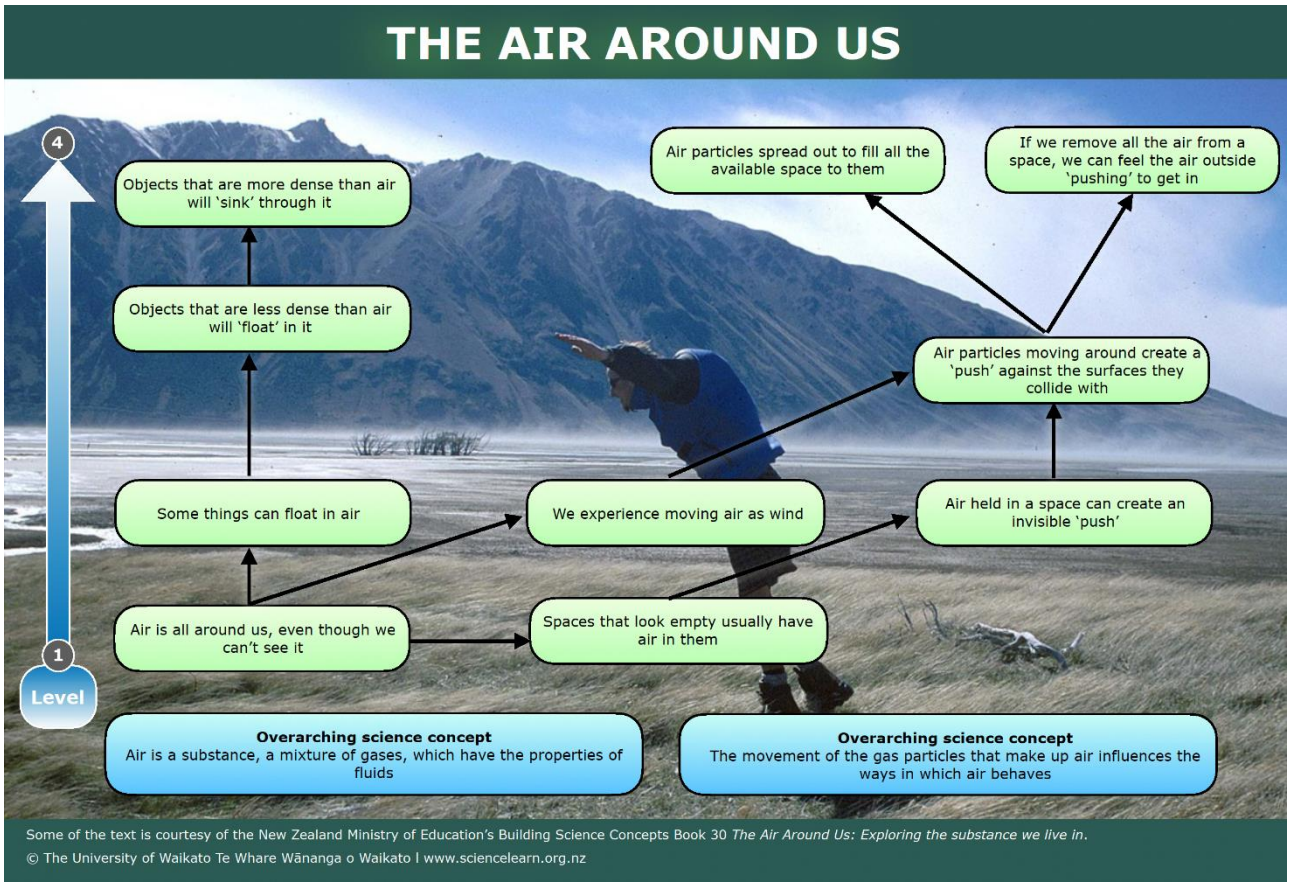
The air around us



Interactive background image courtesy of Professor Peyman Zawar-Reza

This interactive diagram Explores the science concepts that underpin the nature and properties of air.

The concepts listed just above the overarching concepts reflect learning at New Zealand Curriculum level 1 and show how they may build in sequence to level 4. The overarching science concepts are fully developed concepts and might not be achieved until level 7 or 8.

Some of the text is courtesy of the New Zealand Ministry of Education's Building Science Concepts Book 30 *The Air around Us: Exploring the substance we live in*. The links to Hub resources provide additional background information and classroom activities that will support teachers to scaffold the development of their students' conceptual understanding about the nature and properties of air. The images provide a means to initiate discussions, check student thinking and consolidate student understanding.

The article Building Science Concepts: The air around us provides additional science and pedagogical information.

Index

Transcript

Objects that are more dense than air will ‘sink’ through it

undy licensed from 123RF Ltd

Most objects on Earth that are visible have particles more tightly packed than air and predictably will sink (totohu) through it.

Some objects (like gliders and kites) appear to float rather than sink due to the forces that keep them aloft.

Related articles

- Falling, floating, flying
- Solids, liquids and gases
- Air pollution in Christchurch

Related activities

- What flies?
- Putting out the fire

Related images

- Falling, floating or flying
- Glider
- Kites
- Maize (sweet corn) flowers (falling pollen)

Objects that are less dense than air will ‘float’ in it

Child with stones, morrbyte; hot air balloon, mattkaz; both licensed from 123RF Ltd

For something to float in air, it needs to be lighter than the same volume of surrounding air. Its particles are either lighter or less tightly packed than the particles of the air it is in.

The hot air inside a hot air balloon is less dense, where the air particles are not as closely packed together. This warm air inside the balloon is lighter than the air outside the balloon so the balloon will rise.

Helium balloons float because helium is less dense than air. Helium atoms are very, very small and can escape through the balloon material, which causes the balloon to eventually sink.

Related articles

- Falling, floating, flying
- How birds fly

Related activities

- The flying tea bag
- Floating eggs
- Density
- Temperature, salinity and water density

Related images

- Weather balloon being released
- Smoke
- Investigating water density
- Floating ice

Some things can float in air

anglianart, 123RF Ltd

Objects that float in air are sometimes only momentarily supported by the air. These objects can include bubbles, thistledown, balloons, dust, smoke and pollen.

Related article

- Falling, floating, flying

Related activity

- Investigating bubbles

Related images

- Dandelion seeds
- Investigating bubbles
- Floating ice
- Weather balloon being released

Air is all around us, even though we can't see it

Public domain

We live in a mixture of gases that we call air (hau takiwā). Our atmosphere (kōhauhau) is the layer of air that surrounds Earth. Almost all (99%) of this mixture consists of two gases: nitrogen (78%) and oxygen (21%). The remaining 1% includes argon (0.9%), carbon dioxide (0.03%) and variable amounts of water vapour, traces of hydrogen, ozone, carbon monoxide, helium, neon, krypton and xenon. Although the air becomes less dense as you go up in the atmosphere, the proportions of gases in the mixture remain the same, regardless of how dense the air is.

Related articles

- Gaseous atmosphere
- Our atmosphere and climate – introduction

Related activities

- The great candle experiment
- Investigating bubbles

Related images

- Ionosphere
- Vertical structure of the atmosphere

We experience moving air as wind

Cath Samson, Anna Spence1

Although we may not see air, we can feel it when we make rapid movements through it, when the wind blows or when we experience airflows such as a draught. Our body experiences the air pushing harder against the skin on one side of our body than the other. This may require us to exert energy to remain upright or to maintain the speed at which we are travelling.

The energy from the push of the wind can be used to generate electricity. This is called wind power.

Related articles

- Wind power
- Beating the wind
- Energy sources through time – timeline

Related activities

- Making an anemometer
- Making a weather vane and compass

Related videos

- The wind tunnel
- Wind and fire

Related images

- Windy!
- Wind wand sculpture
- Beating the wind
- Te Whanga-nui-a-Tara – Wellington

Spaces that look empty usually have air in them

pspatarapol, 123RF Ltd

Empty space at the Earth's surface might look empty, but it is almost always filled with air. An empty drink bottle can be empty of liquid but full of air. If a plastic bottle is squeezed, the air can be felt against our skin.

Related activities

- Calderas in the sandpit
- The great candle experiment

Related image

- Empty roads

Air particles spread out to fill all the space available to them

Evan Goldin

Air behaves in the same way as any other fluid (wē). It flows and spreads into spaces that are not otherwise occupied. Unlike a fluid, however, it can be squashed (compressed). When a bike tyre is pumped up, more and more air is pushed in to that space, and the air is spread evenly throughout the space but under increasing pressure.

Related article

- Air pollution in Christchurch

Related activities

- Putting out the fire
- Balloons and air density
- Investigating the push of air

Related image

- Tyre design

If we remove all the air from a space, we can feel the air outside 'pushing' to get in

ryzhov, 123RF Ltd

If the air is sucked out of a plastic drink bottle, the walls of the bottle buckle inwards. This occurs because the pressure of air on the outside is greater than that on the inside. If all the air is removed from a container, it is said to contain a vacuum (korekore).

An everyday example of this is vacuum packaging. Air that could cause a food to spoil or go stale is removed from the package, and the push (pana) of the air outside causes the packaging to press inwards against the food.

Related article

- Manufacturing Gouda cheese

Related activity

- The great candle experiment

Related video

- Packaging and storage

Air particles moving around create a ‘push’ against the surfaces they collide with

The University of Waikato Te Whare Wānanga o Waikato

An inflated tyre is firm because of the ‘push’ of the air particles against the inner tyre wall.

When we drink from a plastic bottle and prevent the air moving in to fill the space of the lost liquid, the air outside the bottle has more ‘push’ than what is inside the bottle. As a result, the bottle collapses.

Wind is what we feel when the air particles move and flow around us.

Related articles

- Wind power
- Beating the wind

Related activities

- Balloons and air density
- Investigating the push of air
- The great candle experiment
- Making a barometer

Related images

- Windy!
- Wind wand sculpture
- Beating the wind

Air held in a space can create an invisible ‘push’

The University of Waikato Te Whare Wānanga o Waikato

In an air-filled or pneumatic tyre, the air is held in by a valve (katirere). Air under pressure (compressed air) can support a lot of weight. At the same time, it can absorb impact by compressing further when, for example, a tyre hits a bump in the road.

Bubbles are another example of the push of air. When we blow a bubble, we push air into a film of bubble mixture or a layer of bubble gum.

Related activities

- Investigating the push of air
- Investigating bubbles