

Date _____

Name _____

Introduction

Scientists have collected data that prove that Earth is warming up. Scientific models and experiments show that increasing amounts of carbon in the atmosphere causes this warming. One of the most important scientific questions today is “How are humans impacting the carbon cycle and what can be done about it?”

In your folder are four texts that will help you understand the carbon cycle and how humans are impacting it.

Your Tasks

1. Read the texts in your folder and write notes in the margins about your reading, thinking and problem solving processes.
2. After you have read the texts, respond to the following:

Use information from the texts to create a detailed model, using visuals (pictures, diagrams, graphs, etc...) and words that explain how humans impact the temperature of the Earth.

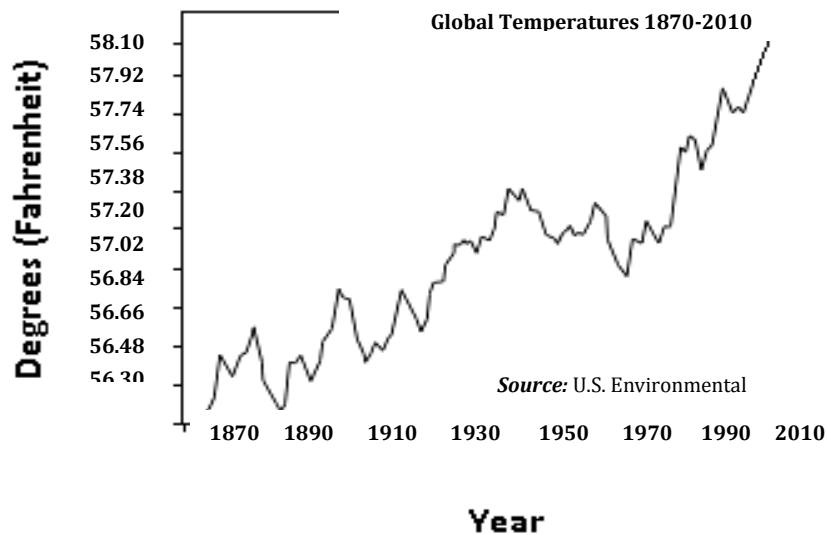
- You can read the texts in any order you wish.
- The information in the texts will help you create your model.
- When you have finished reading and writing notes on the texts take the blank paper that is in your folder and use it to create your model.
- You can look at the texts and your notes when you are creating your model.

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Changes in Global Temperatures

The temperature of the land and the oceans is measured by weather stations all over the Earth. Scientists have access to all of this temperature information. At the end of the year, they take the average of all of these temperatures. This average is called the global temperature of the Earth. Small changes in the average global temperature create big problems for living things. A recent study by the Royal Society of biological sciences found that warmer temperatures are related to higher extinction rates. *

Scientists have recorded temperatures around the globe since 1880. The graph below is a visual model made using this data. It shows the average global temperature of the Earth from 1880 to 2010.



* doi: 10.1098/rspb.2007.1302 *Proc. R. Soc. B* 7 January 2008 vol. 275 no. 1630 47-53

Name _____

Carbon Balance

Carbon is the backbone of life on Earth. We are made of carbon, we eat carbon, and our economies, our homes, our transportation all use carbon. On Earth, carbon is stored in the ocean, the atmosphere, in living things, and in the earth as rocks, soil, and fossil fuels. We call places that store carbon “sinks.”

Carbon moves between sinks through the carbon cycle. Carbon can be moved out of one sink and into another, but it never gets destroyed or goes away. For example, when people use gasoline in their cars, they are moving carbon from the lithosphere to the atmosphere.

Carbon dioxide is gas made up of one atom of carbon and two atoms of oxygen. Carbon dioxide traps heat in the atmosphere. Without it and other carbon gases, Earth would be a frozen world. When there is more carbon in the atmosphere, the Earth warms.

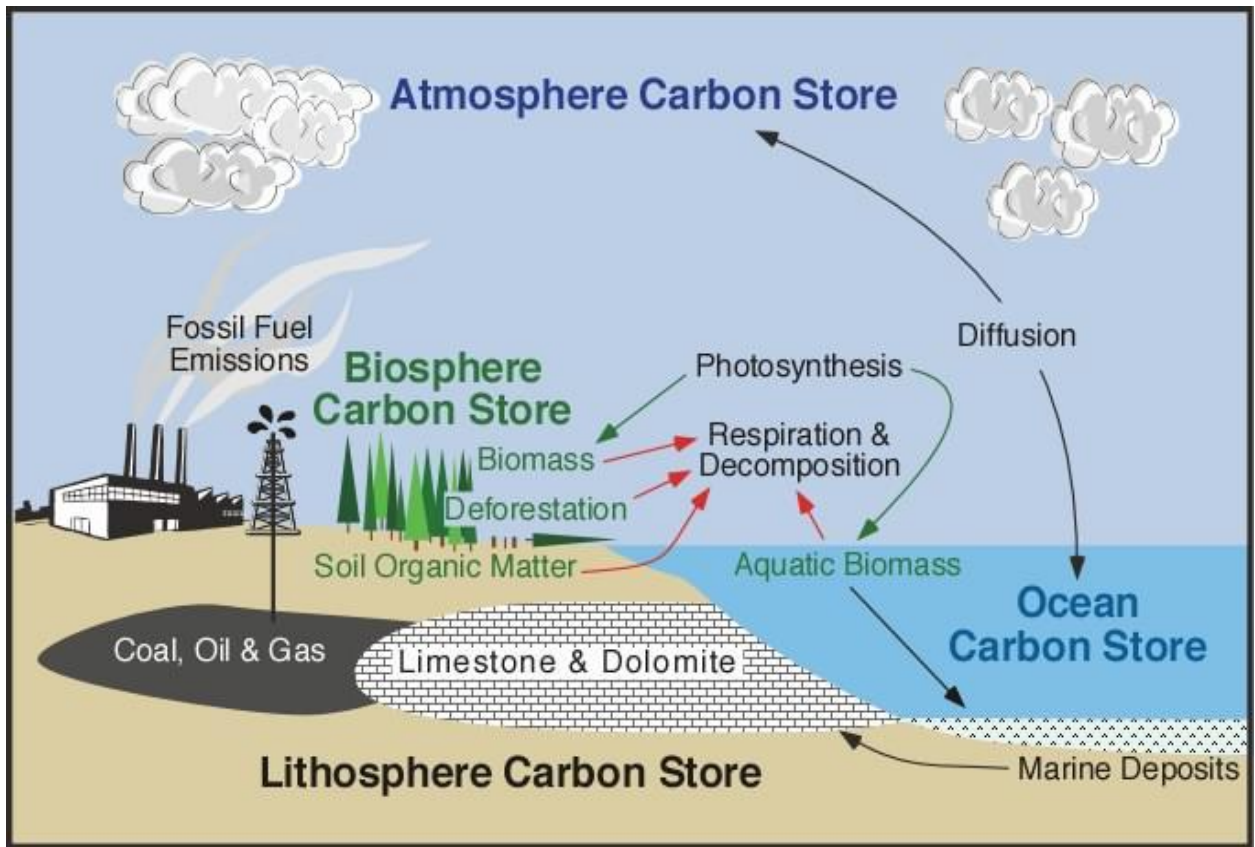
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Carbon Sinks

The diagram below is a visual model of the major carbon sinks, or “stores”.

Carbon is found

- (1) in living things in the *biosphere*;
- (2) as the gas in the *atmosphere*;
- (3) in soils in the *geosphere*;
- (4) as fossil fuels and rock in the *lithosphere*
- (5) in the oceans, or *hydrosphere*.



<http://www.physicalgeography.net/fundamentals/9r.html>

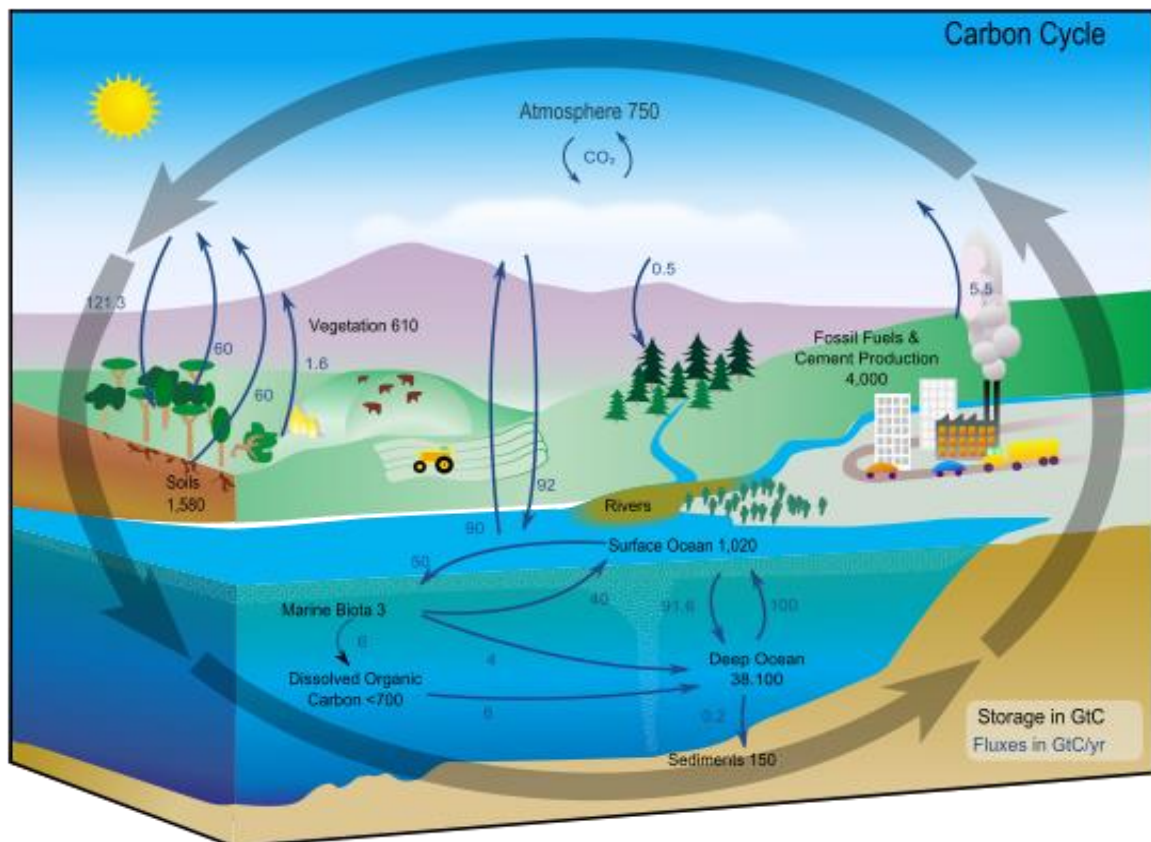
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The Carbon Cycle

The carbon cycle exchanges carbon among the biosphere, lithosphere, geosphere, hydrosphere, and atmosphere of the Earth. It is one of the most important cycles of the Earth and allows for carbon to be recycled and reused by all living things.

Over billions of years, the carbon cycle seems to maintain a balance between the atmosphere and the other four sinks. This balance has kept Earth's temperature relatively stable and capable of supporting life, unlike any other planet in our solar system. But the ways humans use carbon has moved carbon from a few sinks into the atmosphere. This is changing the balance between sinks and impacting Earth's temperature.

Visual Model of the Carbon Cycle



The black numbers show how much carbon is stored in different sinks, in billions of tons ("GtC" stands for gigatons of carbon).

The grey numbers indicate how much carbon moves between reservoirs each year.

http://en.wikipedia.org/wiki/File:Carbon_cycle-cute_diagram.svg