Year 13 Science: Water, carbon, volcanoes and climate trends

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. 25 mm of rain falls on 1.0 km². How much latent heat was released when it condensed? Use $L = 2.26 \times 10^6$ J kg^{-1}.

2. Using the CO_2 table, find the average rate of rise from 2010 to 2020.

3. New Zealand's mean temperature in 2021 was 13.56 °C. How far above the 1981 to 2010 average of 12.61 °C was it?

4. Why does SO_2 that reaches the stratosphere affect climate for longer than SO_2 that stays in the troposphere?

5. Why does the CO_2 record rise and fall a little every year?

Exam-style question: the Pinatubo eruption

In June 1991, Mt Pinatubo in the Philippines erupted, sending a column of ash and gas about 35 km high and putting around 15 million tonnes of SO_2 into the stratosphere. In 1992, average global surface temperature was about 0.5 °C lower than before the eruption.

6. Describe what happened in the troposphere close to the volcano.

7. Explain how the SO_2 in the stratosphere cooled the Earth's surface.

8. Explain why the cooling was felt around the world, including in New Zealand.

9. Explain why the cooling lasted only about two years.

Fix the mistake

10. Correct this statement: "Volcanic ash in the stratosphere is what cools the climate for years."

11. Correct this statement: "Last winter was cold, so the climate is not warming."

12. Correct this statement: "Evaporation cools the air because the water takes heat from it."

13. Correct this statement: "The yearly wiggle in CO_2 is caused by people burning more fuel in winter."