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.

1. 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 _________

2. 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 _________

3. 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 _________

4. Which product is a better deal: the hazardous product or the safer alternative?

   5. 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?

   6. 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](http://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**
  - [Hazardous on the Homefront Mini-Grant](http://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](http://www.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](http://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**
  - [King County](http://www.kingcounty.gov/toxicfreetips/shoppersguide.html#home)
  - 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](http://wnet.ecy.wa.gov/Navigation/ShopaholicGuide.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**
  - [wtoxics.org/healthy-homes-gardens/chemical-products](http://wtoxics.org/healthy-homes-gardens/chemical-products)
  - Get fact sheets on safer cleaners, antimicrobial products, and green cleaning recipes.

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

- **Community Product Guide, The Evergreen School**
  - [Evergreen School](http://www.evergreenschool.org/curriculum/)
  - Seventh grade students created an informational household cleaning product guide that included product options and cost comparisons. They distributed the booklet to school families.

- **Family Green Cleaning Kits, St. Marks School**
  - [Kits, St. Marks School](http://www.stmarks.k12.wa.us/)
  - After soliciting product donations from local stores, fifth grade students created green cleaning kits for families to use at home.
Define Your Project

Define 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 household products.
- cost and efficiency of one safer multipurpose cleaner over multiple specialized products.
- participation in the research process from formulating a question to communicating the findings.
- 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
- math calculations
- computer/online research
- report writing or persuasive writing

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 first 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 3 of the Hazards on the Homemront teacher guide (p. 168) 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 stores.
- 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, counter 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 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 recommend using 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 Carla Jonas in this guide, calculate the financial cost per ounce and per use of a hazardous product and a safer alternative 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.

Green Cleaning Recipes

- Floor cleaner:
  - For floors:
    - Mix 1/3 cup white vinegar in a bucket of water to clean linoleum, tile, or stone, or to deep-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 softer:
      - Add 1/4 to 1/2 cup baking soda to the rinse cycle.
- Oven cleaner:
  - Free minor clogs and help prevent future clogs by pouring 1/2 cup baking soda down the drain, followed by 1/4 cup vinegar. Let fizz for a few minutes then pour down a kett full of boiling water. Repeat if needed. If clog is stubborn, use a plunger or mechanical snake.
- Disinfecting:
  - 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.
- Air fresheners:
  - For tubs, sinks and toilets:
    - Try scrubbing with baking soda or Bon Ami.
  - For bathrooms:
    - Use vinegar as a mop solution.
- Special education and life skills students
  - Create a guide to green cleaning with cost comparisons and distribute it to school families.
  - 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.
  - Students could create a video about green cleaning to share with others.

Safer Cleaners and Persuasive Letters

- Kent-Meridian High School
  - Environmental science students tested when cleaning products are safer and determined 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.
- Ingraham High School
  - International Baccalaureate students designed and carried out experiments to test the effect of hazardous household products on water quality and aquatic life.
  - Students could also obtain Material Safety Data Sheets for more information on the chemical properties of products.
- Students could 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 could also test earth-friendly replacements for paper towels, such as sponges, scrubbing pads, and microfiber cloths.
- Students could create green cleaning kits or recipes for their families.
- Students could also test earth-friendly replacements for paper towels, such as sponges, scrubbing pads, and microfiber cloths.
- Students could present their product findings to other classes within their school, at a nearby school, or to community and family members.
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