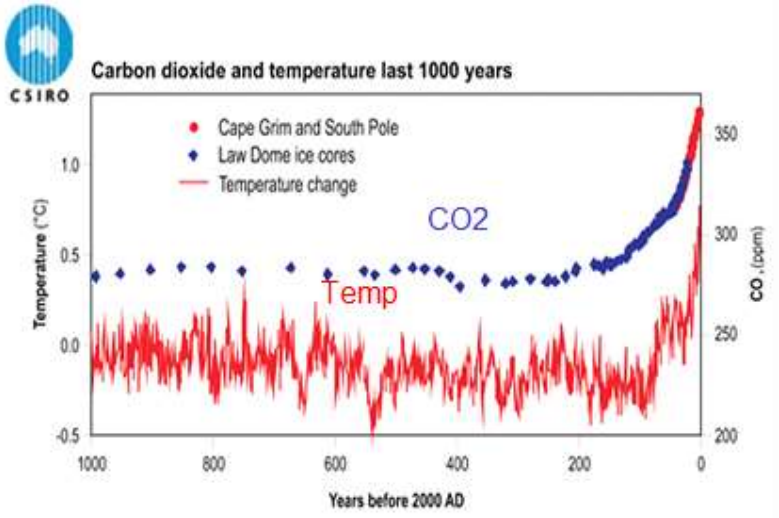
Camden High School

Together we achieve

Year 9 Science

Earth and Space

Assessment Task

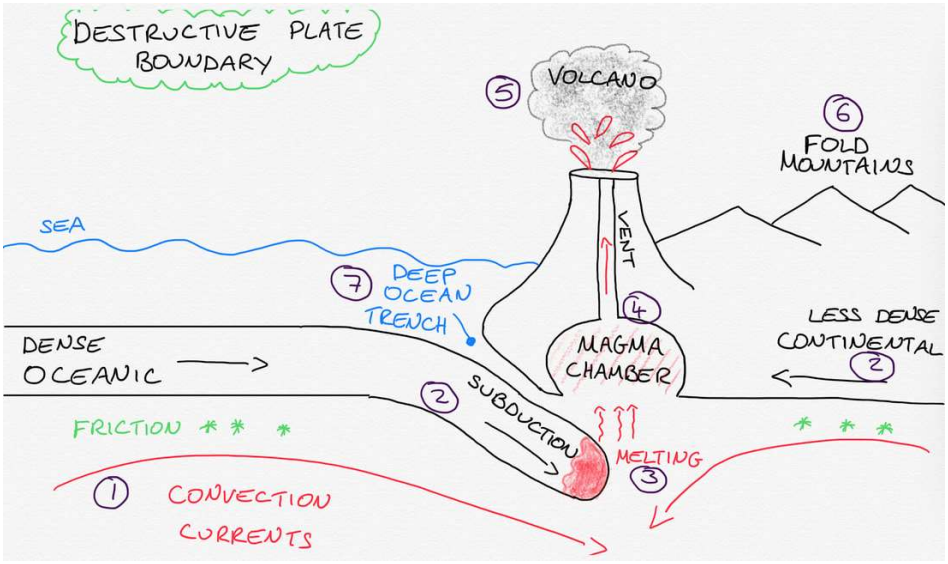


Activity 1 – Plate Interactions

To complete this activity, you will need to draw an **annotated** scientific diagram.

Annotated diagrams include not only labels for key components but **also** short *concept captions* **describing** what *processes* occur and where, or **what** *products* are formed, or **how** *both* related.

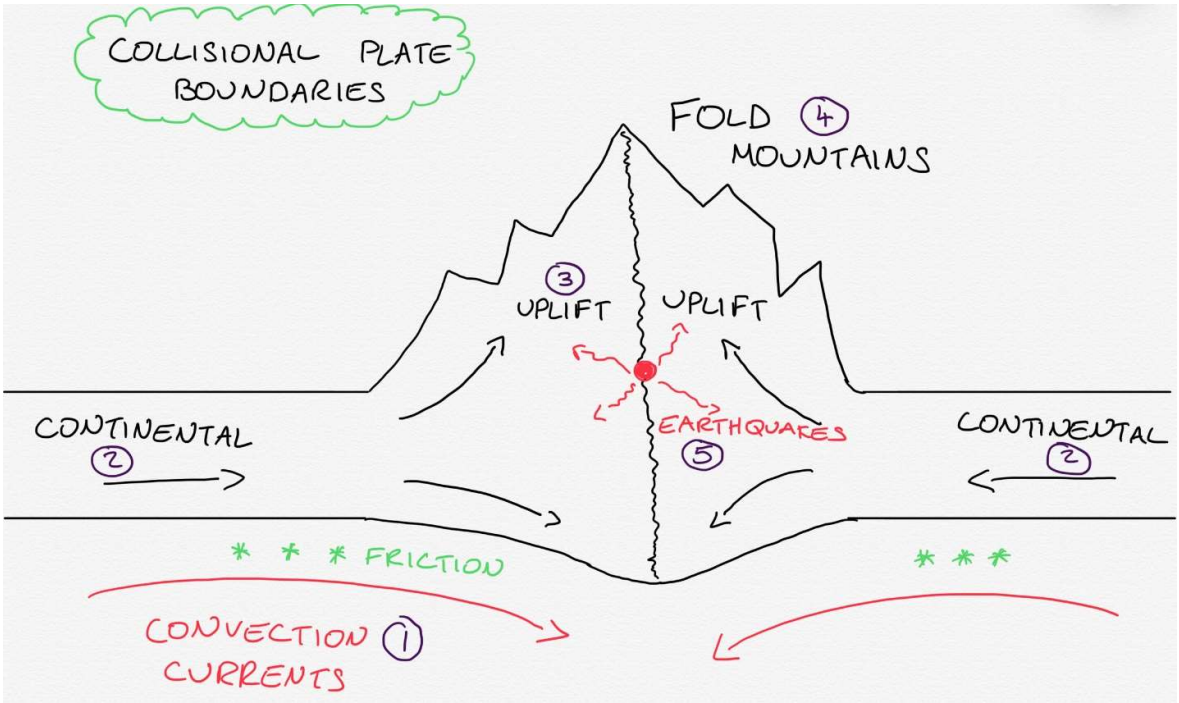
The diagram below is **labelled** and **annotated**



1. Convection currents in the Mantle move towards each other and sink back to the Core.
2. The friction generated between these convection currents and the tectonic plates move them towards each other. The more dense Oceanic plate is subducted under the less dense Continental plate.
3. The subducted plate melts due to the heat and extreme pressure.
4. The melted magma can rise and form a Magma Chamber.
5. As the Magma Chamber grows it builds pressure that can be released in a volcanic eruption.
6. The collision of the two plates stresses the plates which can bend/fold creating Fold Mountains.
7. Where the two plates meet in the ocean they can create a Deep Ocean Trench. These are some of the deepest points on our planet.

See that there are **labels** as well as numbered **annotations** that **describe** or **detail** *processes* and the resultant *products*.

Observe the diagram below of a Collisional plate boundary. Write an annotation for each of the numbers on the diagram.



1. _____

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2. _____

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3. _____

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4. _____

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5. _____

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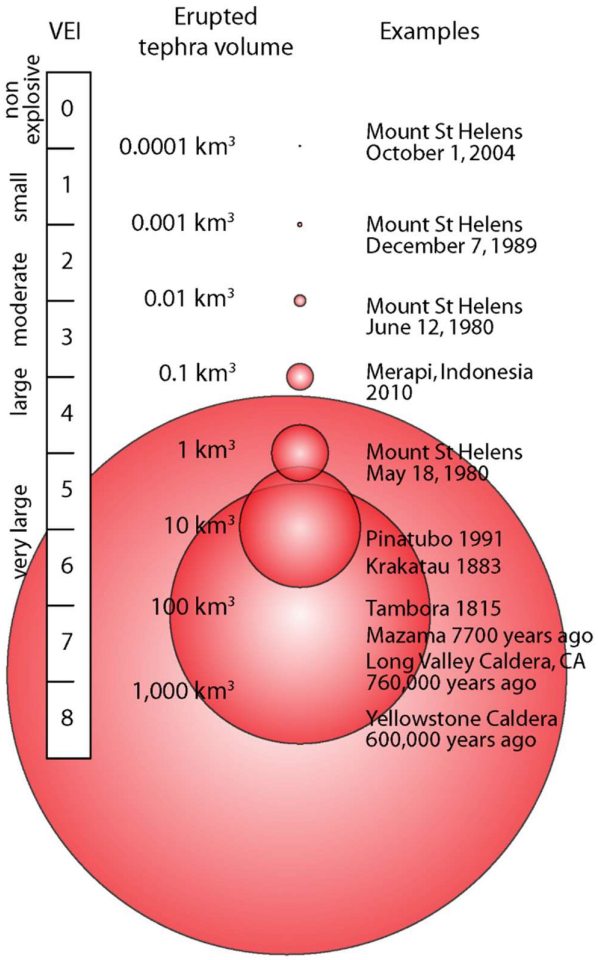
Activity 2 – Case Study

To complete this activity; Use the scaffold provided, to present a case study on a **currently active** volcano of your choice. You will explore the volcanoes geological characteristics, eruption history, impacts on the environment and society, and the mitigation strategies used to reduce the risk of the volcanic hazard.

The Volcanic Explosivity Index or VEI

Volcanoes are measured using the Volcanic Explosivity Index, or VEI. This scale uses several volcanic characteristics to judge the size of an eruption. It uses the eruption cloud height, the volume of products erupted and more subjective qualitative observations (such as effusive and mega colossal!) to attribute a number to the eruption from 0 to 8. The amount of material ejected is on a logarithmic scale. The higher you go up the Index, the less frequent the event becomes.



The following web sites provide reliable information on Volcanoes. You might like to visit them to help you gather some information on your chosen volcano.

https://www.ga.gov.au/education/classroom-resources/hazards/natural-hazards/volcano

https://www.nps.gov/subjects/volcanoes/about-volcanoes.htm

https://www.usgs.gov/science/science-explorer/natural-hazards/hazards-101

Case Study Research Scaffold

Choose a specific volcano to study. It could be a historically significant or recent eruption, a well-known volcano, or one of personal interest.

Volcano Name:	
Geographic location:	
Features: *Include for example; type, size, surface area, height.*	
Geologic Characteristics: *Include for example a description of the type of volcano (stratovolcano, Shield volcano, Plinian etc.)* *Describe its geological formation, including tectonic setting and magma composition*	
Eruption History: *Present a chronological overview of notable eruptions, including dates, eruption styles, VEI and volcanic products (lava, ash, pyroclastic flows).* *Highlight any significant impacts on the environment and human settlements*	

## Environmental and Societal Impacts: *Discuss the effects of past eruptions on the local environment, such as changes in landscape, soil fertility, and vegetation.* *Describe the impact on human settlements, including displacement, casualties, and economic consequences*	
## Mitigation and Preparedness: *Investigate the strategies employed by authorities to mitigate volcanic hazards.* *Discuss preparedness measures, early warning systems, evacuation plans, and community education.*	
## Analysis and Reflection: *Why is it important to understand the features and behaviour of Volcanoes?* *What are the risks and benefits of living close to an active volcano?*	

Activity 3 – Graphing Ice Core Data

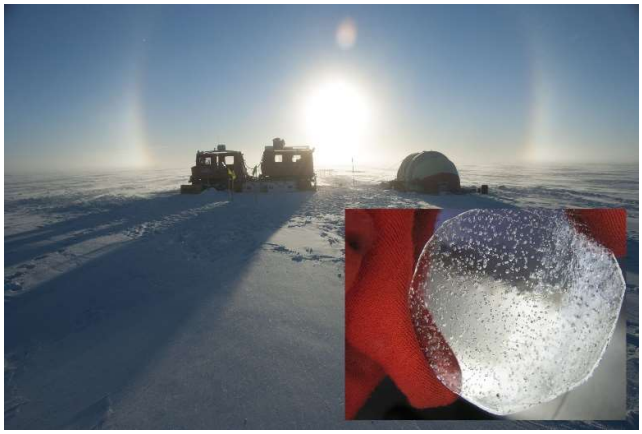
In 2016 a group of Australian scientists travelled to Antarctica and drilled down almost 3km into a glacier and extracted an ice core. The gas bubbles that had been trapped in the ice as it fell over thousands of years was analysed for the concentration of Carbon Dioxide gas(CO_2) present.

Carbon Dioxide is a Greenhouse Gas. Greenhouse gases are important as they help to maintain the Earth's temperature. Too little and the earth would freeze over, too much would make the earths temperature unbearably hot.

The changes in Carbon Dioxide levels can be used by scientists to help understand how the earths climate has warmed and cooled over time.

To complete this activity, you will need to construct a graph from the supplied Ice Core data.

Depth (m)	Year BP	CO_2 levels (ppm)
180	0	280
177	100	260
175	200	240
160	300	220
163	400	240
152	500	260
139	600	280
125	700	300
118	800	320
105	900	340
97	1000	300
89	1100	280
81	1200	260
76	1300	280
70	1400	300
64	1500	320
56	1600	300
47	1700	280
38	1800	300
33	1900	340
25	2000	360
3	2023	420



Ice Core Data Graph

Use the data in the table to construct your graph which shows the changes in Carbon dioxide concentration over time.

Include:

- Relevant scientific title
- Labelled horizontal and vertical axis including units
- Even scales for all axis
- Appropriate graph type
- Accurate plotting
- Clarity of data

Activity 4 – Extended Response: Impacts of Climate Change

Volcanoes for the most part, have been helping to maintain our atmospheric gas concentrations and Earth's global temperature, at just the right levels for many millions of years, contributing greenhouse gasses such as Carbon dioxide for all of Earth's history.

There have been very rare occasions, where colossal eruptions have emitted so much greenhouse gas that massive extinctions resulted. At the end of the Permian some 250 million years ago a, super volcano, (the size of India) erupted continuously for tens of thousands of years, outgassing so much greenhouse gas in to the atmosphere, that much of the Earths ice caps and glaciers melted due to the super greenhouse that was created. Oceans became so acidic due to increased gas concentrations and sea levels rose by so many hundreds of meters that 96% of all marine life and 70% of life on land went extinct. This event was called the ***Great Dying***.

An artist's rendering of the mass extinction of life that occurred toward the end of the Permian Period, about 250 million years ago.

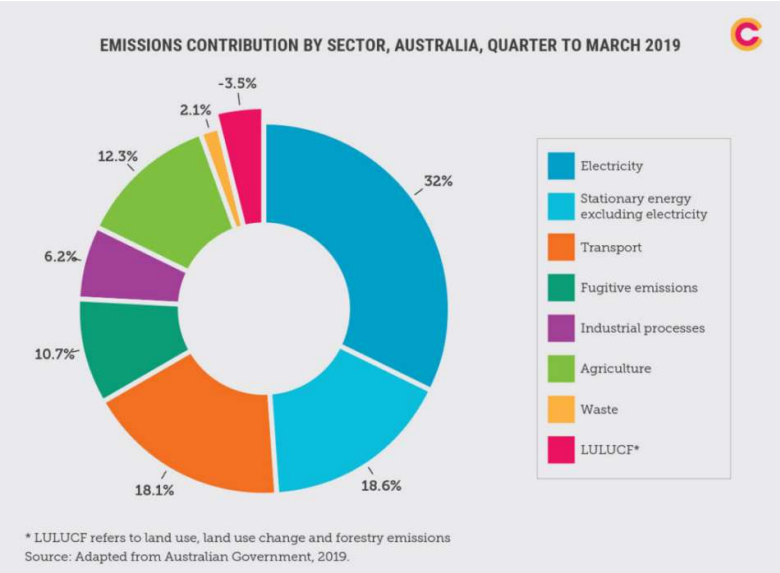
In 1991 Mount Pinatubo in the Philippines, erupted releasing 20 million tonnes of sulphur dioxide and ash particles into the upper atmospheric regions of the stratosphere. This was enough to block the sunlight from reaching the Earth's surface for a short period of time and in the region surrounding the Philippines, the lower atmospheric temperature dropped by 4^{o}C. This affected plant growth and crop yields declined.

The 1991 Eruption of Mt Pinatubo sending gas and ash into the Stratosphere

Extended Response

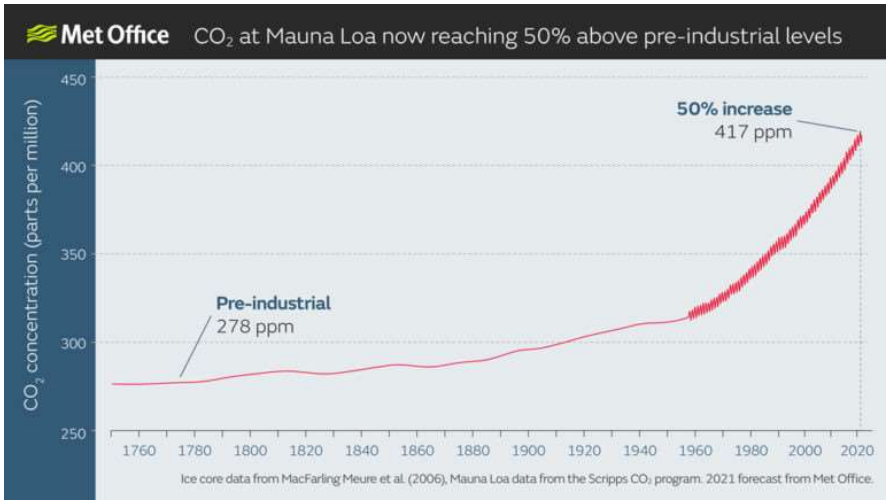
Since 2015, global **human caused** carbon dioxide emissions have been around **37 *billion*** tonnes per year while annual volcanic CO_2 emissions are around **200 *million*** tonnes.

In 2018 it was measured that Greenhouse Gas emission by human activity was 185 times **higher** than volcanic emissions.



Australia's greenhouse gas emissions by sector, 2019. Electricity remains the biggest contributor of greenhouse gases in Australia.

In the last 250 years, since humans started burning fossil fuels to meet our energy needs for industry, electricity and transport, atmospheric carbon dioxide levels have increased at the fastest ever observed rate. As shown in the graph below.



To complete this activity, you will produce an extended written response (approximately 300 words) in response to the inquiry question:

"How does climate change affect the environment and people?"

Use the Alarm Matrix to help scaffold your response.

You should include:

- Correct Spelling, grammar and punctuation.
- Use of scientific terms, language or conventions eg. Carbon dioxide or CO_2 not CO2.
- Data, such as the change in gas concentrations eg CO_2 levels increasing from 218ppm to 471ppm over 250 years and an example of an activity that caused the increase.
- Incorporation of specific examples to help support your arguments eg. changes in cyclone frequency as a result of increased global temperatures.

Inquiry Question:	**"Explain how climate change affects the environment and people?"**
Identify: *What is causing the climate to change?*	
Describe: *A change in the environment due to climate change*	
Explain: *How the change in the environment affects people*	

Extended response

“Explain how does climate change affect the environment and people?”