

Te Rā - the sun - is the primary heat and energy source for the Earth. Almost every living thing relies on it to survive in one way or another.

Millions of years ago, when the dinosaurs (including our own Tuatara) roamed the Earth, the climate was much warmer than it is today.

However, a few thousand years ago, the climate was much colder. Large parts of the world were covered by ice. But these changes happened very slowly, over many millions of years.

Over the past 100 years the temperature on Earth has gone up very quickly - which means the climate is changing quickly. This is a problem as it will be a challenge to adapt to the new conditions and even harder to try and slow the warming down. But we can do it - we love a challenge! And we need to do it as so many people, animals and plants around the world will be affected if the temperatures continue to increase so quickly.

So what is climate change and global warming?

The Earth is wrapped in a blanket of air called the atmosphere. The atmosphere is made up of layers of gases. Sunlight passes through these layers of gas and warms everything on Earth. These gases are called greenhouse gases because they act just like a greenhouse, helping to keep our planet warm. We need them otherwise we would be living on a planet that has an average of 18 degrees C.

What does all this have to do with us?

There are more and more of us in the world and we are producing more and more carbon dioxide. Carbon dioxide is an invisible gas that is all around us. It is one of the most damaging of the greenhouse gases. Unfortunately, we are releasing far too much carbon dioxide into Earth's atmosphere. These gases are getting trapped in Earth's blanket of air, and they are making the Earth hotter. This is known as global warming.

Carbon dioxide is pumped into the atmosphere every day by vehicle traffic on our roads. Most cars, buses and trucks run on fossil fuels, petrol or diesel, and this produces tons of carbon dioxide. Vehicles are the second biggest source of carbon dioxide emissions worldwide. In NZ it is the biggest source of carbon dioxide, so it is the one where we can make the most difference. We can do this by reducing our use of fossil fuelled vehicles.

Carbon dioxide is also made when we burn fuels like coal, gas, oil and wood. Power plants burn fuels to make electricity. In NZ we are really fortunate that about 75% of our electricity is made by renewable sources such as hydro, solar and wind. However it still means that one quarter, 25%, of NZ's power is made from fossil fuels like gas, oil and coal.

So every time we leave lights or appliances on, that we are not using, we are adding to the carbon dioxide that's caught in the blanket of gases that surrounds our planet.

Another problem is that all around the world, forests are being destroyed. We need the forests because they soak up carbon dioxide. Unfortunately, the trees are cut down to make way for farms that produce products we want to buy and also to make room for towns and cities.

What effect is global warming having?

As the Earth is heating up, climates are changing all around the world. We can expect more storms, hurricanes, floods, frosts and heat waves.

In some areas, like the West Coast of NZ, rainfall will increase and cause flooding. In other areas, like the East Coast of NZ, rainfall will decrease and cause droughts. People in many different parts of the world will be short of water. Countries around the equator will be badly affected. The ice at the North and South Poles is melting and sea levels are rising due to this, and the warming of the oceans. This will cause severe flooding in some parts of the world.

Kiribati is an example of this in our own Pacific Ocean. It is an island nation and it looks like the people will not be able to live there by the end of the century.

Many species of animals are also endangered as a result of global warming due to habitats changing so quickly. They may not have time to adapt. Polar bears are a great example.

What can we do to help?

Fortunately, there are lots of things that we can do to decrease the release of carbon dioxide in the atmosphere.

For example:

- Leave the car at home. Walk or cycle or use public transport.
- Switch the television off rather than leave it on stand-by.
- Put on a jersey rather than turn up the heater.
- Replace light bulbs with LED bulbs.
- Take a shower instead of a bath.
- Plant a tree or 10.
- Reduce the amount of stuff you buy, reuse stuff and recycle it.
- Avoiding single use plastic eg. plastic bags, plastic water bottles

So you see, that although global warming is changing our climate and it will have consequences for all of us, there is a lot that we can do to make a difference individually and as a community. There are two aspects to it.

Firstly, by developing good habits today we can help keep our communities and our precious planet a good place to live, for everyone.

Secondly, by understanding how our planet operates, we can learn how to adapt, and be part of creating innovative solutions to cope with our changing climate.

Both are very important roles we can play.



Climate Change and Global Warming KWL Chart

<u>L</u>earn What I learned	
<u>W</u>onder What I want to know	
<u>K</u>now What I think I know	



Climate Change - Note Taking Sheet

Our questions	Information to help us answer the question. Key words, sentences or pictures



Climate Change - Note Taking Sheet

Other Interesting Information

LER 27

Blowing Up Balloons With CO₂

Carbon dioxide is invisible. It comes out of your mouth every time you breathe. You can make it and capture it in this simple experiment.

Contain the carbon dioxide given off by the baking soda and lemon juice reaction by funnelling the gas through a soft drink bottle and into your awaiting balloon!

What you'll need:

- Balloon
- About 40 ml of water (about 2 ½ tablespoons)
- Soft drink bottle
- Drinking straw
- Juice from a lemon
- 1 teaspoon of baking soda

Instructions:

1. Before you begin, make sure that you stretch out the balloon to make it as easy as possible to inflate.
2. Pour the 40 ml of water into the soft drink bottle.
3. Add the teaspoon of baking soda and stir it around with the straw until it has dissolved.
4. Pour the lemon juice in and quickly put the stretched balloon over the mouth of the bottle.



What's happening?

If all goes well then your balloon should inflate! Adding the lemon juice to the baking soda creates a chemical reaction. The baking soda is a base, while the lemon juice is an acid, when the two combine they create carbon dioxide (CO₂). The gas rises up and escapes through the soft drink bottle, it doesn't however escape the balloon, pushing it outwards and blowing it up. If you don't have any lemons then you can substitute the lemon juice for vinegar.

The Greenhouse Effect

Materials:

Tall plastic bottle with lid - label removed

2 x glass jars the same size - small enough to fit one inside the bottle - label Jar 1 and Jar 2

2 x scissors

2 x thermometers

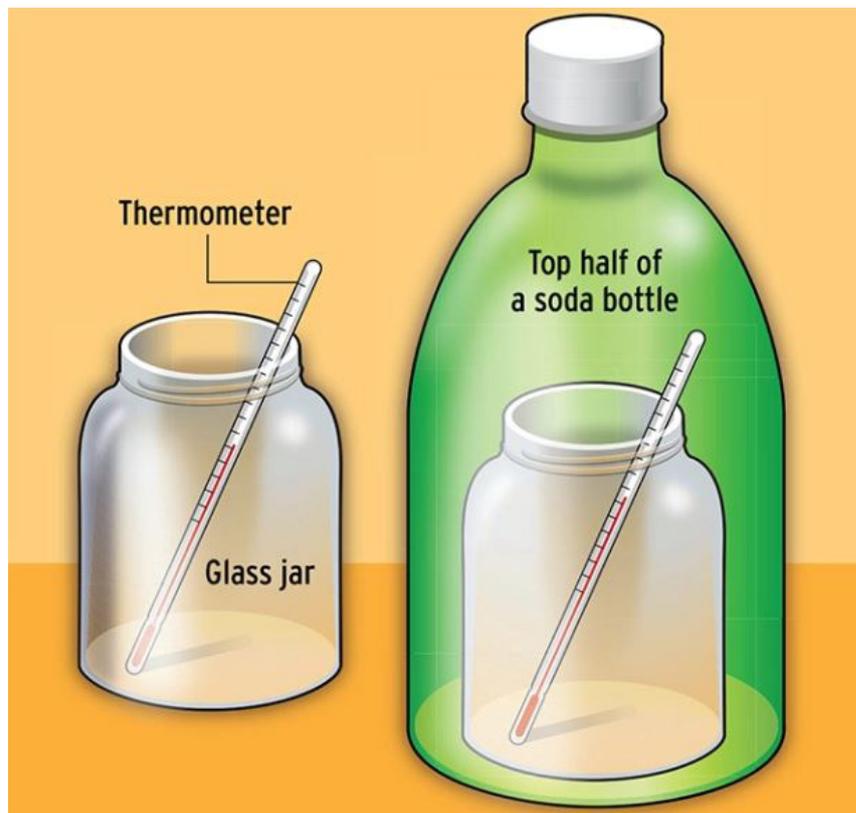
Procedure:

Use the scissors to cut the bottom of the plastic bottle. Leave the lid on.

Stand the thermometer inside Jar 1 and place in a sunny spot.

Stand the other thermometer in Jar 2 and put under the plastic bottle. Place in the same sunny spot.

Check the thermometers after an hour and compare the temperatures.



Variations to try:

Repeat the experiment 5 times to see if the results are the same each time.

Do the experiment for different lengths of time eg. Compare after 10, 20, 30, 40, 50, 60, 70, 80, 90 minutes. Graph and see if there are any trends.

Note:

Monitor as you do the experiment to check the thermometer does not overheat and break.

Conclusion:

The temperature in Jar 2 is warmer than Jar 1. This is because the sun's solar energy passing into the plastic bottle has been turned into heat energy and can't escape. The Earth's atmosphere serves a similar function as the bottle. It allows the sun's solar energy to pass through, then keeps the heat energy from escaping into space.

Image Source: <https://boyslife.org/hobbies-projects/funstuff/2859/weather-experiments/>



Blowing Up Balloons With CO₂

Experiment:

Purpose: I wonder...

Materials:

Hypothesis: I think...

Procedure:

Results:

Conclusion: I learned that...



Climate Change Team Challenge Quiz Template

Climate Change Team Challenge Quiz	Score:
Question 1:	
	Comment:
Question 2:	
	Comment:
Question 3:	
	Comment:
Question 4:	
	Comment:
Question 5:	
	Comment:

What Motivates You?

Your Task	To explain and give an example of what intrinsic motivation is.
Instructions	<ul style="list-style-type: none"> • Read the text. • Think of a way of explaining what intrinsic motivation is. • Think of an example of someone doing something for this kind of motivation. • Think of a time when you were intrinsically motivated. • Share with your buddy and make sure they understand what it means. • Learn what extrinsic motivation means and record your understanding.
Definition	<p>Intrinsic motivation</p> <p>Intrinsic motivation is motivation that comes from inside a person. The person is motivated to learn or do something for the pure enjoyment of it.</p> <p>For example when training for cross country Aniwa runs because she likes the way it makes her feel; strong and fast.</p>
My understanding of intrinsic motivation.	
An example of intrinsic motivation.	
My personal example of intrinsic motivation.	
Share and make sure your buddy knows what it means.	
My understanding of extrinsic motivation.	

What Motivates You?

1. Discuss together and write down at least three activities you do in a day eg. get up, eat a healthy lunch, brush my hair, carry out my learning tasks, play with my little sister, help with chores at home, go to the skate park, play video games.
2. Think about the things that motivate you to do these activities and list them under one of the headings.

Activities	Intrinsic Motivators	Extrinsic Motivators
Eg. Getting up	Seeing my friends at school	Parent coming to get me up



Extrinsic Motivation - Student 2 (Part 1)

What Motivates You?

Your Task	To explain and give an example of what extrinsic motivation is.
Instructions	<ul style="list-style-type: none"> • Read the text. • Think of a way of explaining what extrinsic motivation is. • Think of an example of someone doing something for this kind of motivation. • Think of a time when you were extrinsically motivated. • Share with your buddy and make sure they understand what it means. • Learn what intrinsic motivation means and record your understanding.
Definition	<p>Extrinsic motivation</p> <p>Extrinsic motivation is motivation that comes from outside a person. The person is motivated to learn or do something for external rewards or to avoid negative consequences .</p> <p>For example when training for cross country Jeff runs because he wants to earn the most points for his house.</p>
My understanding of extrinsic motivation.	
An example of extrinsic motivation.	
My personal example of extrinsic motivation.	
Share and make sure your buddy knows what it means.	
My understanding of intrinsic motivation.	



Extrinsic Motivation - Student 2 (Part 2)

What Motivates You?

- 1. Discuss together and write down at least three activities you do in a day eg. get up, eat a healthy lunch, brush my hair, carry out my learning tasks, play with my little sister, help with chores at home, go to the skate park, play video games.
- 2. Think about the things that motivate you to do these activities and list them under one of the headings.

Activities	Intrinsic Motivators	Extrinsic Motivators
Eg. Getting up	Seeing my friends at school	Parent coming to get me up



Motivators for Active Travel Actions

What would motivate you and others to take part in these active travel actions?

Note are **your** motivations more intrinsic or extrinsic?

There are no right or wrong answers.

Active Travel Action	What would motivate me to do this?	What might motivate others to do this?
1. Belong to a walking / biking / skateboarding group of friends. Most days you meet and walk / bike / skateboard together.		
2. Participate in an event like a biker's breakfast. Have one day where everyone who comes to school using wheels gets to have a yummy breakfast.		
3. Write and illustrate a picture book for younger children, to teach them skills to walk to school safely.		
4. Participate in a competition between classes to see who can get the most people using active travel over a week.		
5. Develop a fitness regime that includes using active travel to get to school. There is a fitness goal that would be achieved.		
6. Being the leader of a walking group where you look after the younger students.		
7. Being allowed to walk / bike / skateboard / scoot to school by myself.		
8. Designing a pou or a waka to mark our designated walking or riding meeting places.		