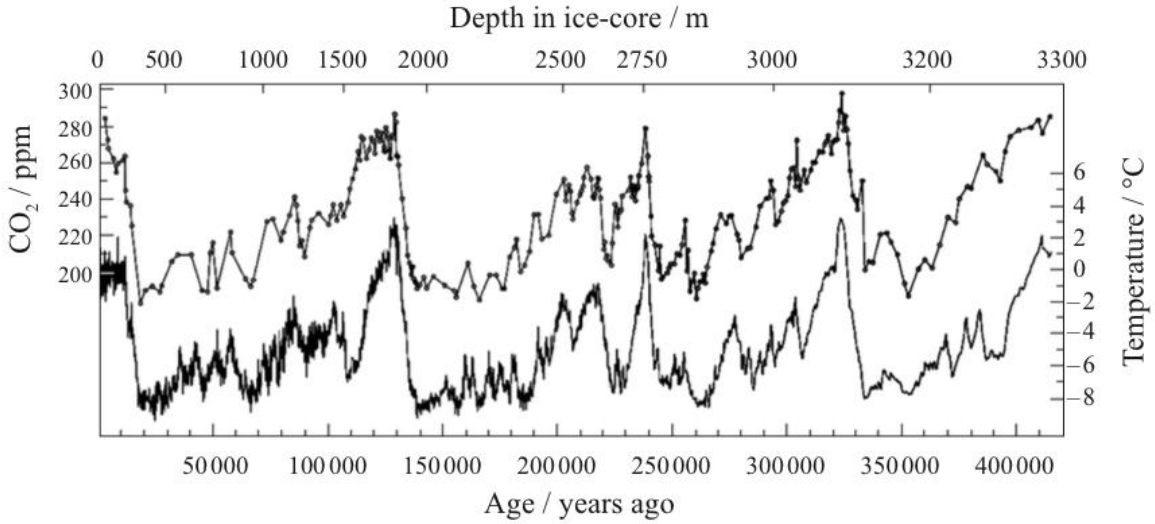
Carbon Dioxide and Temperature

Background

Carbon dioxide concentration in the atmosphere has been implicated in global warming and climate change. Variations in the concentration of carbon dioxide in the atmosphere can be studied using ice-cores. An ice-core record covering the last 400 000 years has been obtained from Vostok in the Antarctic. The graph below shows the carbon dioxide concentrations that were measured at different depths in the ice. Atmospheric temperatures are also shown on the graph. These were deduced from ratios of oxygen isotopes. The upper line on the graph shows CO2 concentrations and the lower line shows temperature.[1]



[Reprinted by permission from Macmillan Publishers Ltd: *Nature*, Lee R. Kump, "Reducing uncertainty about carbon dioxide as a climate driver", 419, pages 188-190, copyright 2002.]

HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

Essential Question:

What is the major trend in Earth's temperature data and what is causing that to happen?

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[1] International Baccalaureate Organization 2010

[2] *Nature*, Lee R. Kump, "Reducing uncertainty about carbon dioxide as a climate driver", 419, pages 188-190, copyright 2002.

Component	Beginning - 5	Approaching Standards – 7.5	Meeting Standards - 9	Exceeding Expectations = 10
Claim	Claim is a simple yes or no, or **incomplete**	Respond to the question asked, but may be **vague.**	Write a detailed statement that answers the essential question. Is **specific** and **complete.**	All of "meeting Standards, and a rebuttal
Evidence	Evidence is missing or is **irrelevant.** Lacks specific numbers	Provide scientific data to support your claim Only use appropriate data and include **enough data to support the claim**	Provide scientific data to support your claim Only use appropriate data and include enough data to support the claim Appropriate data is relevant to the question and allows you to figure out your claim. Remember that not all data is appropriate. Data should be **specific** and **accurate.**	Evidence cites sources. (even if it's your data)
Reasoning		Connect your claim and evidence using logic and reason. Explains why your data counts as evidence using some scientific principles. May not be completely tied back to the claim.	In your reasoning statement, connect your claim and evidence to show how your data links to your claim. Tell why your data counts as evidence to support your claim using scientific principles. Remember, reasoning is the process where you apply your scientific knowledge to solve a problem or question. **Is completely tied back** to the claim.	Has a flow of logic that is easy to follow and tightly connects claim and evidence. Uses advanced scientific principles and justification. Reasoning cites source. (if it's not your data)
Rebuttal				Describe an alternative explanation and provide counter evidence and reasoning to why the alternative explanation is not appropriate.

Claim-Evidence-Reasoning Explanation Tool Scaffold

Name: _____

Essential Question	
What is the major trend in Earth's temperature data and what is causing that to happen?	
Evidence from data and observations **Evidence sources:** **lab results, graphs, additional research**	**Reasoning: Science Ideas and concepts you have learned for support, or explaining why your evidence relates to the question.** **Evidence sources:** **Videos, bell ringers, notes, lab background, additional research**
Claim (Your claim should answer the essential question)	
Reasoning Statement **Remember:** Your claim is an answer to the science question you are trying to solve. The evidence is your data you collect that you will use to evaluate your claim. The science information is what we have learned in class that will help you explain your data. The reasoning is the evaluation of your claim using your data for support and the science to explain why.	