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

# Teaching and learning plan

## Learning intentions

Students will be able to:

* suggest explanations for the observed properties of gases and liquids;
* 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 timeframe

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.

**[Planning ahead and equipment list](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Planning_and_equipment_list_yr5_Is_there_too_much_air_in_chip_packets.docx)**

## Safety considerations

When you and your class are completing your Risk Assessment, consider the following safety points and add any other relevant ones to the list:

* Some students have latex (balloon) allergies. If necessary, replace the balloon with plastic lunch bags.

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## Introduction

This CLE focuses on the observable properties of gases and liquids and links to the Year 5 Australian Curriculum: Science. This CLE is aimed at providing activities to enhance a unit on the chemical sciences. Students will conduct research on the observable properties of gas and that gases take up space. They will also plan and conduct an experiment to determine if gas has mass.

### Equipment needed

Equipment needed per group:

* 1 packet of chips (with a lot of air inside)

### What to do

1. Provide each group of students with a packet of chips. Ask them to look at it closely and to make some observations about what they see. Questions to ask students could include:

* What is in the packet?
* What stops the chips from being crushed?
* What happens if the packet of chips gets squashed? What if you push on one end of the packet? Does it get smaller at all or does it burst straight away?
* Why does the manufacturer add air to the packet? How much does the packet of chips weigh? What is included in this weight? The chips? The packet? Does adding air to the packet affect the amount of chips that can be put in the packet?

## Core

### Investigation 1: Modelling a packet of chips

### Equipment needed

Per group:

* 3 plastic ziplock sandwich bags
* water
* one small handful of crisp chips
* copies of student worksheet [Investigation 1: Modelling a packet of chips](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Worksheet_1_Modelling_packets_of_chips_yr5_%20Is_there_too_much_air_in_chip_packets.docx)

Per class:

* one large parachute

### What to do

1. Instruct students to add the chips to one bag and carefully remove the air and seal the bag.
2. Instruct students to half fill another plastic bag with water and remove the air and seal the bag.
3. Instruct students to half fill the third plastic bag with air and seal the bag.
4. Ask the students to compare how the bags move. Questions to ask the students could include:

* What happens if you press on one end of the water bag only?
* What happens if you press on one end of the air bag only? What do you notice about the similarity of how the water bag and the air bag move?

1. In a large open area, ask the students to hold the edges of the large parachute. Ask the students to lift the parachute high in the air and then pull the edges of the parachute down to the ground. Questions to ask the students could include:

* What did you observe/feel as you lifted the parachute?
* What did you observe/feel when the parachute was pushed to the ground?
* How quickly could you pull the parachute edges to the ground?
* What might be slowing the parachute down?
* What happens to the air under the parachute when the edges are pulled down?
* How does air move out of the way?

1. Ask half the students to pretend/model how the (particles of) air move(s) when the parachute is lifted up and down. When the parachute is lifted into the air, the students move under the parachute. When the parachute is pulled down, the students run out. Questions to ask students include:

* How is the movement of air in the parachute similar to pressing on the bag half filled with water?
* What happens to the water (particles) when you push on one end?
* How is the movement of air in the parachute similar to pushing on the bag half filled with air?
* What happens to the air (particles) when you push on one end?
* Is the bag of air similar to the bag of water?
* What happens to the bag of chips when you push on them? Are they able to move out of the way?

1. Hand out student worksheet [Investigation 1: Modelling a packet of chips](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Worksheet_1_Modelling_packets_of_chips_yr5_%20Is_there_too_much_air_in_chip_packets.docx). Ask students to examine their bags again while filling in their worksheets. Remind students that observations are what they see, hear, smell, touch or taste. Modelling is what scientists use to explain their observations.
2. Ask students to share the answers to their questions.

### Expected results and explanations

Modelling is a way scientists explain their observations. The chips are solids. Their shape does not change when placed in the plastic bag. When the chips are compressed, they will break into smaller parts rather than move out of the way.

Liquids (like water) are able to easily change their shape to fit the shape of the container. When one end of the bag of water is pressed, the water particles are able to flow over each other to other parts of the bag.

Air moves in a similar way to water. When the bag of air is pressed, the air particles are able to move to other parts of the bag. Unlike the water or chips, air can be compressed slightly before the bag busts. The bag breaks open because the particles have nowhere left to move and push against the sides of the bag.

### Investigation 2: Does air weigh anything?

### Equipment needed

Per class:

* packets of chips of different sizes

Per group:

* 2 balloons
* 1 set of balancing scales OR a balancing ruler with a string attached to the middle
* copies of student worksheet [Investigation 2: Does air weigh anything](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Worksheet_2_Does_air_weigh_anything_yr5_Is_their_too_much_air_in_chip_packets.docx)

### What to do

1. Provocation

Pass around the different packets of chips. Questions to ask the students include:

* Which packet of chips has the most chips?
* How do we know which packet has the most chips?
* Which chip packet has the most air in it?
* What is the weight on the side of the chip packets?
* Does the air affect the weight of the chip packet?
* If there is more air in the packet, does this mean the manufacturer can put more or less chips in the packet?

1. Show the students the balloon and suggest that they can model the chip packets with them.
2. Ask the students if the balloons will be heavier/lighter/the same with or without air.
3. Suggest that the students could be food scientists who check the chip packets to ensure that the chip manufacturers are inserting the correct weight of chips into the bags.
4. Use student worksheet [Investigation 2: Does air weigh anything](http://assist.asta.edu.au/sites/assist.asta.edu.au/files/Worksheet_2_Does_air_weigh_anything_yr5_Is_their_too_much_air_in_chip_packets.docx) to guide students in designing an experiment to test if the air in a bag of chips weighs anything, and therefore affects the number of chips in the bag.
5. Ask students to share their results with the class. Questions to ask include:

* How do they know their experiment was a fair test?
* Were their results reproducible?
* Why is this important?
* Does it make a difference if the manufacturer of chip packets adds air to their bags?

### Expected results and explanations

Students should be able to write a number of variables that could be changed in the experiment. These include: the scales; the brand of balloons; the colour of the balloons; how much air is put in the balloon; the size of the balloons; the temperature of the room; who blows up the balloons; how many balloons have air put in them etc. The variable that needs to be changed to answer the question is the amount of air in the balloon. Students should determine that the balloon with the most air will weigh the most. A common misconception is that balloons are lighter when filled with air. This is due to the way students play with balloons by hitting them into the air. All balloons eventually fall to the earth as a result of gravity. The relatively small difference in weight of a balloon with air, compared with a balloon without air, is usually not noticed by students.

## Conclusion

* Discuss with students why the manufacturers add air into the packets of chips.
* Ask students to describe how little air weighs.
* Discuss whether their results for this experiment will affect the way they buy packets of chips.

### Assessment opportunities

Investigation 2 provides an opportunity to assess student Science Inquiry Skills in questioning and predicting (ACSIS231), planning and conducting [(ACSIS086 and ACSIS087)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACSSU078), processing and analysing data (ACSIS090 and ACSIS218), evaluating (ACSIS091) and communicating (ACSIS093).

In addition, students’ ability to classify substances according to their observable properties and behaviours can be assessed.