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 (CO_2) 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—
    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 (CO_2). Since the beginning of the industrial revolution, we have been producing increasing quantities of CO_2, and we are now dumping vast amounts of it into the global atmosphere. . . .*As a percentage of the total atmosphere, CO_2 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 them long enough to maintain the earth's temperature in rough equilibrium.

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Carbon Dioxide and Climate Change

The correlation between CO_2 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 CO_2 in its atmosphere, traps much more solar heat close to its surface and is, predictably, much hotter than the earth.

The amount of CO_2 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 CO_2 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 CO_2 and of temperature during all that time. As can be seen on the illustration [below], CO_2 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 CO_2.

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 CO_2 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 CO_2 in the atmosphere when this century began. For not only are we putting huge amounts of CO_2 into the atmosphere, we are also interfering with the normal way CO_2 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 CO_2, enormous quantities of it. It is as if CO_2 has become the exhalation of our entire industrial civilization. Trees and other plants pull CO_2 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 CO_2.