students also consider how polluted water can affect their health.		
Explain to the students that they will travel to a nearby stream or river to collect samples for later testing and to determine general characteristics of the waterway by recording their observations and taking measurements such as water level, turbidity, and temperature.		
Give the class step-by-step instructions for performing the tests and taking measurements of the water level, turbidity, and temperature. Explain how they are to measure the velocity of the stream, calculate and graph the stream profile, and calculate the volume flow rate of the water source. Tell students that they will be sending the results of their tests to local and state DHEC offices.	Student take notes on water-testing and measuring procedures.	Student participation in the note-taking activity
Review with students how to classify macro invertebrates from a nearby water source and calculate the biotic index value. Explain how to determine the pH and the oxygen, nitrate, and phosphate content of water.		

Teacher Activity	Student Activity	Assessment
Transport your students to the stream to collect water samples for testing and to take the measurements.	Students travel to the stream or river and collect samples for later testing. They also determine general characteristics of the waterway by making observations and taking measurements such as water level, turbidity, and temperature. Students measure the velocity of the stream, calculate and graph the stream profile, and calculate the volume flow rate of the water source. They record the results of their observations and measurements.	Student participation in the sample-collecting and water-testing activity
When they are back in the classroom, have the students perform the tests on the water samples and record the results.	Students classify macro invertebrates from the nearby water source and calculate the biotic index value. They then perform chemical tests to determine the pH and the dissolved oxygen, nitrate, and phosphate concentrations in the water. Students record their test results.	Student participation in the water-testing activity and the recorded results
Have the students write up the results of their water study as reports and send them to local and state DHEC offices.	Students write reports on the results of their study and the importance of maintaining a clean, healthy water supply. They then mail these reports to local and state DHEC offices.	Written reports

46. **Differentiation of Instruction**

Special-needs students can work with partners to test the water and summarize the results. Advanced students can locate information on specific health conditions related to contaminated water.

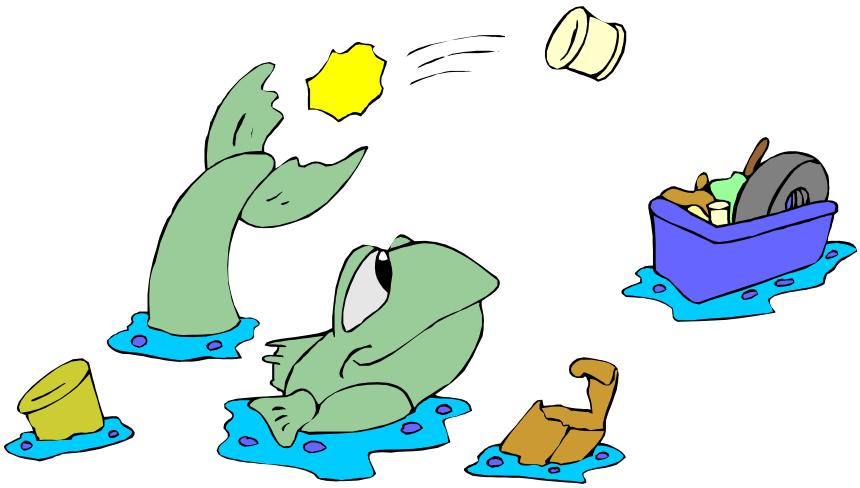
47. **Service-Learning Connection**

Preparation. Students test and measure the water from a local stream or river. They compile their results into a written report on the importance of maintaining a clean, healthy water supply.

Service. Students send the reports of their findings to local and state DHEC offices. Students also display their reports in a high-traffic area of the school and provide printed copies to community groups.

Reflection. Students consider what they hope will be the future effect of their efforts to keep "their" stream or river free of litter and pollution.

Celebration. Students take a field trip to the stream or river they tested and have a picnic lunch to commemorate their efforts to keep the water free of litter and pollution.



Waste and Litter: Mounting over Time

Adapted from *Action for a Cleaner Tomorrow: A South Carolina Environmental Curriculum Supplement.* 3d ed. Columbia: South Carolina Department of Health and Environmental Control, 1998.

Content Area: Social Studies

Grade Levels: Grades 9, 10, 11, and 12

Time to Complete: Two-three class periods

A. South Carolina Curriculum Standards Addressed

SOCIAL STUDIES

I. Time, Continuity, and Change: History

10.2 The learner will demonstrate an understanding of the major developments in the history of the world during the modern era (ca. 1500 to the present).

10.2.8 analyze the causes and consequences of the agricultural and industrial revolutions, 1700–1850

10.2.15 analyze the causes, course, and global consequences of World Wars I and II

10.2.20 interpret major global trends since World War II

12.1 The learner will demonstrate an understanding of the major developments in the United States and South Carolina from the end of Reconstruction through World War II (1945).

12.1.1 explain how the rise of corporations, heavy industry, and mechanized farming transformed the American people in the late 1800s

12.1.11 analyze the emergence of a modern capitalist economy in the 1920s

12.1.14 analyze the causes of the Great Depression and the way it affected American society

12.1.16 examine changes in everyday life in response to technological and scientific advancement

12.2 The learner will demonstrate an understanding of the major developments in the United States and South Carolina from the end of World War II to the present.

12.2.2 describe how postwar science augmented the nation's economic strength, transformed daily life, and influenced the world economy

12.2.7 evaluate economic, social, and cultural developments in contemporary United States from 1968 to the present

III. People, Places, and Environments: Geography

10.8 The learner will demonstrate an understanding of interactions between the environment and society.

10.8.8 describe how the development and use of resources change over time

B. Brief Description of Lesson/Activity

In this activity students examine how the litter problem has evolved over time by looking at how the amount of solid waste has grown through the years. In addition students consider how innovations like plastic wrap and aluminum cans have contributed to present-day litter problems.

C. Focus Questions for Students

1. How have technological advances and industrial progress added to the waste and litter problem?
2. How was waste dealt with in earlier times before trash trucks and landfills?
3. What is the connection between an increase in waste and a problem with litter?
4. What are some future events and possible inventions that could positively or negatively impact the litter problem?

D. Culminating Assessment

After conducting research, students compile a time line of major events and inventions that have contributed to the amount of waste generated and the litter problem.

E. Materials, Equipment, and/or Resources Needed

- computers with Internet access
- poster board
- butcher block paper

F. Teacher Preparation

Assemble the needed items.

G. Procedures

Teacher Activity	Student Activity	Assessment
Introduce the focus questions and have students brainstorm their responses. Record their input on chart paper.	Students brainstorm responses to the focus questions.	Student responses on chart paper
Have students use the Internet and additional resources in the school media center to research for more information on events and inventions that have contributed to the amount of present-day waste and litter. It may be beneficial to assign students different segments of time to research. Have them consider ideas such as • the impact of world events such as wars, • the handling of trash in the	Students do research and take notes.	Student participation in the research activity Notes on research

Teacher Activity	Student Activity	Assessment
pre-automotive world, • the influence of inventions and technological advances, and • the influence of a growing population.		
Divide the class into groups. Have each group of students use the results of their research to compile a time line on poster board highlighting events and inventions over the past two hundred years that have contributed to the waste and litter problem.	Students work in groups to create time lines of key events and inventions. They record their time lines on poster board.	Completed time lines
Allow class time for student groups to share their time lines. Use the information provided by all the groups to compile a class time line. Display the class time line on butcher block paper.	Student groups share their time lines and assist in the creation of a class time line.	Student participation in the time-line activity

H. Differentiation of Instruction

Rather than requiring extensive research, provide special-needs students with information on the history of antilitter organizations such as Keep America Beautiful and guide them in writing a brief summary. Advanced students can create time lines beginning with the Industrial Revolution in the mid-eighteenth century and provide illustrations.

I. Service-Learning Connection

Preparation. Students complete their research and compile their time lines. Students brainstorm some ways to positively impact the future of the litter problem within their community. The students use these ideas to implement a project such holding a schoolwide newspaper-collection day, creating a computer printer cartridge drop-off site, or establishing a recycle-your-old-phone-book program. Students present the ideas for such a project, and the class votes on which project they want to undertake as a class.

Service. Students implement the project endorsed by the class, gathering support as needed.

Reflection. After the project is complete, students take some time to meet in small groups to discuss the immediate impact of their effort and some ways to make positive long-term results.

Celebration. The class gathers for a special lunch marking their efforts and recognizing the project leaders.

It's All Wrapped Up!

Content Areas: Science, Social Studies

Grade Levels: Grades 9, 10, 11, and 12

Time to Complete: Approximately two weeks

A. South Carolina Curriculum Standards Addressed

SCIENCE

Grades 9–10

I. Inquiry
- B. Design and Conduct Investigations
  1. Design a scientific investigation based on the major concepts in the area being studied.
  8. Identify possible sources of error inherent in an experimental design.
  9. Organize and display data in useable and efficient formats, such as tables, graphs, maps, and cross sections.
  10. Draw conclusions based on qualitative and quantitative data.
  12. Communicate and defend the scientific thinking that resulted in conclusions.

SOCIAL STUDIES

IV. Production, Distribution, and Consumption: Economics

12.9 The learner will demonstrate an understanding of how scarcity and choice impact economic activity.
- 12.9.3 examine how money, goods, and services link households and businesses in the U.S. economy
- 12.9.7 assess how choices may translate into opportunity costs and result in trade-offs that determine what goods and services are provided
- 12.9.10 identify present-day choices that have important future consequences
- 12.9.11 describe factors of production

12.10 The learner will demonstrate an understanding of markets and the role of demand and supply in determining price and resource allocation.
- 12.10.10 identify the components of market research and its impact on products

12.13 The learner will demonstrate an understanding of government in the operation of markets.
- 12.13.6 explain the functions of government regulations

B. Brief Description of Lesson/Activity

This lesson examines the packaging, specifically the overpackaging, of commonly used food products and encourages students to ask the tough questions and propose solutions for this environmental problem.

C. Focus Questions for Students

1. What are some items that your family purchases from the grocery store on a weekly basis? How are these items packaged?
2. What is the purpose of packaging?
3. Does the way a food item is packaged add to its consumer appeal?
4. Does the packaging of a food item add to the cost of the product?
5. Are manufacturers and producers packaging items in materials that can be reused or recycled? Should they be required to so?
6. How can buyers support the use of environmentally friendly packaging?
7. What role does the government play in regulating the packaging of consumer products?
8. What are some ways that overpackaging can be reduced or eliminated without violating the rights of the producers?
9. Why or how can excess packaging lead to environmental problems and contribute to the litter problem?

D. Culminating Assessment

After students complete the "Food Packaging Survey" chart and the follow-up question sheet, they work in groups to design and give oral presentations showing what they have learned. To make certain that they have grasped the major concepts presented in the lesson, the students revisit and respond to the focus questions.

E. Materials, Equipment, and/or Resources Needed

- colored markers, chart paper, poster board, rulers, and so forth for visuals for student presentations
- computers with Internet access

Web sites:

"Precycling: How to Shop for Future Generations" (a three-page essay on product packaging, taken from *Recycling World,* an Environmental Defense Fund newsletter about practical action for the environment)

- http://www.edf.org/pubs/Brochures/RecyclingWorld/b_Precycling.html

"Packaging: How Much Is Too Much?" (one section of a Web page titled "Waste: The Environmental Problem," written by Canada's Peace and Environment Resource Centre)

- http://perc.ca/waste-line/rrr/home/waste.html#packaging

F. Teacher Preparation

1. Assemble the supplies for making the visuals for the group presentations.
2. Make a copy of the "Food Packaging Survey" chart and the "Follow-Up to the Packaging Survey" question sheet for every student. (Both sheets are provided below.)
3. Become familiar with the concept of overpackaging.

G. Procedures

Teacher Activity	Student Activity	Assessment
Introduce the focus questions. Have students respond to them orally. Record their ideas on an overhead or on chart paper.	Students respond to the focus questions.	Student participation in responding to the focus questions
Pass out the "Food Packaging Survey" charts to the class. Have students take the charts home and complete them on the basis of the specific food products that they and their family members buy and use for a one-week period. They will record the specific materials and the number of different materials that were used as packaging for items such as meats, eggs, and snacks that they or their family purchased during that one week.	Students complete the "Food Packaging Survey" charts at home for one week.	Completed "Food Packaging Survey" charts
After completing the survey, students should examine their findings by completing the "Follow-Up to the Packaging Survey" sheet and conduct additional research as needed.	Students complete "Follow-Up to the Packaging Survey" question sheet.	Completed "Follow-Up to the Packaging Survey" question sheets
Divide the class into groups and have each group design a presentation that uses visuals (charts, posters, graphs, and so forth) that feature the results of their food packaging surveys and the follow-up question sheets.	Students work in groups to design and give a visual presentation of the results of their food packaging surveys.	Student visuals and presentations
After the group presentations, have students redesign the packaging of one of the products they presented so that the overpackaging is eliminated but all needs for the packaging of the food product are met. Allow volunteer students to present their newly designed items to the entire class.	Students redesign the way that one of the food items used by their families is packaged.	Redesigned packages

Teacher Activity	Student Activity	Assessment
Have students revisit the focus questions and compare their original answers with their responses now, after having completed the lesson.	Students respond to the focus questions, comparing their answers now with their original ones.	Student responses

H. Differentiation of Instruction

Special-needs students can complete the "Food Packaging Survey" chart and the "Follow-Up to the Packaging Survey" sheet with the assistance of their parents. Depending on the severity of their disability, special-needs students can be given the option of not taking part in the oral presentation. Advanced students can do additional research on packaging alternatives and identify the companies that are guilty of excess packaging.

I. Service-Learning Connection

Preparation. After completing the food packaging surveys, the follow-up questions, and their oral presentations, the students compile a list of consumer products that are overpackaged and locate contact information for the companies that produce these items.

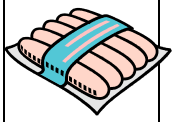
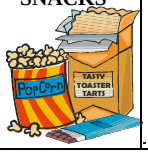
Service. Students write letters to selected companies asking them to reconsider how their products are packaged, highlighting the environmental problems that overpackaging causes.

Reflection. Students use their findings to make the decision to change one behavior regarding the products they or their families purchase.

Celebration. Students host a "No Packaging" lunch for another class at the school. They serve beverages in reusable plastic cups, serve sandwiches on reusable plastic plates, use cloth napkins instead of paper ones, use metal utensils instead of plastic ones, and serve apples for dessert and compost the cores! As the students are eating their lunch, they highlight for the visiting class what they have learned.

Food Packaging Survey

Name: _____ **Week of survey:** _____

PACKAGING MATERIAL										
FOOD	**Plastic**	**Glass**	**Cardboard**	**Foil-Lined Cardboard**	**Tin**	**Aluminum**	**Polystyrene**	**Plastic Wrap**	**Paper**	**TOTAL**
MEATS 										
EGGS 										
JUICE 										
SOFT DRINKS 										
CEREAL 										
FRUITS & VEGGIES 										
FAST FOOD 										
SNACKS 										

Adapted from Australia's Waste Wise Schools Web site at <http://203.202.189.6/wastewise/resources/invest_litter.htm>.

Follow-Up to the Food Packaging Survey

Name: _____

After completing the "Food Packaging Survey" form, answer the following questions in complete sentences unless otherwise specified:

1. List the items you surveyed that were packaged in materials that could be reused or recycled:

2. List some examples of products that you feel are overpackaged:

3. Does the way an item is packaged add to its consumer appeal? How? Provide examples.

4. Can you think of alternative ways to package some of the products? Describe those alternatives.

5. Of the items you examined, which ones are available in more environmentally friendly packages? For example: recycled paper containers versus Styrofoam cartons.

6. How will the completion of this survey influence the buying habits of you and your family?

7. Of the items you surveyed, which ones are more likely to end up as litter? Explain why.

8. What are some ways to reduce excess packaging? (You may need to do additional research.)