



Clean Air - Teacher's Notes

Clean air as a resource

Have you ever noticed how the air smells different in the city from the bush? In the bush there is less pollution from burning fossil fuels for industry, household energy and transport. Dirty air makes people sick and can even kill them. During the winter of the "Great London Smog" of 1953, between 5,000 and 7,000 people died and 90,000 children had to go to hospital with severe respiratory illnesses. The main culprit was burning low-grade brown coal for industrial use and domestic heating. When laws were passed to restrict coal fire pollution the health of the nation improved rapidly. During the last two Olympic Games competitions, local industries were closed down so that athletes could compete fairly and that sick visitors did not embarrass host cities.



It may be important to explain that many of the pollutants in our air that are released when fossil fuels are burned, such as sulphur dioxide, nitrogen oxides and carbon monoxide, are invisible.

Our neighbors to the north suffer annual breathing problems from illegal fires lit to clear land for growing palm oil trees. Air quality becomes particularly bad when the peaty soil catches fire. Pollution from fires in Indonesia affected Malaysia, Singapore, Guam, Palau and the North Marinas closing schools, cancelling international flights and sending the old people and children to hospital. Normally the onset of the cyclone season puts out these fires but in 2015 this was unusually late. During 26 days the 2015 Indonesian fires produced more greenhouse gasses than the USA, whose output is second only to China. Air is shared internationally.



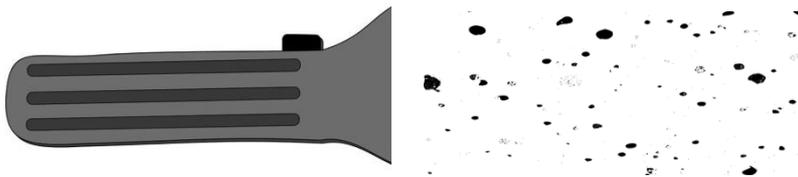
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Dust in Air - Teacher Demonstration

Pre-test this activity in your classroom as not all rooms can become sufficiently dark. Masking tape can be used to create a narrow light beam from a light or torch. If you are able to darken your classroom by switching off lights and drawing curtains or blinds, a narrow bright torch beam or shaft of strong light from the data projector will demonstrate the fine dust particles whirling in the air if viewed from the side. If it is bright and sunny outside, a narrow gap in the curtains will also display dust particles.



Dust is always part of the air we breathe. It is the dust in our atmosphere that causes the wonderful colours in the sky at sunrise and sunset. Up to 30% of the dust we breathe in town is thrown up by road vehicles. Most of the dust we breathe at home is dead skin cells!

Pollution and Lung Problems

Students who suffer from bronchitis or asthma may be aware of the effect gasses and dust can have on their breathing. The lining of their airways can become inflamed and narrow. Breathing out can be very difficult.

One of your students who suffer from airway problems may be able to remind other class members of what First Aid could be done if they have an attack. What they should and shouldn't do and who to contact. A visit from the Community Nurse might also be possible.





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Dust in the Air - Student Activity

We shall be examining "particulate matter" or DUST. (This activity should not be done immediately after rain, as most of the dust will be washed off).

Have you ever breathed in a lot of dust? What happened?

You may have to remind students of hiding under the bed, hiding in a wardrobe playing "hide and seek" or standing round a camp fire and getting a face full of smoke. *Coughing, wheezing, eyes water, sneezing.*

Early settlers often were troubled by dust storms caused by clearing vegetation from the land.

Air quality in our school

When scientists test air for dust they use a machine like a vacuum cleaner. Air is sucked in through fine filters and the quantity and volume of dust estimated. We shall be using an air filter from Nature.

Plants take in air through holes (stomata) in their leaves and use parts of it (carbon dioxide) to make food for

themselves and for us. If we wipe the surface of leaves around the school we can sample the amount of dust in the air. Dust on the top of the leaf is more liable to be washed away by



rain. Samples taken where teachers park their cars are usually pretty dusty. Some indoor plants, which do not get washed by rain or blown by wind, can be pretty dusty too! Thank goodness that few students smoke because in years gone by "Smoker's Corner" was outstanding for its pollution. If you fear your class may severely defoliate the school grounds, wiping windowsills or the outside of windows can be substituted.





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Materials

- Scissors
- Worksheet and pen
- Map of the school. Students may already have been shown how to use a map in Geography. Alternatively display the map on a Smart Board.
- 6 Pre-cut pieces of tissue (toilet paper sheets cut in quarters are fine).
- Access to stapler or glue stick

Method

1. Issue student groups with worksheet and map of the school help them select 6 locations. Place the numbered locations on the map.
2. Board the number and name of each location.
3. Issue each student with six pieces of double tissue.
4. Accompany students to each location and ask them to firmly wipe the underside of leaves at each location six times. Explain that leaves are to remain undamaged on the trees or bushes.
5. Return to the classroom and fix the paper in the correct square with the stapler or glue.
6. Discuss your findings and range your locations from least dusty to most dusty.





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Results

Which area had the worst dust pollution? The area with the worst dust was the teacher's car park.

Most Dusty					Least dusty

Most of the dust within our houses and schools is made from dead skin cells. When you see the filter from your vacuum cleaner after one week you will realise how much this can be. Within the dust lie little arthropods that eat it. These dust mites are the most common cause of childhood allergies. After two years, 10% of your pillow is composed of dead mites and their droppings!

If the air at school suddenly became less fresh, what could you do to make it be less dusty?

- Keep as many vehicles (including bicycles) as far away as possible.
- Walk to school.
- Dampen down the dust with sprinklers.





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- Wear a facemask.
- Plant more low lying groundcover to stop the wind blowing the dust around

Smoking signs

Smoking cigarettes produces both noxious gasses and fine hot particles.



What have these signs to do with clean air?

Smoking makes clean air dirty.



Why aren't people allowed to smoke in school?

Smoking makes people sick.



Is it only the smokers who get sick?

No. People around them breathe in smoke too.