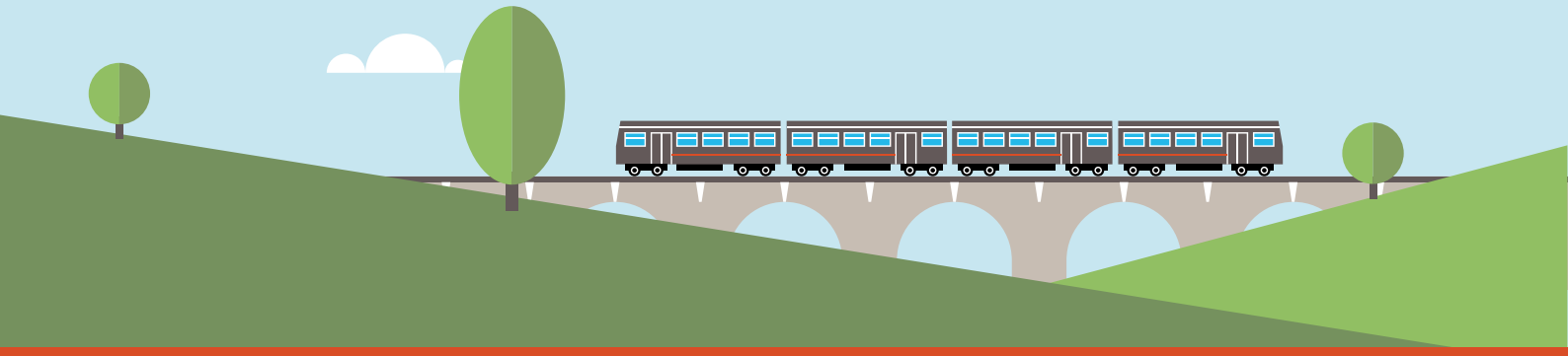
DiNGDiNG.ORG.UK

Little Planet



Teachers Lesson Plan - Key Stage 2

www.littleplanet.org.uk

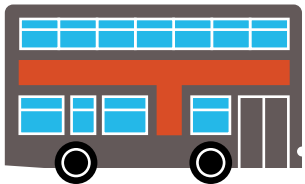
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Little Planet
Key Stage 2 Resource

The combustion of petrol and diesel to transport people is one of the largest human sources of CO2 emissions today. Little Planet is an interactive site that gives pupils the opportunity to investigate the impact on CO2 emissions of the journeys they make. They have the opportunity to compare different types of transport and determine how these, along with other variables, contribute to greenhouse gas emissions.

The learning combines the impact of the choices we make on environmental issues, with understanding statistics and using datahandling software.

The activities listed are designed to be used with Key Stage 2 pupils. To access all activities, pupils will need access to the internet on a computer or tablet and datahandling software, for example a spreadsheet. They will also need access to weighing scales.





National Curriculum Links

NB All links and quotations are taken from -
The national curriculum in England Framework document September 2013

Mathematics

"...in lower key stage 2...Teaching should ensure that they can use measuring instruments with accuracy and make connections between measure and number."

"in upper key stage 2... Teaching in geometry and measures should consolidate and extend knowledge developed in number."

Measure - Programme of study references

Pupils should:

- (Y3) measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- (Y4) estimate, compare and calculate different measures, including money in pounds and pence
- (Y5) use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling
- (Y6) solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate

Statistics - Programme of study references

Pupils should:

- (Y3) interpret and present data using bar charts, pictograms and tables
- (Y3) (Notes and guidance (non-statutory)) they continue to interpret data presented in many contexts
- (Y4) interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs
- (Y4) solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs
- (Y5) complete, read and interpret information in tables, including timetables
- (Y5) (Notes and guidance (non-statutory)) they begin to decide which representations of data are most appropriate and why
- (Y6) (Notes and guidance (non-statutory)) pupils both encounter and draw graphs relating two variables, arising from their own enquiry and in other subjects

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/244223/PRIMARY_national_curriculum3.pdf



Mathematics & ICT

"Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. In both primary and secondary schools, teachers should use their judgement about when ICT tools should be used."

Computing

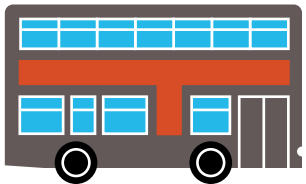
Purpose of study:

"A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science, and design and technology, and provides insights into both natural and artificial systems."

At Key Stage 2

Pupils should be taught to:

- select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information







Session 1

Learning Objectives

- Investigate online simulations.

Activity

Show pupils how to access the 'Little Planet' site. Show them how to change the variables available:

- Where do you want to go?
- Distance.
- How do you get there?
- How often?
- Just you?

Allow the pupils around 10 minutes to experiment with the site.

Key questions

- What information does the site give us?

This is an appropriate time to talk to the pupils about CO2 emissions and the way that these are measured. The amount of carbon dioxide (CO2) emitted from vehicles is calculated in grams per kilometre (g/km).

These sites provide further information along with games and quizzes to help pupils learn about global warming and carbon footprint. They are suitable for KS2 pupils.

http://www.clean-air-kids.org.uk/globalwarming.html
http://ecoagents.en.eea.europa.eu/
www.dingding.org.uk (in particular 'Ice, Ice Baby')



Session 2

Learning Objectives

- Investigate comparable statistics by changing one variable on the system.
- Create a bar chart to help determine the consequence of changing the variable.

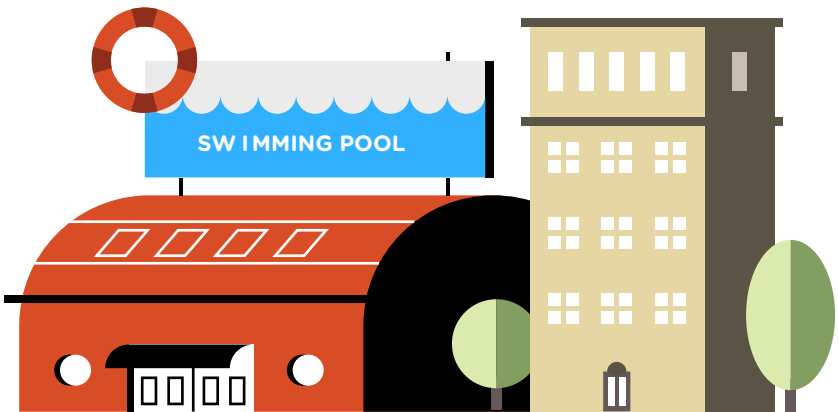
Activity

Talk to the pupils about the concept of a fair test. They should be familiar with this in the context of science and know that for a test to be fair, just one variable should be changed at a time. Discuss that in order to compare statistics, all but one variable must remain constant.

Set the pupils a challenge. You might want to use the suggested challenge on Appendix 1. The challenge uses the website to determine CO2 emissions where only the form of transport is altered. All other variables remain the same. You might want to discuss why this challenge is a useful exercise, even though some of the journeys are unlikely to be realistic e.g. travelling 5 miles by train.

Key Questions

- What does this challenge tell us about different forms of transport?
- What is the least environmental way of travelling?
- How should the family try to travel to the local shops and why?
- Is going by tram better than a small car? Why?
- From the graph work out which is environmentally more damaging - a 4x4 or a small car. Why do you think this is?
- Why may the family decide not to walk to the local shops?
- Find out what an eco car is? How does it differ from a normal car?
- Why do some people choose to go by car rather than take public transport?
- What are the advantages of going by public transport as opposed to a car or 4x4?
- How does the bar chart make it easier to decide which form of transport creates the most CO2?





Session 3

Learning Objectives

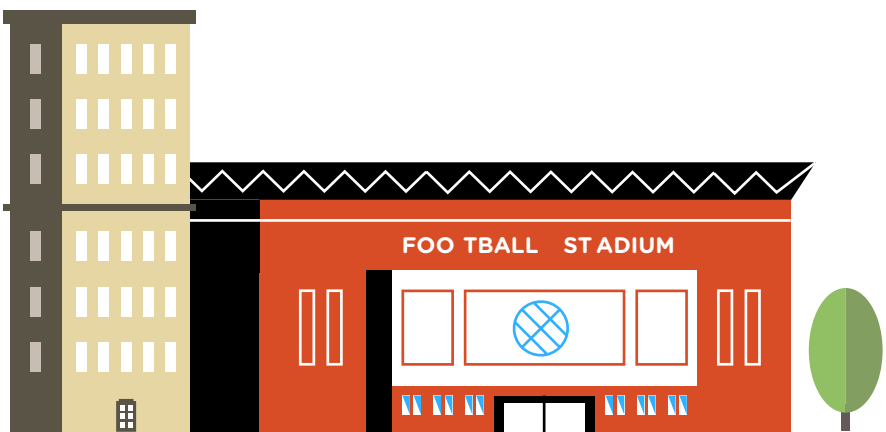
- Investigate comparative statistics by changing one variable on the system.
- Create a bar chart to help determine the consequence of changing the variable.
- Predict results.
- Check results by carrying out similar investigations.

Activity

Ask pupils to consider their results from Session 2. They are going to generate similar statistics, this time comparing forms of transport over a 10 mile journey. Ask them to record the CO2 emissions and show their results on a bar chart. You might want to use the suggested challenge on Appendix 2. Then draw a bar chart showing both sets of statistics on it to make comparisons easier. Pupils then predict results if a journey is 15 miles and test these predictions.

Key questions

- How much have CO2 emissions changed by?
- Are the results what you expected them to be?
- How does drawing the bar chart help us understand the data?



Session 4

Learning Objectives

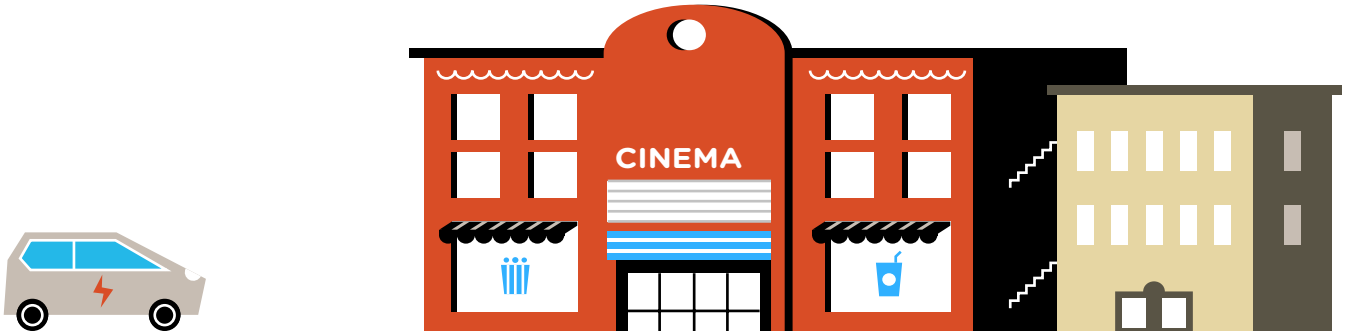
- Devise an investigation to determine the effect of different variables on CO2 emissions.
- Investigate comparative statistics by changing one variable on the system.
- Create a bar chart to help determine the consequence of changing the variable.
- Predict results.
- Check results by carrying out similar investigations.

Activity

Ask pupils to consider each of the variables on the 'Little Planet' site. They have already determined which type of transport creates the most CO2. Tell them that they are now going to investigate how the other variables affect CO2 emissions. You might want to use the suggested challenge on Appendix 3.

Key questions

- Were you able to predict any of the results before they were displayed?
- Were your predictions correct (or nearly correct)?
- Which factors effect CO2 emissions the most? Can you think of any reasons for this?
- Can you think of any other factors that might affect CO2 emissions (e.g. congestion, driving style, luggage)?



Session 5

Learning Objectives

- Weigh familiar objects found in the classroom.
- Use a range of calculation strategies to calculate how many of these objects equate to different CO2 emissions.

Activity

Pupils will have realised that CO2 outputs on the site are compared to the weight of everyday objects e.g. paperclips, pianos, pieces of Lego. Ask pupils to weigh objects found in the classroom and calculate how many equate to a particular journey. You might want to use the suggested challenge on Appendix 4.

Key questions

- How did you calculate the solution?

Possible extension activities

- How do you think the website works out the emissions and comparative numbers? Create a table to show CO2 emissions and comparable weights of everyday things.
- Prepare a presentation to show the results of the findings.
- Combine with travel safety and awareness of different types of travel by investigating www.dingding.org.uk ('Walking Safely' section).
- Find a way to communicate the concept of a CO2 emissions/carbon footprint to younger pupils.



Appendix 1

Bobby wants to travel from his house to the local shops with his family. There are four of them in the family altogether.

The shops are 5 miles away and they go once each week. Investigate the CO2 emissions that would be generated if they use each of the forms of transport available.

Record the amount of CO2 emissions in kg per year on the table below:

Type of transport	CO2 emissions
Walking	
Cycling	
Bus	
Small Car	
4x4	
Eco Car	
Family Car	
Tram	

Extension activity

You might decide to go straight to this part of the activity without completing the table above.

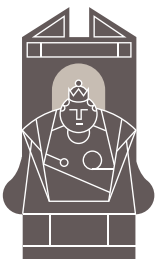
Enter the data onto a spreadsheet or other datahanding software and use the table to create a bar chart.

Answer the following questions

- What does this challenge tell us about different forms of transport?
- What is the least environmental way of travelling?
- How should the family try to travel to the local shops and why?
- Is going by tram better than a small car? Why?
- From the graph work out which is environmentally more damaging - a 4x4 or a small car. Why do you think this is?
- Why may the family decide not to walk to the local shops?
- Find out what an eco car is? How does it differ from a normal car?
- Why do some people choose to go by car rather than take public transport?
- What are the advantages of going by public transport as opposed to a car or 4x4?
- How does the bar chart make it easier to decide which form of transport creates the most CO2?







Appendix 2

Bobby wants to travel from his house to the local shops with his family of four.

The shops are 10 miles away and they go once each week. Investigate the CO2 emissions that would be generated if they use each of the forms of transport available.

Record the amount of CO2 emissions in kg per year on the table below:

Type of transport	CO2 emissions
Walking	
Cycling	
Bus	
Small Car	
4x4	
Eco Car	
Family Car	
Tram	

Extension activity

You might decide to go straight to this part of the activity without completing the table above.

Enter the data onto a spreadsheet or other datahanding software and use the table to create a bar chart.

Compare your results to those from Session 2 when the family travelled just 5 miles. Create a bar chart that shows both sets of data on it.

Answer the following questions

- How much have CO2 emissions changed by?
- Are the results what you expected them to be?
- How does drawing the bar chart help us understand the data?

Predict the results if the journey is 15 miles. Test your predictions. Are they what you think they would be? Show the results on a bar chart.



Appendix 3

Each year, Ruby travels to each of these places once. They are all 30 miles away from her house and she has a small car. Does her destination change the CO2 emissions of her car? You can use this table to record your results if you want to. predict your answers first and draw a graph to show the results.

Type of transport	CO2 emissions
Cinema	
Swimming Baths	
Theme Park	
Football Stadium	
City Shops	

Ajay wants to travel by tram to see his grandmother 40 miles away. He changes the frequency that he travels. How does this affect CO2 emissions? Can you predict the changes that we might see? Draw a graph to help understand the data.

Jason wants to travel to a concert by train. The journey is 50 miles away. How does the number of people travelling with him change the CO2 emissions? Predict your answers first and draw a graph. You can pretend that the whole world will travel with him if you like!

Key Questions

- Were you able to predict any of the results before they were displayed?
- Were your predictions correct (or nearly correct)?
- Which factors effect CO2 emissions the most? Can you think of any reasons for this?
- Can you think of any other factors that might affect CO2 emissions (e.g. congestion, driving style, luggage)?



Appendix 4

John wants to go to the cinema 20 miles away with his family of four. He goes there once a month and always travels by tram. This creates 55kg of CO2 – you can check this on the Ticket to Kyoto website.

If an apple weighs 100g, how many apples are equivalent in weight to the CO2 emissions for this journey?

Find out how much CO2 is created on one of the journeys that you make e.g. travelling to school each day, going to the theme park once a year with your family, going to the swimming baths with your class each week.

Find an object in the classroom and weigh it.

Work out how many of these objects are equivalent in weight to the CO2 emissions for this journey.

Can you find another everyday object that we could use to compare this journey?

How many of this everyday object equate to the CO2 emitted for the journey?

Answer these questions

- How did you calculate the solution?

