

Graphic Organizer: English III: Reading: Module 1: Lesson 2: Annotating to Deepen Understanding

Questions for Al Gore's book, *Earth in the Balance*

1. Following Al Gore's ideas, we can assume that he believes that Carbon dioxide (CO₂) should be—
 - a) reduced
 - b) eliminated
 - c) exhaled by plants
 - d) trapped in ice caps

2. Before World War II, carbon dioxide in the atmosphere—reached dangerous levels
 - a) reached dangerous levels
 - b) remained at a constant level
 - c) was completely nonexistent
 - d) fluctuated with the temperature

3. The main idea of this reading is that—
 - a) carbon dioxide has always been in fluctuation and is a natural phenomenon.
 - b) the chemical and thermal dynamics of global warming are extremely complex.
 - c) by rapidly destroying the forests, humans are damaging the forests' ability to remove excess carbon dioxide.
 - d) due to human causes, carbon dioxide has increased at a dangerous rate in the atmosphere since World War II.

Reading excerpt...

from *Earth in the Balance*

by Al Gore

The chemical and thermal dynamics of global warming are extremely complex, but scientists are looking especially carefully at the role played by one molecule: carbon dioxide (CO₂). Since the beginning of the industrial revolution, we have been producing increasing quantities of CO₂, and we are now dumping vast amounts of it into the global atmosphere. . . . As a percentage of the total atmosphere, CO₂ represents only about .03 percent of the molecules that make up the air, or 355 parts per million. Even so, it has always played a critical role as the greenhouse gas that triggers enough warming to increase the amount of water vapor that evaporates from the oceans into the atmosphere. This extra water vapor, in turn, traps nearly 90 percent of the infrared rays radiated from the surface of the earth back toward space, retaining the long enough to maintain the earth's temperature in rough equilibrium.

Carbon Dioxide and Climate Change

The correlation between CO₂ levels and temperature levels over time is well established. The greenhouse effect is, after all, a natural phenomenon that has been understood for more than a century. Venus, which has much more CO₂ in its atmosphere, traps much more solar heat close to its surface and is, predictably, much hotter than the earth.

The amount of CO₂ in the earth's atmosphere has fluctuated significantly over time in cycles lasting tens of thousands of years. The ice ages, for example, correspond to periods when CO₂ concentrations were relatively lower than they have been for the last 15,000 years. A few years ago, scientists from the Soviet Union and France conducted an extensive analysis of the tiny bubbles of atmosphere trapped in the ice in a deep hole they drilled in Antarctica two miles down through 160,000 years' worth of ice. After learning to read the ice the way foresters read tree rings, they found a striking correlation between the ups and downs of CO₂ and of temperature during all that time. As can be seen on the illustration on the next page, CO₂ levels fluctuated between 200 parts per million (ppm) during the last two ice ages and 300 ppm during the period of great warming between the two ice ages. The global average temperature rose and fell along a line that seems to match the line measuring CO₂.

Human Causes of Climate Change

Surprisingly, however, the range of this natural fluctuation is quite small compared to the changes caused by humankind. We are driving CO₂ from its warm level of 300 to over 600 ppm—with most of that change occurring since World War II. In fewer than fifty years, we will have doubled the amount of CO₂ in the atmosphere when this century began. For not only are we putting huge amounts of CO₂ into the atmosphere, we are also interfering with the normal way CO₂ is usually removed from the atmosphere.

The human lung inhales oxygen and exhales carbon dioxide, and the engines of civilization have, in effect, automated the process of breathing. The wood that fuels our fires, the coal and oil and natural gas that feed our furnaces, the gasoline that runs our cars—all convert oxygen into CO₂ enormous quantities of it. It is as if CO₂ has become the exhalation of our entire industrial civilization. Trees and other plants pull CO₂ of the atmosphere and replace it with oxygen, transforming the carbon into wood, among other things. By rapidly destroying the forests of the earth, we are damaging its ability to remove excess CO₂.

