

Pedagogical sequence associated with the box

« Save the Future: A Time Mission »

Theme: Sustainable energies & future city

Ages: (8-10 / 10/12)

Duration: 3 sessions of 45–50 minutes each

Storyline overview: During a school field trip, Iris and Orestes discover a mysterious time machine that transports them into a future where nature and the city face serious challenges. To return home, they must collect three keys that guide them through different missions: saving trees through recycling, lighting the city with renewables, and clearing the air by rethinking transport. Each success brings visible signs of hope (green shoots, glowing lights, cleaner air) showing that mathematics, curiosity, and teamwork can help rebuild a sustainable future. Through inquiry-based STEM missions, pupils connect storytelling with hands-on problem-solving to see how everyday choices shape the world around them.

Session n°1 – « The Trash Trap – Recycling & Trees Saved »

This lesson focuses on...

... engaging pupils in a recycling challenge where they help the heroes restore their school's system by sorting materials, calculating how much paper is collected and how many trees are saved. Through classification, data decoding, and scaling, they discover how mathematics makes the results of everyday ecological actions visible.

At the end of this lesson, pupils should be able to:

- Identify and classify recyclable and non-recyclable materials, including tricky cases.
- Decode symbolic data (leaves) and connect it to quantities of recycled paper.
- Scale weekly results to a whole year and interpret them as trees saved.
- Collaborate and share strategies to justify mathematical reasoning.
- Reflect on how mathematics makes the ecological value of recycling visible.

Aims of the lesson

- To connect mathematical reasoning (classification, coding/decoding, scaling) with an environmental challenge relevant to pupils' daily lives.
- To help pupils gain confidence in applying mathematical reasoning to real environmental data by linking their calculations to tangible results such as trees saved.
- To raise awareness of the importance of recycling and show how small, repeated actions can have a measurable ecological impact.
- To foster collaborative inquiry and shared problem-solving as pupils classify materials and reason together through the recycling challenge.

Historical context of the concept or/and Real-life connection:

The principle of Reduce, Reuse, Recycle (the 3Rs) has guided environmental education since the late 20th century, encouraging citizens to take responsibility for their waste and protect natural resources. Recycling paper remains one of the most accessible and visible actions for young learners, directly connecting their school life with real environmental impact. By calculating how much paper is collected and how many trees are saved, pupils understand how mathematics helps reveal the tangible benefits of sustainable habits in their own communities.

LESSON PREPARATION

Prior knowledge and skills:

For this lesson, pupils should already be able to:

Level 1 (ages 8–10)

- Recognise and classify materials (paper, plastic, glass, metal, non-recyclable).
- Add and multiply whole numbers and simple decimals (e.g., 0.5, 1.5).
- Divide whole numbers in simple cases
- Understand simple fractions (e.g., $\frac{1}{2}$) and represent them visually (e.g., 30 kg of paper = $\frac{1}{2}$ tree).
- Convert between kilograms and grams in simple cases (e.g., 0.5 kg = 500 g).
- Work cooperatively in small groups, record observations, and share simple ideas with peers.

Level 2 (ages 10–12)

- Apply the above skills with greater complexity.
- Perform addition, multiplication, and division with decimals and relate decimals to fractions.
- Use estimation and rounding strategies to check results.

Materials and classroom setup (online/offline):

- Projector or interactive whiteboard to display the story for whole-class discussion or computers/tablets (one per group) for pupils to navigate the story interactively. Internet access is required.
- Printable recycling bins (with labels *Paper, Plastic, Glass, Metal, Non-recyclable*) per group.
- Posters, 1 set for the class.
- Printable object cards (bundles of newspapers, cardboard boxes, textbooks, bottles, jars, cans, pizza boxes, etc.) per group.

- Recycling Report sheets (two versions, for ages 8–10 and 10–12, with leaf symbols), per group
- Mission Sheets for recording calculations and reflections, one per group
- Pencils, erasers, scissors and coloured markers.

Classroom setup: Arranged for group work.

INSTRUCTIONS FOR THE LESSON

Level 1 and 2	Introduction to the subject
<p>8 – 10 years old</p> <p>10 – 12 years old</p>	<p>The lesson begins with the narration, where pupils follow Iris and Orestes into the future and notice unusual changes in their schoolyard. The first challenge introduces the concept of recycling and its ecological impact. Pupils learn about its importance and are invited to help the heroes in their mission to restore the school’s recycling system.</p> <p>Once the first challenge appears, each group receives its Mission Sheet for this session, which pupils will use to record their observations, calculations, and reflections as they progress through the enigma.</p> <p><u>Specific vocabulary introduced with simple definitions:</u></p> <ul style="list-style-type: none"> • Reduce: use less and avoid unnecessary waste. • Reuse: use things again instead of throwing them away. • Recycle: use old materials to make new things. • Non-recyclable: items that cannot be recycled and must go to waste. • Estimate: make a careful guess, not an exact number.

PUTTING IT INTO PRACTICE

Level 1	Activities
<p>8 – 10 years old</p>	<p><u>What the teacher says/does:</u></p> <ul style="list-style-type: none"> • Initiates a short discussion using the school noticeboard poster as a starting point to recall the 3Rs (Reduce, Reuse, Recycle) and explains that all three are equally important for protecting the environment and reducing waste. • Distributes to each group the printable recycling bins and object cards, inviting pupils to explore how they might organise the materials. • Lets pupils decide freely what to do first, without giving instructions, and observe how they interpret the task from the Mission Sheet. • After sorting, invites each group to share one bin with the class and explain how they decided where each item belongs. • Encourages pupils to listen to others' reasoning, compare ideas, and discuss different interpretations before reaching a common understanding. • Discusses any tricky items, such as a glass jar with a metal lid. Encourages pupils to use scissors to separate the lid (metal) from the jar (glass). Explains that a greasy pizza box belongs in the non-recyclable bin due to contamination, emphasizing that only clean materials can be recycled. • Distributes the Recycling Report (with leaf symbols) to each group and invites pupils to discuss what the symbols

might represent and how they could be used to find out more about the collected paper.

- Offers support only when groups need clarification or ask for help, encouraging them to explain their reasoning and listen to one another.
- Encourages pupils to take on different team roles (Coordinator, Recorder, Materials Keeper, Presenter), adapting them to the needs and dynamics of the class.
- Allows flexibility so that pupils can share or switch roles as they collaborate.

What the pupils do:

- Sort materials into the correct bins and present their choices.
- Examine and decode the Recycling Report with leaf symbols.
- Calculate weekly and yearly totals of recycled paper and trees saved.
- Compare their findings with the school's faded poster (≈ 25 trees/year).
- Record findings and share reasoning with peers in the Mission Sheet.

Level 2	Activities
<p style="text-align: center;">10 – 12 years old</p>	<p>The activity follows the same structure as for ages 8–10, with deeper mathematical reasoning and more open discussion.</p> <p>Differentiation:</p> <ul style="list-style-type: none"> • Pupils work with a more detailed Recycling Report including decimals, using estimation and rounding to interpret and extend their results. • Groups manage their own roles and decide how to record and explain their findings, justifying strategies and comparisons with the school’s old poster.

<p style="text-align: center;">Conclusion Level 1 8-10 years old</p>	<p>Pupils complete the reflection section of the Mission Sheet, discussing what their results reveal about recycling and how small collective actions can make a measurable difference.</p> <p>At the end of the session, the teacher may guide a short discussion with open questions such as:</p> <ul style="list-style-type: none"> • What message can we take with us from this mission? • What did you learn about how mathematics helps us see the impact of recycling? • What part of today’s activity did you find most surprising or inspiring?
<p style="text-align: center;">Conclusion Level 2 10-12 years old</p>	<p>Pupils complete the reflection part of the Mission Sheet, comparing their results with the school’s old poster and interpreting what this reveals about impact and change.</p> <p>The teacher encourages pupils to justify their reasoning, connect</p>

	<p>numerical results with real environmental meaning, and express what they learned from the mission.</p>
<p>To go further...</p>	<p>Level 1 (ages 8–10):</p> <ul style="list-style-type: none"> • Pupils could create recycling posters showing how many trees can be saved in one year. • As a class, they could set up a classroom recycling corner with bins for paper, plastic, and other materials. • Pupils could play a sorting relay game where teams compete to put mixed objects into the correct recycling bins. <p>Level 2 (ages 10–12):</p> <ul style="list-style-type: none"> • Pupils could explore the difference between Reduce, Reuse, and Recycle, finding examples in their daily lives. • Pupils could weigh the school’s recycled paper for one week, record the weight, calculate trees saved (60 kg = 1 tree), and then project to one school year compare the result with the story’s poster. • Pupils could design a class survey on recycling habits at home and present the data with bar charts or pie charts. • Pupils could prepare a short presentation for younger pupils to explain how recycling helps save trees.

Session n°2 – « Powering the City – Renewable Energy »

This lesson focuses on...

... engaging pupils in an energy challenge where they help the heroes restore power to the city by exploring how renewable sources (sun, wind, and water) can work together. Through modelling, calculation, and comparison, they discover how mathematics helps design efficient systems and understand the impact of daily energy-saving choices.

At the end of this lesson, pupils should be able to:

- Use multiplication, repeated addition, and estimation to calculate and compare energy production.
- Evaluate different renewable sources (solar, wind, water) for efficiency and suitability.
- Apply reasoning to plan an optimal energy mix for the city model.
- Communicate and justify their strategies and results to peers.
- Reflect on how small energy-saving choices contribute to sustainability.

Aims of the lesson

- To calculate and compare the energy produced by solar panels using multiplication, repeated addition, and estimation.
- To analyse how the orientation of rooftops affects solar efficiency and total energy output.
- To test and combine renewable sources (solar, wind, hydro) to create a balanced and reliable energy system for the city.
- To justify group decisions with mathematical reasoning and communicate results clearly to peers.
- To reflect on everyday actions that reduce energy waste and make the city more sustainable.

Historical context of the concept or/and Real-life connection:

Modern cities rely on energy for lighting, transport, and comfort — yet using too much from non-renewable sources causes pollution and energy shortages. Around the world, communities are increasingly turning to solar, wind, and waterpower to build cleaner and more resilient cities. The lesson connects this real challenge to the story of a city blackout, as pupils explore how renewable energy and everyday habits can work together to make the future sustainable.

LESSON PREPARATION

Prior knowledge and skills:

For this lesson, pupils should already be able to:

Level 1 (ages 8–10)

- Recognise the four main orientations (North, South, East, West) and relate them to sunlight.
- Calculate simple totals using addition or multiplication.

Level 2 (ages 10–12)

- Apply the above skills with larger numbers and more complex calculations, using estimation and reasoning to check results

Materials and classroom setup (online/offline):

- City Cards, one per group.
- City board and Energy sources, one per group.
- Mission Sheets for recording calculations and reflections, one per group

INSTRUCTIONS FOR THE LESSON

Level 1 and 2	Introduction to the subject
<p>8 – 10 years old</p> <p>10 – 12 years old</p>	<p>The story begins with a sudden citywide blackout that leaves Iris and Orestes searching for answers. Guided by Nelly, a young researcher, pupils explore why the city’s energy system has failed and how it could be restored. They investigate renewable energy sources — sunlight, wind, and water — using mathematical reasoning to plan solutions and reflect on responsible energy use.</p> <p><u>Specific vocabulary introduced with simple definitions:</u></p> <ul style="list-style-type: none"> • Energy: the power we use for light, heat, or machines. • Kilowatt-hour (kWh): a unit to measure how much energy is used or produced. • Solar panel: a device that changes sunlight into electricity. • Wind turbine: a machine that uses wind to produce electricity. • Hydro dam: a wall built across a river that uses water to produce electricity. • Renewable energy: energy that comes from natural sources like the sun, wind, or water, which do not run out. • Energy saving: using less energy by being careful and avoiding waste.

PUTTING IT INTO PRACTICE

Level 1	Activities
<p>8 – 10 years old</p>	<p><u>What the teacher says/does:</u></p> <ul style="list-style-type: none"> • Briefly recalls the blackout context from the story and explains that each group will act as energy planners for one neighbourhood of the city. • Distributes materials (a few City Cards to each group, 1 City board + Energy sources, Mission Sheet) and lets pupils explore the setup on their own. • Observes the process without intervening, prompting inquiry only when needed: <ul style="list-style-type: none"> – “What makes you think this building gets more sunlight?” – “How could you check if your idea works?” • Invites groups to present and compare their results, combining totals to see how much of the city needs to “light up.” • Introduces Part B, inviting pupils to test new renewable sources (hydro, wind, solar farm) and reason about which positions work best. <p><u>What the pupils do:</u></p> <ul style="list-style-type: none"> • Observe on the cards they get the roof directions to understand where it gets sunlight. • Read the <i>Energy Rule</i> and use it to decide how many solar panels are needed. • Work as a team to calculate total energy on the Mission Sheet.

	<ul style="list-style-type: none"> • Compare results with other groups to see how much of the city lights up when all buildings are combined. • Add new renewable sources (hydro, wind, solar farm) to complete the city’s energy mix. • Reflect on what helped the city shine again and suggest simple daily actions to save energy.
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Level 2	Activities
<p>10 – 12 years old</p>	<p>The activity follows the same overall structure as for ages 8–10, but with greater numerical reasoning and analytical depth.</p> <p>Differentiation:</p> <ul style="list-style-type: none"> • Pupils work with a new parameter (the weather) and calculate larger energy totals, applying estimation and rounding strategies. • When adding renewable sources (hydro, wind, solar farm), they discuss trade-offs and propose how combining them can optimise total energy production. • Reflection focuses on interpreting results, suggesting improvements, and linking mathematical conclusions with real-world energy planning and sustainable habits.

<p>Conclusion</p> <p>Level 1</p> <p>8-10 years old</p>	<ul style="list-style-type: none"> • Encourages pupils to share their reflections — what they discovered about energy sources and everyday habits. • Helps pupils connect their mathematical results and story experience with real-life ideas about cooperation and sustainability. • Highlights that both renewable energy and responsible habits are essential for a balanced future. • Concludes with the story’s message: <i>“So the real secret is this: producing clean energy is important, but saving energy in our daily lives is just as powerful. Together, we light up the city!”</i>
<p>Conclusion</p> <p>Level 2</p> <p>10-12 years old</p>	<p>Together, pupils review which energy sources proved most efficient and why, recognising the value of combining solar, wind, and hydro power to ensure balance and reliability.</p> <p>The conversation then shifts from technical solutions to personal responsibility: pupils reflect on how everyday choices — switching off lights, reducing waste, or sharing resources — can make a real difference.</p> <p>Finally, the teacher encourages reflection with open questions such as:</p> <ul style="list-style-type: none"> • Why is saving energy as important as producing it? • What message from today’s mission could you share with your family or community? • What did you find most interesting or surprising in today’s mission? • What part did you find the most challenging — and how did your team solve it?

To go further...

Level 1 (ages 8–10):

- Pupils build a simple classroom poster showing “energy-saving heroes,” where each pupil draws or writes one action they can do at home or school (e.g., switching off lights, closing the fridge quickly).
- Pupils could use a simple sun-compass outside in the schoolyard to see which side of the building gets the most sunlight, linking it to the idea of solar panels.
- Make a small comic titled “*A Day Without Electricity*” and describe what they would do.

Level 2 (ages 10–12):

- Pupils could use a simple sun-compass outside in the schoolyard to see which side of the building gets the most sunlight, linking it to the idea of solar panels.
- Pupils could look at real-life labels on devices (Watt values) and discuss how power relates to energy use. Then they could compare two common appliances (e.g., a lamp vs. a computer) and estimate which one uses more energy and why.
- Pupils could make quick calculations of how much energy one light bulb uses in a day and how much could be saved if switched off for an hour.
- Pupils could explore how solar panel orientation changes in different parts of the world — for example, in most of Europe panels face South, while in Australia they face North, because the sun moves differently in the southern hemisphere. They could mark both on a world map and explain the reason behind it.

Session n°3 – « The Class Footprint – Transport & CO₂ »

This lesson focuses on...

... helping pupils explore how daily transport choices affect the environment.

Working with the stories of the heroes' classmates, they calculate the carbon footprint of their daily journeys to school and see how different travel habits change the total.

Through this mission, pupils connect mathematics with real-life responsibility, discovering how small choices can make a big difference for the planet.

At the end of this lesson, pupils should be able to:

- Recognise how different modes of transport contribute to CO₂ emissions.
- Use given data to calculate the carbon footprint of individual and group journeys.
- Compare results and discuss which journeys could realistically change to reduce the footprint, expressing reductions in numbers and, for older pupils, also as percentages.
- Reflect on how everyday travel choices affect the environment and how small changes can lead to measurable improvements.

Aims of the lesson

- To link mathematical reasoning with real-life questions about transport and sustainability.
- To analyse and compare CO₂ emission data for different travel options.
- To apply inquiry and decision-making skills when evaluating transport choices.
- To promote teamwork and discussion around realistic ways to reduce pollution.
- To build awareness that both individual and collective travel habits impact air quality and climate.

Historical context of the concept or/and Real-life connection:

The concept of the carbon footprint appeared in the late 20th century, when scientists began to measure how much CO₂ is released by daily activities such as transport and energy use. Today, this idea guides policies to reduce emissions and fight climate change. Pupils connect this global issue to their own travel choices — walking, cycling, or using public transport — and realise how small daily actions can lead to cleaner air and a more sustainable future.

LESSON PREPARATION**Prior knowledge and skills:**

For this lesson, pupils should already be able to:

Level 1 (ages 8–10)

- Understand and extract key information from short narrative texts.
- Recognise and work with small distances (in kilometres), using addition or simple multiplication to find totals.

Level 2 (ages 10–12)

- Apply the above skills with greater precision when handling larger numbers.
- Use percentages to describe and interpret reductions or comparisons.

Materials and classroom setup (online/offline):

- Transport Story Cards (one set for each level, ages 8–10 and 10–12), shared among groups, each describing a pupil's journey to school.
- Mission Sheet, one per group.

INSTRUCTIONS FOR THE LESSON

Level 1 and 2	Introduction to the subject
<p style="text-align: center;">8 – 10 years old</p> <p style="text-align: center;">10 – 12 years old</p>	<p>The lesson begins with the story scene where Iris, Orestes, and Nelly step outside and notice the hazy sky. They learn that the air pollution is caused by smog and high CO₂ levels from cars and chimneys. The smartwatch flashes a red warning: “Air system unstable.” The heroes explain that even small daily journeys leave a mark in the air and invite pupils to investigate how their classmates’ travel habits affect the environment — and how simple changes could help make the air cleaner.</p> <p><u>Specific vocabulary introduced with simple definitions:</u></p> <ul style="list-style-type: none"> • Smog: dirty air caused by smoke and gases. • CO₂ (carbon dioxide): a gas released when fuels are burned, making the air dirty. • Carbon footprint: the amount of CO₂ produced by activities like transport. • CO₂ measuring station: a small device placed in an area that measures how much CO₂ is in the air. • Emission: the smoke or gas that comes out from cars or chimneys.

PUTTING IT INTO PRACTICE

Level 1	Activities
<p>8 – 10 years old</p>	<p><u>What the teacher says/does:</u></p> <ul style="list-style-type: none"> • Distributes the <i>Mission Sheet</i> and the <i>Transport Story Cards</i> among the groups and invites pupils to read and discuss the short stories within their group. • Explains briefly that each story represents a pupil’s daily journey and invites groups to discover its “footprint.” • Encourages discussion and reasoning rather than direct calculation guidance, offering small prompts such as: “Do they travel once or both ways?” • Collects and combines totals to reveal the footprint of the whole class. • • Introduces the second task: imagining small, realistic changes in transport habits, and comparing the new totals. <p><u>What the pupils do:</u></p> <ul style="list-style-type: none"> • Read and discuss the <i>Transport Story Cards</i> in small groups, identifying how each pupil travels to school. • Use the <i>Carbon Footprint Reference Chart</i> to calculate and record each journey’s emissions on the <i>Mission Sheet</i>. • Compare results across the class to find the total footprint for one day. • Revisit the stories to decide which journeys could realistically change and recalculate the footprint. • Reflect on how small choices can lead to big differences and share ideas on other everyday actions that could reduce pollution.

Level 2	Activities
<p style="text-align: center;">10 – 12 years old</p>	<p>The activity follows the same sequence as for ages 8–10.</p> <p>Differentiation:</p> <ul style="list-style-type: none"> • Pupils work with larger distances and totals, applying more precise calculations. • Calculate not only the difference but also the percentage reduction between the old and new footprints. • Explain and justify which changes are realistic or most effective in reducing emissions. • Reflect more deeply on the relationship between numbers and real-life impact — how data can guide sustainable decisions.

<p style="text-align: center;">Conclusion Level 1 8-10 years old</p>	<ul style="list-style-type: none"> • The teacher concludes the session by linking the discussion to the <i>Reflection</i> section of the Mission Sheet. Together, pupils review what they discovered about how daily transport affects the air and how even a few changes can make a visible difference. • The teacher guides them to think beyond transport: “We saw that cars and buses leave a footprint — but what else in our lives might leave one too?” • The discussion broadens to everyday habits, helping pupils realise that every small choice — at home, at school, or in the community — adds up to a cleaner planet.
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<p>Conclusion</p> <p>Level 2</p> <p>10-12 years old</p>	<ul style="list-style-type: none"> • The teacher concludes the session by linking the discussion to the <i>Reflection</i> section of the Mission Sheet. • Together, pupils analyse which changes made the biggest difference and consider why some habits are harder to change than others. • The discussion then shifts from numbers to real-life impact: <i>“If our own school wanted to reduce its footprint, where could we start?”</i> • The teacher encourages pupils to connect their results with broader ideas about responsibility and community action, showing that reducing the footprint is not only about individual choices but also about teamwork and planning for change. • Finally, the class reflects on the meaning behind their calculations — that understanding data is the first step toward improving the world around them.
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To go further...

Level 1 (ages 8–10):

- Pupils can build a class pledge wall: each writes or draws one promise for a small change (e.g., turn off lights, walk to a friend’s house, recycle paper).
- Pupils can take an outdoor walk: observe what transport people use in the neighbourhood.
- Pupils can connect with art: draw two pictures — one of a polluted city with cars, one of a clean city with bikes and buses — and compare them.

Level 2 (ages 10–12):

- Pupils can use the [Carbon Footprint Animation](#) to estimate their own footprint. Then, in groups, they discuss which everyday habits contribute the most and suggest realistic small changes to reduce it.
- Pupils can write a short persuasive text (letter, article, or speech) encouraging classmates to choose greener travel.
- Pupils could organise a community bike ride in their neighbourhood, inviting families and friends to join. During the event, they can share simple messages about how cycling instead of driving helps reduce pollution and improve air quality.