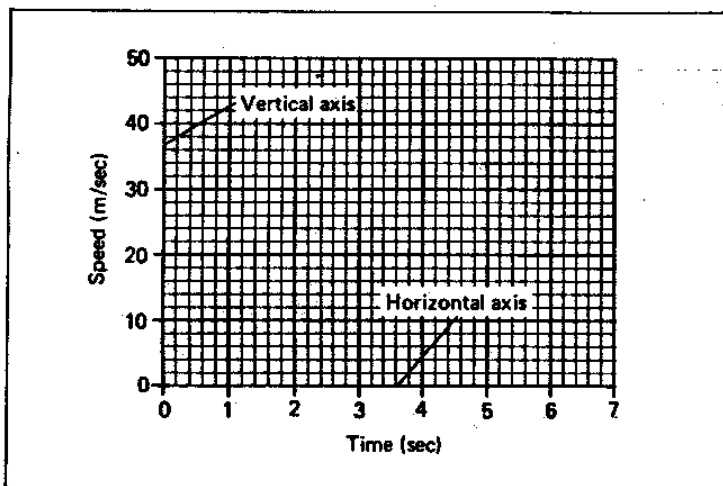


2

A graph shows the relationship between two quantities. Usually, one of the two is thought of as independent and the other is thought of as dependent on the first. For example, suppose one quantity is the changing speed of an object and the other quantity is time. We would consider the speed dependent on time—the speed has different values at different times—and we would consider time independent. Of course, sometimes it is not so clear which quantity is the independent one, and you are free to choose as you start your graph.

The independent quantity is represented by a horizontal *axis*—a straight line with values marked on it—at the bottom of the graph. The dependent quantity is represented by a vertical axis at the left of the graph. When you are asked to make a graph of something *vs.* something, the quantity stated first is the dependent quantity and goes on the vertical axis; the quantity following “*vs.*” is the independent quantity and goes on the horizontal axis. For example, on a graph of speed *vs.* time, speed is on the vertical axis and time is on the horizontal axis.

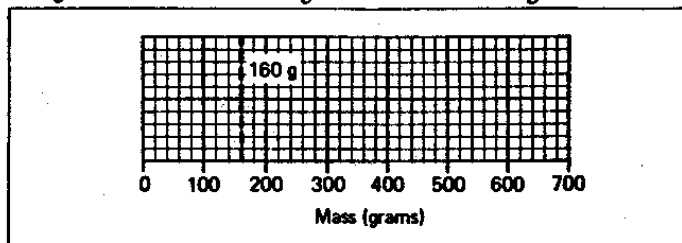


The following suggestions will make your graphs easier to construct and to read.

1. When marking a scale along the axis of a graph, make short lines perpendicular to the axis and labelled with numbers at appropriate points. You do not need to put a numerical value beside or under each mark if it will make the scale too crowded. You may choose to label only every other, or every five, or even every ten.

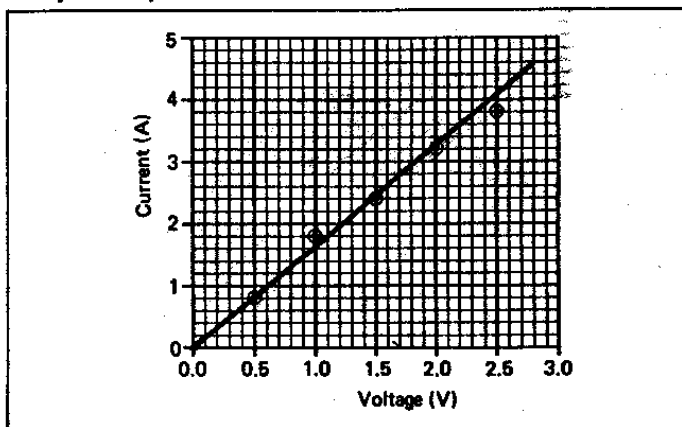
2. To make it easy to find positions along an axis scale between the marked positions, take advantage of the decimal system. Since the grid lines on the graph paper supplied with this manual are close together (five lines to a centimeter), put your markings every five or ten lines apart.

3. When trying to find a value between marked values, keep in mind how much each space stands for. For example, if there are marks for each 100 grams and the marks are 5 grid lines apart, each space stands for 20 grams. The position corresponding to 160 g would be on the third grid line after the 100-g mark.



4. When plotting points on a graph, make dots that are big enough and dark enough to be seen clearly but small enough to mark a specific position on the graph. Often it helps to put a circle around the dot to make it stand out.

5. When graphing data points that appear to lie on a straight line, more or less, draw a single straight line that goes through as many points as possible. Unless there is some reason to question some of the data, there should be equal numbers of points slightly above the line and slightly below it. Never "connect the dots" unless specifically instructed to.



6. When graphing points that do not appear to lie on a straight line, draw a *smooth* curve that goes through as many points as possible. There should be equal numbers of points on either side of the curve.

7. Not all graph lines go through the (0,0) point (the origin). Ask yourself whether the dependent quantity really is zero when the independent quantity is zero. If you let go of a ball just as you start to clock it, the speed is zero at time zero. On the other hand, if the ball is already moving when you start to clock it, the speed on your graph should *not* be zero at time zero.