LESSON MAKER PRO

# Footprint Choices

*Use numbers to compare ways to cut emissions.*

**HIGH SCHOOL · ES.13**

**ES.13** "Design and defend a sustainability plan to reduce an individual's ecological footprint, taking into account how market forces and societal demands influence personal choices."

NAME _____ DATE _____

## COMPARE THE CUTS

Use kg $CO_2e$ to compare greenhouse gas emissions. To find a total cut, multiply the cut per action by the number of times you do it, then add cuts from actions you can combine. Subtract the cut from your starting footprint, and check whether the plan fits your budget and daily life.

## WORKED EXAMPLE

Biking instead of getting a car ride avoids 5 kg $CO_2e$ per round trip. If a student bikes for 7 round trips each month for 10 months, how much does the student avoid?

1. Find the monthly cut: 5 × 7 = 35 kg $CO_2e$.
2. Find the total cut: 35 × 10 = 350 kg $CO_2e$.

**Answer: 350 kg $CO_2e$**

## PRACTICE 6 problems

**1** Taking the bus instead of getting a car ride avoids 8 kg $CO_2e$ per round trip. How much do you avoid in 6 round trips?

**ANSWER** _____

**2** A change at home cuts emissions by 18 kg $CO_2e$ each week. How much does it cut over 20 weeks?

**ANSWER** _____

**3** Your food choices produced 45 kg $CO_2e$ last week and 28 kg $CO_2e$ this week. What was the cut?

**ANSWER** _____

**4** A plan cuts 420 kg $CO_2e$ over 30 weeks. If the weekly cut is the same each week, what is it?

**ANSWER** _____

**5** Your monthly footprint is 60 kg $CO_2e$. A change cuts it by 25%. How many kg $CO_2e$ does it cut?

**ANSWER** _____

**6** Your weekly footprint is 80 kg $CO_2e$. Your plan cuts 24 kg $CO_2e$ per week. What percent of your original footprint is the cut?

**ANSWER** _____

## APPLY IT Show your work

**1** You travel to music rehearsal 6 times a week for 20 weeks. For each round trip, taking the bus instead of getting a car ride avoids 6 kg $CO_2e$. A bus pass costs $18 a week, while the car rides use $30 a week in gas. Rehearsal ends before the last bus leaves. Find the emissions cut and money saved over 20 weeks. Explain how the prices and rehearsal schedule affect this choice.

WORK SPACE

**ANSWER** _____

**2** You need 2 jackets. Each used jacket costs $24 and has an estimated footprint of 6 kg $CO_2e$. Each new jacket costs $72 and has an estimated footprint of 18 kg $CO_2e$. Your school is hosting a used-clothing sale. If you buy used jackets instead of new ones, find the emissions cut and money saved. Explain how the sale could affect your choice.

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

Your starting footprint is 120 kg $CO_2e$ per month. You can spend at most $25 extra per month. Your student council asks students to cut at least 40 kg $CO_2e$ per month. You may combine any of the changes in the table. Which plan meets the council's goal for the lowest extra cost? Give its cost and your new footprint. Explain how the budget and council goal shaped your plan.

**MONTHLY CHOICES**

| Change | Cut (kg CO2e/month) | Extra cost ($/month) |
|---|---|---|
| Take the bus | 32 | 16 |
| Choose lower-emission meals | 15 | 9 |
| Repair an item | 8 | 6 |

WORK SPACE AND ANSWER

# Footprint Choices



## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Taking the bus instead of getting a car ride avoids 8 kg $CO_2e$ per round trip. How much do you avoid in 6 round trips? | **48 kg $CO_2e$** |
| 2 | A change at home cuts emissions by 18 kg $CO_2e$ each week. How much does it cut over 20 weeks? | **360 kg $CO_2e$** |
| 3 | Your food choices produced 45 kg $CO_2e$ last week and 28 kg $CO_2e$ this week. What was the cut? | **17 kg $CO_2e$** |
| 4 | A plan cuts 420 kg $CO_2e$ over 30 weeks. If the weekly cut is the same each week, what is it? | **14 kg $CO_2e$ per week** |
| 5 | Your monthly footprint is 60 kg $CO_2e$. A change cuts it by 25%. How many kg $CO_2e$ does it cut? | **15 kg $CO_2e$** |
| 6 | Your weekly footprint is 80 kg $CO_2e$. Your plan cuts 24 kg $CO_2e$ per week. What percent of your original footprint is the cut? | **30%** |

## PART 2 · APPLY IT

1. **The bus cuts 720 kg $CO_2e$ and saves $240. The pass costs less than the gas, and rehearsal ends in time to catch the bus, so the plan is practical.** Emissions cut: 6 × 6 × 20 = 720 kg $CO_2e$. Money saved: ($30 - $18) × 20 = $240.
2. **Buying used cuts 24 kg $CO_2e$ and saves $96. The school sale makes used jackets easier to find.** Emissions cut: (18 - 6) × 2 = 24 kg $CO_2e$. Money saved: ($72 - $24) × 2 = $96.

## CHALLENGE

**Take the bus and repair an item. The plan cuts 32 + 8 = 40 kg $CO_2e$ per month, costs $16 + $6 = $22 extra per month, and leaves a footprint of 120 - 40 = 80 kg $CO_2e$ per month. It meets the council's goal within the budget at a lower cost than the other qualifying plan.**

Accept equivalent arithmetic and explanations that connect prices or available services to a choice. In the challenge, bus plus lower-emission meals also meets the goal, but its $25 extra cost is higher.