This document will show a number of tricks that can be done in Minitab to make attractive graphs. We work first with the file X:\SOR\2405\M\ANIMALS.MTP. This first picture was obtained through Graph ⇒ Plot ⇒. It shows gestation period (in days) on the vertical axis and lifespan (in years) on the horizontal axis.

Here’s a refined version of this picture. Each of the features was created from the Graph ⇒ Plot ⇒ panel.

Gestation Period as a function of Lifespan

The title at the top was created through Annotation ⇒ Title ⇒.
   The text was entered at line 1.
   The font was selected as Times New Roman. (Minitab’s default here is Arial font.)
   The text size was set to 2. (Minitab’s default size is 1.5.)

Edit Attributes ⇒ was used to set the symbol size to 0.5. (Minitab’s default size is 1.0.) The symbol could be changed from a solid circle to something else, but we chose to leave this feature alone.
We can do a few more things here. It would be helpful to have interesting points labeled.

Gestation Period as a function of Lifespan

This was done in the following steps.

When the graph window is active, do Editor ⇒ Brush ⇒. (Be sure to distinguish Editor from Edit.) This will give a pointing hand icon which you can use to get the row numbers of any points. By referring back to the data window, we can identify the points marked here as corresponding to the Asian elephant and to humans.

Do Editor ⇒ Edit ⇒. Two tool palettes will pop up. On the smaller palette, select the line icon; it shows as a diagonal line in a box. Using the mouse, drag from the desired starting point of a line to the desired ending point. Now select the text icon; it shows as letter T in a box. You will get a cross-hair cursor. Using the mouse, click at a desired corner for a text box and drag the mouse to the diagonally opposite corner for the text box. At this point a small window will open, and you can write the desired text.

What if you make a mistake? Click on the select icon, which shows as an arrow. Click on the mistaken object so that “handles” or small squares appear on the object. Then push the delete key.

The larger tool palette contains items which will allow you to alter the drawing details. For instance, when you’ve clicked on the text icon, items in the larger tool palette will allow you to alter the font or color.
When the drawing work is completed, do Editor ⇒ View ⇒. The graph can now be copied through the Windows clipboard.

All right, let’s try something else. With the same data set, let’s plot Dsleep (hours of deep sleep) in terms of NonDSleep (hours of non-deep sleep).

Let’s get more detail on the horizontal axis.

The graph seems to cover values 0 through 20 on the horizontal (X) axis. Using Frame ⇒ Tick ⇒, note that X corresponds to line 1. Now find Number of Major in line 1 and enter the number 11. This will give 11 tick marks, and they must fall at values 0, 2, 4, …, 20. (If you had entered the value 5, you would get tick marks at 0, 5, 10, 15, 20.)

We can tilt the axis labels as well. Again use Frame ⇒ Tick ⇒.

Find Text Angle and enter the value 30.

Find Horizontal Offset and enter the value 0.

Find Vertical Offset and enter the value -0.05.

This trick is quite unnecessary here, but you might find it helpful when the axis labels are numbers with five or six figures.

Finally, let’s put a grid on the graph. Use Frame ⇒ Grid ⇒ and under Direction type X for row 1 and type Y for row 2. Minitab will fill in the defaults for the style of the grid lines, and you could change these if you wish.
The final graph is this:
Let’s consider another graphical trick. Consider the file X:\SOR\2405\M\CONDO.MTP. This shows selling prices on some tacky Florida condominium units. Among the variables are FLOOR (the floor of the building) and VIEW (=1 if the unit has an ocean view and =0 otherwise). We’d like to produce a histogram which shows the impact of FLOOR and VIEW on PRICE.

This graph was made with the following steps.

Use Graph ⇒ Chart ⇒ . In the resulting dialog box, enter PRICE for Y and enter FLOOR for X. In the Function column, use the drop-down menu to select Mean.

Click Options ⇒ and in the next dialog box, check off Cluster. Then type VIEW in the accompanying box. Click OK ⇒.

Use Annotation ⇒ Footnote ⇒ to enter the information which appears at the bottom left. Unfortunately, Minitab does not otherwise produce any information regarding the use of the variable VIEW.
You could of course exchange the roles of FLOOR and VIEW. This would require altering the footnote. Here’s the result:

![Bar chart showing values for floors 1 through 8]

Finally, let’s consider another difficult graphing problem. It was desired to make a histogram for the counts (meaning frequencies) of the values of the price improvements in a set of 32 stock transactions. The price improvement is defined as

- Asking price - execution price for a stock *purchase*
- Execution price - Bid price for a stock *sell*

In general the worst price you should pay for a stock is the asking price, which is the high end of the bid/ask spread. In selling, the worst price you should get is the bid price, which is the low end of the bid/ask spread. Thus, the price improvement is the amount that you save over the worst possible situation.

Most of the price improvement values are zero, but sometimes you get a $\frac{1}{10}$ or even better. For the data at hand, there was actually a value of $-\frac{1}{2}$, meaning that the execution price was well outside the bid/ask spread.
There were several technical issues in making the histogram:

The actual data values were listed in Minitab as 0.0625, 0.125, and so on, but we want the axis labeled with familiar symbols like $\frac{1}{16}$ and $\frac{1}{8}$.

We want to set up a system of tick marks on a $\frac{1}{16}$ spacing, and we want these tick marks aligned with the histogram boxes.

We might actually have to prepare several histograms for comparable situations, and we want all to have the same horizontal and vertical axes.

Here is the end product:

![Histogram Image]

For these data, we knew that the minimum is $-\frac{1}{2}$ and the maximum is $+\frac{3}{16}$. At a spacing of $\frac{1}{16}$, we know that we will have to allow space for 12 histogram bars. Within Graph ⇒ Histogram ⇒, we do Options ⇒ and click the radio buttons for Frequency and MidPoint. These choices simply say that we want the vertical axis to be frequency (rather than percents), and we also want the bars to be centered over the corresponding values. We also do Options ⇒ and click the radio button for Number of Intervals: and enter the value 12; we want to allow space for exactly 12 bars.

We also need to control the spacing on the horizontal axis. Within Graph ⇒ Histogram ⇒, we do Frame ⇒ Min and Max ⇒ . Then for Minimum for X: we enter the value -0.5625, and for Maximum for X: we enter the value 0.25. Observe that these are the centers of the bars one step removed from our data. Minitab allows a little white space between the bars and the borders of the graphing area, so this step is tricky. (At the same time, we set the limits for Y as 0 and 25.)
Next we need to align the tick marks under the bars. We have asked for space for 12 bars, and we’ve set up our minimum and maximum to allow for one extra bar at each end. We therefore ask for 14 tick marks. This is done through Frame ⇒ Tick ⇒ ; in the row for Direction X, set Number of Major as 14. (At the same time, we set 6 major ticks for the Y direction. We want tick marks at 0, 5, 10, 15, 20, 25.)

Without specific guidance, Minitab would label the horizontal axis with values -0.5625, -0.5000, -0.4375, -0.3750, … and so on. We’d really prefer labels that relate to stock prices. In order to make this work, we create a column in Minitab, say C20, with 14 entries to correspond to the 14 horizontal tick marks. For this example, column C20 contained these 14 entries:

(blank), -1/2, (blank), (blank), (blank), (blank), (blank), (blank), (blank), 0, 1/16, 1/8, 3/16, (blank)

The fraction symbols are not recognized as numbers by Minitab, so this column is text information. This is not a problem. Our peculiar use of the blanks gets us labels only at values -1/2, 0, 1/16, 1/8, 3/16. Again use Frame ⇒ Tick ⇒ ; in the row for Direction X, set Labels as C20.

There are some incidental details, too. On the main Graph ⇒ Histogram ⇒ panel, we set Display to Project. Then under Edit Attributes ⇒ , we used Line Type as Solid and we also used Line Size as 25. The Line Size feature allows us to control the widths of the histogram bars. The horizontal grid lines were achieved through Frame ⇒ Grid ⇒ and then choosing Direction as Y and Major Type as Dot.

Here is a histogram for similar data, lacking values at $-\frac{1}{2}$.

Observe that the two graphs have identical axes and can thus be easily compared.
OK… one more trick. Suppose that we had a data base in which we wanted to have a histogram for variable AGE, done separately for GENDER = 1 (male) and GENDER = 2 (female). This cannot be done through Graph ⇒ Histogram ⇒.

Instead, go through the following Stat ⇒ Basic Statistics ⇒ Display Descriptive Statistics ⇒. Under Variables, select AGE. Then check off the box for By variable: and enter the variable GENDER. Then click on Graphs and select Histogram of data.

You will get the desired histograms in separate graphical windows. Minitab will use the same horizontal axis for both histograms.

It is also through Stat ⇒ Basic Statistics ⇒ Display Descriptive Statistics ⇒ that you can get a histogram with a superimposed normal curve.