

Name \_\_\_\_\_

# CARBON

1. What was one new thing you learned last class?
2. Do you think these climate changes are a natural occurrence on Earth? Why or why not?

**The element carbon** is one of the most basic building blocks of life on earth. It is found virtually everywhere -- from plants and animals to pencils, diamonds, soil, and even soda. Carbon's essential nature allows it to grab onto other atoms readily (including other carbon atoms); this is why carbon exists in so many forms. Carbon can dissolve in water (carbonic acid), form chains to create sugars (food), and form solid materials like graphite (pencils) and limestone (rocks). Carbon in living things can be released or absorbed through respiration, consumed as food, or transformed into fossil fuels over millions of years. In the atmosphere, carbon exists primarily as carbon dioxide.



## KEY VOCABULARY:

*Atmosphere:*

*Lithosphere:*

*Biosphere:*

*Hydrosphere:*

Record your journey through the carbon cycle below

ROUND 1

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

**Now the industrial revolution has begun!**

ROUND 2

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

1. After completing this activity, do you think humans have altered the carbon cycle? Why or why not?

**Answer these questions when we complete round 1:**

Did you see any patterns? For instance did you stay at any place more than once?

Did you go back and forth between two stations (for example, biosphere and atmosphere)? What may explain this?

**Answer these questions when we complete round 2:**

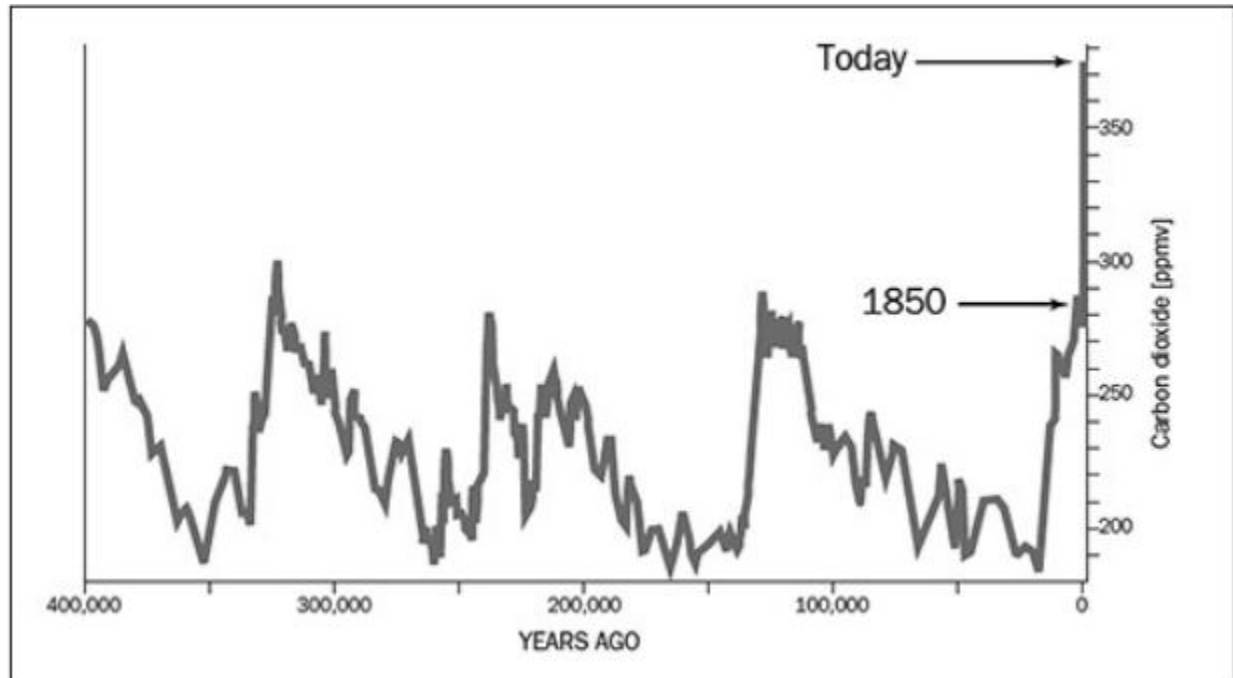
How did this second round compare with their first journey through the carbon cycle?

Did anyone find themselves “stuck” in one place? What may explain this?

Did you notice any differences from this round to the previous round?

2. Predict: What impact does this have on the Earth?

Carbon over the last 400,000 years



The graph above shows the changes in carbon dioxide concentration during the last 400,000 years. It was produced by measuring ice samples in Antarctica and extracting atmospheric gases from trapped bubbles of air. The 100,000-year ice age cycle is clearly recognizable. Also shown on the graph is the last 150 years of carbon dioxide concentration data since 1850. (Data sources: Petit et al. 1999; Keeling and Whorf, 2004).

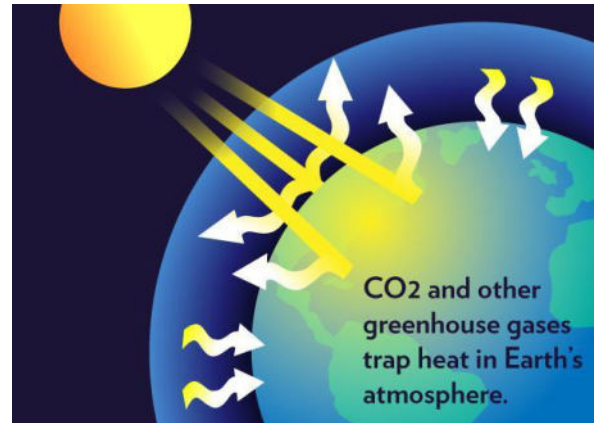
1. Do you notice any pattern in the carbon cycle or is it all random? If you see a pattern, outline it!
2. If it were not for the sharp rise in carbon dioxide after 1850, what would you predict would have been the carbon dioxide changes during the next 100,000 years?
3. Some people believe that the current rise in carbon dioxide is part of a natural cycle of changes. Based on this graph, what would your reply be to this belief?

### *What do the scientists think?*

Carbon dioxide is known as a greenhouse gas due to its ability to trap the sun's heat in the atmosphere. Without carbon dioxide's natural ability to trap heat in the atmosphere like a blanket, life as we know it could not exist.

When fossil fuels are burned, the bonds that hold carbon together inside those fossil fuels are broken and carbon is released into the atmosphere. Scientists have noted that the global atmospheric concentration of carbon dioxide has increased nearly 35% since the dawn of the industrial age; methane, another carbon containing compound, has increased by 150%. Earth's average global temperature has also increased by more than one degree Fahrenheit over this time period – a seemingly small change, but one with significant ramifications for earth's climate and living things.

A majority of climate scientists agree with the hypothesis that earth's rising temperature is largely due to the increase in carbon dioxide and other greenhouse gases in the atmosphere resulting from the burning of fossil fuels.



#### **CHALLENGE QUESTIONS:**

1. Why is there an increase of carbon in the atmosphere?
2. What impact does more carbon in the atmosphere have on the Earth and how/why does this happen?
3. *SO DO YOU THINK HUMANS ARE AFFECTING CLIMATE?* Cite evidence from today and yesterday's class, make sure to mention that amount of carbon changes naturally, but identify what is different about today than in the past in a 3-4 sentence explanation.