



## In Class Exercises (ICE) - 3/2/01

**Weather is one of the most critical factors in planning any sort of event. Predicting the exact details of the weather is very difficult, but meteorologists can often develop a reasonable estimate of what the weather conditions will be like. In this ICE<sup>1</sup>, you'll look at what is involved in predicting the temperature in a geographic location.**

**The city of Tamanrasset in Algeria (see Figure 1<sup>2</sup>) is one of the few cities in the Sahara desert. The city has a hot, arid climate (see Figure 2<sup>3</sup> for a picture of the area). Tamanrasset was once a major tourist destination, but in recent years terrorist activity<sup>4</sup> in Algeria has all but destroyed the tourist industry.**

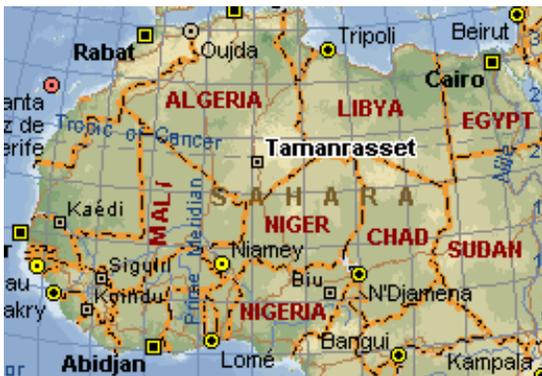


Figure 1: Map of northern Africa showing the location of Tamanrasset, Algeria.



Figure 2: A photograph showing the terrain of the Hoggar Mountains surrounding Tamanrasset, Algeria.

**Some data on the climate of Tamanrasset is given in Table 1 below (the numbers are the average temperatures in °F).**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
55.0	59.7	65.1	72.0	79.0	83.8	83.3	82.8	79.9	72.7	64.0	56.7

Table 1: Average monthly temperatures in Tamanrasset, Algeria<sup>5</sup>.

**In this ICE, your job is to use this data to create a function that can be used to estimate the temperature in Tamanrasset on any given day.**

<sup>1</sup> This ICE is adapted from the Connected Curriculum Project module “Sinusoidal Graphs” by Nathan Kahl.

<sup>2</sup> Image source: [www.expedia.com](http://www.expedia.com)

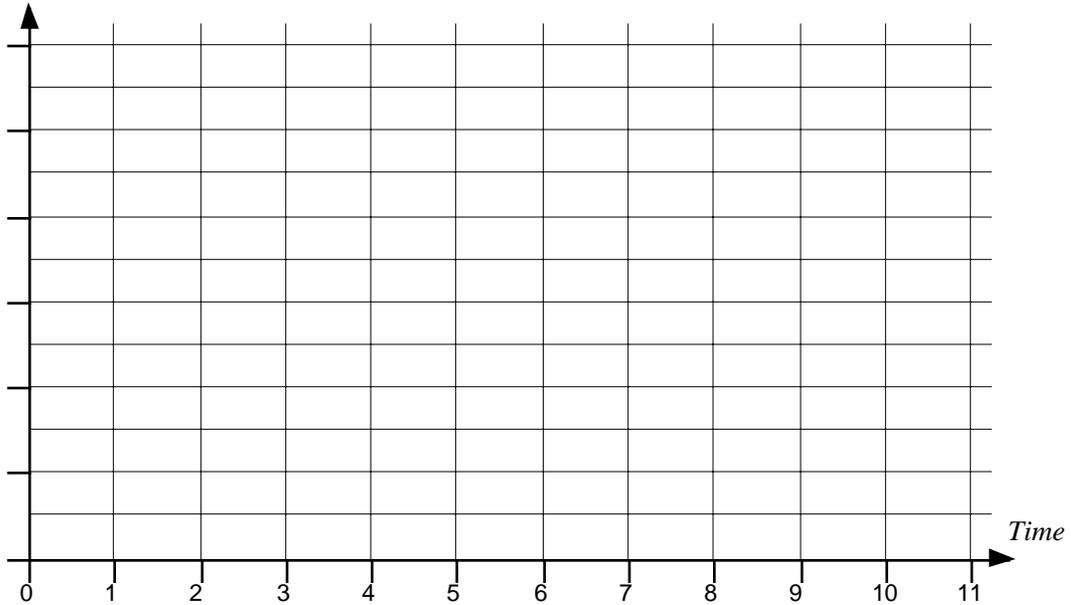
<sup>3</sup> Image source: Washington Times.

<sup>4</sup> Source: US Department of State (April 2000) “Patterns of Global Terrorism, 1999.” The main group operating in Algeria is the “Armed Islamic Group” (GIA) who have been responsible for about 65,000 deaths since January of 1992.

<sup>5</sup> Source: [www.worldclimate.com](http://www.worldclimate.com)

- Use the data in Table 1 to plot a graph that shows temperature versus time.

Temperature



- What patterns do you see in this graph? Would you expect these patterns to be repeated? Decide what quantities you would have to specify in order to describe these patterns with numbers, and then use your graph to find these numbers.

- Figure 3 (below) shows the graph of a function  $f(t)$ . How would you algebraically manipulate the formula for  $f(t)$  to make it resemble to graph of temperature versus time that you plotted above?

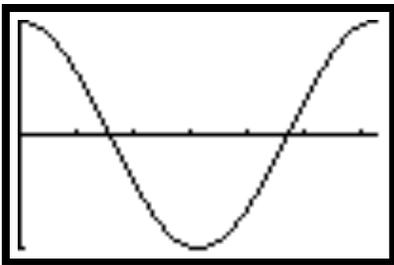


Figure 3: Graph of  $y = f(t)$  with a window size of  $[0, 2\pi]$  by  $[-1, 1]$ .

- Find a formula that will give the average temperature as a function of time and compare the graph of this function with the plot you made above.