

Cost Analysis

for Hazardous Products and Their Safer Alternatives

Purpose —To determine whether the hazardous product or its safer alternative is a better deal. The following steps will help you determine which product is a better deal.

- List the price of the hazardous product and the amount of product you get for the price. For example, if 16 ounces of slug bait costs \$10.00, then the price is \$10.00 and the amount is 16 ounces. Note: You may use the metric system or the American system of measuring.
Price of hazardous product _____ Amount _____
- Now list the price of the safer alternative and the amount you get for the price. Since you may be making the safer alternative recipe, be sure to include all parts of the recipe. For example a safe tub and sink cleaner is baking soda and castile soap, so list the price and amount of baking soda, then the price and amount of castile soap.
Price of the safer alternative _____ Amount _____
Price of the second item _____ Amount _____
Price of the third item _____ Amount _____
- Now calculate the price per use. For example, if there is enough furniture polish to polish your table 8 times and the polish costs \$8.00, then the price per use is \$1.00 (\$8.00/8). Some calculations will be more complicated. Ask your teacher, if you need help. This step may require some estimation.
Hazardous product price per use _____
Safer alternative price per use _____
- Which product is a better deal: the hazardous product or the safer alternative?
- Challenge —Think about the hidden costs of your hazardous product. Hidden costs are expenses that result from the negative side-effects of your product. For example, if your cat died from eating slug bait, the hidden cost would be the value of your cat. Can you think of any hidden costs for your hazardous product?
- When you consider the price, how well the product works, and how hazardous the product is, which product would you buy? Why?

Resources

English Language Learner (ELL) Adaptations

King County Solid Waste Division
your.kingcounty.gov/solidwaste/education/curriculum.asp
Find activity adaptations and visuals for teaching English Language Learning (ELL) students and community members about household hazardous products and safer alternatives.

Grants

Hazards on the Homefront Mini-Grant
King County Solid Waste Division
your.kingcounty.gov/solidwaste/education/minigrants.asp
Teachers in King County who have taken the Hazards on the Homefront workshop and are interested in completing a household hazardous waste project with their students can apply for a mini-grant of up to \$500.

Tips for Finding Safer Alternatives

Green Cleaning
Seattle Public Utilities
seattle.gov/util/Services/Garbage/KeepSeattleClean/GreenCleaning/index.asp
Protect your health and the environment with these non-toxic cleaning tips and green cleaning recipes.

Household Products Database

National Institute of Health
householdproducts.nlm.nih.gov
Find a detailed inventory of common household products that may pose a potential health risk to people. Information is available on product ingredients and their potential health effects, safe handling and proper use.

Local Hazardous Waste Management Program in King County

lhwp.org/home/HHW/hhw.aspx
Get tips on finding safer alternatives to household hazardous products, complete plans for creating least-toxic classroom labs, and access to LHWMP's library of resources.

Toxic Free Tips

WA State Department of Ecology

ecy.wa.gov/toxicfreetips/shoppersguide.html#home
Find links to sources of information on alternatives from around the U.S. Information is also provided in Spanish and Vietnamese.

Washington Toxics Coalition

watoxics.org/healthy-homes-gardens-1/cleaning-products
Get fact sheets on safer cleaners, antimicrobial products, and green cleaning recipes.



Family Green Cleaning Kits, St. Marks School

After soliciting product donations from local stores, fifth grade students created green cleaning kits for families to use at home.



Community Product Guide, The Evergreen School

Seventh grade students created an informational household cleaning product guide that included product options and cost comparisons. They distributed the booklet to school families.

Alternative Formats On Request
206-296-4466 | TTY Relay: 711
1-800-325-6165 ext. 6-4466



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as part of the **Local Hazardous Waste Management Program**
in King County

Hazards on the Homefront GREEN CLEANING PROJECT GUIDE

Learning about safer alternatives to household hazardous products helps students discover how they can protect the health of their families as well as make a difference in the quality of our air, water, and soil. The inquiry-based, hands-on projects in this guide show students that simple and effective safer alternatives do exist and often can be less expensive than hazardous products. The guide also suggests ways for students to teach others what they've learned.

This project guide builds on Lesson 5 in the *Hazards on the Homefront* teacher guide and assumes students have an understanding of what household hazardous products are, why they are dangerous, and how to identify them and recognize safer alternatives. This foundation information can be found in Lessons 1 and 2 in the guide.



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Define Your Project

Determine goals and objectives

What are you hoping to accomplish? Once your students are knowledgeable about safer alternatives, will they share this information with their other classes, their families or the community?

Determine student learning outcomes

Know what your focus will be for student learning. Multiple learning outcomes may be achieved simultaneously and may include

- use and effectiveness of safer substitutes for common hazardous household products.
- cost and efficiency of one safer multi-purpose cleaner over multiple specialized products.
- participation in the research process from formulating a question to communicating the findings.
- practice in writing a formal business letter.
- improvement of interpersonal skills.

Define the size of your project

This will depend on how much time you can commit. This project guide offers multiple activities which can be mixed and matched based on your needs. Regardless of the size of the project, students will learn positive choices they can make to protect our health and the health of the environment.

Determine needs

Do you have all the necessary supplies for students to complete each facet of the project? Will you need funding or assistance? See the Resources panel of this guide.

Apply it to an existing lesson

Are there avenues within your curriculum to incorporate this project? Is there already a scheduled science fair that your students could participate in or an opportunity for a field trip to a local store? Does this fit in best with a particular unit or concept that you will be teaching such as any of the following?

- scientific experiment design
- data interpretation
- math calculations
- data tables and graphs
- compare/contrast systems
- report writing or persuasive writing



Safer Cleaners and Persuasive Letters, Kent-Meridian High School

Environmental science students tested various cleaning products in order to determine for themselves the effectiveness of safer alternatives. Students then wrote persuasive letters on the merits of safer alternatives and delivered the letter to the family member who buys cleaning products. Their letters also included a recipe to make a natural cleaner at home.



Green Cleaning and Community Products Show, McKnight Middle School

Eighth grade science students designed experiments comparing a hazardous cleaning product with its safer alternative. After writing a detailed lab report, students presented their results at a products show for parents, community members, and other students.



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Put Products to the Test

Design and conduct an experiment

- Have students use the scientific method to design an experiment comparing the effectiveness of a hazardous product to a safer alternative for that product.
- Have students conduct the experiment in groups during class time or at home with a parent. Have them complete the experiment worksheet in Lesson 5 of the *Hazards on the Homefront* teacher guide (p. 86) or write their own lab report describing each step and variable in their experiment and a detailed description of the results.

Test products in the classroom

- Set up stations around the classroom where students can compare two to four different brands of cleaners used for the same purpose.
 - Stations could include dishwashing soaps, glass cleaners, all purpose cleaners, laundry detergents, hand soaps, scrubbing powders, cleaning wipes, and a natural product station with cleaners made from lemons, baking soda, vinegar, or safer alternative commercial cleaners from the store.
 - Students could also test earth-friendly replacements for paper towels, such as sponges, scrubbing pads, and microfiber cloths.
- Have students fill out a worksheet rating their favorite product for each purpose.

Test a green cleaning recipe at home

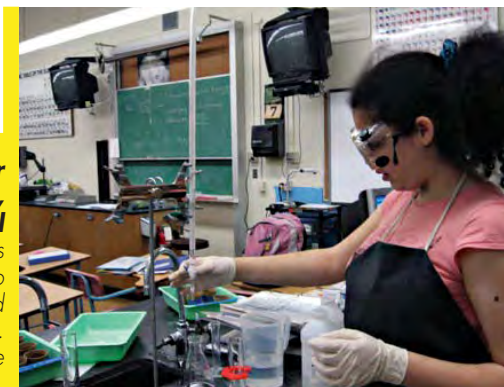
- Have students choose a green cleaning recipe to follow (see suggestions on next panel).
- Have students clean a sink, window or mirror, kitchen floor, countertop or drain, or something else in their home using the green cleaning recipe they chose. Be sure students get parent approval before starting the cleaning project.
- Have students answer the following questions and ask a parent to sign the assignment when the cleaning job is complete.
 - What did you choose to clean in your home?
 - What safer alternative product(s) did you clean it with?
 - What cleaning product do you normally use?
 - Did the green cleaning product work as well as the product you normally use?
 - Would you use this or other green cleaning recipes to clean with in the future? Why or why not?
 - Any other comments about this green cleaning assignment? Student or parent may comment.

Do a cost analysis and research ingredients

- Using the cost analysis sheet in Lesson 5 (p.89) or the cost analysis worksheet created by teacher Carlie Jonas in this guide, calculate the financial cost per ounce and per use of a hazardous product and a safer alternative to that product.
 - Consider a field trip to a local grocery store for students to gather cost data. Students can also use the internet to research the cost of products.
- Have students research and compare hidden costs of each product such as environmental and health impacts of manufacturing or disposing of the products. For example, students can compare listed ingredients on products and research where the ingredients come from and how they may affect human health as well as the environment as part of their hidden cost evaluation.
 - Students could also obtain Material Safety Data Sheets for more information on the chemical properties of products.
- Ask students to determine which product they would buy and why. Considerations may include price, how well the product works, and how hazardous the product is, particularly for children as well as those with health problems.

Cleaning Products and Water Quality Natural Cleaners, Kent-Meridian High School

International Baccalaureate students designed and carried out experiments to test the effect of hazardous household products on water quality and aquatic life. They also considered how safer alternative products reduce these effects.



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Share results and take action

- Organize a Green Cleaning product show.
 - Create a science fair that shares the results of students' green cleaning projects. Have students create posters and displays that answer the following questions:
 - o What is the purpose of the product?
 - o How does it hurt people or the environment?
 - o What are the alternatives?
 - Ask students to include everything from their research, lab reports, and cost analysis in their display in a readable format that emphasizes their results and conclusion.
 - Students can display the actual products they tested at the show and allow visitors to test the products themselves. Students could also offer their green cleaning recommendations as a hand-out to the community members that visit their display.
- Ask students to write persuasive letters to their parents on what they learned and why a safer alternative is preferable to a hazardous product. Alternatively, they could write letters to manufacturers about the pros and cons of their products.
- Have students create green cleaning kits or recipes for their families.
- Create a guide to green cleaning with cost comparisons and distribute it to school families. Each student or team of students can be responsible for creating a page.
- Students can present their product findings to other classes within their school, at a nearby school, or to community and family members.
- Send articles written by students about hazardous products to newspapers and other media outlets.
- Have students videotape each other using green cleaning techniques and share with others.

Green Cleaning Recipes

- Floor cleaner
Mix ½ cup white vinegar in a bucket of water to clean linoleum, tile, brick or stone, or to damp-wipe wood floors. Use a microfiber mop to reduce the amount of cleaner needed.
- Clothes whitener
Use non-chlorine whiteners such as oxygen or hydrogen peroxide based products.
- Fabric softener
Add ½ to ¾ cup baking soda to the rinse cycle.
- Drain cleaner
Free minor clogs and help prevent future clogs by pouring ½ cup baking soda down the drain, followed by ½ cup vinegar. Let fizz for a few minutes then pour down a kettle full of boiling water. Repeat if needed. If clog is stubborn, use a plunger or mechanical snake.
- Oven cleaner
Mix one cup baking soda with water to create a paste. Apply to oven surfaces and let stand a few minutes. Use a scouring pad for most surfaces. Do not use this recipe on self-cleaning ovens.
- Window and mirror cleaner
Mix one part vinegar to three parts water.
- Copper cleaner
Mix one tbsp vinegar and one tbsp salt and apply to surface with a rag. Rinse with water afterward to avoid corrosion. Apply vegetable oil with a cloth and rub for shiny appearance on non-lacquered finishes.
- For tubs, sinks and toilets
Try scrubbing with baking soda or Bon Ami. Rinse well.
- For wood surfaces
Try a drop of Murphy's Oil Soap on a wet washcloth.
- For disinfecting kitchen and bathroom
Mix one tbsp bleach and one quart cool water. Do not add soap; it reduces the effect of bleach. Use immediately on clean surface; leave on for two minutes. The solution weakens, so mix new solution daily.



Student Green Cleaning Videos, Ingraham High School

Special education and life skills students learned green cleaning techniques and created videos to teach others.

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