LESSON PLAN

Lesson 3: Counting Carbon: Which way wins?

LESSON SUMMARY

In this lesson, students explore how different types of transport affect the environment by examining the amount of carbon dioxide (CO_2) they produce. They learn that every time we travel in some vehicles, we leave behind a carbon footprint – a way of measuring the pollution we create. Using data collected by the class and engaging hands-on activities, students calculate their own carbon footprint based on how they move around their community. They consider which travel choices are the most sustainable and better for the planet.

SEQUENCE TITLE: JOURNEY SMART - Stepping towards active, safe and independent travel

LEVEL
Years 5-6

LESSON NUMBER
3 of 8

LESSON LENGTH
60 minutes

CURRICULUM AREAS

LEARNING AREAS

- Health and Physical Education
- Science
- Mathematics
- Humanities - Geography

ROAD SAFETY EDUCATION VICTORIA

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Victorian Curriculum 2.0 Content Descriptions

LEARNING AREAS

Health and Physical Education

VC2HP6P09 Investigate different sources, quality and types of health information and how these apply to their own and others' health choices.

Science

VC2S6H02 Scientific knowledge, skills and data can be used by individuals and communities to identify problems, consider responses and make decisions.
VC2S6I04 Data and information can be organised and processed to show patterns, trends and relationships by constructing representations including tables, graphs and visual or physical models.

Mathematics

VC2M5N06 Solve problems involving multiplication of larger numbers by one- or two-digit numbers, choosing efficient mental and written calculation strategies and using digital tools where appropriate; check the reasonableness of answers.

Geography

VC2HG6K01 How places and environments are changed and managed by people.
VC2HG6K04 The importance of sustainability to places and environments, including the custodial responsibility Aboriginal and Torres Strait Islander Peoples have for Country and Place and how it influences their sustainability practices.

PRIOR KNOWLEDGE

- Students should already understand the meaning of active travel and have collected data on how they and their classmates get to and/or from school or other locations within their community.

VOCABULARY

Carbon Footprint – a measure of the greenhouse gas emissions released into the atmosphere by a particular person or thing.
Emissions – gases released into the air by cars, buses, and machines that trap heat in the earth's atmosphere.
Fossil Fuels – petrol, diesel, or natural gas used to power vehicles like cars, buses, and motorbikes.
Carbon dioxide (CO_2) – a gas made when we burn fuel; too much causes climate change.
Climate Change – the long-term shifts in temperatures and weather patterns attributed directly or indirectly to human activity.
Carpooling - sharing a car ride with one or more people who are traveling to the same or similar destination.
Transport mode – a way of travelling (walking, car, bus, bike, train etc.).

MATERIALS REQUIRED

- Whiteboard and markers.
- Calculators.
- Student data on how students travel to school.
- Carbon Counting – Which way wins? poster.
- Active Travel Map Examples #1 and #2.
- Travel Emissions Comparison Worksheet.
- Travel Choices and Emissions – My class data Worksheet.
- Videos: How to reduce Australia's transport emissions - The Climate Council
  Explaining Emissions Targets - BTN

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LEARNING OBJECTIVE

Students will compare the environmental impact of different transport methods using emissions data and understand how their travel choices contribute to or reduce pollution.

SUCCESS CRITERIA

- I can calculate CO_2 emissions for trips with two travel modes.
- I can compare emissions across different travel combinations.
- I can identify which travel choices are better for the environment.
- I can reflect on how I and my class can travel more sustainably.

TEACHING CONSIDERATIONS

- Use visuals and real-world examples for neurodiverse learners (e.g., image cards of vehicles).
- Provide printed calculators and a table of pre-filled emissions per km for EAL/support students.
- Use flexible grouping so students can choose to work in pairs or small groups.
- Offer sentence starters and discussion prompts for students who need help expressing ideas.

Extend

- Have advanced students create bar graphs comparing total class emissions by transport mode. Calculate the impact parking a bit further away and walking would have on the result.
- Let students research electric vehicles or public transport upgrades as sustainability solutions.

Enable

- Provide pre-filled data tables for calculations.
- Give sentence starters for written reflections (e.g., "I think walking is better because...").

ASSESSMENT

- Observe pair work and guide as they complete calculations.
- Collect Travel Emissions Comparison worksheet to check for understanding of emission comparison and sustainable reasoning.
- Discussion participation: Note students' ability to justify their reasoning during the review phase.

Additional links to support teacher knowledge and student learning:

- Environmentally sustainable transport – Vic Gov
- Greenhouse gas emissions - Understanding Victoria's contribution to climate change.
- Transport and Climate Change - Institute for Sensible Transport
- Cutting Victoria's emissions 2021–2025 - Transport sector emissions reduction pledge

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LEARNING CONTINUUM

Focus: Investigating travel emissions and comparing the environmental impact of different transport methods using emissions data. Increases understanding how their travel choices contribute to or reduce pollution.

Learning Continuum	Phase 1	Phase 2	Phase 3
Understands how emissions data can be used to compare the environmental impact of transport modes and influence personal travel choices.	Recognises that transport affects pollution levels; may recall one or two facts with support.	Describes how different transport modes produce different levels of pollution using emissions data and provides basic comparisons.	Accurately interprets emissions data to compare transport modes, explains the environmental impact of different choices, and uses evidence to justify personal or group actions to reduce pollution.

ASSESSMENT RUBRIC

Organising Element	Action	Insufficient Evidence	Quality Criteria		
Understanding of emissions and pollution	1. Explain how transport contributes to pollution	1.0 No response or shows no understanding	1.1 Identifies that some transport causes pollution with limited explanation	1.2 Describes differences in pollution between transport modes using basic examples	1.3 Explains how specific transport choices impact pollution levels and climate, using data or reasoning
Data interpretation and comparison	2. Use emissions data to compare transport methods	2.0 No response or irrelevant response	2.1 Refers to emissions figures with support; may not link clearly to transport modes	2.2 Accurately reads and compares simple emissions data (e.g. car vs. bus)	2.3 Interprets and applies emissions data to make informed comparisons across multiple transport types
Application to personal or group action	3. Suggest actions to reduce emissions from travel	3.0 No response or unrelated answer	3.1 Offers a basic idea (e.g. "walk more") with prompting	3.2 Suggests a realistic action and links it to reducing pollution	3.3 Justifies personal or class actions using emissions data and explains their environmental benefit

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Structure of lesson:

1 LESSON PHASE: Introduction (Hook) TIMING: 10 mins

Explain students will compare the environmental impact of different transport methods using emissions data and understand how their travel choices contribute to or reduce pollution.

Show video - How to reduce Australia's transport emissions - The Climate Council - highlighting how transportation pollutes the air.

Review and check for understanding of specific terms mentioned in the video (e.g. Emissions, Carbon dioxide, fossil fuel, Climate change).

Reinforce the idea that the more Victorians who choose public and active transport – like walking and bike riding – can lower emissions while also delivering cleaner air, less congestion and make our communities much more liveable.

Brainstorm: *Which ways of travelling do you think pollute the air the most?*

Record responses on the board.

DIFFERENTIATION STRATEGIES

Enable

- **Pause Video:** Pause the video and explain key terms using visuals and real-life examples (e.g. "CO_2 is like smoke filling the air").
- **Small Group Discussions:** Create small teacher-led groups to discuss the video and key vocabulary, using prompt cards to guide discussion.

Extend

- **Persuasive Statement:** Ask students to write a short persuasive statement about which travel mode is best for the environment and why.
- **Independent Research:** Challenge students to identify unfamiliar environmental terms in the video and research their meanings independently.

2 LESSON PHASE: Explicit Teaching & Modelled Learning TIMING: 15 mins

Display Poster - Carbon Counting: Which Way Wins?

Explain the differences in the numbers: Not all types of transport make the same amount of CO_2. One way to measure this is by looking at how much CO_2 is made for **each person for every kilometre they travel**. That's called **grams of CO_2 per person kilometre (g CO_2/person km).**

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Here are some examples:

Type of Transport	CO_2 Made (per person per km)	What it Means
Car (1 person)	About 194 g	One person in a car = lots of pollution.
Car (4 people)	About 61 g	Sharing the ride means less CO_2 per person!
Bus	About 22 g	Carries many people, so the pollution is shared.
Train	0 g (metro) About 14 g (regional)	Carries many people, so the pollution is shared.
Tram	0 g	Trams carry lots of people like buses but have recently transitioned to renewable electricity.
Bike or Walking	0 g	Great for the planet – no CO_2 at all!

Brainstorm: *What do you notice about these figures? What can we learn from this?*

Discuss the following points and check for understanding:

- If 4 people each drive their own car, that means 4 cars on the road, create **4 times more CO_2** than if all 4 people shared just **one car.** This is called carpooling – and it's **better for the planet!**
- **Trains and buses** are even better! One train can carry **hundreds of people**, so there are **way fewer cars** on the road. That means **less traffic and much less pollution** than if everyone drove a car.
- Electric buses and electric vehicles are becoming more common in Victoria. Some buses in Melbourne already say "I'm an electric bus"! These types of vehicles don't produce greenhouse gas emission when they run.
- Biking and walking don't use fuel at all, so they don't create any CO_2 when you travel!

Think-Pair-Share: *So, what can we do* to help keep our air clean and protect the Earth?

Example responses:

- Walk or ride a bike when we can.
- Drive part way and park. Then walk the rest.
- Take the bus or train instead of getting a lift in a car.
- Share car rides with friends.

Explain that this way, we all help reduce pollution together and that's a smart move for our future!

DIFFERENTIATION STRATEGIES

Enable

- **Physical Aids:** Use coloured counters or cubes to physically represent emissions data for different transport types.
- **Visual Aids:** Provide number lines or visual aids (e.g., CO_2 "thermometer" charts) to help with understanding large numbers.
- **Groupings:** Group students into mixed-ability pairs and provide sentence stems to assist verbal reasoning during discussions.

Extend

- **Create Infographic:** Invite students to create a slide or infographic comparing the CO_2 output of at least two transport modes.
- **What If Scenarios:** Provide a "what if" scenario (e.g. 100 people switch from cars to bikes) and ask students to calculate the total CO_2 saved.

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3 LESSON PHASE: Guided Practice

TIMING: 15 mins

Set up Active Travel Map Examples #1 and #2 on an outdoor court or indoor gym/hall.

Divide the class in half and assign each group to one of the examples.

Using mathematical measuring tools, students work together to measure and record the distance travelled by car, bus and walking.

Distribute Travel Emissions Comparison Worksheet and complete in pairs.

Pairs join another pair and check calculations together.

DIFFERENTIATION STRATEGIES

Enable

- **Assign Roles:** Provide a step-by-step checklist and assign roles in pairs (e.g. one measures the distance, one records data).
- **Learning Environment:** Use clearly marked zones in the room or outdoor area for supported movement and structured guidance.

Extend

- **Weekly Tracking:** Ask students to calculate weekly emissions for their route to school or other places they regularly travel and compare these to an alternative method.
- **Mapping Other Modes:** Offer an extended challenge map that includes more modes of transport per journey. Add data to include how students travel home from school.

4 LESSON PHASE: Independent Application

TIMING: 10 mins

In small groups, students share the mode or modes of travel they use to get to school.

Use Google maps to investigate how far each member of their group travels using each mode of transport.

Distribute Travel Choices and Emissions – My class data worksheet (one per student).

Groups record their distances in the first few rows of their sheet.

Students calculate everyone's total CO_2 emissions per km travelled to school.

If time permits, **students record** the rest of the class travel data and emissions in the table.

DIFFERENTIATION STRATEGIES

Enable

- **Calculation Assistance:** Support students with calculator use and visual templates to complete their CO_2 calculations.
- **Visual Instructions:** Provide quiet workspaces with visual instructions and allow use of headphones for guided Google Maps exploration.

Extend

- **Report Writing:** Ask students to write a short report on how different travel choices impact long-term CO_2 emissions.
- **Content Analysis:** Encourage students to compare and analyse their usual route versus a greener alternative and reflect on the environmental benefits.

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5 **LESSON PHASE:** Review / Reflection **TIMING:** 10 mins

Whole-class circle discussion

Ask: *Did anything surprise you about the data? Are there any questions that you still have about transport options and the environment?*

Show video - Explaining Emissions Targets - BTN and explain that the global leaders are also setting targets and trying to lower emissions.

Review *Active Travel Pledges* from Lesson #2.

Explain that the class will recalculate class emissions data in a few weeks after students have been given time to alter their modes of travel to and from school or other locations in the community.

DIFFERENTIATION STRATEGIES

Enable

- **Sentence Starters:** Provide other sentence starters or prompt cards (e.g. "I notice...", "I wonder why...", "This reminds me of...") to scaffold thinking and expression.
- **Pre-sharing:** Allow students to work in pairs or small teacher-led groups to discuss their ideas before sharing with the class.

Extend

- **Poster production:** Ask students to create a poster or write a short plan outlining how they could reduce their travel emissions over the next month.
- **Broader Context:** Challenge students to connect their learning to global sustainability goals and reflect on how individual actions contribute to broader change.