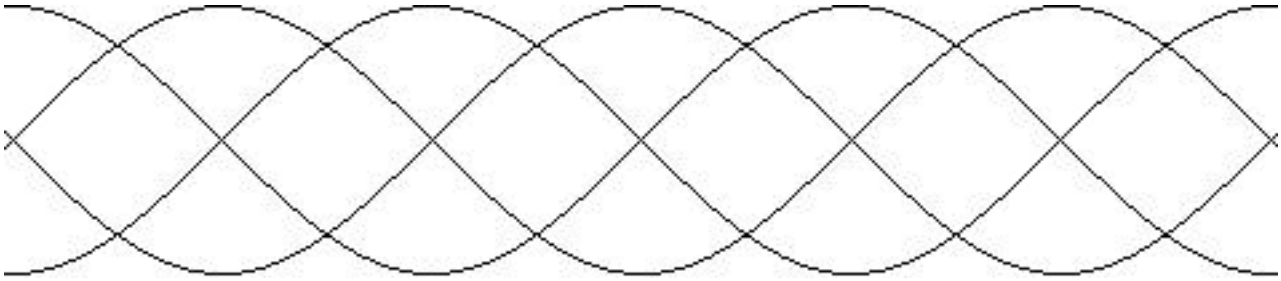
# 3. Exploring Sine Functions (MM1/2) (KP:2.1;4.1;5.1;7.1)



**1.** Enter and plot the function Y1 = sin x in the viewing window [-10,10] by [-10,10]. If you wish to examine the first cycle of the graph of this function to the right of the y-axis, why might this not be the most appropriate viewing window for examining the graph of this function?

**2.** Enter more appropriate viewing window parameters and then re-plot the graph.

Xmin = _____ Xmax = _____ Xscale = _____ Ymin = _____ Ymax = _____ Yscale = _____

**3.** Adjust the function in Y1 so that it now has the rule Y1 =sin Ax. Store the value 2 into the parameter A, and then plot the function. Over what period does Y1 cycle (as a fraction of $\pi$)?

**4.** Experiment with other positive integer values of A. Build a table for the period (as a fraction of $\pi$) of the sine function for each value of A.

**5.** Using your answers from question 5, create a rule which calculates the period of the function in terms of A.

## Extension

The water depth, D metres above the sea bed near a particular coral reef, is modelled by the rule

$$D(t) = 3.3 + 1.5 \sin At$$

where *t* represents the number of hours after midday on 20th May, 1996. Some parts of the coral reef, which has its highest peaks 3 metres above the sea bed, are exposed at low tide. The successive high tides are 12.5 hours apart.

**6.** Use the information given to find the value of A.

**7.** How long will some part of the reef be exposed during low tide?

**8.** How long will some part of the reef be exposed in the 24 hours following midday 20th May, 1996?

Note: The purpose of this task is to illustrate one method in which graphics calculators can be used to quickly link the symbolic and graphical representations of functions. Students are encouraged to discover the links. The spirit of this task may be reproduced for other types of functions.