Chapter 8 Web Task

Carbon Dioxide Emissions

Scientists have been measuring and recording carbon dioxide (CO_2) particles in the air at Moana Loa observatory since 1958. Moana Loa is the largest volcano on Earth and is on Big Island, Hawaii, at approximately 19.5ºN. The observatory is 3400 m above sea level and is not close to any local source of pollution and so is a good site for measuring general CO_2 levels in the atmosphere within the tropics. This task provides an opportunity for you to analyse some of the data.

The table shows the mean daily level of carbon dioxide, in parts per million, by month for the years 2003-2007.

2003 Month	CO_2	2004 Month	CO_2	2005 Month	CO_2	2006 Month	CO_2	2007 Month	CO_2
01	374.92	01	377.03	01	378.43	01	381.40	01	382.94
02	375.62	02	377.87	02	379.70	02	382.20	02	383.86
03	376.51	03	378.88	03	380.92	03	382.66	03	384.49
04	377.75	04	380.42	04	382.18	04	384.69	04	386.37
05	378.54	05	380.62	05	382.45	05	384.94	05	386.54
06	378.20	06	379.70	06	382.14	06	384.01	06	385.98
07	376.68	07	377.43	07	380.60	07	382.14	07	384.36
08	374.43	08	376.32	08	378.64	08	380.31	08	381.85
09	373.11	09	374.19	09	376.73	09	378.81	09	380.74
10	373.10	10	374.47	10	376.84	10	379.03	10	381.15
11	374.77	11	376.15	11	378.29	11	380.17	11	382.38
12	375.97	12	377.51	12	380.06	12	381.85	12	383.94

a) Describe the trends in the data. What trends do you observe within each calendar year? Suggest possible reasons for the peak months. Is there a general trend over this 5-year period?

b) Choose the data for one year and graph it using technology. Use sinusoidal regression to approximate a curve of best fit, using an equation of the form $y = a\sin(bx + c) + d$.

c) Over these five years, find the rate of change of carbon dioxide levels.

This table shows the annual mean daily CO_2 level, in parts per million, by year from 1980 to 2007.

d) Plot the data using graphing technology. Find a line or curve of best fit for the data. Use regression to determine the equation of a function that approximates the trend in the data.

e) Predict the level of carbon dioxide emission in 2017.

f) Find the average rate of change in carbon dioxide levels for the time period 1980-2007.

g) Discuss the implications of your analysis on worldwide pollution.

Year	CO_2
1980	338.70
1981	340.11
1982	341.21
1983	342.84
1984	344.40
1985	345.87
1986	347.19
1987	348.98
1988	351.45
1989	352.89
1990	354.16
1991	355.49
1992	356.27
1993	356.96

Year	CO_2
1994	358.63
1995	360.62
1996	362.37
1997	363.47
1998	366.50
1999	368.14
2000	369.41
2001	371.07
2002	373.16
2003	375.80
2004	377.55
2005	379.75
2006	381.85
2007	383.72

- To obtain more data, and information about the Moana Loa observatory, go to www.mlo.noaa.gov .