

Lesson Plan

Air Pollution Swab Test

Suitable for all KS2 and lower KS3 pupils



Aim

Carry out a scientific experiment around your school to identify sources of air pollution with a simple low cost swab test. This will help identify main sources of pollution and demonstrate what pollution can look like.

National Curriculum Relevance (Suitable for Year 3 to year 9 pupils)

Main Activity: Science: Sc2.1, Sc2.2, Geography: G1 G2.1 PSHE: Citizenship

Additional Activities: English: En1, En2.1, PSHE: Citizenship

Key Words

Air Quality, Pollution, Particles, Dust, Air, Fumes, Idling, Exhaust, Health, Breathing, Lungs.

Lesson time

A one hour lesson including additional activities.

Resources

1 or more rolls of standard sticky tape (like Sellotape)

Scissors to cut into 10cm lengths.

Pens/Pencils

A4 piece of paper (or use attached template)

A basic map of the test site (i.e. the school grounds) (optional)

Alternative version uses biodegradable wipes (such as wet wipes or surface wipes)



Lesson Activities

Introduction

As we know Air Pollution around schools is a major issue, coming mainly from road vehicles. This simple and practical experiment will demonstrate to pupils what air pollution can look like, and also show which areas are worst affected by air pollution. By the end of the lesson pupils should be able to understand the following:

- Where air pollution comes from
- Why it is an issue around the school
- Which areas are worst affected by air pollution
- What are PM2.5 particles
- How air pollution can be lowered and the role they can play in this

Introduce the lesson as a science experiment to try and discover which areas are affected by air pollution and that the pupils will need analyse their results to try and work out why they think that some areas are worse than others if the results demonstrate that. The pupils will work in small groups of 2-4 children and then compare the results with each other at the end of the experiment. Each group will choose 4 or 5 locations around the school to test. These can be indoor or outdoor but a mixture of locations is important.

Each group will require one sample sheet, 4 or 5 strips of tape (or a roll of tape to use themselves) and a pen or pencil to record the location of the sample as well as a map to mark the location. If using swabs instead of tape then these will need to be stuck onto the sheet with pva glue or similar.

Main Activity

Each group will have around 10-15 minutes to sample 4 or 5 locations around the school and mark the locations on their map if using one. A clipboard may be useful to aid this. If working in 3's one can hold the map and sample sheet and write in the locations, whilst the other two cut the lengths of tape and take the samples before attaching to the sheet, taking turns if necessary. The samples should be taken at a height of around 1–1.2mts from ground level (around the height that the children conducting the experiment breathe the air).

Once the sample sheet is full they should head back to the classroom to analyse the results and compare with the rest of the class.

Analysing the results

The following points will assist you in analysing the results:

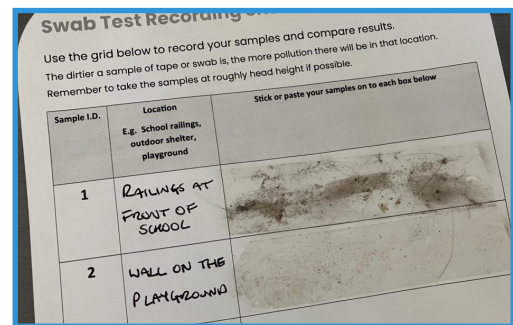
- Do all of the samples look the same?
- Are some dirtier than others?
- If so, why do they think that the dirtiest samples are worse than others?
- Where do they think the dirt and dust particles come from?
- Is there a pattern? Is there something nearby that they think could make some of the samples worse?
- How do they think that the dirt and dust got on to the surfaces?

Some facts that will help answer some of those questions are:

- Most of the dirt and dust will come from road vehicles, mainly from the exhausts. The particles are that small that they cannot be seen individually with the human eye. They are the equivalent to 1/20th the width of a human hair 2.5 microns across. Some particles also include brake dust and tyre wear.
- These particles carry through the air as they are so small and then settle on surfaces that they come into contact with. What people don't realise is that they are breathing in these particles all the time, and they can get into the bloodstream causing medical complications if concentrations are too high. They can also affect lung function and may result in cases of asthma.
- The worst affected areas will almost certainly be from the sample locations nearest the road, other points where it is easy to see dust and dirt accumulating is near to open windows and door frames where restricted airflow pulls them in to small places.
- Some of the samples will contain heavy metals which can be more problematic and other volatile organic compounds (VOCs) which can come from chemicals and paint. Other sources of pollution indoors include chemical sprays, open fires, log burning stoves and cookers.

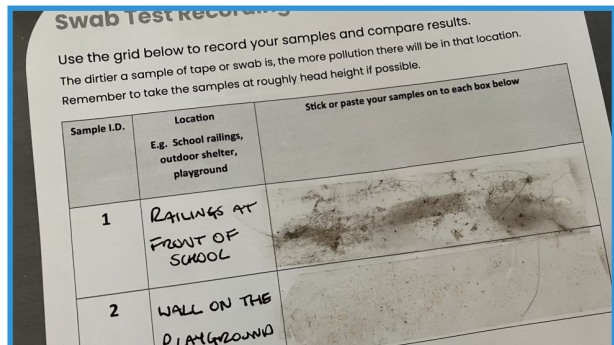
Additional plenary actions can include:

- Writing a small report on their findings (10-15 minutes) and what they have discovered during the lesson.
- A discussion on what they think they could do to help lower the pollution levels around the school, would less car use lead to lower pollution? What other measures would help to reduce pollution, is screening or filtering a realistic option
- Make a display board to show the rest of the school, or do a report for the school that could be used to help raise awareness of air pollution.



Support

If you require any support with this lesson plan or if you have any questions please contact your School Travel Advisor at into@staffordshire.gov.uk and they may be able to help you deliver the lesson or give you some advice on how to conduct it successfully. Please share with us what you found too, and give any feedback.



Further Reading

For further information on air pollution and air quality around schools please look at the following websites which will help pupils to add some facts and statistics to their letters.

Staffordshire County Council Air Aware Pages for schools: [Click Here](#)

Staffordshire County Council You Tube Video about Air Pollution near schools: [Click Here](#)

Children Campaign to cut Air Pollution outside their school: [Click Here](#)

For support, advice or assistance with this lesson plan please contact your School Travel Advisor at into@staffordshire.gov.uk

Lesson plan created by Ryan Procter: ryan.procter@staffordshire.gov.uk 07973 683905