



Upper Key Stage 2 Lesson Plans

Below is a detailed lesson plan, and then further brief lesson plans. These have been designed with key learning objectives and curricular links in mind. The Air Quality Experiments could also be done with Key Stage 2 pupils.

Upper Key Stage 2 Detailed Lesson Plan

Curriculum links:

Science: Undertaking scientific enquiries to answer questions about our world and human behaviour

Science: Exploring the impact of our environment on how our bodies function, including learning how pollutants can be harmful to the human body

Geography: Using fieldwork and observational skills to study the key human and physical features of their school, home and local environment

You Will Need

- Pens or pencils
- Printed copies of worksheets one, two and three
- Whiteboard and marker
- Internet access (for viewing images)

Opener: Great Smog of 1952 (5 mins)

- To start the lesson, display a gallery of images from the Great Smog of 1952. The Guardian has a good collection: www.tinyurl.com/smog1952
- Explain that smog is a kind of dirty fog. In 1952, the weather was very foggy. The fog mixed with lots of dirty smoke from people's coal fires and pollution coming out of power station and factory chimneys.
- This mixture of weather and pollution created a very poisonous blend. The smog was so dirty and thick that it stopped traffic and gave lots of people serious breathing problems. Sadly, the Great Smog of 1952 killed over 4,000 people.
- The terrible conditions and the deaths of people and animals made everyone very angry. The government responded by passing a new law that banned the dirtiest types of smoke and stopped factories and families using coal and smoky wood burners in the city.

Class Activity: Higher or Lower? (10 mins)

- Tell your class that you are going to play a dangerous guessing game. Write "Air Quality" in the middle of your whiteboard with a vertical line and big arrows above it and below it. Using **Teacher notes 1.1: Higher or Lower?** as a guide, ask your class to raise their hands if they think each of the different hazards is more dangerous (higher!) or less dangerous (lower!) than poor air quality or the other hazards already listed.
- Order students' responses on the whiteboard. You may wish to group responses agreed table by table or take a note of the majority's answer. Once you have ordered all eight hazards

you can reveal the real answers.

Group Work: The Air That We Breathe (20 mins)

- Use the results of the previous activity to prompt a short discussion. If necessary, use the following prompts to guide the discussion:
 - Did they get the order right?
 - Were there any surprises?
 - Did your class expect poor air quality to be this dangerous?
 - Does the air your class are breathing now look as polluted as it did in the Great Smog?
 - What do they think modern pollution is?
- Ask your class to take a deep breath and think about what is going into their lungs. Air is a mixture of gases that we breathe in thousands of times a day. The mixture changes depending on where we are and what we (or others) are doing. Can the class think of anything we do that might change the quality of the air around us?
- Hand out Worksheet 1.1: The Air That We Breathe and talk your students through the basic make up of air and the pollution that might be in it. Ask your students to work in pairs or small groups to complete the activity on the worksheet. When encouraging them to imagine the very worst place and the very best place for air quality, encourage them to think both realistically (a bus station) and fantastically (a bus station on top of a volcano).
- Draw a line down the centre of your whiteboard, labelling one half “worst” and one half “best”. Ask each group in turn to describe their worst place from the last activity, noting key attributes on the “worst” half of your whiteboard. If needed, prompt them to provide explanations for their decisions. After each group has described their places, ask the rest of the class if they can think of local places with those key attributes. They may not find any active volcanoes but there may be places with lots of idling traffic, industrial areas or power stations. Add any locations your class think of to your whiteboard.

Worksheet: Routes to School? (10 mins)

- Hand out Worksheet 1.2: Routes to School and ask each of your pupils to fill in the survey.
- Explain that the answers to this survey will combine with the school’s assembly answers to help them find evidence of people changing their habits in ways that will help improve local air quality. Once your pupils have filled in the survey, collect the sheets and put them away until next lesson, for review with the Air Quality Detective results.

Close: Air Quality Detective (5 mins)

- Tell your class that their homework is to become an “Air Quality Detective”. Each of them will be exploring their school route, investigating the local area and questioning their family. Hand out Worksheet 1.3: Air Quality Detective and walk them through it. Explain that next time you have an air quality lesson they will report back on their investigations!

Teachers Notes 1.1 Higher or Lower?

MOST DANGEROUS

SMOKING

Smoking is responsible for 96,000 deaths a year in the UK, mainly from cancer and heart or lung problems

OBESITY

In the UK, obesity and complications arising from obesity were responsible for 34,100 deaths in 2015

DROWNING

Around 200 people accidentally drown each year in the UK

LIGHTNING

30 to 60 people are struck by lightning each year in the UK, but less than five die as a result

AIR QUALITY

In the UK, 28-36,000 premature deaths a year are linked to a number of different types of poor indoor or outdoor air quality

TRAFFIC ACCIDENTS

1,775 people died because of traffic accidents in the UK in 2015

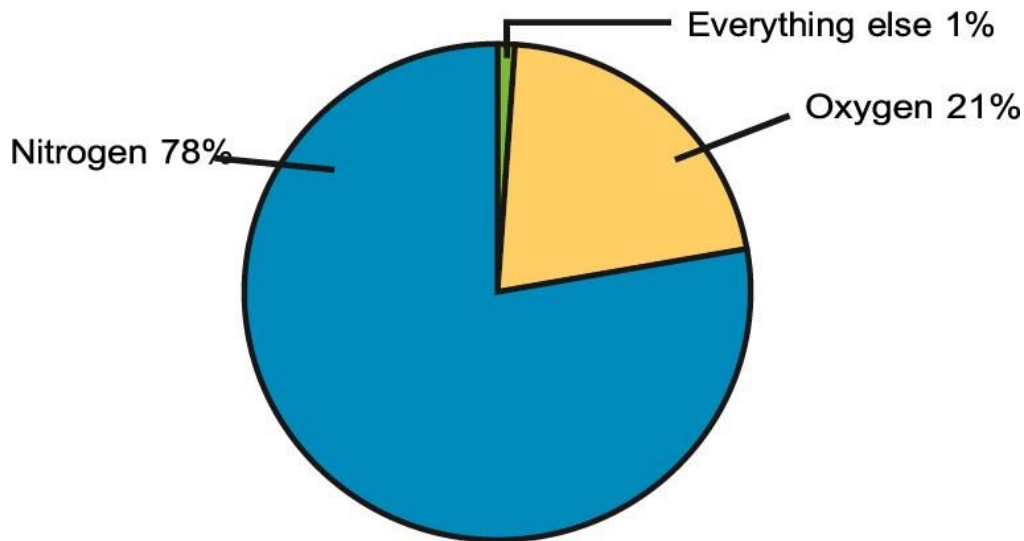
BEE STINGS

Five people a year die because of bee or wasp stings in the UK

SELFIES

No deaths in the UK were caused by selfies. However, there were 28 selfie-related deaths worldwide in 2015. That's 20 more than deaths than were shark-related

Worksheet 1.1 The Air That We Breathe



99% of our air is made up of nitrogen and oxygen, gases that are friendly to humans. However, an increasing amount of the remaining 1% of air is made up of harmful substances called pollutants. Too many of these pollutants create poor air quality. Air quality is a measure of the healthiness of our air.

We pollute our air in lots of different ways. When cars, vans or buses burn fuel in their engines, polluting fumes come out of the exhaust pipe. Some houses use coal, wood or gas fires to keep warm or cook, which produces polluting smoke. Half of electricity used is made in power stations that burn coal, oil and gas. These examples are all caused by humans. However, pollution can also come from natural sources, such as volcanoes or pollen.

Read the descriptions of five types of pollution below. The first two types of pollution on the list (nitrogen dioxide and particulates) are the most concerning in Swindon.

- Nitrogen dioxide comes from car exhausts, burning fuel in power plants, cigarettes and thunderstorms. You can find lots of it in cities during rush-hour traffic. It is dangerous for humans, especially people with asthma.
- Particulates aren't gases but lots of bits floating around in our air, including aerosols, smoke, fumes, dust, ash and pollen. Particulates get into our lungs, contributing to heart and lung disease.
- Carbon monoxide comes from burning fossil fuels. You'll find it wherever there are cars, taxis, buses, or fires. It causes headaches, fainting and eventually suffocation.
- Carbon dioxide (CO₂) comes from humans (and other animals) breathing out. At high enough doses it has the same toxic result as carbon monoxide - and it's also very bad for the planet. Increased carbon dioxide is the reason a room filled with people feels stuffy (besides temperature). Other sources of CO₂ are fires, volcanoes, cars and aeroplanes.
- Sulphur dioxide is a smelly but colourless gas that come from power stations and volcanoes. It combines with water in the air to produce acid rain.

Where might you find poor air quality? Imagine the very worst and very best places and describe them here.

Worksheet 1.2 Routes to School

Name: _____

Year: _____

Class: _____

School: _____

Please circle: Girl Boy

Age: 5-6 7-8 9-10 11+

What is important to you on your route to school?

What is worrying about your route to school?

Reason	Rank 1 to 6 1 = most 6 = least Use each number once
Being safe	
Being on time	
Being with friends and family	
Good exercise/healthy	
Having fun	
Saving money	

Reason	Rank 1 to 6 1 = most 6 = least Use each number once
Being safe	
Being on time	
Being with friends and family	
Good exercise/healthy	
Having fun	
Saving money	

What do you like about your route to school?

- 1.
- 2.
- 3.

What don't you like about your route to school?

- 1.
- 2.
- 3.



Worksheet 1.2 Routes to School

How do you usually travel to school?

Type of Transport	Count
Walk (including scooter, roller-skates, skateboard etc)	
Cycle	
Car or van to the school entrance (not sharing)	
Car or van to the school entrance (travelling with others)	
Park and walk (not sharing)	
Park and walk (travelling with others)	
Bus	
Rail	
Other	
Total	

How would you most like to travel to school?

Type of Transport	Count
Walk (including scooter, roller-skates, skateboard etc)	
Cycle	
Car or van to the school entrance (not sharing)	
Car or van to the school entrance (travelling with others)	
Park and walk (not sharing)	
Park and walk (travelling with others)	
Bus	
Rail	
Other	
Total	

Thank you very much for completing our survey!

Thank you for taking part in this survey! We will keep your information safe and will not share it with anyone. It will only be used for the purposes of this project.



Worksheet 1.3 Air Quality Detective

Hello! Please help your local air quality detective complete their investigation. The detective's school is working on the "Cleaner Air 4 for Schools" project. We are learning about pollution, measuring local air quality and taking steps to reduce health risks.

Q1. How do you feel about the following statement? Circle one answer.

I know a lot about pollution and air quality in Swindon.

Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree Don't know

Q2. Do you have a bike? Circle one. Yes No

Q3. Do you have a car? Circle one. Yes No

Q4. How often do you leave your engine running for longer than 1 minute while your car is parked?

Always Often Sometimes Infrequently Never No car

Q5. How far do you live from school? Circle one answer.

Within 0.5 miles 0.5-1 miles 1-1.5 miles Over 1.5 miles Don't know

Q6. How do you usually travel to school, to work or in your leisure time? Tick one per column.

Type of Transport	School	Work	Leisure Time
Walk			
Cycle			
Car or van to the school entrance (not sharing)			
Car or van to the school entrance (travelling with others)			
Park and walk (not sharing)			
Park and walk (travelling with others)			
Bus			
Rail			
Other			

Q7. Why do you travel to school using the type of transport above?

Q8. What is most important to you when travelling to school? (Rank 1-6, 1 being most important)

Being Safe	Being on Time	Money	Being Healthy	Family Time

Q9. What are you most concerned about when travelling to school? (Rank 1-6, 1 being most important)

Being Safe	Being on Time	Money	Being Healthy	Family Time

Q10. How would you prefer to travel to school, to work or in your leisure time? Tick one per column

Type of Transport	School	Work	Leisure Time
Walk			
Cycle			
Car or van to the school entrance (not sharing)			
Car or van to the school entrance (travelling with others)			
Park and walk (not sharing)			
Park and walk (travelling with others)			
Bus			
Rail			
Other			

Q11. Why would you prefer to travel using the types of transport above? What is stopping you?

Q12. What is your role in the school? Circle all that apply

Parent or carer Educator Non-teaching staff School governor

Q13. Which year groups do you have children in? Circle all that apply

Reception Year 1 Year 2 Year 3 Year 4 Year 5 Year 6

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Upper Key Stage 2 Brief Lesson Plans

Subject Area and Theme	National Curriculum Links	Activity	Resources
<p>Geography</p> <p>What do families think about air pollution?</p>	<p>Pupils should be taught to:</p> <p>use fieldwork to observe, measure, record and present the human and physical features in the local area</p> <p>describe and understand key aspects of human geography including land use.</p>	<ul style="list-style-type: none"> • Explain to children that we want to find out more about the choices families make when deciding how to travel to and from school. To do this, the children will be designing a questionnaire that will be used to interview parents within the school. • Discuss the difference between open and closed questions and how these can be used to elicit different types of information. • Children to design their own questionnaires to find out more about the choices families make when deciding how to travel. • Children to conduct their questionnaires. This could be done as families are arriving to collect or drop off their children at the start or end of the school day. 	<p>Clipboards</p>
<p>English</p> <p>Should cars be allowed on the school run?</p>	<p>Pupils should be taught to:</p> <p>participate in discussions, presentations, performances, role play/improvisations and debates</p> <p>consider and evaluate different viewpoints, attending to and building on the contributions of others.</p>	<ul style="list-style-type: none"> • Debate: 'Cars should not be permitted to drop off or collect children from school'. • Split children into small groups and ask them to note down some arguments for and against the motion. Encourage children to draw upon the ideas they came across when carrying out their family surveys. • Before beginning the debate, remind children of the ground rules for a debate i.e. that everyone has the right to speak, show respect for the speaker and that it is ok to politely disagree with one another's opinions. • Carry out the debate. The teacher may feel that it is appropriate to assign specific roles to the children (e.g. children speaking in favour or against the motion). 	

<p>English & Computing</p> <p>How to sell an electric car</p>	<p>Pupils should be taught to:</p> <p>identify the audience for and purpose of the writing, selecting the appropriate form and using other similar writing as models for their own</p> <p>select appropriate grammar and vocabulary, understanding how such choices can change and enhance meaning</p> <p>select, use and combine a variety of software to design and create a range of content that accomplish given goals, including presenting data and information.</p>	<ul style="list-style-type: none"> • Show children a selection of car advertisements, such as the linked examples. Discuss the linguistic devices that advertisers use, such as emotive language and puns. • Show children the news report about the world’s fastest electric supercar and explain that the children are going to be creating an advert for it. • Brainstorm examples of catchy phrases, adjectives or adverbs that could be useful in promoting the car. • Children to create their own car adverts using an appropriate software package such as Powerpoint. 	<p>Mercedes advert</p> <p>Landrover advert</p> <p>BBC news report</p> <p>Ipads/computers</p>
<p>Geography</p> <p>Re-designing our school</p>	<p>Pupils should be taught to:</p> <p>use maps, atlases, globes and digital/computer mapping to locate countries and describe features studied.</p>	<ul style="list-style-type: none"> • Discuss how plants and trees can help to mitigate the effects of air pollution. Ensure that children understand that one of the biggest sources of indoor pollutants is CO2 from breathing and that there are some types of plant that are particularly effective in reducing the amount of CO2, such as ivy and cacti. • Provide children with an aerial map of their school. Ask them to mark onto the map any existing areas of trees or plants. Encourage the children to think about any areas of the school that don’t have trees or plants. Children to redesign the school grounds, adding in plants or trees. 	<p>Aerial map of school building and grounds</p>
<p>Science</p> <p>How do the lungs work?</p>	<p>Pupils should be taught to:</p> <p>identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</p> <p>recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</p>	<ul style="list-style-type: none"> • Show children a video clip explaining lung function. Ensure that children are familiar with key vocabulary such as particulates, molecules, oxygen and carbon dioxide. • Provide each children with a straw and explain that we are going to simulate how it feels to breathe with reduced lung capacity. Ask each child to put the straw in their mouth and then breathe through their mouth only. Get each child to fold the straw over to flatten it, then repeat the activity. This should be more difficult and simulates how it feels to breathe with reduced lung capacity. [Teachers will need to be sympathetic to those children who suffer from asthma and may not wish to take part in this 	<p>Video of lung function</p> <p>Drinking straws</p> <p>Plastic bottle</p> <p>Balloon</p> <p>Plasticine</p>

		<p>activity. Teachers will also need to stress that the children must stop if they start to feel dizzy or unwell.]</p> <ul style="list-style-type: none">• Get children to make their own model 'lung' to demonstrate breathing. Follow the instructions on the Science Sparks website.	<p>Elastic bands</p> <p>Science Sparks</p>
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