**Al’s\* Box Method for Graphing Sinusoidal Functions**

This method is a simple way to graph sinusoidal functions such as

or

1) To graph a sinusoidal curve, first put the curve in one of the forms below:

y = A cos (B (x – D) ) + C or y = A sin (B (x – D)) + C

(or, in Dr. Leisinger’s class:)

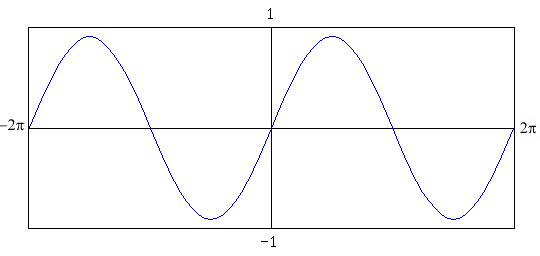
y – C = A cos (B (x – D) ) or y – C = A sin (B (x – D))

2) Next, make a box, as shown below.

The height of the box is , twice the amplitude

The width of the box is units, which is one cycle (period) of the cosine or sine curve.

3) A full cycle (period) of the sine or cosine curve is then fitted into the box, so that it looks like the one below.



A=Amplitude

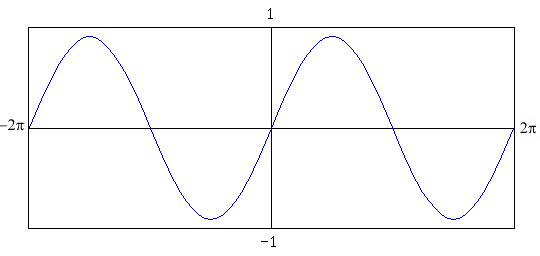
period =

A=Amplitude

4) Next we place the box (stretched, shifted as needed) in the coordinate plane.

The box is centered vertically a distance units above the -axis, and displaced horizontally a distance units to the right of the -axis.

The finished graph is shown below.



A=Amplitude

period =

A=Amplitude

**Example:** Graph

1) The curve is in the proper form. It is in the form

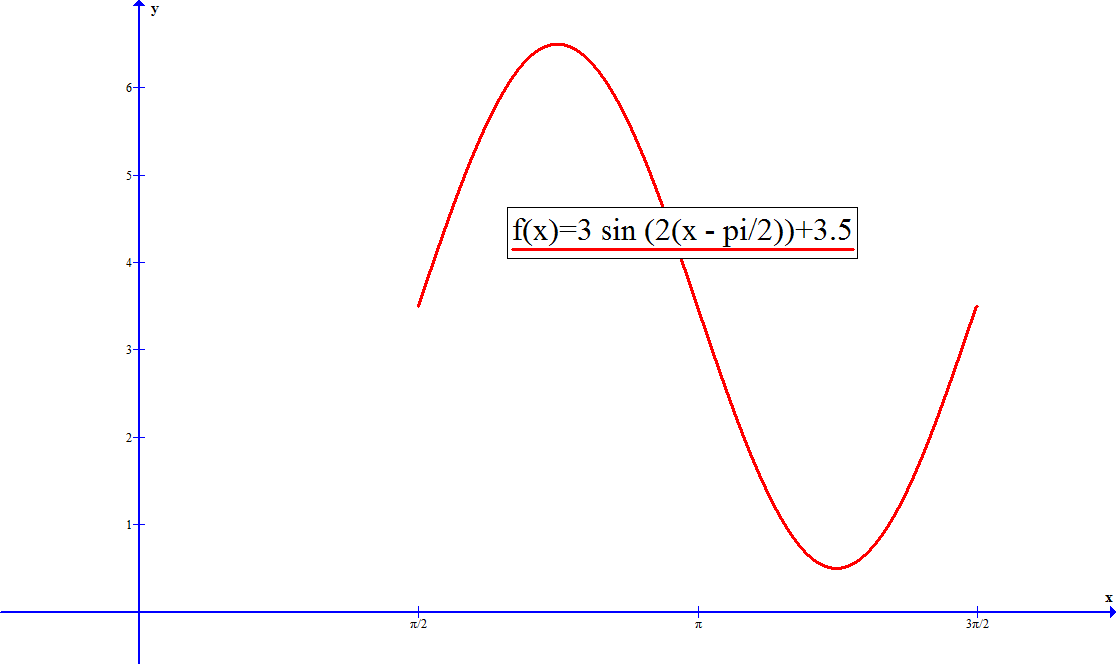
2) We make a box with height units. It rises units above the center to , and descends units below the center to units.

The width of the box is . Since it starts at it extends to .

3) A full cycle of the sine curve is fit into this box.

4) The box is then positioned on the coordinate plane. It is centered vertically at units above the -axis, and units to the right of the -axis.

The finished graph is shown below. [You will often want to use multiple boxes to draw several cycles of the curve].



Note: Given a graph of a sinusoidal function, you may write its formula by using the method in reverse. This means that, if you can find the coordinates of two adjacent crests and one point on the center line, you can get the coordinates of the “box” containing one period or cycle. From these coordinates, get A,C,D, and p. Find B = 2π/p. Then write the equation.

\* This excellent teaching method was developed by Al Leisinger. The write-up was done by Stan Dick.