CO₂ emissions excel graphing activity and questions

Go to the link [http://teachers.sduhsd.net/bbodas/carbon%20dioxide%20emissions%20historic%202-5%202009.xls](http://teachers.sduhsd.net/bbodas/carbon%20dioxide%20emissions%20historic%202-5%202009.xls)

You should see data of Carbon Dioxide Emissions for a variety of sources (total fossil fuels, liquid fuel, solid fuel, cement production, gas flaring, and Per Capita CO₂) over many years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total CO₂ emissions from fossil-fuels (million metric tons of C)</th>
<th>CO₂ emissions from gas fuel consumption</th>
<th>CO₂ emissions from liquid fuel consumption</th>
<th>CO₂ emissions from solid fuel consumption</th>
<th>CO₂ emissions from cement production</th>
<th>CO₂ emissions from gas flaring</th>
<th>Per capita CO₂ emissions (metric tons of carbon; after 1949 only)</th>
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<tbody>
<tr>
<td>1751</td>
<td>3</td>
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1. Find the excel data for the historic CO₂ emissions
2. Copy all the data into a **new excel spreadsheet** (make sure that you include all the column headings, and be sure to include the data for the per capita CO₂ emissions in the last column...that data doesn't begin until 1950, so be careful).
3. Highlight all of the data range, and make sure you have all the data from **1751 to 2002**….highlight the column headings as well (make sure you do this or your graph will come out incorrectly)
4. Click on the insert tab from the top list of tabs, and select **line graph** from the chart options, and specifically select the “**line with markers**” option.

5. **Drag your graph to open space on the sheet or put it on a different sheet like sheet 2**
6. Drag the corner of your graph to make your graph much larger
7. Click on the blue time line on the graph and **delete** it.
8. The **per capita** data will be hiding on the x-axis…so we need to **add a secondary Y axis** to force excel to graph the per capita data on a second Y axis. **Right click** on the pinkish line on the x-axis and select **format data series.** Then, select “**secondary axis**” to force excel to create a **secondary Y-axis** for the per capita data (the rest of the data on the sheet is in different units).
9. Go back to the top of the sheet and click on the **Layout tab**.
10. Click on “**Chart title**” and add an appropriate chart title.
11. Click on “**Axis titles**” and add an appropriate primary vertical, secondary vertical, and primary horizontal axes titles. *Make sure to include units where appropriate as well!!!*

12. Take a look at your sophisticated, multi axis, multiple line, labeled graph, and ponder the general trends of the historic CO₂ emissions.  **Success!**

13. **Add your name somewhere on your graph and print a copy.**  Make sure to save your Excel file on your H: drive on the school network.

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Answer the questions below, and refer to the provided web links to help you answer the questions.

1. How do your plot/graphs reflect the history of fuel use in the world?

2. Look at the plot for per capita emission on the graph you made. What do the data points imply? Why does the shape of this plotted data look the way it does (Refer to your graph to answer the question!!!)

3. Suppose the total mass of the Earth’s atmosphere is about 5.1 x 10^18kg, and is about 0.037% CO₂. What was the percent increase in global atmospheric CO₂ as a result of the 2000 emissions? Show all your calculations and work. (Refer to your graph for 2000 emissions…you will need to read off the number of millions of metric tons of carbon emissions and 1 metric ton=1000Kg)

Where does CO₂ go / Carbon Sinks (question #4a & #4b)
http://www.newscientist.com/data/images/archive/2604/26041103.jpg

4a. Identify and describe some of the carbon dioxide sinks in the world.

4b. Describe how humans may be interfering with or inhibiting the sinks.

Sites with information on Anthropogenic Carbon (question #4c)
http://oto2.wustl.edu/bbears/trajcom/carbon3.htm

4c. What is meant by anthropogenic sources of carbon? List the top ways that you as an individual contribute to anthropogenic carbon? What are two ways you could reduce anthropogenic carbon emissions?

Greenhouse Gasses / Global warming potential (heat holding capacity) / Greenhouse gas levels (#5)
http://www.dnrec.delaware.gov/Documents/2a1a16a18f3e4fbb31695d5d06d5d0CCMaingreenhousegases2.JPG
http://www.epa.gov/climatechange/science/causes.html (Read the section on main and other greenhouse gases)

5a. Identify and describe the source of two other greenhouse gases besides carbon dioxide.

5b. Describe the relative ability of greenhouse gases to hold heat in the atmosphere?

5c. Compare their (the gasses) heat holding capacities or global warming potentials.

5d. How have the greenhouse gas concentrations varied over time in general, say over the last 500 years?

Temperature change in relation to atmospheric global carbon dioxide concentration (#6)
http://www.climatechoices.org.uk/images/globalTempCO2.gif

6a. Describe how temperature has varied with the increase in global carbon dioxide levels.

6b. Do you think the data displays a direct cause and effect relationship? Why or why not?

6c. Describe in detail three potential negative environmental impacts given the trends in the graphs.