margin modes are useful for aligning labels on stacked graphs. The "Axis label margin" setting applies to margin modes while the "Axis label position" setting applies to axis modes.

The absolute modes measure distance in points. Scaled modes have similar numerical values but are scaled to respond to changes in the font size.

The Labels pop-up menu controls which labels are drawn. On gives normal axis labeling. Axis Only leaves the axis label in place but removes the tick mark labels. Off removes the axis labels and tick mark labels.

Axis and Tick label rotations can be set to any value between -360 and 360 degrees.

## Axis Range Tab

See **Scaling Graphs** on page II-285.

## Manual Ticks

If Igor's automatic selection of ticks does not suit you, and you can't find any adjustments that make the tick marks just the way you want them, Igor provides two methods for specifying the tick marks yourself. On the Auto/Man Ticks tab of the Modify Axis dialog, you can choose either Computed Manual Ticks or User Ticks from Waves.

### Computed Manual Ticks

Use Computed Manual Ticks to enter a numeric specification of the increment between tick marks and the starting point for calculating where the tick marks fall. This style of manual ticking is available for normal axes and date/time axes. It is not available for normal log axes but is available in LogLin mode.

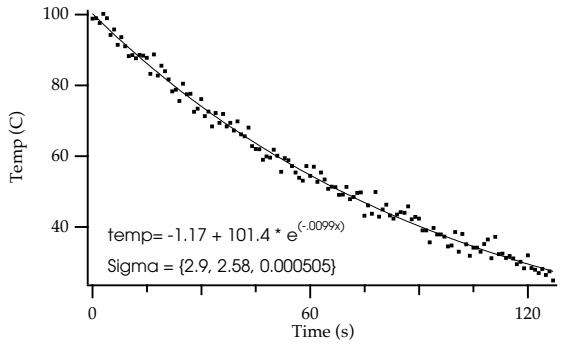
When you choose Computed Manual Ticks, the corresponding settings in theAuto/Man Ticks tab becomes available.

If you click the "Set to auto values" button, Igor sets all of the items in the Compute Manual Ticks section to the values they would have if you let Igor automatically determine the ticking. This is usually a good starting point.

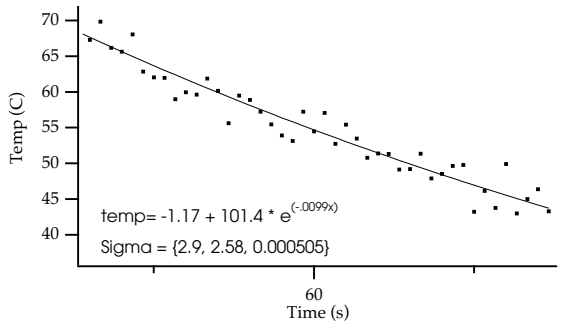
Using the "Canonic tick" setting, you specify the value of any major tick mark on the axis. Using the "Tick increment" setting, you specify the number of axis units per major tick mark. Both of these numbers are specified as a mantissa and an exponent. The canonic tick is not necessarily the first major tick on the axis. Rather, it is a major tick on an infinitely long axis of which the axis in the graph is a subset. That is, it can be *any* major tick whether it shows on the graph or not.

When you use computed manual ticks on a large range logarithmic axis in LogLin mode, the settings in the dialog refer to the exponent of the tick value.

Imagine that you want to show the temperature of an object as it cools off. You want to show time in seconds but you want it to be clear where the integral minutes fall on the axis. You would turn on manual ticking for the bottom axis and set the canonic tick to zero and the tick increment to 60. You could show the half and quarter minute points by specifying three minor ticks per major tick ("Number per major tick" in the Minor Ticks section) with every second minor tick emphasized ("Emphasize every" setting). This produces the following graph:



Now, imagine that you want to zoom in on t = 60 seconds.




The canonic tick, at t = 0, does not appear on the graph but it still controls major tick locations.

### User Ticks from Waves

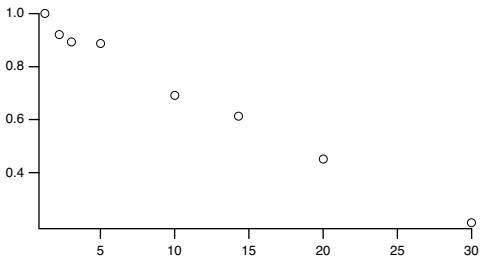
With Computed Manual Ticks you have complete control over ticking as long as you want equally-spaced ticks. If you want to specify your own ticking on a normal log axis, or you want ticks that are not equally spaced, you need User Ticks from Waves.

The first step in setting up User Ticks from Waves is to create two waves: a 1D numeric wave and a text wave. Numbers entered in the numeric wave specify the positions of the tick marks in axis units. The corresponding rows of the text wave give the labels for the tick marks.

Perhaps you want to plot data as a function of Tm/T (melting temperature over temperature, but you want the tick labels to be at nice values of temperature. Starting with this data:

| Point | InverseTemp | Mobility |
|---|---|---|
| 0 | 30 | 0.211521 |
| 1 | 20 | 0.451599 |
| 2 | 14.2857 | 0.612956 |
| 3 | 10 | 0.691259 |
| 4 | 5 | 0.886406 |
| 5 | 3.0303 | 0.893136 |
| 6 | 2.22222 | 0.921083 |
| 7 | 1.25 | 1 |

you might have this graph:




Create the waves for labelling the axes:

```
Make/N=5 TickPositions
Make/N=5/T TickLabels
```

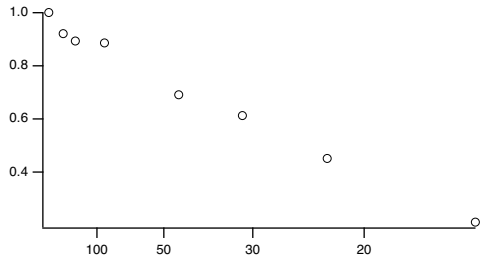
Assuming that Tm is 450 degrees and that you have determined that tick marks at 20, 30, 50, 100, and 400 degrees would look good, you would enter these numbers in the text wave, TickLabels. At this point, a convenient way to enter the tick positions in the TickPositions wave is a wave assignment that embodies the relationship you think is appropriate:

```
TickPositions = 450/str2num(TickLabels)
```

Note that the str2num function was used to interpret the text in the label wave as numeric data. This only works, of course, if the text includes only numbers.

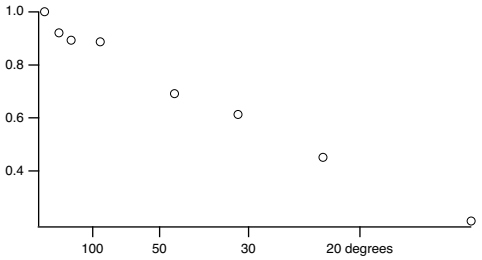
Finally, double-click the bottom axis to bring up the Modify Axis dialog, select the Auto/Man Ticks tab and select User Ticks from Waves. Choose the TickPositions and TickLabels waves:

The result is this graph:




You can add other text to the labels, including special marks. For instance:

| TickLabels.d | TickPositions |
|---|---|
| 20 degrees | 22.5 |
| 30 | 15 |
| 50 | 9 |
| 100 | 4.5 |
| 400 | 1.125 |




Finally, you can add a column to the text wave and add minor, subminor and emphasized ticks by entering appropriate keywords in the other column. To add a column to a wave, select Redimension Waves from the Data menu, select your text wave in the list and click the arrow. Then change the number of columns from 0 to 2.

This extra column must have the column label 'Tick Type'. For instance:

| TickLabels[][0].d | TickLabels[][1].d | TickPositions |
|---|---|---|
| | Tick Type | |
| 20 degrees | Major | 22.5 |
| 30 | Major | 15 |
| 50 | Major | 9 |
| 100 | Major | 4.5 |
| 400 | Major | 1.125 |
| | Minor | 21.4286 |
| | Minor | 20.4545 |
| | Minor | 19.5652 |
| | Minor | 18.75 |
| | Emphasized | 18 |
| | Minor | 17.3077 |
| | Minor | 16.6667 |
| | Minor | 16.0714 |
| | Minor | 15.5172 |

Dimension label "Tick Type" has keywords to set tick types

Blank entries make ticks with no labels.

Use keyword "Subminor" for subminor ticks such as Igor uses on log axes.