Conceptual Physics Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Historical Temperatures Block \_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



The Earth’s atmosphere is composed largely of nitrogen and oxygen gases (99%), which have little effect on atmospheric processes. However the gases that make up less than 1% of the atmosphere have a much greater effect on weather and climate and can vary in concentration over time and location. These gases (water vapor, carbon dioxide, methane, nitrous oxide, sulfur dioxide, CFC’s) can absorb thermal energy emitted by the earth.

Vostok Station in Antarctica drills ice cores, a cylindrically shaped sample of ice drilled from a glacier. Snowfall that collects on glaciers each year captures atmospheric concentrations of dust, sea-salts, ash, gas bubbles and human pollutants. Analysis of the physical and chemical properties of an ice core can reveal past variations in climate ranging from seasons to hundreds of thousands of years. Ice core records can be used to reconstruct temperature, atmospheric circulation strength, precipitation, ocean volume, atmospheric dust, volcanic eruptions, solar variability, marine biological productivity, sea ice and desert extent, and forest fires.

In this investigation, you will be using the data obtained from Vostok Station to reconstruct the concentration of CO2 and temperature over the past 400,000 years.

Directions:

1. Create 2 graphs, both with time in years on the x-axis. Start with 400,000 BC on the left and number as far as year 0 on the right counting by intervals of 10,000 years.
2. On the first graph, label the CO2 concentration will be the y-axis. Begin with 100 ppm at the lower end and number up to 400 counting by intervals of 10 ppm.
3. On the second graph, the temperature anomaly will be the y-axis. Begin with -10°C at the lower end and number up to 2.0°C, counting by intervals of 0.5°C.

**Carbon Dioxide Concentration and Temperature Anomaly Data**

**(398,000 BC to 400 BC)**





**Questions:**

1. What patterns do you notice between the two graphs? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. How many peaks can you identify? How many troughs? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. What is the approximate number of years in one complete cycle? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Do peaks represent cold periods or troughs? How do you know? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. This table uses deviation from a reference point (-56°C) to provide data. Would the patterns change if the reference point were different? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Does this data provide a link between CO2 concentration and temperature? Explain. \_\_\_\_\_\_\_

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