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?
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 their 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.

Describe 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

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 Hazardous on the Homestead teacher guide (p. 68) 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 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 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
  Mix ½ cup white vinegar in a bucket of water to clean linoleum, tile, brick or stone, or to clean wood floors. Use a microfiber mop to reduce the amount of cleaner needed.

- Bathroom cleaner
  Add ½ to 1 cup baking soda to the rinse cycle.

- Drain cleaner
  Use non-chlorine whiteners such as oxygen or hydrogen peroxide based products.

- Fabric softener
  Add ½ to 1 cup baking soda to the rinse cycle.

- Oven cleaner
  Mix one cup baking soda with water to create a paste. Apply to oven surfaces and let stand a few minutes. A use a scouring pad for most surfaces. Do not use this recipe on self-cleaning ovens.

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- Window and mirror cleaner
  Mix one part vinegar to three parts water.

- Copper cleaner
  Mix one cup vinegar and one cup salt and apply to a rag. Rinse with water after wiping surface and pat dry. Apply vegetable oil with a cloth and rub for shiny appearance on non-lacquered finishes.

- For tubs, sinks and toilets
  Try a drop of Murphy’s Oil Soap on a wet washcloth.

- For disinfecting kitchen and bathroom
  Mix one cup Bleach and one quart cold 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.

- Paper towels
  Try a drop of Murphy’s Oil Soap on a wet washcloth.

- For wood surfaces
  Try a drop of Murphy’s Oil Soap on a wet washcloth.

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