# *Is there too much air in chip packets?*

# **Teacher background notes**

**In this investigation, students explore the properties of gases and liquids. They will follow instructions to predict the effect of changing a variable when planning an investigation. They will use equipment in safe ways and improve the accuracy of their results. Students will construct a table to organise data. They will compare their data with their predictions and describe the fairness of the investigation.**

## [Australian Curriculum: Science links](https://assist.asta.edu.au/resource/4188/there-too-much-air-chip-packets-year-5-cle)

## Learning intentions

Students will be able to:

* suggest explanations for the observed properties of gases;
* identify when science is used to ask questions and make predictions;
* discuss ways to conduct investigations and safely use equipment to make and record observations;
* use tables to organise their data and identify patterns in data;
* suggest explanations for observations and compare their findings with their predictions;
* suggest reasons why their methods were fair or not; and
* complete simple reports to communicate their methods and findings.

## Suggested time for this CLE

The time needed to complete the *Is there too much air in chip packets?* CLE will depend on the depth of the prior knowledge of students and the time to perform the two investigations—*Modelling a packet of chips* and *Does air weigh anything*? Allow 2–3 hours.

***This CLE is aimed at enhancing a unit already being taught on the properties of solids, liquids and gases.***

## Prior conceptual knowledge

Science / Year 3 / Science Understanding / Chemical sciences

Content description

*A change of state between solid and liquid can be caused by adding or removing heat.* [(ACSSU046)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACSSU046)

## New concepts to be introduced

The concept of states of matter, and gases in particular, can be challenging for primary students. Students at this level are not ready to develop a deep understanding of the particle theory; so much of the explanation of the different states of matter is inaccessible to them. Nevertheless, primary students are capable of observing the properties of gases and comparing them to liquids or solids.

During these initial explorations, teachers will encounter various student misconceptions. Purposeful teaching will equip students with the content knowledge and investigation skills they will require to successfully tackle more advanced concepts as they come across them in their future studies. The activities in this CLE will help students develop their understanding that gases consist of matter and as a result have mass.

**Note: Students in Year 5 should be aware of the concept of an object having mass, but they may not be able to differentiate between the concepts of mass and weight. The student handouts therefore all talk about the weight of the objects involved in the experiments. The teacher should remind their students that an object’s weight is determined by its mass and the force of gravity.**

## Possible misconceptions

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| **STUDENTS MAY THINK…** | **INSTEAD OF THINKING…** |
| Gases are not matter because they are invisible. | Gases are particles of matter that are spread out. Not all gases are invisible. |
| Gases have no mass. | Gas is made up of matter and therefore has mass. |
| Gases float. | Some gases are less dense than the air in the atmosphere and therefore rise. Some gases are denser than the air in the atmosphere and therefore sink. |
| Gases are invisible. | Not all gases are invisible. |
| Gases are flat. | Gases spread out to fill the container in which they are contained. |
| Air is not affected by gravity | Air is made up of matter, and therefore is affected by the force of gravity. |

## Links to further information

‘Problems with Classifying Solids, Liquids and Gases’, Victoria State Government Education and Training website**,** <http://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/Pages/classifying.aspx> (April 2014)