1. Which of the following is NOT an important factor in the greenhouse effect?
   A. The earth’s atmosphere is fairly transparent to sunlight.
   B. Carbon dioxide and water vapor absorb infrared radiation.
   C. Part of the energy absorbed by the earth’s atmosphere is re-radiated to the surface.
   D. Snow and ice reflect more sunlight than land covered by vegetation.
   E. The earth radiates energy at a rate that increases with its temperature.

2. Which of the following does not lead to the ocean levels rising.
   A. The ocean waters getting warmer.
   B. Glacier ice melting.
   C. Sea ice melting.
   D. Greenland ice melting.
   E. All of the other answers lead to ocean level rising.

3. Burning one pound of low-grade coal releases roughly 4 kWhr equivalent heat and 4 pounds of CO₂. Assuming a state of the art 25% efficient power plant, how many short tons of CO₂ result from one million kWhr of electricity generation? (One short ton equals 2000 pounds).
   A. 2
   B. 200
   C. 2000
   D. 500
   E. 5000
4. Your local utility is offering "green power". This will cost you an extra $0.059 per kWhr. Assume you use 600 kWhr per month. How much extra will you pay on your monthly bill if you choose the green power?

A. $3.00  
B. $300.00  
C. $35.00  
D. $0.30  
E. $7.00

5. In addition to ocean level rise, what direct effect is the increase of carbon dioxide concentration having on the oceans?

A. It is making the oceans colder.  
B. It is causing larger waves, including tsunamis.  
C. It is making the oceans more acidic.  
D. It is making the oceans saltier.  
E. It is causing fish populations to explode.

6. Human activity is increasing the $CO_2$ concentration in the air by about 2.5 parts per million (ppm). We are currently at about 410 ppm, and some climatologists claim 460 ppm is an upper limit we should not breach. How long do we have until we reach this concentration limit?

A. 20 to 25 years  
B. About two and a half years  
C. More than 200 years  
D. Less than four years
7. There have been several geoengineering proposals to either cool the earth directly or reduce CO₂ in the atmosphere. One proposal, to inject Sulfur Dioxide in the atmosphere, mirrors what natural phenomena?
   A. Earthquakes
   B. Sunspots
   C. Eclipses
   D. Volcanoes
   E. Algae blooms

8. The atmospheric CO₂ concentration was 280 ppm in 1800 and rose to 365 ppm in the year 2000. In the year 2000, the atmosphere contained about 3 trillion tons of carbon dioxide. How many tons of carbon dioxide did we add to the atmosphere between 1800 and 2000?
   A. about 730 million tons
   B. about 350 million tons
   C. about 11 billion tons
   D. about 700 billion tons
   E. about 2 trillion tons
9. Why does the burning of fossil fuels increase the greenhouse effect on earth?
   A. The burning fuels warm the planet
   B. Burning fossil fuels deplete the ozone layer which causes more ultraviolet light to reach the surface
   C. Burning fossil fuels increase the carbon dioxide concentration of the atmosphere
   D. Burning fossil fuels give off infrared radiation which gets trapped in the atmosphere
   E. Burning fossil fuels does not increase the greenhouse effect

10. If 60% of US petroleum use goes for transportation, and 1% of this goes for buses, how much oil per day is used for buses? Assume that total US petroleum use is 20,000,000 barrels of oil (bbl) per day.
    A. 120,000,000 bbl
    B. 12,000,000 bbl
    C. 120,000 bbl
    D. 2,000,000 bbl
    E. 200,00 bbl

11. The US consumes $10^{20}$ J of energy each year and the current US population is roughly 300 million. How much average power per person does the US consume?
    A. 1 kWhr/person
    B. 10 kW/person
    C. 100 kW/person
    D. 10 kWhr/person
    E. 1 kW/person
12. Ocean acidification results predominantly from
   A. Increased $CH_4$ atmospheric concentration
   B. Melting glaciers
   C. Increased $CO_2$ atmospheric concentration
   D. Reduced albedo
   E. Rising sea levels

13. If you add 62.5 m$^3$ of water into a rectangular swimming pool that is 50 m long and 25 m wide, what will be the change in its water level?
   A. 5 cm
   B. 5 m
   C. 50 cm
   D. 20 cm
   E. 2 m

14. If your electricity comes solely from a coal power plant that is 33% efficient, how many kilotons of atmospheric $CO_2$ do you emit if you use a 80 W light bulb continuously for 2 years? The energy content of coal is 24 GJ/ton and 1 ton of burned coal leads to 2.86 tons of atmospheric $CO_2$.
   A. 0.1
   B. $10^{-2}$
   C. 1
   D. $10^{-3}$
   E. 10
15. Current $CO_2$ concentration is about 410 ppm. If we dump 30 Gton of $CO_2$ into the atmosphere each year and the oceans and plants absorb about 3.5 Gtons of Carbon per year, by which year will we reach a 2°C increase in temperature?
   
   A. 2019  
   B. 2029  
   C. 2035  
   D. 2027  
   E. We are past the 2°C mark!  
   F. 2050

16. Radiative forcing (RF) is

   A. The effective change in the absorbed solar flux.  
   B. Caused by the presence of $CO_2$ in the atmosphere.  
   C. 288 °K  
   D. The radiative flux of the Earth adjusting to balance the increased flux from the Sun