



MAKING THE FUTURE: LESSON PLAN

Welcome

The Climate Action Toolkit is a set of enriching and engaging classroom activities designed and tested by Cambridge University for Y5-6 pupils (9-11 years old) to explore the urgent topic of climate change. 5 hour-long lessons have been designed by experts from across the University of Cambridge and tested in primary schools.

Lesson Plan

Activity	Guidance	Resources Needed	Time
01 Starter Everyday Inventions	<p>This activity aims to get pupils realising that nearly everything they use or see in their lives was once invented! They were all designed and made to solve some kind of problem. As times change, people have different problems that need solving, so different inventions are needed. From here we will scale up to build confidence that they can be part of this inventive world.</p> <p>What to do for this activity: Hand out the bingo cards with everyday inventions Tell the story of Ethan's morning routine. Pupils should get bingo with 'bus' at the end of the story.</p> <p>Script (optional) We're going to play a game of bingo. You have a card with 16 different things that someone once invented. These are all inventions because someone had to think about what they would make and how to make it...</p> <p>I'm going to read a story. Every time you hear a name of an invention on your card, put an X through that item. When you get a full line of inventions crossed out, then put up your hand and say BINGO!</p> <p>Script: Thea's story It is the year 2030. Thea woke up to the sound of her phone's alarm. She stretched, yawned, and turned on the lights. The energy comes from a wind turbine in her community.</p>	Bingo cards	5 min





MAKING THE FUTURE: LESSON PLAN

She headed straight to the bathroom to use the **toilet** before turning on the **tap** to wash her hands. Next, she picked up her **toothbrush** and squeezed a line of minty toothpaste onto it. She brushed her teeth in front of the **mirror**.

Back in her room, Thea got dressed: socks, **pants**, and her school uniform. Then she headed to the kitchen to get a bowl of cereal and **plant-based milk** from the fridge, and sat down to eat. The crunchy cereal filled her up, giving her the energy she needs for school.

When it was time to leave, Thea slid her feet into her **shoes** and grabbed the **keys**. She locked the house behind her and headed toward the bus stop, where the **electric bus** soon came rumbling down the road. She climbed aboard, finding a seat next to her friends, and the electric bus took them all to school!

Extension: If you want to extend this activity, this is one possibility: What other inventions are there in your morning routine? Come up with as many as you can. We recommend you set a time limit, like 2 minutes for this, and write on a mini white board. You may want to get them to count up the inventions and write the number they found on the other side of the mini whiteboard.

Could be a competition. Who uses the most inventions? Who the least?

Discussion:

Thea's life looks quite similar to ours today... can you spot any differences?
Which of the bingo card inventions are particularly important for helping us tackle climate change?

Can pick any of the inventions below:

Transport: Thea goes to school on an electric bus. How we get around will have to change, away from private cars to public transport and





MAKING THE FUTURE: LESSON PLAN

	<p>active transport, like walking and bikes. Using electric transport to move away from fossil fuels.</p> <p>Energy/Lighting: The energy needed to light the lights in Thea's home is renewable. It comes from a community wind turbine. We will need to switch to renewable energy like solar or wind. Use low energy devices.</p> <p>Plant-based food: Thea has plant milk on her cereal. Eating more plant based food instead of animal-based food reduces emissions from dairy and meat production</p>		
02 Activity Story of Transport	<p>This activity aims to get pupils to start thinking about the inventive process, how people are continually changing how their world looks through design and engineering.</p> <p>The activity does this by looking at how much transport has changed over time due to new inventions. These reflect the different priorities that people have had across time. Inventing new, faster or more convenient ways of travelling was once a priority, but this has not always been good news for the environment. Some of the most ancient ways of getting around, like walking, are the least polluting, and some of today's ways of getting around, like cars, are the most polluting!</p> <p>The activity starts in the present day and progresses back in time step by step. After this we look to the future, and think about how transport might change. The key idea to get across here is that future transport needs to be not polluting, Good for the environment, and perhaps good for people's wellbeing and health.</p> <p>This activity aims to start getting them to think creatively, to invent, and to realise that they can be part of that creative journey. Thinking about how people's changing needs leads to developing new inventions and making the ones we have already better.</p> <p>Go through each of the numbered time periods below. For each go through the following steps.</p>		10 min





MAKING THE FUTURE: LESSON PLAN

- Show slide 1: the question
- Ask class for ideas. Write these down on the board
- When you have a 'complete' list of transport options for that time period, you could get pupils to vote on which they think was the most likely.
- Show Slide 2: some pictures of example transport in that time period.
- Make sure all the modes of transport in that period are written on the board.
- For following time periods, you could then get pupils to vote on if they think people still travelled by 'car', 'bus', 'bike' etc. Thumbs up/thumbs down or similar to decide. Any different ways of transport than are on the board currently? Did any of them look different? How?

The remainder of this section outlines some suggestions and information that can help with this section.

- How did you get to school this morning? Get ideas from class. Next slide shows some means of transport. Could get pupils to vote on which they used. Bike/E-bike, train, bus, car, walking. Mention that many buses are electric, or hybrid which are less polluting when electricity is from renewable energy. This exercise is looking at local journeys, so avoid using examples of planes and long-distance transport here and keep it local.
- How do you think people travelled locally when your parents and teachers were kids? Ask pupils to share ideas. If there are multiple options that come out of this, then that is fine, or you could make it a vote to see which they think is the most common option. For example: 'put your hand up if you think they still had buses, 'put your hand up if you think they still had electric cars'. The next slide shows slightly older transport. Here the transport is more polluting than the versions we have today, as they rely on fossil fuels or are less efficient. Even electric trains were more polluting then than they are now as they used electricity from conventional power stations which burned fossil fuels.





MAKING THE FUTURE: LESSON PLAN

	<ul style="list-style-type: none">• How did people travel locally in the Victorian times? Ask for ideas The next slide shows some victorian transport. Share the information below. Family cars were very rare. Some families may have used a horse and cart, especially in the countryside. Buses were popular, some were horse-drawn and some were motor powered. Trains were steam engines, and they all burned coal which is very polluting. Overall, there was much less transport than today, but if there had been lots there would have been a lot of pollution from burning coal. However, some ways of getting around, like using horses and walking were much less bad for the climate.• How did people travel locally in the ancient times? Ask class for ideas. If using the hand's up style of voting you could ask if you think that people still used buses? bicycles? trains? The next slide shows some ancient transport. There were no engines, only ways of transport used people or animals to power or were boats powered naturally by the wind. Most people would have walked everywhere• How will kids travel to school in the future? Pose the question and choose one of these options for facilitating:<ul style="list-style-type: none">• Individually - Get pupils to brainstorm or sketch an idea on their mini white boards.• As a whole class activity - gather ideas in a brainstorm and jot them all down on the board. <p>Could extend discussion around this to ask which of the 'future' ideas fulfil these.</p>		
03 Activity Would you rather?	<p>The aim of this activity is to encourage pupils to think about the importance of inventions and the impact they have on daily life and society. It encourages imagination by imaging life without different inventions, helping pupils to think creatively about ways that people could adapt or solve problems differently.</p> <p>How to facilitate:</p> <ul style="list-style-type: none">• There are a series of slides, each with 2 inventions shown side by side.		10 min





MAKING THE FUTURE: LESSON PLAN

	<ul style="list-style-type: none">• Pupils pick the 'invention' that they would choose to keep. Imagining the other one had never been invented. Suggestions have• been given on the slides, but you can change pairings if you like. Start with something silly and everyday, and then move to bigger picture, more thought provoking pairings. We think 5-6 is a good number to use. This can be fast paced, or you could draw out a pupil to explain why they made the choice they did. <p>Script to introduce (optional): In a moment, you'll see two inventions on the screen—one on the left and one on the right. Your job is to imagine that you can only keep one of them. The other one never existed! Think about which invention you couldn't live without.</p> <ul style="list-style-type: none">• If you choose to keep the invention on the LEFT, put your hands on your HEAD.• If you choose to keep the invention on the RIGHT, put your hands on your HIPS. <p>Alternative: this could be done outdoors or in a large space, then pupils could go to one side of the room or the other to stand at the side of the invention that they want to vote to keep.</p> <p>Other inventions we thought might work for this are: Cutlery, Glass/cup, Gunpowder, Bikes, School uniform, Fridges, Washing machine, Engines (cars/trains/buses/planes), The internet, Electricity, Clothing, Paper (including toilet paper!), Soap, Roads, Wheels, Toilets, Medicine, Running water</p>		
04 Activity Climate Change Inventions	<p>This next section moves the inventing and creativity towards climate change. Here we are trying to draw out big solutions and crazy ideas.</p> <p>Think like an inventor Introduce by pointing out that all these things we have seen are innovations - designed by people to make life better and solve problems. We are all problem solvers, and trying to make</p>	<p>1 piece of plain paper per student</p> <p>Pens/pencils</p>	<p>20 min</p>





MAKING THE FUTURE: LESSON PLAN

the world a better place. The name for people who design and make things to solve problems for their job is an engineer.

- Start by showing the slide to spot climate change inventions. We already are familiar with many inventions that can help the climate. In this picture there are: solar panels, wind turbine, bicycle (green transport), recycling... these are all inventions.
- The remainder of the activity gets pupils to start inventing and creating themselves. The first slide is an example to model to pupils what a good solution looks like. Of course, there are no right and wrong answers here, and crazy ideas are encouraged!
- The example is a device to keep ice cream cool as climate change is making the summers hotter. Show the example answer. You could discuss how this could be improved, or other ways you could have solved the problem differently.
- Pupils pick one of the first challenges to draw a design for. Either 'too much rain' or 'getting to school'. Set a time limit - 3-5 minutes is suitable.
- Extension for fastest pupils: Throughout this exercise, if you have pupils who are progressing faster, their extension is to label and explain how their invention works, as in the example.
- Get pupils to share their idea with the person next to them. 30 seconds to describe, and 30 seconds to ask questions about it each.
- Encourage them to give each other feedback in their pairs: 'Do you think their design would work?'; 'What do you like about their design?'; 'How could they make it better?'
- Show the slide with the bike with square wheels... not all designs work! That is ok! All good designs have been through lots of cycles of design, testing and improvement.
- Repeat the design and drawing exercise as before with the 2 new challenges: 'water saver' and 'clean energy'. Pupils choose 1 of the challenges and draw their own invention.





MAKING THE FUTURE: LESSON PLAN

	<p>Suggestions: Depending on your pupils, I would avoid colour to keep it as focused on the inventions, rather than becoming a colouring-in exercise.</p> <ol style="list-style-type: none">1. Pupils choose 1 of the challenges and draw their own invention.2. Extension for fastest pupils: Label and explain how it works3. All then pair with someone nearby and take turns to explain their invention.		
05 Plenary	<p>To conclude the lesson, each pupil must take their invention and share with another pupil (1 minute to find someone and assign/be assigned (could number off from 1-16 to pair everyone). The pair then take turns to describe their invention, what its features are and how it works.</p> <p>1 minute per describer, 1 minute to ask questions of each. Then swap</p> <p><i>Teaching Suggestion: If you think your class might struggle with this, ask two pupils to do this in front of the class as an example before commencing the activity.</i></p> <p><i>We initially thought that pupils should be paired with another who has done a different challenge, but the chance you have a 50/50 split is very small!</i></p>		5 min
06 Extension	<p>These are a few suggestions that could be used to extend these activities for a longer session or follow-on.</p> <p>Improving inventions</p> <p>If you wanted to make either of the inventing activities into a longer activity, you could discuss with class what made ideas good and why?</p> <p>They could then improve their inventions using some of the good ideas they have seen around the classroom, or inspired by them.</p>		Optional





MAKING THE FUTURE: LESSON PLAN

05 Plenary	Showcase of ideas <ul style="list-style-type: none">• Students could make posters of their ideas• Display them on tables or around the room• In groups or as a class, move around the room to look at different designs• Put post it notes on designs with their own feedback: WWW/EBI• Vote for their favourites using 'dot stickers'		5 min
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Further resources

The above lesson plan is designed to be inclusive and creative. This kind of topic has strong links with engineering which is all about being creative and solving problems to make people's lives better. However, this is a career that there are often a lot of misconceptions about, and has a lot of mileage for follow-on lessons if design and invent struck a chord with your class.

A great starting point is this video from Thisisengineering (<https://www.youtube.com/watch?v=V0jesBygDUw>). It shows some of the exciting breadth of activities engineers do, and how they improve lives. Its 2 minutes and really worth a watch and short discussion about what was surprising, and to get a real flavour of what engineering is and the difference it makes.

If you want to make links to engineering stronger, or explore this aspect further with your pupils, there are some great resources produced by the Royal Academy of Engineering, including lots of video profiles of exciting projects by diverse engineers. They can all be accessed at <https://thisisengineering.org.uk/>

