

APES MINI-LAB: CO₂ AUDIT (YOUR CONTRIBUTION TO GLOBAL WARMING AND WHAT YOU CAN DO ABOUT IT)

WHAT TO TURN IN:	Data Table I and II	Calculations	Discussion
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For this activity you will analyze your consumption patterns to access the amount of carbon dioxide you contribute to the atmosphere on an annual basis. Calculate your annual CO₂ emissions from your use of various types of energy as well as products consumed and discarded or recycled. Calculate only your personal production (e.g. your portion of the garbage/electric bill) or the total for your household. If your values are for your household, include the number of individuals that live in dwelling. Summarize your results in a table (Data Table 1). For the analysis/pledge section (Data Table 2), report the total CO₂ emissions saved in pounds and in tons. Convert this value into metric units such as kg.

The discussion section is a closing section describing your results and their implications.

I. Calculating your Annual CO₂ Emissions (create Data Table 1)

CO ₂ EMISSIONS FOR VARIOUS SOURCES		
Item	Unit	lbs CO ₂ / unit
Electricity	Kilowatt-hours	1.7 lbs / kWh
Gasoline	gallon	24 lbs / gal
Propane	gallon	14 lbs / gal
Natural Gas	therm (thm) (1 therm = 100.000 BTU)	12 lbs / thm
Trash Discarded	pounds	3 lbs / lb. trash
Recycled Items	pounds	2 lbs / lb. items

- A. **Automobile:** check your vehicle mpg; estimate how many miles you put on your vehicle per year
 $(1 / \text{vehicle mpg}) \times (24 \text{ lbs/gal}) \times (\text{_____ miles/year}) = \text{_____ lbs CO}_2 / \text{yr.}$
- B. **Airplane travel:** estimate how many miles you fly per year
 $(0.9 \text{ lbs/mile}) \times (\text{_____ miles/year}) = \text{_____ lbs CO}_2 / \text{yr.}$
- C. **Bus:** estimate how many miles you use the bus per year
 $0.7 \text{ lbs/mile}) \times (\text{_____ miles/year}) = \text{_____ lbs CO}_2 / \text{yr.}$
- D. **Garbage:** (avg per capita garbage is 7 lbs/day; ** adjust your estimate as needed)
 $(7 \text{ lbs garbage** /day}) \times (3 \text{ lbs CO}_2/\text{lb garbage}) = \text{answer} \text{ lbs CO}_2 / \text{day}$
 $(\text{previous answer} \text{ lbs CO}_2 / \text{day}) \times (365 \text{ days} / 1 \text{ yr.}) = \text{_____ lbs CO}_2 / \text{yr.}$
- E. **Electricity:** check past power bills (archives online)
 $(\text{_____ kWh} / \text{year}) \times (1.7 \text{ lbs} / \text{kWh}) = \text{_____ lbs CO}_2 / \text{yr.}$
 based on fossil fuel consumption
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II. Analysis/Pledge for Reducing Annual CO₂ Emissions (create Data Table 2)

This should be based on what you actually intend to do. Tally the reduction in CO₂ you are pledging to do below and then summarize them in a second table giving a total in pounds, tons, and kg.

2000 lbs = 1 ton 1 kilogram = 2.20462262 pounds

- A. Automobile
1. Eliminate _____ miles of car travel (use lbs/mile).
 2. Maintain tire pressure (usually about 32 psi) OR maintain tire pressure at maximum pressure shown on tire (usually about 35 psi)
 3. Tune up once a year (900 lbs).

- B. Light bulbs
1. Replace _____ incandescent lights with compact fluorescents (typical CO₂ reduction = 180 lbs /light).
 2. Replace _____ high-watt incandescent with lower-watt incandescent bulbs (each 10-watt reduction typically eliminates 22 lbs. of CO₂ emissions).
 3. Turn off lights when leaving a room all year (120 lbs / room).
- C. Recycling
1. Recycle aluminum cans (typical CO₂ reduction = 34 lbs per 100 cans).
 2. Recycle glass bottles (typical CO₂ reduction = 30 lbs. per 100 bottles).
 3. Recycle pounds of paper (typical CO₂ reduction = 20 lbs. per 100 lbs.).
- D. Insulation
1. Wrap a home hot-water heater (typical CO₂ reduction 1,200 lbs, for electric heaters; 400 lbs. for gas)
 2. Insulate the attic of a house (for a 6-room house, typical CO₂ reduction: 1,800 lbs if oil-heated; 1,390 lbs. if gas-heated; 4,430 lbs. if electricity heated/cooled).
- E. Reduction of garbage by 0.5 lb. / day
- F. Reduction of Hot-Water Use
1. Wash clothes in cold water (typical CO₂ reduction = 250 lbs per person with an electric hot-water heater; 110 lbs. with gas).
 2. Install a low-flow showerhead (typical CO₂ reduction = 225 lbs per person with an electric hot-water heater; 99 lbs. with gas).
 3. Turn hot-water heater down 10 degrees (typical CO₂ reduction 240 lbs. with an electric heater; 106 lbs. with gas).
- G. Trees
1. Plant _____ trees (600 lbs / tree)
 2. Plant _____ shade trees on the east, south or west side of a house to reduce air conditioning (600 lbs / tree)
- H. Air Conditioning (reduction values are given for a single family detached home)
1. Raise thermostat by 10°F (400 kWh).
 2. Shade windows with white drapes, blinds, reflective film or awning (400 kWh).
 3. Paint roof white (1,200 kWh).
- I. Purchases
1. Trade in car for one with _____ more mpg (about 700 lbs for each extra mpg).
 2. Buy new energy-efficient refrigerator (1,000 lbs).
 3. Buy new air conditioner with SEER of 12 instead of 8 (3,700 lbs). (May actually be more because of peak load reductions)
- J. Donate money to preserve tropical rainforest (\$100 per acre, 240,000 lbs. per acre - one time reduction only).
- K. Other / Miscellaneous - Describe and Calculate (based on your own research)