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| SUBJECT: KS2 SCIENCE - AIR QUALITY – My Naturehood Air Quality Trail    LEARNING OBJECTIVE: To learn about positive and negative impacts on air quality.  Key vocabulary: pollution, air quality, climate change, gases, exhaust, emissions, fumes, particles, oxygen, nitrogen dioxide, health, lungs, fossil fuels, petrol, diesel, idling, biodiversity, nature, impact, solar.  **Teacher knowledge:** information will be found at the end of the lesson plan.  **Teacher preparation:** Teachers will need to provide a street map of the local school neighbourhood including green spaces, quiet and busy roads (an A4 page printed from google maps will suffice). If this isn’t possible, a map is provided on slide 4 to discuss.  Teachers (or pupils) prepare a large sketch map of the local school neighbourhood for display. | | | | |
| TEACHER RESOURCES:  Powerpoint ‘AIR QUALITY – My Naturehood Air Quality Trail’  Post-it notes  Pencils  Sticky tac  Coloured felt pens/pencils/crayons | | | Photograph pack (1 pack per 4-6 pupils)  A4 local street map (1 copy per 2 pupils)  Large sketch map of local school neighbourhood (teacher prepares)  Provide a sketch map of local school neighbourhood or pupils draw their own map (1 sheet per pupil)  Flip chart paper with title ‘POLLUTION SOLUTIONS’  Homework sheet (1 per pupil) | |
| **LESSON**  **TIMING**  **1 hour** | **OBJECTIVE** | **ACTIVITY** | | **RESOURCES** |
| 5 mins | Prior knowledge assessment | Discuss the learning objective – To learn about positive and negative impacts on air quality. (Discuss the meaning of the word ‘impacts’ = *effects/influence*)  Discuss pupils’ prior knowledge on air pollution/air quality.  *Key questions:*  *What is air pollution?*  *How does it affect us? Why should we care about air quality?*  *What can be done to reduce air pollution and improve air quality?*  Explain what ‘air pollution’ is: (slide 2)  **Air pollution** is when unwanted chemicals, gases, and particles enter the air and the atmosphere causing harm to humans and animals and damaging the natural cycles of the Earth.  Road transport is estimated to be responsible for about [50% of nitrogen oxide emissions in London.](https://www.londonair.org.uk/LondonAir/guide/WhatIsNO2.aspx) 30% comes from wood burning or heating. | | Powerpoint slide 1 - 2 |
| 10 mins | Identify positive and negative impacts on air quality. | *Discuss key questions:*  *How does walking to school help reduce air pollution?*  *What do you see on your way to/from school?*  *What things do you notice on your walk to school that can be ‘good for’ (positive impacts) or ‘bad for’ (negative impacts) on air quality?*  ACTIVITY 1:  Hand out a photo pack to each table. Pupils discuss and identify what are positive or negative impacts on air quality, i.e., bio-diversity (trees, plants, birds, insects), idling cars, transport, cycle lanes, bicycles, paved front gardens, speed limit regulations, low emission zones, school streets, parking, electric car charging points, solar panels, electric car/bike/scooter, etc.  Put them in separate piles for positive or negative impacts.  Discuss pupils’ findings. | | Powerpoint slide 3  Photograph packs (1 pack per 4-6 pupils) |
| 10 mins |  | ACTIVITY 2:  Explain that pupils will be studying maps to pinpoint negatives and positives of air quality locally.  Display the London street map.  *Questions:*  *Which areas do you think might have poor air quality? Which areas do you think have better air quality? Where can you see a park?*  Display your local street map (or the map provided on slide 4).  *Do you recognize any of these places?*  *Which roads do you think are busy? Which roads do you think are less busy? Where do you think there will be more pollution?*  Display photos of things around the local school area.  What things do you notice around your school?  Here are some examples from the Finsbury Park neighbourhood:   * Gillespie Park * a Japanese loquat tree - there are only 31 of them in streets in London and they help to purify (clean) the air. * Wetlands - wetlands can act as natural flood defences and 'carbon sinks', removing carbon dioxide from the atmosphere and storing it away. | | Powerpoint slide 4  Powerpoint slide 5  Powerpoint slide 6 |
| 25 mins |  | Explain that pupils are going to create a ‘Naturehood Air Quality Map’ identifying impacts on air quality and nature in their neighbourhood. Describe it as their ‘naturehood’ (explaining the link between ‘nature’ and ‘neighbourhood’).  Display the local drawn sketch map.  Discuss what pupils might see along their route to school. A pupil from each table draws on the large map where an ‘impact’ might be seen (e.g. a bus).  Teacher chooses pupils to mark locations on the large map by drawing in green pen for ‘positives’ and a red pen for ‘negatives’.  Teacher models drawing items on the map e.g. trees, cars, bikes, green roofs, electric bus, etc.  Teacher models drawing a less polluted route to school.  Explain that pupils will be doing this on their own map.  Provide a sketch map of the local school neighbourhood or pupils draw their own map with reference to the google map and the teacher’s sketch map.  Hand out A4 copies of the local map/plain paper and pens/pencils.  Pupils work in mixed ability pairs to draw ‘positive’ and ‘negative’ items on the map. (It may be useful for pupils to refer to the photo pack from Activity 1.) | | Powerpoint slide 7  Powerpoint slide 8  A4 copies of the local sketch map/plain paper and pens  Photograph packs |
|  |  | OPTIONAL EXTENSION ACTIVITY:Pupils draw a map of their walking route to school.Reminder: pupils to mark the school in a position where they follow their local route home, i.e. the school located in one corner of the grid which enables them to mark a route to their home. | | Grid paper |
| 10 mins |  | PLENARY  Pupils discuss the positive and negative pollution impacts they have added to their maps.  Each pupil draws on a pollution solution on a post-it note and sticks it to POLLUTION SOLUTIONS chart. | | Powerpoint slide 9 |
|  |  | HOMEWORK  Explain that pupils will use their map on their walk to/from school to create their own ‘My Naturehood Air Quality Trail’. They will identify and add positive and negative impacts they see on their route. i.e. trees, bushes, green pavements, cars, one person in car, green roofs, green roundabouts, electric cars or scooters, electric car parking places, etc. Pupils may also use the website [www.treetalk.co.uk](http://www.treetalk.co.uk) where they can type in an address to create a daily walk. This then identifies trees along their route.Pupils may use the app SEEK (by iNaturalist) where they can take photos of flora and fauna and identify them. | | Powerpoint slide 10  Homework sheet (1 per pupil)  [A Tree Trail | Create and discover the best local tree walks and trails on your streets with TreeTalk London](https://www.treetalk.co.uk/route/3af98ad7-e671-4d5b-ad0e-5ff797622c88) |
| **FOLLOW UP** | | Plan a review lesson to discuss and compare pupils’ findings.  Key questions:  *What did we find in common?*  *What surprises did we find?*  *What suggestions can we make to improve air quality in the future?* | | Pupils completed homework sheets |
| **Follow-up lesson activity ideas:** | | Literacy: Pupils could write a letter to a local MP with their proposed suggestions to improve air quality.  ICT: Pupils could produce their findings on a map on an ipad/computer.  Pupils could present their findings in a PowerPoint.  Science/ICT:  Pupils could use the SEEK app and/or [www.treetalk.co.uk](http://www.treetalk.co.uk) to complete their maps and to identify species and trees on their walk.  Geography: Use map co-ordinates to locate items on their maps. Create a Key.  • Create a large simplified road map of the school, and mark on it the areas of high/low pollution.  • Deliver a school assembly or to a parents’ coffee morning on their findings and the impact low-pollution routes may have on the health of the school community.  • Ask if the findings can be included to improve the School Travel Plan.  • Upload information to a global community science projects, such as the Mapping for Change Community Maps. [Planting Healthy Air in Schools - Mapping for Change | Mapping for Change](https://mappingforchange.org.uk/projects/planting-healthy-air-in-schools/) | |  |
| Learning Outcomes: **Some will** suggest positive impacts to reduce air pollution.  **Most will** be able to identify what can reduce air pollution.  **All will** understand what air pollution is and that there are positive and negative impacts.  Cross-curricular subject links: Geography (mapping skills); Science, ICT, Literacy, PSHCE, Numeracy.  **National Curriculum links**  This activity develops key concepts and skills which are fundamental to curriculum subjects, including:  • Science: planning and carrying out scientific investigations; gathering, analysing and evaluating evidence; and communicating scientific information.  • PSHE/Citizenship: recognising that individual choices and behaviour can affect issues and political and social institutions; researching, debating, talking and writing about their own and others’ viewpoints on issues that affect themselves and society; and playing an active role as citizens, making real choices, participating in decision making and leading a healthier, safer lifestyle.  • English: developing skills of speaking, listening, reading and writing for a purpose, investigating, planning, predicting, debating, and communicating to the wider community in the context of an issue which is real, relevant and motivating.  • Geography: undertaking a geographical enquiry, asking geographical questions, collecting and recording evidence, recognising how people can improve or damage the environment, explaining their views on a geographical issue, identifying opportunities for their own involvement in managing environments sustainably and communicating in ways appropriate to the task and audience.  • ICT: developing research skills, preparing and interpreting information using ICT, presenting information via desk-top publishing or multi-media presentations, sharing information via the internet.  •Numeracy: co-ordinates and grid references. | | | | |
| **Teacher knowledge:**  **Air pollution** is when unwanted chemicals, gases, and particles enter the air and the atmosphere causing harm to humans and animals and damaging the natural cycles of the Earth. Some sources of air pollution come from nature. These include eruptions of volcanoes, dust storms, and forest fires.   Human activity is a major cause of air pollution, especially in large cities. Human air pollution is caused by things such as factories, power plants, cars, airplanes, chemicals, fumes from spray cans, and methane gas from landfills.  **Air pollution** can have extremely negative impacts on health and well-being, leading to serious health problems. These impacts are often most severely felt by vulnerable people such as children, older people and those with existing heart and lung conditions.  People living in areas near major roads - which are often some of the most deprived parts of London - are exposed to particularly high levels of pollution.  Air quality is about how healthy the air that we breathe is. Air is made up of “good” gases like **oxygen** that we need to breathe, “bad” gases like **nitrogen dioxide** that affect our health, and tiny particles like “**dust**”.  **AIR POLLUTION IN SCHOOLS**  Pollution on school grounds can be minimised by increasing the amount of **foliage. Plants** reduce the amount of **carbon dioxide** in the air, they increase oxygen, and they help eliminate **toxins**. Studying and increasing the number of plants in the classrooms, throughout campus and on the grounds, could be linked to the school’s science curriculum, and choosing herb, vegetable and flower varieties would be an ideal class project. Low maintenance plants that excel at **purifying air** by absorbing pollution include cacti and ivy.  Installing a **green roof** can be another source for air purification and pollution reduction on the school grounds and could serve as a school project in conjunction with the school’s curriculum. The air quality benefits of a green roof stem from the plants’ ability to reduce carbon dioxide levels and airborne particulates. Other benefits include increasing **biodiversity**, improving the thermal performance of buildings, and reducing surface run-off of water (see case studies for examples of school installing green roofs).  **SOLUTIONS TO AIR POLLUTION IN SCHOOLS**  All schools will have unique challenges to overcome when implementing a successful school travel plan and maximising air quality benefits. There are many common barriers schools may encounter, such as cost, awareness, apathy, time and safety concerns. Simple and effective solutions that you can use to reduce emissions and exposure to air quality associated with travel to and from school include:  • Mark out and publicise **walking and cycling** routes which are **safer and with cleaner air**, as chosen by your staff and pupils. Encourage participation through a walking or cycling “bus” scheme.  • Publicise **existing cycling routes and networks**, such as those found on the TFL and Sustrans websites  • Create **park and stride zones**, marking out exclusion areas within which parents are not allowed to park in (i.e. within one mile). Identify possible areas where parents can park, and walk the remaining distance (further ideas and guidance can be found on the Walk to School website).  • Create and publicise a public transport route map to highlight to staff and pupils opportunities for travelling to school by public transport.  • If walking, cycling or using public transport is not practical, consider setting up a car share scheme.  • Design competitions amongst parents, pupils and classes to promote healthier ways of getting to school  • Create scooter and cycle park areas for safe storage during the day. Funding may be available for cycle and scooter parking; please contact your borough officer of TFL for further details.  • Offer incentives or prizes for sustainable travel - TFL, local councils and sustainable transport charities may be able to support you.  • Link themes and projects to school curriculum, and use online learning resources to increase interest (e.g. Generation Green, Young Crossrail). Ensure that cycling and walking are part of the **physical education curriculum** to help steer pupils towards **healthier choices outside the classroom.**  • Establishing **pupil and teacher air quality/healthy lifestyle champions** to raise awareness can be very effective.  • Encourage school participation in **cycle proficiency training** offered by the British Cycling Team Go-Ride scheme and TFL, and take part in the Met Police’s free cycle security marking scheme. | | | | |