**Activity 1.4.6 Greenhouse Gas Emissions**

*A greenhouse gas is a* [*gas*](http://en.wikipedia.org/wiki/Gas) *in an atmosphere that* [*absorbs*](http://en.wikipedia.org/wiki/Absorption_%28electromagnetic_radiation%29) *and* [*emits*](http://en.wikipedia.org/wiki/Emission_%28electromagnetic_radiation%29) *radiation within the* [*thermal infrared*](http://en.wikipedia.org/wiki/Thermal_infrared) *range.*

*Annual per capita emissions in the industrialized countries are typically as much as ten times the average in developing countries. Due to China's fast economic development, its annual per capita emissions are quickly approaching the levels of those in the* [*Annex I group*](http://en.wikipedia.org/wiki/Kyoto_Protocol#2012_emission_targets_and_.22flexible_mechanisms.22) *of the Kyoto Protocol (i.e., the developed countries excluding the USA). Other countries with fast growing emissions are* [*South Korea*](http://en.wikipedia.org/wiki/South_Korea)*, Iran, and Australia. On the other hand, annual per capita emissions of the EU-15 and the USA are gradually decreasing over time. Emissions in Russia and the* [*Ukraine*](http://en.wikipedia.org/wiki/Ukraine) *have decreased fastest since 1990 due to economic restructuring in these countries.*

*Energy statistics for fast growing economies are less accurate than those for the industrialized countries. For China's annual emissions in 2008, the* [*Netherlands Environmental Assessment Agency*](http://en.wikipedia.org/wiki/Netherlands_Environmental_Assessment_Agency) *estimated an uncertainty range of about 10%.*

*The* [*GHG footprint*](http://en.wikipedia.org/wiki/GHG_footprint)*, or greenhouse gas footprint, refers to the amount of GHG that are emitted during the creation of products or services. It is more comprehensive than the commonly used carbon footprint, which measures only carbon dioxide, one of many greenhouse gases.*

<http://en.wikipedia.org/wiki/Greenhouse_gas>

"Data from <http://ccsl.iccip.net/co2highlights.pdf>

1. Based on the graph above the following regions can be described using the following functions, where *x* represents the number of years since 1970 and the function represents the million tonnes of CO2.

North America: 

Pacific: 

Europe: 

China: 

1. Find the sum of North America and Europe.
2. Find the sum of North America and Europe in 1987.
3. Find the difference between North America and China.
4. Find the difference between North America and China in 1998.
5. Find the sum of all four regions.
6. Find the sum of all four regions in 2005.

2. Given the functions for each region what is meant by f(x + 10) or f(x) + 10?

3. Find f(x + 10) or f(x) + 10 for each region.