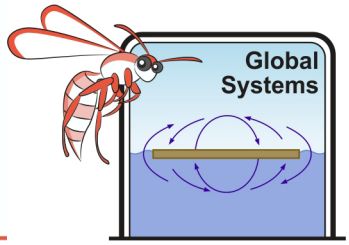



# Air Quality – Teacher Notes

An abundance of fine particles in the air can be bad for animal (including human) health, and the environment. They can cause respiratory problems, irritation to eyes and even non-fatal heart attacks. Depending on the chemical composition of the particles they can mix with rainwater to cause acid rain and make lakes and streams acidic, they can block pores on leaves, preventing gas exchange, and deplete the nutrients in soils.
Often, the pollen count is part of the daily news, especially during springtime. Although not considered a pollutant it can cause irritation to those with hay fever.

Air quality can be particularly bad in built up areas. Bushfires and drought can result in large amounts of ash and dust in the air, which also decreases air quality. Blasting from mining can cause dust to enter the air.
It is worth noting that air quality indoors can often be worse than outdoors (this often surprises people).

Students will discuss the advantages and disadvantages of this method of air quality monitoring. You may wish to split the class into groups and each group have a different area to monitor, they can then report their results back to the class.

***Activity***

**Aim** To compare the air quality at different locations around the school.

**Pre- investigation discussion:**

Do you think there will be more dust lower to the ground or higher up? Generally, the lower to the ground the more dust there will be as wind does not have enough energy to lift dust and pollution (from exhausts) high. However, if there are lots of trees releasing pollen, they add to dust particles found higher up.

Should you select surfaces at the same height? As you are looking to examine the difference in locations across the school, yes. If you were looking to investigate the difference in pollution at different heights, then students would choose to put their grids at the same location at different (set) heights.

Which areas around the school do you think will have the most fine particles?
Around the car park and also around the gardens if the flowers are in bloom.

**Materials** per group

- 8 (suggested number) pieces of acetate with a 1cm x 1 cm grid marked on (around 10 x 5 cm total size)
- Petroleum Jelly
- Plastic knife
- Blu tack
- Marker pen
- Microscope/magnifying glass
- (Ruler and marker pen if acetate does not already have grid marked on it)
- Map of the school

# Air Quality – Teacher Notes

**Method**

1. Choose 8 locations around the school where you will test the air quality and number them 1 through to 8.
2. Use the marker pen to number each piece of acetate 1 – 8, corresponding to the locations marked on the map. If your acetate does not already have a grid marked on it, use a ruler and marker pen to draw one on each sheet.
3. Use the knife to spread a very thin layer of petroleum jelly on each acetate grid.
4. Use Blu tac to stick the pieces of acetate up at each selected (mapped) location and leave for at least 24 hours before taking them back to the classroom.


**Results/observations**

Students can use the microscopes to analyse their grids. They may wish to create replica grids in which they can write the number of particles found in each square. If there are a lot of particles and they vary greatly in size they may want to create a table of results for each piece of acetate and tally their results as they go along:

| Particle size (µm = 1/1000mm) | Number | Any additional interesting features (e.g) shape |
|---|---|---|
| >1 | | |
| 1-10 | | |
| <1 | | |

**Discussion**

Which location had the highest number of particles per $cm^3$? Answers will vary.

Which location had the least number of particles per $cm^3$? Answers will vary.

Were you surprised about the locations that had the worst air quality, explain your answer? Students should compare to their predictions they made before the investigation.

Did you notice any clear difference in size of the particles at different locations? For example, where the particles much larger near the flower beds than in the car park? (You may need to have another look at your grids). If they have created a table, they can give more detailed statistical analysis and perhaps make pie charts or scatter plots, as well as determine the mean, median, mode and range of particle size for each location.

# Air Quality – Teacher Notes

Consider what is around each location. How do activities nearby impact your results?
Students may want to talk about proximity to traffic, building, industry and flowers etc. You may wish to show them the image below and discuss what type of particles they may have collected.

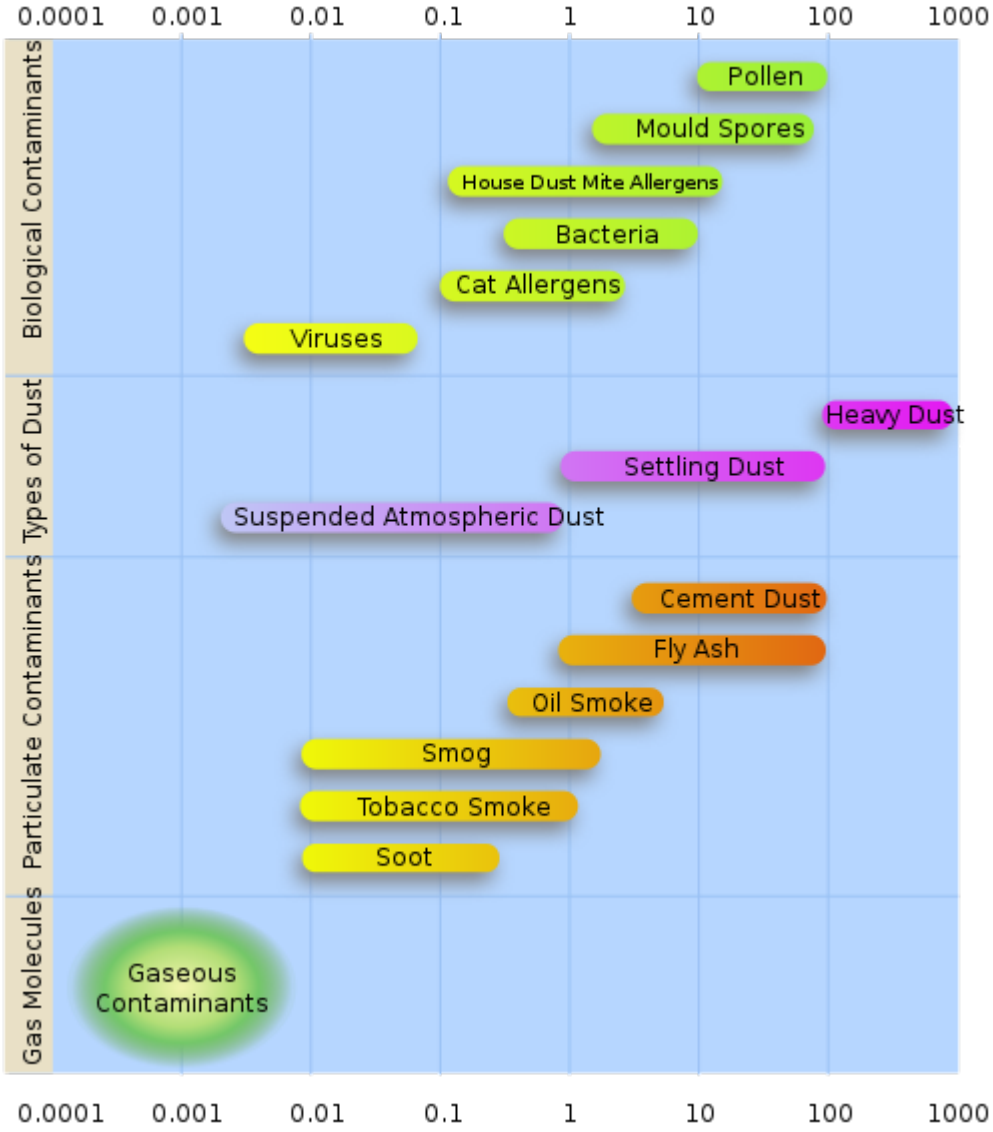
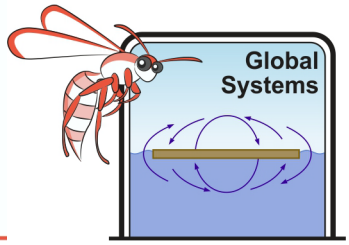



Figure 1. Airborne particles are commonly either biological contaminants, particulate contaminants, gaseous contaminants, or dust. This diagram shows the size distribution in micrometres (µm) of various types of airborne particles. (Creative Commons)

What natural variables could impact your results? (Consider if you did this at a different time of year for example.)
Answers may include wind, abundance of pollen and leaf litter, wind, rain, dust in dry seasons.

How could you improve or extend this experiment? Justify your suggestions.

- Repeat numerous times throughout the year to give a clearer overview of air quality at different times and look for anomalies.
- Have larger grids to collect more data.
- If the students have not conducted statistical analysis, then they could do this.




# Air Quality – Teacher Notes

**Conclusion**

Can you draw any conclusions from your results?

Answers will vary. Some students will decide they need more information to give clear conclusions. Some students may make conclusions about the height from the ground and quantity/size of particles. Other conclusions may be about the size or quantity of particles in relation to proximity to different sources, e.g., gardens, roads and building works.